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ABSTRACT

The curriculum and resource guide is designed to help elementary school teachers organize their classroom and instructional activities to increase achievement of pupils whose first language is Spanish. The guide offers a curriculum plan, instructional strategies and activities, suggested teacher and student materials, and assessment procedures focusing on acquisition of higher-order thinking skills, integration of science and mathematics concepts, acquisition of content knowledge, and language skill development. Motivational strategies compatible with the pupils' own social and cultural environment are incorporated into the materials. This, the first of two volumes, contains six instructional units, three for kindergarten and three for grade 1. Each unit contains 7-10 lessons. The 3 kindergarten unit topics are: the 5 senses; spiders; and dinosaurs. The first-grade unit topics are: plants and seeds; the human body; and good health. An introductory section gives an overview of the materials and some suggestions for using them. An additional section provides a Spanish translation of the basic unit and lesson summaries. The detailed units and lessons follow. (Contains 26 references.) (MSE)

Integrating Mathematics, Science And Language: An Instructional Program

Developed through

SEDL Paso Partners Project
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Preface

Of the 42 million schoolchildren in the United States, about 1.5 million are in programs for Limited English Proficient students, and perhaps another 3.5 million qualify for such assistance. The majority of these students are Hispanic, and they face the double challenge of mastering academic subject matter and learning a new language at the same time. To attack the problem of poor mathematics and science achievement among Limited English Proficient Hispanic students in grades K-3, the Southwest Educational Development Laboratory (SEDL) organized Paso Partners — a partnership of three public schools, an institution of higher education and staff from SEDL's Follow Through Program.

The Paso Partners Project was a three-year project funded by the Dwight D. Eisenhower National Mathematics and Science Program, administered by the Office of Educational Research and Improvement of the U.S. Department of Education. It combined SEDL's Follow Through Model with the best emerging strategies and materials for teaching and integrating mathematics, science and language development; it trained teachers; and it provided technical assistance to help the teachers implement improved strategies and materials in K-3 classrooms in three primarily low-income Hispanic school districts on the U.S.-Mexico border near El Paso, Texas. During the first year, teachers from the districts received graduate college credit for special mathematics and science curriculum courses taught by faculty from The University of Texas at El Paso. Faculty from the University and SEDL Follow Through staff provided technical assistance in the development of curriculum materials for the integration of mathematics, science and language.

The Paso Partners Project produced this two-volume curriculum and resources guide to supplement existing teaching materials for use with young students, particularly Limited English Proficient Hispanic children. A regional conference, professional presentations and integration of the concepts into other federally funded SEDL service projects have given regional and national exposure to the project and to this curriculum and resources guide.

Acknowledgements

Many people have contributed to the development of **Integrating Mathematics, Science and Language: An Instructional Program.** The curriculum and resources guide was developed through a joint effort by representatives from each of the consortium members: The University of Texas at El Paso, three school districts (Canutillo ISD, San Elizario ISD, Socorro ISD) and the Southwest Educational Development Laboratory.

Dr. Norma G. Hernandez and Dr. James P. Milson, mathematics and science teacher educators from The University of Texas at El Paso, guided the selection and preparation of the mathematics and science content and provided inservice training for the participating teachers. Dr. Hernandez served as the Project Coordinator. She managed the day-to-day operation of the project, directed the development and preparation of the content and authored substantial portions of the guide. Ms. Rosa Gomez, Secretary for the project, typed various drafts of the materials and provided invaluable support services throughout the project.

Administrators and supervisors from the school districts served in advisory and support roles. Teachers from the school districts assisted by planning the guide, by drafting materials and by testing drafts of the materials in their classrooms. We gratefully acknowledge the invaluable contributions made by the following school personnel:

Canutillo Independent School District

Superintendent:	Wilson P. Knapp
Principals:	Edgar Bullock; Velia Minjarez
Mathematics Coordinator:	Vodene Schultz
Bilingual Coordinator:	Marge Gianelli
Teachers:	Amy Craig; Sheila Britton; Mary Brockett; Margaret Gonzales; Inez Lopez; Irene Mendoza; Linda Ochoa; Majorie Rodriguez; Carmela Sanchez; Consuelo Trujillo

San Elizario Independent School District

Superintendent:	Beatriz Reyna Curry
Assistant to Superintendent:	Robert Langoria
Principals:	Norma Valdivia; Rafaela Pitcher
Assistant Principals:	George Augustain; Max Padilla
Teachers:	Martha Amayua; Cathy Barnes; Glynanne Edens; Dora Garner; Nora Guerra; Bernie Hernandez; Rosa Hernandez; Terry Jurado; Maria Lorentzen; Mary Mendiola; Diana Noriega; Nora Rueda; Adriana Velez, Maria Zuniga

Socorro Independent School District

Superintendent:	R. Jerry Barber
Principals:	Elfida Gutierrez; Al Cardenas; Mary Ross
Assistant Principals:	Juan Aranda; Jesus Melero; Alfredo Solis
Director of Special Populations:	Ann Garrett
Teachers:	Berit Ahumada; Helen de Anda; Martha Hernandez; Terry Jaime; Elsa Medina; Socorro Esparza Nava; Sandra Rios; Tina Vasquez; Gloria Vega

Southwest Educational Development Laboratory (SEDL) organized the Paso Partners consortium and administered the project. Dr. Betty J. Mace-Matluck served as the project director and manager. She was responsible for overseeing the preparation and publication of the materials and for the dissemination activities. She also assisted in editing the final draft. Ms. Maria Torres provided guidance in developing the language component and assisted in writing the materials. She also assisted in providing inservice training for the teachers. Ms. Cris Garza and Ms. Suzanne Ashby of SEDL's Follow Through Program provided inservice training in language development and instructional strategies during the early stages of the project. Ms. Rosalind Alexander-Kasparik contributed her expertise in the area of format and design and worked with the graphic artist, design specialist, technical editor and publisher to create the final product.

Dr. Neil Devereaux, Angelo State University, prepared the Spanish language translation. Dr. Mary Ellen Quinn, Our Lady of the Lake University, and Dr. Rudolfo Chavez Chavez, New Mexico State University, reviewed the materials for the accuracy and appropriateness of the content. Ms. Miriam Kuznets edited the final draft of the manuscript. Mr. Peter Szymczak created the design of the guide, formatted the materials, assisted with the editing and worked tirelessly to create the final product. Ms. Amy Young rendered the illustrations and assisted in the design of the cover.

Table of Contents

(Volume 1, Grades K-1)

Introduction

Integrating Mathematics, Science and Language: An Instructional Program is a two-volume curriculum and resources guide designed to help elementary school teachers organize their classrooms and instructional activities in order to increase achievement of Hispanic primary-grade children whose first language is not English. The guide offers a curriculum plan, instructional strategies and activities, suggested teacher and student materials and assessment procedures that focus on the acquisition of:

- higher-order thinking skills to apply newly learned knowledge and understanding;
- understanding of relations between mathematics and science concepts;
- knowledge, i.e., specific items of information and understanding of relevant concepts; and
- language to gain and communicate knowledge and understanding.

Motivational strategies and materials compatible with the students' own social and cultural environment are incorporated into the instructional materials to develop and enhance positive attitudes and values toward mathematics, science and language learning.

Assumptions Underlying the Materials

A number of assumptions about teaching and learning have guided the development of the materials.

Assumptions about Learning

1. All children, even the very young, learn mathematics and science concepts by developing cognitive structures through interactions with the environment.
2. In the process of learning mathematics and science, students "experience" instructional activities as an integrated whole, i.e., as an affective, cognitive and relevant activity.
3. Language development is an integral aspect of the acquisition of mathematics and science concepts and skills. It becomes an even greater factor in cognitive growth and development for children whose first language is not the same as the language of school instruction. Effective learning occurs when the student acquires language in the context of academic instruction as well as in social interaction.
4. Children learn mathematics and science constructively, i.e., children build or construct meaning by using their own experience and previous knowledge as a guide.
5. Children acquire language within the context of everyday experience. Language concepts and skills are not learned in isolation, but rather as a consequence of interaction within a setting that is compatible with the experiential and cultural background of the students.

6. Students construct concepts through experiences that involve using manipulatives, pictures, verbal interactions and other models representing the concepts to learn.
7. Mental structures effectively develop through educational activities that allow students to explore, investigate, apply and solve problems related to "tentative constructs" that students modify during the learning process.
8. In learning mathematics and science, as well as in acquiring and developing language, the students assimilate experiences into a construct that is available to them through subjective representation. However, the meaning of the representation must be consistent with experience, with the meaning of related constructs and with conventional meanings constructed by others.

Assumptions about Teaching

1. The design and the implementation of an effective instruction activity include cognitive, affective and relevant aspects of the social and cultural context in which the science, mathematics and language concepts develop.
2. Teachers help create effective and appropriate mathematics, science and language constructs through a variety of approaches that include:
   - **spontaneous** opportunities that provide and provoke suitable questions, conflicts, material and explanations to induce inquiry;
   - **inductive and deductive** sequences that provide students relevant examples to help them extract the common features and important ideas of a concept or generalization; and
   - **pragmatic or practical** opportunities for students to grapple with and solve real-world problems that students discuss with their peers and the teacher in order to verify and affirm their thinking.
3. To assist students in developing mathematics, science and language constructs, teachers provide many carefully selected and structured examples that facilitate abstraction of common features to form a concept. Also, teachers present interesting and challenging problems. Teachers use manipulatives, pictures, graphs and verbal interactions to support and encourage learning.
4. Teachers facilitate acquisition of mathematics and science concepts by children whose first language is not English through appropriate language development strategies that assume a language-rich environment in which students may use either the home language (e.g., Spanish) or English or both to communicate knowledge and understanding.
5. For children whose first language is not English, teachers give specific attention to the development of specific concepts (science and mathematics, in this case) within the overall context of both Spanish and English language development.

Structure of the Guide

The guide is bound into two volumes. Volume One contains materials for use in Kindergarten and Grade One. Materials in Volume Two are for use with students in Grades Two and Three. Depending on the students' academic backgrounds and local curriculum expectations, the materials for each grade level may provide a full academic year of instruction. Each volume contains an introductory section and three units for each grade level.

Structure of each Unit

Each unit is designed to assist teachers in offering up-to-date science and mathematics content, along with appropriate language usage, through teaching and learning strategies that will excite children about the world of mathematics, science and language. The selection and arrangement of the material is planned to engage children's natural inquisitive nature and to stimulate them to investigate, explore and learn. Teachers are helped to create dissonance in familiar situations in order to stimulate questioning, hypothesizing, exploring and problem solving.

Each unit contains three types of materials: (1) unit overview materials and background information for the teacher, (2) the lessons and (3) an annotated bibliography and list of teacher reference/resource materials.

Spanish language translation. Preceding each complete unit in English is a Spanish version of background information for the teacher, as well as a Spanish version of the formal introductory portion of the lesson cycle.

Unit overview materials and background information for the teacher. Presented first in the unit is a recommended list of content and/or skills students should have as **Prior Knowledge** before initiating unit activities. Next **Specific Mathematics, Science and Language Objectives** are listed followed by a **Topic Concept Web.** The web shows relationships among the various science content elements that teachers will present in the unit. In turn, the web prompts the identification of two major ideas, one in science and one in mathematics, that the class will develop in each lesson. It also encourages teachers to view teaching as providing children opportunities to develop cognitive structures that are more global and complex than those that students can demonstrate by performance on objective-defined tasks. Therefore, the application, or problem-solving, phase of the lessons takes on a specific character and increased importance — it allows the student and the teacher to look for dimensions in understanding that go beyond the level that can be universally required of all students. There is no vertical or horizontal "cap" or "ceiling" in thinking that circumscribes the students' progress.

Next is a list of key **Vocabulary** items, in both English and Spanish, that the teacher will use in presenting the unit. The students will gain an understanding of the terms and may incorporate some, or most, of them into their active vocabularies.

The **Teacher Background Information** section, which follows the Vocabulary section, contains science and mathematics content. This content, also in both English and Spanish, is provided as a ready reference for teachers to draw upon as they implement the unit.

Next is The **Lesson Focus** that lists each of the **Big Ideas** presented in each of the lessons. Each Big Idea is stated as an overarching concept, or principle, in science and/or mathematics that generates the lesson activities. The Big Idea is what each student is to construct. The construct has many other ideas that relate to it, both in mathematics and science, thus forming a web of ideas. The construct, however, develops within a language context — either in English or Spanish — in order to formalize the concept. Once assimilated, the Big Idea can facilitate students' future learning in related content areas. Thus, the Lesson Focus, together with the array of objectives, gives the teacher a view of the extent and direction of development of the Big Idea in each lesson.

Following The Lesson Focus is an **Objectives Grid** displaying the unit objectives by content area and by lesson activity. Objectives, in and of themselves, cannot dictate the scope of the instruction. Learning takes place when the students "experience" instructional activities as an integrated whole, i.e., as an affective, cognitive and relevant activity. Thus, the grid serves to provide direction and indicators of student progress. The objectives are used to develop assessment procedures by which to measure, in part, student achievement.

Lesson Design

Each lesson design assists the teacher in developing the Big Ideas selected for a given lesson. The term "lesson" as used in this guide means a set of activities selected to teach the Big Ideas. It is not meant to convey the notion that the material included in a "lesson" is to be taught within a single period of time on any given day. One "lesson" may extend over several days.

Each lesson provides the instructional context and the activities for the students to acquire the concepts, or build the constructs, contained in the lesson's Big Ideas. The lesson does suggest a sequence in which to implement the activities, but there is no "single" sequence or a given time limit in which to present the unit. Indeed, a number of the units require previous preparation on the part of the teacher, and in some cases on the part of the students. Some units, for example, require the students to collect, organize and summarize data and then to apply their findings. This process may require a period of three or four weeks. Nonetheless, prior to initiating the unit, teachers should construct an overall and day-to-day schedule for the implementation of the unit.

The lesson's content develops through a process that reflects a cycle. The process moves through various phases of the learning cycle. Learning cycles to facilitate the organization of science and mathematics instruction have been proposed for some years; many cycles incorporate an inquiry approach to learning with emphasis on problem solving. Typically, a learning cycle includes an experimentation phase during which the learner actively experiments with concrete materials to develop, or "construct", an idea. Although scholars vary in their opinions as to the required nature, design and number of such phases, all include at least three phases: experimentation, concept introduction and development, and application.

The Lesson Cycle

For the purpose of this guide, a five-phase lesson cycle has been employed:

1. Encountering the Idea
2. Exploring the Idea
3. Getting the Idea
4. Organizing the Idea
5. Applying the Idea

Each phase of the cycle is described briefly below.

Encountering the Idea, or developing a "readiness" state, is the first phase in the cycle. During this time the teacher provides a background, or enabling structures, to facilitate the development of "new constructs." This phase of the teaching cycle is important for students whose early childhood experiences may not have been sufficiently varied to provide them with some of the necessary underlying concepts on which to build the Big Ideas that the lesson promotes. Therefore, this cycle shapes a backdrop on which to develop the new ideas. Additionally, the readiness activities alert the students to the direction of the lesson by providing provocative questions and conflicting situations designed to bring the students into an exploration perspective.

Because language development is a fundamental co-requisite for learning mathematics and science concepts, processes and skills, many of the lessons begin with literature (e.g., oral stories, children's books) and discussion activities that set the stage for posing questions and presenting conflicting situations related to the mathematics and science Big Ideas that are the focus of the lesson. The use of well-selected literature, in addition to being an effective tool in language development, is an effective motivational strategy. Other language development strategies are presented below in the section, **Language Activities Related to Mathematics and Science Processes.**

Exploring the Idea, or experimentation, is the phase in which learners are involved with concrete or familiar materials in activities designed to have them encounter new information that they can assimilate in their attempt to find responses to the questions posed earlier and/or to hypothesize a resolution to the conflicting situation presented. During this stage, the learner explores the new ideas through the use of materials in learning centers, with the teacher providing relatively little structure. As students realize that there are new ideas they have not dealt with previously and that produce some confusion, doubt or interest, they discuss among themselves and with the teacher what these ideas may mean. At this point, the teacher moves the students into the next phase of the cycle.

Getting the Idea, or concept introduction and development, is the phase in which the teacher helps the learners assimilate and accommodate the new information into a new structure that signifies the development of a new understanding. The students begin to work with new words conveying the new concepts. They work with new ideas in many different ways to ensure that a new idea is valid. The main emphasis during this phase is to see what is happening. What do we know? How do we know this is true? How can we explain this? Students may want to brainstorm and ask related questions, or they may choose to go back to the exploration or experimentation phase to validate the new ideas.

Organizing the Idea is the phase in which the students consciously consider the new ideas in their own right. They attempt to understand a new idea as a whole. New terminology, notation and symbols are introduced at this time. Students may then express their ideas and opinions through a variety of activities.

During this phase, the students may relate the new ideas to associated ideas in other areas of subject matter. They make new connections, generalizations and abstractions. They may decide that the best manner to organize and communicate the new ideas is through charts, tables, number sentences, graphs, diagrams or verbal and written explanations. Thus, the information is organized in a logical and quantitative manner. The students may report the results of their experiments, observations, conclusions and interpretations to the class. Students may to do additional reading or listening to tapes. Once the students have grasped the concepts, they are ready for the application phase of the lesson.

Applying the Idea is the phase in which students develop a broad grasp of the concepts. In this phase the students relate the new ideas to their own world — to something "real" — and to associated ideas in other areas of subject matter. They are then able to solve problems and answer related questions. They may also formulate their own problems.

Assessment of Student Achievement is ongoing on an informal basis throughout the lesson through teacher observation of the students' interactions and behaviors. Assessment strategies are provided in the final phase of each lesson or unit to assist the teacher in determining the extent to which the students have grasped the Big Ideas presented in a given lesson and/or unit.

Language Activities Related to Mathematic and Science Processes

Because language development is a fundamental co-requisite for learning mathematics and science concepts, processes and skills, the lessons in many instances begin with literature (e.g. stories, books) and discussion activities that set the stage for posing questions and presenting conflicting situations related to the Big Ideas in mathematics and science that are the focus of the lesson.

Language development strategies specifically related to mathematic and science processes were incorporated into the lessons. Some examples of these are described briefly below.

Sequencing. The students tell or write a story, indicating the sequence of events by using ordinal numbers. They may also use such words as "then", "next", and "finally" to show sequence. The students may take a nature walk around the school and report their observations in order of occurrence.

Questioning. In the initial stage of a unit the students may list, in the form of questions, information that they would like to have about the topic. As they proceed through the unit and gather further information, they may record answers to the questions that they formulated.

Comparing/contrasting. Student may design and make charts, graphs or diagrams that compare or contrast two concepts. For example, the students may use Venn diagrams to compare and contrast spiders with insects.

One-to-one correspondence/counting. In comparing objects, students use comparative adjectives (e.g., "longer", "shorter", "bigger", "smaller"). In comparing groups or sets in preparation for counting, the students begin to use the notion of "more than" and "less than." In making these comparisons, they may compare two groups physically by laying them side by side. In increasing the accuracy of their statements, students can say, for example, "The tiger cage in the zoo has three tigers, and the bear cage has six bears; the zoo has more bears than tigers." They can put three tigers alongside six bears, show that the three tigers are "tied" with three bears and that there are three extra bears. They conclude that there are three more bears than tigers, and that six is three more than three.

Predicting/hypothesizing. During the initial stage of a unit, and after the students have listed the questions that they would like to answer, they hypothesize answers or solutions to as many of the questions or problems as they can. During the implementation of the unit, they explore hypotheses and confirm or reject them as they gather evidence. The students verbalize their reasons for confirming or rejecting the hypotheses.

Validating/persuading. During problem-solving sessions, the students study the nature or character of the evidence they can use to confirm or reject a hypothesis. They suggest reasons why in some cases one negative example is sufficient to reject a hypothesis, while in other cases several positive examples are not sufficient to confirm or reject a hypothesis.

Conferring. Students ask for a conference with the teacher and/or other students to discuss or exchange opinions about an important, a difficult or a complex matter. For example, a student is preparing to write in her journal but needs clarification about an idea. She asks the teacher to meet her at the "conference table" (which is inaccessible to other students for the duration of the conference) in order to discuss her ideas prior to writing about them in her journal. The student may ask that another student join the conference, particularly if the students have done the work collaboratively. The student initiates the conference, gives it direction and decides when the purpose of the conference has been met. A student may also request a conference for the purpose of assessing her achievement or progress.

List and Recommended Sequence of K- 3 Integrated Units

- Grade K and 1 Integrated Units
  - Grade K
    - Five Sense
    - Spiders
    - Dinosaurs
  - Grade 1
    - Plants and Seeds
    - The Human Body
    - Good Health
- Grade 2 and 3 Integrated Units
  - Grade 2
    - Oceans
    - Weather
    - Sun and Stars
  - Grade 3
    - Matter
    - Sound
    - Simple Machines

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Traducciones en Español

Unidad K: *Los Cinco Sentidos*
Unidad K: *Las Arañas*
Unidad K: *Los Dinosauros*
Unidad 1: *Plantas y Semillas*
Unidad 1: *El Cuerpo Humano*
Unidad 1: *La Buena Salud*

unidad

K Los Cinco Sentidos

Información de Fondo para la Maestra

Sin la información que recibimos a través de los cinco sentidos, no podríamos funcionar como los seres que somos. Cada sentido es importante de por sí, pero tiene limitaciones. Por otra parte, se puede utilizar un sentido para compensar por otro. Por supuesto, la manera más eficaz de recibir información es de usar todos nuestros sentidos en armonía.

Otro aspecto importante de utilizar nuestros sentidos es la conciencia de limitaciones físicas que podrían causar dificultades a las personas que no tienen acceso a éstos, **pero esto no hace que las personas sean diferentes, ni de menos valor.** Por consiguiente, se tienen que proteger y cuidar a estos maravillosos dones de percibir el mundo en que vivimos.

En esta unidad la información de fondo para los maestros es algo extensa y se ha colocado dentro de cada lección. Los maestros tendrán mayor facilidad de acceso a la información si se encuentra más cerca del otro material de instrucción para la unidad.

Quizá se incluya más información que la que una maestra quiera proporcionarles a los niños. Sin embargo, está disponible; se debería poner a la disposición de los niños todo lo que la maestra crea razonable.

LECCION

1 *Los Cinco Sentidos*

Captando la Idea

1. Después que los estudiantes hayan terminado sus actividades, debe pedirles que repasen las experiencias que tuvieron durante su paseo. ¿Qué aprendieron del mundo durante su viaje? ¿Qué usaron para aprender durante su viaje? ¿Qué hay en el mundo además de la gente? ¿Cómo lo sabe? ¿Qué tipos de sonidos hay? ¿Cómo lo sabe? ¿Qué es lo importante de nuestros sentidos? Aprendemos del mundo.
2. Léales a los niños el libro **My Five Senses** por Aliki. Hablen del libro. Los estudiantes enseñan a la clase las fotos que recortaron de las revistas y dicen por qué seleccionaron ésas. ¿Cómo estaba usando la gente los sentidos?
3. Se debe de juntar el trabajo de los niños para un "Big Book" (Libro Grande) de la clase.
4. Los estudiantes les enseñan a los otros miembros de la clase cómo clasificaron los objetos en el **Mathematics Center** y explican por qué los pusieron en esas

categorías. ¿Cuántas categorías formaron? ¿Cuántos objetos incluyeron en cada categoría? ¿Pusieron algunos objetos en más de una categoría? ¿Cuáles? ¿Por qué?

LECCION 2 La Vista

Captando la Idea

Enséñeles a los niños el libro **Brown Bear, Brown Bear, What Do You See?** Pídales a los estudiantes que digan de antemano de lo que va a tratar el cuento; lea el libro. Hable del cuento con los estudiantes.

1. Los estudiantes hablan sobre la dificultad de identificarle a una persona sólo por tocar y adivinar. ¿Cómo nos reconocemos el uno al otro por la vista? ¿Qué cosas buscamos? Los estudiantes hablan sobre la manera en que dependen del oído y del tacto cuando no pueden ver para moverse de un lado a otro. ¿Cómo se siente uno de la misma manera cuando se mueve de un lado a otro en la oscuridad? ¿Es fácil atrapar la bolsita de frijoles con los ojos vendados? ¿Cómo es más fácil—con los ojos abiertos o cerrados? ¿Por qué? ¿Qué parte del cuerpo se usa para ver?
2. Mostrando un diagrama del ojo, la maestra les informa a los estudiantes sobre las partes diversas del ojo y sus funciones. Por ejemplo: nuestros sentidos son la manera en que nos informamos del mundo en que vivimos. Aprendemos por los sentidos. Vemos con los ojos, y esto nos informa de lo que está fuera de nuestro cuerpo. Nuestros ojos nos dan visualizaciones, o imágenes, de la apariencia que tienen las cosas. Uno puede ver para leer, o para saber por donde va, para jugar, o para encontrar a los amigos. Por los ojos se perciben la luz, el color, las formas, y los tamaños. Los ojos nos ayudan a decidir a qué distancia está algo.

Hay muchas partes del ojo, y cada una de ellas nos ayuda a ver. La luz entra por una apertura que se llama **la pupila.** Esa es la parte negra al centro del ojo. La iris o parte coloreada alrededor de la pupila, puede cambiar el tamaño de la apertura, dejando entrar más o menos luz. El lente enfoca los rayos de luz en **la retina; la córnea** protege el lente. Cuando uno se mira los ojos en el espejo, sólo se ve una parte de ellos. El ojo completo tiene la forma de una bola redonda. La mayor parte de él está dentro de la cabeza y el cráneo lo protege. **Los párpados** y **las pestañas** protegen los ojos también. Los párpados permiten que los ojos se cierren, y no dejan pasar la luz cuando uno está cansado. El cerrar los ojos hace más fácil que uno se duerma.

El ojo es como una cámara. La luz golpea en algo y se refleja. Esta luz reflejada, la luz que se refleja de lo que se está mirando, entra en el ojo a través de la pupila. Al entrar por el ojo, la luz cruza por el lente. El lente ayuda borrar la imagen borrosa que uno mira, y se enfoca. Mientras la luz cruza por el lente, ¡la imagen se invierte! Cuando la imagen invertida brilla en el fondo del ojo, golpea la **retina. La retina** contiene el nervio óptico que transmite la impresión óptica al cerebro. **Los bastones** y **los conos** forman parte de la retina y nos ayudan a distinguir las formas y los colores de lo que se está mirando. Luego, el cerebro invierte la imagen de nuevo en sentido opuesto.

El cerebro decide lo que se está viendo. El cerebro te ayuda decidir cómo reaccionar. Por ejemplo, al ver la palabra **GATO**, el ojo transmite una impresión óptica a tu cerebro que estás viendo algo escrito en un libro. El cerebro descifra, o requerda, la palabra, y te permite leer la palabra **GATO**. Véase ésta palabra: **OJO**. Con la ayuda de tus ojos, ¿te puede decir tu cerebro cuál palabra es?

¿Son importantes las lágrimas? ¿Por qué? Porque las lágrimas mantienen húmedos y limpios los ojos. ¿Derramó lágrimas Brown Bear? Cada vez que parpadeamos, limpiamos la superficie del ojo con las lágrimas. De ésta manera, podemos limpiar el polvo y cualquier otra cosa que hay en los ojos. Sin embargo, no debemos tallarnos los ojos cuando nos dan comezón. ¿Qué piensas que debemos hacer? Podemos parpadear varias veces para sacarnos el polvo o cualquier otra cosa que hay en los ojos. Algún adulto nos puede ayudar limpiar los ojos, pero esto se debe hacer con agua limpia y con algodón.

Vamos a hacer esto. Mantenga tu cabeza recta y véase hacia en frente. Ahora, sin moverse la cabeza, véame a mí. (Señale un punto o un lugar en dónde los estudiantes deben poner la vista.) ¿Cómo movieron los ojos? Los ojos tienen **músculos** que permiten el movimiento de los ojos de un lado a otro, hacia arriba y hacia abajo, y hacia alrededor sin mover la cabeza. Vamos a hacerlo. ¿Puedes sentir los músculos de tus ojos moviendo tus ojos alrededor? ¿Cómo en mover los ojos te ayuda a leer?

Algunas personas no ven las cosas tan claras como otras personas. Usualmente, las personas de menor edad tienen mejor vista que las personas de mayor edad. Cuando tienen dificultades viendo las cosas que están cerca, pero pueden ver las cosas que están lejos fácilmente, se les llama **hipermétropes**. Cuando ocurre lo opuesto, y no pueden ver las cosas que están lejos pero sí pueden ver las cosas que están cerca, se les llama **miopes**. El llevar lentes ayuda a corregir los problemas con la vista.

LECCION 3 *El Oído*

Captando la Idea

1. Lea el libro **Hearing**. Los estudiantes hablan sobre el oído como uno de los cinco sentidos que se usan para aprender del mundo en que vivimos. Hablan de las cosas que oyeron durante sus paseos afuera. ¿Eran agradables todas las cosas que oyeron? ¿Había ruido? ¿Música? ¿Oyeron risas? ¿Llanto? ¿Qué aprendieron del mundo a través del sentido del oído? Los estudiantes hacen sugerencias que se escriben en un cuadro que se usará más tarde en el **Writing Center**.
2. Después de hablar con los estudiantes sobre la actividad con los "teléfonos" de papel, se piden sugerencias sobre la manera en que funcionan. Después de haber dado los estudiantes sus ideas, explique que cuando habla el com-

pañero de conversación, vibra el aire en el envase. El hilo lleva las vibraciones al envase en el otro extremo, y el compañero de conversación las oye como sonidos.

3. ¿Qué produce los sonidos que oyen nuestros oídos? (Vibraciones que se mueven en el aire.) Tiene que haber vibraciones antes de que nosotros podamos oírlas. ¿Vibraban los teléfonos de papel? ¿Las ligas? ¿La garganta?
4. Muestra un diagrama del oído externo e interno; describe cómo funcionan **los oídos.** Toca una grabación de algún sonido, o prende el radio. Pídales a los niños que pongan su manos encima del radio para sentir las vibraciones que hace. Se les explique que podemos oir la música o la voz del radio o la grabadora porque se está vibrando. Está haciendo el aire vibrar o que se mueve para adelante y para atrás. A moverse para adelante y para atrás, o a vibrar, el aire forma **ondas acústicas.** Las ondas acústicas se mueven por el aire por todas direcciones. Las ondas llegan al **oído externo** y corren a través del **conducto auditivo.** Entrando al conducto auditivo, hacen contacto con **el tímpano,** y lo hace vibrar. Estas vibraciones se agitan y hacen vibrar **el oído medio.**

Cuando el oído medio empieza a vibrar, **el caracol,** una pequeña parte del **oído interno,** empieza a vibrar. El caracol, un hueso pequeño que tiene la forma de una concha, contiene líquido. La vibración del caracol causa la vibración del líquido que hay adentro de él. La vibración del líquido causa la vibración de unos pelos minúsculas que cubren la concha. Luego estos cilios transmiten una impresión auditiva a través **del nervio auditivo. El nervio auditivo** funciona como un alambre eléctrico, y transmite la impresión auditiva al cerebro. Recuerde, todo esto tiene que ver con las vibraciones.

Una vez que el cerebro haya recibido la impresión auditiva, hace lo posible para determinar lo que significa el sonido, qué es lo que hace el sonido (las vibraciones del radio), y la forma en que uno debe reaccionar (disfrutar de la música si la canta tu grupo musical favorito). Si por la mañana oyes a tu mamá diciéndote que te levantes para irte a la escuela, te levantas y das prisa.

Tus oídos tienen otra función—te ayudan mantener el equilibrio. **El oído interno** le permite a uno saber si está sentado, o parado, o acostado, o colgándose a revés. Si se da vueltas por demasiado tiempo, te puedes marear o te puede doler el estómago.

Los sonidos nos ayudan para evitar el peligro. Se les pide a los estudiantes describir el procedimiento que deben seguir cuando hay un ensayo para en caso de un incendio. ¿Qué nos advierte del peligro?

5. Pregúnteles a los estudiantes por qué piensan que el sonido favorito de la clase fue ______________ en la encuesta. Después de las explicaciones, pregúnteles si todos los sonidos que oyen son agradables. ¿Desagradables? ¿Qué información les da el sentido del oído acerca de los sonidos?
6. ¿Qué más hace para nosotros nuestro sentido del oído? (Nos advierte del peligro.)

ACTIVIDAD
El Sonido son Vibraciones

Captando la Idea

1. ¿Qué estaba vibrando que causaba que las botellas produjeran sonidos distintos? (el aire dentro de la botella)
2. ¿Todas las botellas contenían la misma cantidad de aire? (No, las que tenían mucha agua sólo tenían un poco de aire en la parte de arriba.)
3. Cuando estaban haciendo sonar los vasos de la "marimba de agua", ¿qué estaba vibrando? (los vasos y el aire estaban vibrando. Por eso todos los vasos tienen que ser idénticos con respecto a forma y altura, de otra manera los sonidos serían diferentes.)

ACTIVIDAD
Los Tubos que Hablan

Captando la Idea

Explíqueles a los estudiantes que el oído es algo como un tubo con embudo. El sonido entra por la parte exterior del oído — que es como el embudo — y pasa por un tubo llamado el conducto auditivo.

Pídales a los estudiantes que hagan una lista de cada objeto que estaba vibrando para hacer que se oyera el sonido. (el tictac del reloj hacía vibraciones, y por causa de que estaba puesta sobre la mesa, hacía que la madera vibrara; el sonido pasaba por la madera y por el aire en el tubo de cartón hasta el oído de la persona.) Al susurrar los estudiantes sin la ayuda del embudo, no era lo suficientemente fuerte para que se oyera desde esa distancia, pero sí causaba vibraciones, de otro modo no podrían haber oído el susurro. Las ondas acústicas también pasaban por el aire y por el embudo.

Después de esta actividad, la maestra da el resto de la explicación de la manera en que funciona el oído al oír.

LECCION 4 *El Tacto*

Captando la Idea

1. Se habla sobre las texturas con que han trabajado los estudiantes durante la actividad del Grupo Entero y en los centros. Al hablar los estudiantes sobre las texturas que tocaban, se muestran las tarjetas con palabras.
2. Ahora los estudiantes reportan sobre el trabajo que hicieron en el **Mathematics Center** y muestran sus gráficas. Explican las gráficas, y describen los diseños que han hecho usando los adjetivos correctos.

3. ¿Qué aprendimos de nuestro mundo por el tacto? ¿Podemos tocar la luna? ¿Podemos tocar una estrella? ¿Qué sentido nos hace falta para hacer eso? ¿Puedes tocar un trueno? ¿Puedes tocar una nube? ¿Qué sentidos nos hacen falta para hacer eso?
4. ¿Qué aprendimos del tamaño y forma de las cosas usando nuestro sentido del tacto?
5. Se les muestra a los estudiantes el diagrama de la epidermis. Se les dice lo siguiente: el sentido del tacto también es muy importante. Se usa de varias maneras. Como **la piel** nos cubre todo el cuerpo—cualquier parte está cubierta con la piel—nos protege, y a la vez nos da una impresión de lo que hay alrededor y dentro de nuestro cuerpo. Al tocar algo, la piel no indica si la cosa es desconocida o conocida, mojada o seca, fría o caliente, áspera o lisa, dura o suave. Muchas veces la piel nos puede indicar cualquier combinación de estas sensaciones—todo a la vez. La piel nos protege el cuerpo de otra manera—nos protege de los microbios que causan las enfermedades y las infecciones. Por ejemplo, si nos cortamos el dedo, nos ponemos una curita alrededor del dedo para evitar la entrada al cuerpo tierra que puede estar llena de organismos dañinos que causan la infección. La piel es como una curita gigantesca que cubre todo nuestro cuerpo y que prohibe la entrada de los gérmenes a nuestro cuerpo.

Todas las impresiones que recibimos a través de los sentidos de la vista y del oído, llegan al cerebro a través de **las terminaciones nerviosas.** Lo mismo ocurre con la piel. **La epidermis,** o la superficie de la piel, contiene muchas, muchas terminaciones nerviosas por todo el cuerpo. Las terminaciones nerviosas transmiten impresiones al cerebro que nos indican que tipo de cosas estamos tocando. El cerebro entonces determina qué estamos tocando, y si debemos hacer algo con ello. Por ejemplo, si un amigo te pone un pedazo de hielo en tu cuello, las terminaciones nerviosas de tu piel transmiten una impresión al cerebro que dice: **¡HIELO!** Tu cerebro decide que tú no quieres el hielo en tu cuello, y luego transmite una impresión a tu cuerpo diciéndote: **¡Muévete!** Hasta te dice que debes **Gritar.**

El sentido del tacto puede hacer varias cosas. Cuando alguien o algo te toca, puedes sentir que te está tocando, y te da la sensación que tú también lo estás tocando. Uno también puede sentir la presión de algo sobre la piel. Hay terminaciones nerviosas especiales para sentir la presión. Algunas veces, si se aplica demasiada presión, sale una contusión en la piel.

No nos gusta que el sentido del tacto nos ayuda a sentir el dolor. Si tocamos alguna cosa caliente, sentimos el dolor y inmediatamente retiramos la mano. En esta manera, el sentido del tacto nos protege.

El pelo y las uñas también forman parte de la piel. El pelo no tiene terminaciones nerviosas, y no transmite impresiones al cerebro. Cuando nos cortamos el pelo o la uñas porque están muy largas, no se siente el dolor. No obstante, las uñas y el pelo nos protege el cuerpo.

LECCION 5 El Olfato

Captando la idea

1. Se usa el diagrama de la nariz para explicar lo siguiente tocante el sentido del olfato:

El sentido del olfato es muy importante para cualquier persona. La nariz nos ayuda en saber más acerca del mundo que nos rodea, aparte de tocar las cosas y la gente o de poderlas ver. Decimos que algunas cosas huelen bien o no. Decimos que algunas comidas saben bien o no. ¿Cómo hace esto la nariz?

El sentido del olfato empieza con tu nariz, y incluye otras partes de tu cabeza y tu cerebro. Vamos usar el ejemplo de un fósforo encendido para entender cómo funciona éste sentido.

La nariz funciona de esta manera. Cuando empieza a quemarse un fósforo, pedacitos de ceniza flotan a través del aire. No alcanzamos ver estos pedacitos de ceniza porque son muy pequeños, pero la nariz es muy sensible a ellos y los puede oler cuando llegan a la nariz a través del aire. Los pedacitos de la ceniza le "dan comezón" a las terminaciones nerviosas del **nervio olfatorio.** El nervio olfatorio es como un alambre eléctrico de un teléfono que envia una impresión al cerebro diciéndole que estás oliendo un fósforo encendido. Este nervio se encuentra aquí (señalando el lugar en el diagrama) en la parte superior del conducto nasal. No siempre percibimos un olor en seguida. Se requiere tiempo para que las partículas caminan a través del aire, y penetran la nariz, hasta llegar dónde están las terminaciones nerviosas. Cuando estás resfriado, y tienes la nariz constipada, ¿por qué pienses que no puedes oler algunas cosas, como el perfume, o sacarle gusto a la comida?

Los seres humanos tienen un sentido del olfato muy débil. Al evolucionar los humanos y al comenzar a hacer más uso de la razón, no se requería que olieran tan bien como los animales. Podían usar los ojos y el cerebro de una manera diferente. Hay una manera en que se diferencia el sentido del olfato de todos los otros sentidos. Después de percibir el olor de algo durante un rato, se cansa el sentido del olfato. En el momento de entrar en la casa, se puede oler lo que se está cocinando para la cena. Después de un poco, se sobre cansan los nervios olfatorios, y entonces no se puede oler nada.

Algunas personas desarrollan el sentido del olfato para un uso particular. Un fabricante de perfumes puede distinguir la diferencia entre todas las flores por sus distintos olores. Un fabricante de vinos tiene el mismo talento de distinguir los diferentes vinos por su olor.

El olfato es una de las maneras que tenemos para saber de nuestro mundo. Cierra los ojos y huele una rosa, o después de un largo invierno, ve afuera. El olor de las plantas verdes nos dice que ha llegado la primavera.

2. Se habla de los usos de la nariz para los animales y los humanos.
3. ¿Qué sentidos se necesitan usar para saborear? ¿Se puede saborear algo sin poder olerlo? ¿Qué comidas se pueden saborear aún cuando no se pueden oler?

LECCION 6 *El Gusto*

Captando la idea

1. Hablen de por qué es difícil tratar de contar usando **sólo el gusto.**
2. Comparen y hablen de los resultados de la encuesta sobre las comidas favoritas. ¿Qué comidas le gustan y no le gustan a más gente? ¿Cómo lo sabemos?
3. Cuando buscaban fotos en las revistas de personas que estaban comiendo, ¿qué sabores tenían esas comidas: dulce, agrio, salado, o amargo? ¿Qué fotos eran las más fáciles de encontrar en las revistas? ¿Se puede adivinar mirando las fotos qué sabor tiene la mayoría de las comidas comunes?
4. Los estudiantes describen oralmente el patrón que cada uno ha creado usando el vocabulario del gusto - salado, dulce, amargo, agrio. Ejemplo: salado, salado, dulce, agrio, etc.
5. Provee cada estudiante con uno o dos dulces de la marca "M&M" y de la marca "Sweet Tarts," un pedazo de un limón y un pedazo de la cáscara de un plátano o de una toronja, un pedazo de una manzana o de una pera, y un pedazo de una papa. Muestra un diagrama de la lengua y describe la función de la lengua. **La lengua** es la parte principal del cuerpo que usamos para saborear la comida. Recuerde, ya se dijo que la nariz nos ayuda a saborear la comida, pero la lengua es la que transmite impresiones al cerebro tocante de lo que estamos comiendo. Sabemos que cada sentido, como la vista, el oído, el tacto, y el olfato funcionan por medio de las terminaciones nerviosas en los ojos, los oídos, en la piel, y en la nariz. Estas terminaciones nerviosas transmiten impresiones al cerebro y el cerebro decida como reaccionar a las impresiones. Lo mismo ocurre con la lengua.

La lengua es un músculo cubierto con muchos bultos pequeños denominados **papilas gustativas** que tienen muchas terminaciones nerviosas. Las distintas partes de la lengua contienen bultos pequeños, o papilas gustativas, que tienen su función particular. Sólo podemos saborear cuatro diferentes sabores—agrio, salado, amargo, y dulce, porque las papilas gustativas sólo tienen esa función. Por ejemplo, la parte delantera de la lengua se usa para los sabores **dulces** como el azúcar y la miel. Ahora, prueban el pedazo de limón que tienen en su escritorio. ¿Sabes lo que estás saboreando? Sí, los sabores agrios le hace la boca agua porque las partes laterales de la lengua saborean las cosas **agrias** como los limones o el vinagre. Ahora, prueba el pedazo de la cáscara del plátano. ¿Dónde lo saboreas? ¿Por la parte posterior de la lengua? Sí, las papilas gustativas en la posterior de tu lengua saborean las cosas **amargas** como la cáscara de una toronja o de un plátano. Las papilas gustativas que saborean las cosas **saladas** están por todas partes de la lengua. Podemos saborear la sal en todas partes del cuerpo.

Otra cosa importante que debemos recordar sobre el sentido del gusto es la función de **la saliva.** La saliva también nos ayuda a saborear la comida. Toman un dulce de la marca "M&M" y ponlo encima de la lengua. ¿Puedes saborear el dulce? No, porque necesitamos mojar el dulce con la saliva, masticarlo, y mezclarlo con más saliva ántes de poder saborearlo. La saliva se mezcla con la comida y distribuye los sabores a todas partes de la lengua. A funcionar las diferentes pupilas gustativas, determinan si el dulce es dulce, agria, amarga, o salada. Vamos a probar el dulce de la marca "Sweet Tarts." ¿En cuál parte de la lengua se saborea?

Recuerda, el oler también es una función muy importante de saborear. Cuándo has estado resfriado y tu nariz constipada, ¿has podido oler la comida? ¿Sabe rica la comida, o sabe igual todo lo que comes? Vamos a hacer este experimento: Cierran los ojos y agárranse la nariz. Ahora, prueba los pedacitos de la pera, la manzana, y la papa que tienen en su escritorio. Si no puedes oler la comida, ¿puedes distinguir la diferencia entre la pera, la manzana, o la papa?

¿Crees que es buen idea probar algo desconocida para saber lo que es? ¿Por qué? Sí, podría ser algo que no se debe comer. Algunas cosas se ven ricas, pero **pueden ser muy peligrosas.** Si alguien les ofrece una comida desconocida (por ejemplo, cuando van de casa a casa en busca de dulces en "Halloween"), o si quieren determinar lo que es alguna comida desconocida, no se debe probar. Es mejor preguntarle a su papá o a su mamá si se puede probar.

LECCION 7 *Todos Juntos, Ahora*

Captando la Idea

Hay que leer y hablar del libro **El país de los cinco sentidos** por E. Larruela.

unidad

K Las Arañas

● ● ● Información de Fondo para la Maestra

Esta unidad los ayudará a los niños a apreciar el lugar que ocupan las arañas en el mundo y disminuir su temor de las arañas causado por malentendidos. Comenzarán con actividades como el construir un hábitat de araña, hacer una telaraña y leer sobre las arañas para desarrollar el tema. Hay más de 30,000 tipos de arañas que conocen los científicos. La mayoría son animales de tamaño muy reducido que ayudan a la gente comiendo insectos molestosos. La araña bananera, the trap-door spider, the purse web spider, the garden spider, and the grass spider son unos pocos de los animales interesantes de los que vamos a aprender.

Las arañas no son insectos, como creen muchas personas. En esta unidad se aprenderán las diferencias físicas entre los insectos y los arácnidos. También se estudiarán otras diferencias como su contribución a otros organismos en la naturaleza. Se explicará su necesidad de alimento así como el concepto de la "presa" y "enemigos naturales".

Las arañas pertenecen a una categoría de animales denominados Arácnidos. Tienen cuatro pares de patas segmentadas, y pueden regenerarse una pata si pierden una. La mayoría de las arañas tienen ocho ojos, y no tienen ni antenas ni alas. El cuerpo de una araña está dividido en dos secciones, el abdomen y el cefalotórax. Las patas, los ojos y las partes de la boca están en el cefalotórax. La mayor parte de las arañas tienen glándulas venenosas y colmillos en las mandíbulas, que utilizan para inyectar veneno en su presa.

Normalmente las arañas tienen seis glándulas, localizadas debajo de su abdomen, llamadas hileras, que producen seda. La seda viene del interior del cuerpo de la araña en forma líquida, más espesa que el agua. Cuando una araña quiere hacer una telaraña, exprime la seda por dos pequeños agujeros en la parte trasera de su cuerpo denominados hileras. En el momento que se expone al aire, la seda se seca formando una hebra de seda que se parece a un pelo largo. Muchas arañas usan sus telarañas pegajosas y sedosas para atrapar su alimento, que consiste en animalitos. Algunas utilizan la seda como un arrastre, que son hebras largas de seda que la araña mantiene pegadas a su cuerpo mientras que el viento las sopla por el aire. La araña siempre puede subirse por la hebra de seda si es que el viento la sopla hasta un lugar en que no quiere estar. Algunas arañas hilan telarañas de seda, y otras forran sus madrigueras con la seda. Muchas arañas depositan sus huevos en hueveras de seda. Todas las arañas jóvenes, y algunos de los machos adultos, sueltan largas hebras sedosas para flotar o usar la fuerza del viento como medio de transporte de un lugar a otro. Esto se llama "ballooning".

Aunque las arañas pueden vivir casi en cualquier parte del mundo, a algunas les gustan los lugares húmedos y a algunas les gusta lo seco. Unas arañas viven debajo de la tierra, y atrapan su presa saltando encima de ella. Otras viven en árboles y atrapan su presa en su telaraña. Otras viven en nuestras casas. ¿Las han visto colgándose del techo? Muchas veces el nombre común de las arañas nos dice algo de ellas. ¿En dónde creen que vive la araña del jardín? ¿Qué tal la araña de agua? ¿Una araña lobo? ¿Una araña bananera?

Probablemente **las tarántulas** son las arañas más temidas. Es muy grande y se puede extender casi hasta el tamaño de una regla de un pie — 10 pulgadas. Es suave y tiene pelo, al contrario de otras arañas. Es un animal **nocturno** y sale de noche para buscar alimento. Es lo suficientemente grande para comerse a muchos animales que las arañas más pequeñas no pueden atrapar. Puede comerse a los escarabajos grandes, y aún sapos y ranas. Hasta puede comerse a los pájaros pequeños, culebras y lagartijas. La mayoría de las arañas viven dos o tres años, pero la tarántula requiere de 8 a 10 años para hacerse adulta, y entonces vive unos años más. Unas personas tienen tarántulas como mascotas en su casa porque son fáciles de domesticar.

Las arañas son consideradas como amigas del hombre por razón de que ayudan a controlar la cantidad de insectos. El hombre utiliza la seda de las arañas para hacer líneas sedosas para microscopios, telescopios, y otros instrumentos científicos.

Todos los animales tienen enemigos naturales. Los pájaros, insectos como avispas, culebras, lagartijas, ranas y peces se comen a las arañas. A veces las arañas se comen las unas a las otras. Los humanos tratan de destruirlas porque no comprendemos lo útiles que son. Las arañas tratan de protegerse y defenderse de sus enemigos. Se les pide a los estudiantes que se imaginen que son arañas, ¿qué harían para protegerse y defenderse? Todos sabemos protegernos usando métodos muy parecidos a los de la araña.

1. **¡Escaparse!** ¿Cómo? (usar un arrastre para colgar en el aire y esperar; por la telaraña a un lugar seguro; usar sus mandíbulas contra animales más pequeños; usar su veneno). Normalmente las arañas tienen miedo de la gente y tratan de escaparse de nosotros porque les parecemos gigantes. Los humanos también tratan de escaparse de algo que creen ser peligroso.
2. **¡Esconderse!** Una araña se puede esconder usando sus colores y diseños como **camuflaje** para armonizar con colores y diseños. ¿Qué colores tienen las arañas? ¿Cuáles son los colores de la tierra, árboles, hojas y césped? Los humanos se esconden también si se enfrentan a un peligro.
3. **¡Atemorizar al enemigo!** Mucha gente cree que todas las arañas son venenosas, pero en general, muy pocas picaduras de arañas son perjudiciales a los humanos. **Las tarántulas** parecen espantosas, pero no son venenosas. Sólo atemorizan sobremanera a sus enemigos y a la gente.
4. ¡Usar un arma — su veneno! La mayoría de las arañas no son venenosas, pero algunas sí lo son. **La viuda negra** y **la reclusa café** son venenosas y hacen que la gente se ponga muy enferma con sus picaduras. Mucha gente no comprende que las arañas muy raramente atacan a sus enemigos. Si una araña ve a un enemigo, generalmente trata de escaparse. Sin embargo, todas las arañas usan su veneno en defensa propia, cuando el escape es imposible.

A veces las arañas no atacarán a su presa a menos que se esté moviendo. Muchos insectos han aprendido que si no se mueven, la araña no detectará las vibraciones del movimiento. Las arañas que atrapan a su presa en las telarañas, no usan su veneno. Las arañas que cazan a su presa o se esconden en las flores y capturan a los insectos asiéndolos con sus colmillos cuando los insectos se acercan, matan a sus víctimas con veneno.

LECCION 1 Las Arañas: ¿Espantosas o Buenas?

Captando la Idea

Después de la lección, los estudiantes expresan en forma oral sus decisiones de cualificar sus opciones sobre sus preferencias con respecto a las arañas y escriben sus comentarios encima de o debajo de su nombre en la gráfica.

Se coloca el cuadro gráfico en el **Mathematics Center** para agregar elementos al ir trabajando los estudiantes en esta unidad.

LECCION 2 Las Arañas Tienen Características Especiales

Captando la Idea

Después de que los estudiantes hayan tenido la oportunidad de explorar la idea, se discute lo siguiente:

Mucha gente cree que las arañas son insectos — no lo son — se parecen a los insectos. Hay dos características principales que distinguen las arañas de los insectos — tienen sólo dos partes corporales y ocho patas, mientras que los insectos tienen tres partes corporales y seis patas. Durante esta discusión se muestran fotos o arañas vivas e insectos mientras que se muestran las diferencias.

LECCION 3 Las Arañas Atrapan a Su Presa

Captando la Idea

Se discute cómo la araña usa una telaraña para atrapar a la presa. Se muestran diferentes tipos de telarañas y cómo esas arañas atrapan a su presa. Se muestran las tarjetas con palabras durante esta discusión. Se discute cómo el camuflaje ayuda a las arañas a atrapar a su presa y escaparse de sus enemigos.

Se discute la noción de una cadena alimenticia con los estudiantes. Las arañas consumen muchos diferentes tipos de insectos, pero ellas mismas son presa para otros animales. En la parte más baja de la cadena están las plantas porque producen su propio alimento. En la parte más alta de la cadena están los humanos. Los humanos consumen plantas, pero también comen carne. Ya que las ranas sirven de presa para muchos diferentes animales, se colocan varios .eslabones dentro del eslabón de la rana.

¿Cómo usa la araña su veneno? ¿Todas las arañas son perjudiciales a los humanos? ¿Todas las arañas pican? ¿De qué tipos de arañas se ha sabido que han matado a humanos con su picadura? Si no todas las picaduras de araña causan la muerte, en qué otra manera pueden ser perjudiciales las picaduras de araña?

LECCION 4 *El Ciclo Vital de la Araña*

Captando la Idea

Después de que los estudiantes hayan tenido la oportunidad de completar sus actividades en los centros, se discuten las siguientes ideas: ¿Qué es **un ciclo vital**? ¿Qué significa la palabra ciclo? Sí, como una bicicleta, es algo que está en un círculo. Un ciclo vital significa que los animales, y las plantas también, viven un un ciclo. Nacen, llegan a ser adultos, se reproducen, o hacen otros animales o plantas, y entonces se mueren. Aunque los adultos se mueren después de reproducirse, siempre hay más animales nuevos. Los organismos vivos siempre se preservan en esta manera. Cuando todos los animales de un tipo se mueren, y no nace ninguno nuevo, decimos que ese animal es **extinto.** No sabemos si algún tipo de araña es extinto, pero sabemos **por cierto** que la araña no está en la lista de especies en peligro. Hay demasiado de ellas para llegar a estar extintos y han aprendido a **adaptarse** a su ambiente. Siempre sobrevivirán.

Todos los animales necesitan un lugar para nacer y vivir. El lugar donde los animales nacen, viven y se mueren se llama **un hábitat.** Es muy parecida a la palabra española, **habitación.** Las arañas tienen un hábitat donde nacen y viven. Diferentes tipos de arañas tienen hábitates distintos. Los hábitates son distintos porque los lugares en que viven las arañas son muy distintos. Las arañas tienen que usar lo que las rodea en su ambiente para hacer su hábitat. Describan algunos de los hábitates de que han aprendido de los libros que han leído y mirado. (Se hace una pausa para que los estudiantes den sus reportes orales sobre los resultados de sus actividades.)

Las arañas nuevas salen de huevos. ¿Cuántos huevos deposita una araña hembra? Es verdad, las arañas depositan muchísimos huevos. Al salir las arañas nuevas de los huevos éstas se llaman **arañuelos.** ¿Cuáles son dos cosas que los arañuelos pueden hacer tan pronto como nacen? (Se hace un pausa para esperar las respuestas de los estudiantes.) Sí, pueden hilar seda y pueden atrapar y comer la presa.

Como un grupo entero los estudiantes escriben un **cinquain** o **quinteto** expresando sus sentimientos sobre las arañas.

LECCION 5 *Las Arañas Tienen Enemigos Naturales*

Captando la Idea

1. Hagan una lista en la pizarra de los peligros a que se enfrentó la araña en **The Lady and the Spider.** Discutan cómo se quitaron cada una de las barreras.
2. Los estudiantes discuten y comparten información sobre las arañas que se encuentra en **Actividad** — Las Arañas se Defienden.
3. Las arañas usan su telaraña para atrapar a su presa y para defenderse. ¿Cómo usan sus telarañas para defenderse? Se observa una telaraña por un microscopio. Se puede ver que hay gotas pegajosas de seda en unas hebras de la telaraña, pero no en todas. La araña sabe moverse por la telaraña para no pegarse; de esta manera puede moverse muy rápidamente por la telaraña y escaparse.
4. Se discute **wierd disguises** con los estudiantes.
5. Una **araña blanca** no construye una telaraña para atrapar a su presa. Depende de su camuflaje. La Araña Blanca vive en una flor cuyos pétalos son completamente blancos. El color de la araña también es blanco. Cuando una abeja se posa en el pétalo de la flor para recoger polen para hacer miel, la abeja no puede ver a la araña porque parece un pétalo de flor. La araña salta sobre la abeja, y la atrapa para alimento.

Una araña es **una engañadora.** La araña **finge ser un insecto.** Saben que las arañas tienen ocho patas, pero un insecto tiene sólo seis patas. ¿Cuántas patas más tiene una araña que un insecto? Es verdad, dos más. Esta araña engañadora levanta las dos patas delanteras y hace de cuenta que son antenas. Ya que muchos insectos no pueden ver muy bien, para ellos la araña que finge ser un insecto, tiene sólo seis patas. El insecto queda engañado, y la araña se lo come.

LECCION 6 *Las Arañas Viven en Todas Partes*

Captando la Idea

Se pueden encontrar a las arañas en todas partes de la tierra porque se han adaptado al ambiente para hacer **un hábitat.** Por ejemplo, si el lugar en que viven, su hábitat, es frío, tiene demasiada lluvia o luz y hay muchos enemigos, unas arañas construyen tiendas que usan como refugio o escondrijos donde encuentran protección de todo aquello. Esas arañas enrollan una hoja, la envuelven y aseguran con hilos de seda. Se meten en su lugar de protección hasta que se sienten seguras y pueden salirse. De esta manera las arañas pueden vivir bajo condiciones difíciles en diferentes partes del mundo. Unas arañas usan las tiendas para saltar sobre su presa que no sospecha nada.

Unas arañas construyen tiendas debajo del agua. Una araña de agua construye su tienda en forma de una campana y la llena de aire. Otras arañas se envuelven completamente en su seda dura y se quedan allí con sus huevos hasta que los arañuelos puedan cuidarse a sí mismos.

Las arañas no viven en cautividad por mucho tiempo. Los machos se mueren poco después de aparear, pero si se quedan a solas en cautividad, pueden sobrevivir por unas semanas más, y normalmente se niegan a comer. Las hembras, por otra parte, viven más. En algunas especies la hembra se muere poco después de depositar sus huevos, pero en otras, podrán vivir durante varios años y depositan sus huevos anualmente. Algunas tarántulas han sobrevivido en cautividad hasta por quince años.

LECCION 7 *Ahora Conocemos a las Arañas*

Captando la Idea

Los estudiantes leen los 'cinquains o quintetos' que escribieron en el **Writing Center.** Discuten las ideas en los quintetos entre sí comparando y contrastando sus sentimientos sobre las arañas.

Se les pregunta a los estudiantes si creen que el saber de algo los ayuda a formar mejores opiniones sobre esa cosa. Por ejemplo, cuando al principio dieron sus opiniones sobre las arañas, ¿sabían que las arañas no picaban ni atacaban a menos que no tuvieran ningún escape? ¿Qué más no sabían sobre las arañas que influía su opinión? Hagan una lista de cosas que los estudiantes no sabían sobre las arañas. ¿Qué saben de las arañas ahora? Se explica que después de aprender cosas nuevas de las arañas, tal vez a la gente **todavía no le gusten,** pero ahora tienen **razones** para que les gusten o no les gusten.

unidad

K Los Dinosauros[1]

● ● ● Información de Fondo para la Maestra

Los dinosauros, o lagartos gigantescos, existieron hace millones de años. Esos reptiles vivieron en la tierra, y entonces llegaron a su extinción hace unos 64 millones de años, según los descubrimientos de fósiles. Los científicos sólo pueden especular sobre cómo se veían, lo que comían, dónde vivían y cómo murieron. Hay varias teorías sobre la manera en que los dinosauros llegaron a su extinción: los mamíferos ovíperos se comieron todos los huevos de los dinosauros; un desplazamiento continental ocasionó cambios en el tiempo, así como las áreas bajas, donde los animales podían pastar y beber, empezaron a desparecer; una estrella grande cerca de la tierra explotó y emitió rayos cósmicos mortíferos que destruyeron los dinosauros; y una tormenta de meteoritas sobre la tierra causó la formación de nubes enormes y vapor que bloquearon los rayos del sol, lo cual causó una edad de hielo, durante la cual los animales de sangre caliente, que servían de presa para los dinosauros, no pudieron sobrevivir.

Se inicia la unidad haciendo que los estudiantes hagan una lista en el cartel del tamaño de un dinosauro de todas las cosas que les gustaría saber sobre los dinosauros. Después de hacer la lista, los estudiantes tratan de especular, o sugerir hipótesis, sobre las contestaciones correctas. Durante la implementación de la unidad, cuando un estudiante encuentre una respuesta, la coloca sobre el cartel al lado de la pregunta correspondiente, **después de que el resto de la clase se haya puesto de acuerdo.** El estudiante apoya la contestación indicando dónde se encuentra en un libro, por qué se hizo un cálculo, o dónde hay otra evidencia para apoyar la declaración.

Las estrategias sugeridas son la representación de papeles y la solución de problemas. A medida que los estudiantes hacen de cuenta que son paleontólogos, viajan en una cápsula de tiempo al mundo de los dinosauros donde los pueden estudiar en su hábitat y especular sobre el por qué de su extinción. La representación de papeles sugiere una época prehistórica. Los estudiantes comienzan a trabajar en un mural, coloreando un dinosauro recortado de papel de carnicero, en el que los estudiantes mostrarán su trabajo cuando se complete, etc. Al ir aprendiendo los estudiantes más sobre los dinosauros y su tiempo, van agregando estos destalles al mural.

La palabra "Dinosauro" significa lagarto terrible. Los dinosauros vivieron hace 200 millones de años, en la Era Mesozoica, antes de que los humanos habitaran la tierra. Durante el tiempo en que vivieron los dinosauros, la tierra era caliente y estaba cubierta de plantas. Todos los dinosauros vivieron sobre tierra, o eran anfibios; ninguno tenía alas ni aletas. Además, los huevos de dinosauros no eran enormes, pero sí tenían la cáscara dura; los dinosauros o comían carne (carnívoros) y/o plantas (herbívoros).

[1]Se puede usar la palabra dinosauros o dinosaurios.

Todos los dinosauros caminaban totalmente erecto. Los dinosauros modernos como los lagartos o cocodrilos caminan con las patas extendidas hacia los lados. Los dinosauros son los únicos reptiles que caminaban como mamíferos; algunos caminaban sobre dos patas, y otros sobre cuatro. Todos los dinosauros cuadrúpedos eran herbívoros. Todos los carnívoros eran bípedos, aunque algunos de los herbívoros eran bípedos también. Todos los dinosauros tenían características esqueléticos especiales: aberturas craniales únicas, disposición de la cadera para que pudieran caminar erecto, y fémures rectos.

LECCION 1 *Hace Mucho Tiempo*

Captando la Idea

Cuando decimos "Fue hace mucho tiempo", ¿qué queremos decir? ¿Qué quiere decir ayer? ¿Quiere decir hace muchos años antes de que nacieran? ¿Antes de nacer sus padres? Podría significar todas esas cosas, pero en esta unidad, cuando decimos "hace mucho tiempo" eso va a significar **hace muchísimo tiempo.** Estamos hablando del tiempo en que había sólo plantas y animales sobre la tierra. No había humanos. Hablamos de un tiempo sobre el que sabemos muy poco, porque no había nadie que lo pudiera recordar y contárselo a sus hijos. La única manera en que podemos saber algo que sucediera durante ese tiempo es que podemos escarbar en la tierra y encontrar lo que queda de las plantas y animales que no se haya deteriorado ni podrido.

Los paleontólogos han descubierto fósiles, no solamente los dinosauros y las plantas como los helechos y musgos, sino también otros tipos de animales. (Se muestran retratos de dinosauros y otros animales.) Había osos enormes, mastodontes que se parecían a los elefantes de nuestros días, y tigres gigantescos llamados tigres de dientes de sable por razón de que tenían los dientes filosos como sables o cuchillos. La mayoría de esas plantas y animales ahora están extintos, pero hay algunos animales y plantas que todavía se parecen a aquellos animales prehistóricos. Los lagartos de la actualidad, los cocodrilos, tortugas y ballenas se parecen en muchas maneras a aquellos animales que vivieron sobre la tierra en la edad de los dinosauros.

Cuando decimos que algo es "grande", o que algo es "pequeño", ¿qué queremos decir? (Se hace una pausa para que contesten los estudiantes.) Es verdad, comparamos las cosas para ver cuál es mas alto o más largo. ¿Qué queremos decir cuando decimos que algo es "el más grande"? Es verdad, eso significa que no hay nada de lo que estamos hablando que sea más grande. Descubriremos más sobre cosas "grandes" y "pequeñas" estudiando los dinosauros.

Cuando decimos que cero es el número que nos indica cuántos dinosauros existen en la actualidad, ¿qué queremos decir? Es verdad, el cero nos indica que la unidad de todos los dinosauros sobre la tierra hoy, está vacía. Que no hay dinosauros en estos días. ¿Cómo se ve el número cero? Es verdad, es un círculo sin nada adentro — como la unidad vacía. Se les nuestra una tarjeta con el número cero.

LECCION 2 *La Extinción*

Captando la Idea

Ninguno de nosotros ha visto un dinosauro. Si eso es verdad, ¿cómo sabemos que existieron alguna vez? (Se hace una pausa para las respuestas de los estudiantes.) Es verdad, tal vez no hemos visto nunca un dinosauro, pero sí hemos visto partes de dinosauros que han quedado intactas durante millones de años. Esas partes, que son mayormente huesos, que han permanecido, nos sugieren que tales cosas como dinosauros sí existieron.

Sabemos que muchos de los animales como los dinosauros que vivían sobre la tierra en aquel entonces eran muy grandes. Eso quiere decir que necesitaban mucho alimento, en forma de plantas o animales. ¿Cuánto alimento estimaron que comería cada día un dinosauro del tamaño del que medimos? Es verdad, si comparamos nuestro tamaño con el de ellos y luego estimamos cuánto alimento comemos cada día, podemos sacar una idea de cuánto alimento **más** necesitarían.

¿Qué pasaría si los dinosauros no pudieran encontrar suficiente alimento? Sí, morirían. ¿Qúe más necesitaban? Aire y agua. Si no se satisficiera cualquiera de esas necesidades, ¿qué les pasaría a los dinosauros? Sí, morirían. ¿Qúe pasaría si tuvieran muchos enemigos naturales y no pudieran protegerse? Sí, sus enemigos los matarían.

Se presenta la palabra "evidencia"; se le muestra en una tarjeta de palabras. Se les dice a los niños que hay "evidencia", como fósiles, que nos hace creer que aunque nunca hemos visto uno vivo, los dinosauros existieron hace muchos años. Sabemos qué tan grandes o pequeños eran por causa de que hemos medido sus fósiles. Se les dice a los estudiantes que hay varias teorías sobre lo que habrá sucedido a los dinosauros. Una teoría es como una especulación, pero es una especulación basada en información, o en la evidencia disponible. En nuestra lección estudiaremos de algunas de esas teorías.

Las teorías sobre la extinción de los dinosauros sugieren que:

1. tal vez los enemigos naturales de los dinosauros, u otros dinosauros, hubieran comido sus huevos; o
2. tal vez la tierra se hubiera desplazado causando cambios en el tiempo; cuando se efectuaran los cambios en el tiempo, las plantas existentes en aquel entonces no podrían crecer y producir la cantidad de alimento requerido para alimentar a los dinosauros, y éstos no podrían seguir viviendo, o
3. tal vez una estrella grande causara una explosión de rayos cósmicos que mataran a todos, o
4. tal vez, una tormenta de meteoros causara que nubes bloquearan los rayos del sol, que hubiera afectado las plantas porque no podrían producir las cantidades suficientes de alimento que hubieran requerido los dinosauros.

Todas esas teorías son posibles. Sin embargo, los científicos no saben a ciencia cierta por qué los dinosauros dejaron de existir. ¿Qué creen ustedes? ¿Cuál es su teoría?

LECCION 3

Los Fósiles

Captando la Idea

Pregunta: ¿Quién ha visto un verdadero dinosauro? Se les pide a los estudiantes que adivinen de qué tratará el libro **Bones, Bones, Dinosaur Bones,** y luego se lee en voz alta. Se señalan las palabras conocidas. Ninguno de nosotros ha visto los dinosauros, pero hemos visto evidencia de que sí existieron. Una de las evidencias que tienen los científicos para sugerir que los dinosaurós existieran sobre la tierra hace millones de años, son los fósiles, o restos de esos lagartos gigantescos que han quedado intactos durante millones de años. En nuestro **Science Center** vamos a descubrir cómo los científicos que descubrieron esos fósiles los sacan de la tierra y luego los estudian. De esas observaciones los científicos entonces especulan sobre los dinosauros.

Se habla sobre un paleontólogo al mostrar la tarjeta de palabras. La maestra muestra el cuadro, Fossil Hunting, con sus encabezados: Dónde buscar huesos y otros fósiles y luego pide sugerencias de los estudiantes sobre qué poner bajo cada encabezado. ¿Qué herramientas se usarían? ¿Cómo haríamos un registro sobre lo que encontráramos? Se escriben los comentarios/respuestas de los estudiantes en una hoja grande de papel o en un cuadro que se usará más tarde.

¿Qué evidencia buscan los paleontólogos al salir a buscar fósiles? ¿Los huesos son lo único que quieren encontrar? ¿Qué otras cosas son importantes? (hojas, para indicarnos qué tipos de plantas existían en aquel entonces; conchas marinas, para indicarnos si esa parte del mundo hubiera estado debajo del agua; restos de los humanos como alfarería o huesos humanos para indicarnos si vivieran humanos sobre la tierra en aquel entonces.) Nunca se han encontrado huesos humanos que fueran tan antiguos como los huesos de los dinosauros, por eso los científicos creen que no había humanos sobre la tierra a la misma vez que vivían los dinosauros sobre la tierra.

Los fósiles que se han encontrado parecen ser de tres tipos: huesos reales o dientes de animales, huellas (impresiones) como huellas de pies, o espacios o moldes, que permanecen en piedras después de que el objeto se ha deteriorado. ¿Qué tipo de fósiles hicieron ustedes? Cuando representaron los papeles de paleontólogos, ¿qué tipos de fósiles encontraron?

LECCION 4 *Tipos de Dinosauros*

Captando la Idea

¿Cuántos tipos **diferentes** de dinosauros hemos estudiado? Es verdad, había muchos tipos diferentes sobre la tierra antes de su extinción. ¿Todos eran del mismo tamaño? No, algunos eran pequeños y algunos eran muy grandes. ¿Cómo sabemos que algunos eran pequeños y algunos eran grandes? Sí, los paleontólogos han hallado huesos de diferentes formas y tamaños. Las formas de los huesos les revelan a los científicos muchas cosas. Por ejemplo, si los huesos eran grandes, entonces los animales tenían que ser grandes. Si las huellas de los pies eran pequeños, entonces los animales eran pequeños.

¿Adónde teníamos que ir para encontrar fósiles? Se han encontrado fósiles en los pantanos, en las montañas, y en muchos otros lugares. ¿Qué herramientas se han usado para encontrarlos?

Se les pide a los estudiantes que repitan los nombres de los diferentes tipos. ¿Cuáles eran los pequeños? ¿Los grandes? ¿Los carnívoros? ¿Los herbívoros?

Cuando usaron las formas geométicas para constuir los dinosauros, ¿cuáles formas eran fáciles de usar? Sí, los que tienen líneas rectas son fáciles de usar porque se pueden juntar. ¿Qué tal las formas circulares? Sí, si se juntan las círculos, hay espacios que sobran. Pero se pueden combinar las diferentes formas geométricas para hacer formas nuevas.

En el **Listening Center** los estudiantes escucharon cintas y "leyeron" cintas de lugares de uno o dos de los libros nuevos.

LECCION 5 *Los Carnívoros y los Herbívoros*

Captando la Idea

Sabemos que había muchos tipos diferentes de dinosauros que vivían sobre la tierra hace millones de años. ¿Cómo sabemos que había muchos tipos diferentes? ¿Cómo sabemos que no había sólo **un** tipo de animal? Los fósiles que se han hallado nos revelan que había muchos tipos diferentes porque los fósiles que se han encontrado son de formas, tipos y tamaños diferentes. De esa evidencia, los paleontólogos pueden concluir que eran diferentes. También podemos concluir que había muchos tipos diferentes de plantas por causa de los fósiles de plantas que se han encontrado.

A cada niño se la da un bocadito y mientras comen cuentan los pedacitos de comida que les quedan en el plato. Se comienza una discusión sobre la importancia de encontrar tipos diferentes de dientes de dinosauros y de otros tipos de animales, mientras los estudiantes comen "carne" y "plantas". Una cosa que los científicos han hallado que nos revelan lo que comían esos animales diferentes son dientes fosilizados. En el **Science Center** ustedes mismos se han mirado los dientes y pueden ver que son diferentes.

Cada tipo de diente tiene un trabajo especial. Unos dientes son para morder. ¿Cuáles son? (Los estudiantes piensan en qué tipo de dientes están usando para comer el bocadito de "carne" y "plantas" — los dientes delanteros.) Ya que a muchos de ustedes se les están saliendo los dientes delanteros nuevos, vamos a describirlos. Los dientes delanteros nuevos todavía tienen partes filosas. Pero los míos (los dientes delanteros de la maestra) no tienen esas puntas filosas. ¿Por qué creen que es eso? Es verdad, con el tiempo las partes filosas se desgastan.

¿Cuáles dientes sirven para arrancar pedazos de carne? (Los dientes incisivos, que tienen puntas filosas. Son para morder también.) ¿Para qué son los dientes traseros? (Para moler y triturar en pedacitos para que podamos pasar nuestro alimento.) Estos dientes también se denominan **muelas**. En español la palabra moler significa "to grind", que es lo que hacen esos dientes a la comida antes de pasarse

¿Cuáles dientes estamos usando para comer nuestras "plantas"? (Primero mordemos, y luego masticamos; pero no tenemos que arrancar la fruta ni las legumbres.) Los humanos tienen los dos tipos de dientes porque los humanos comen carne y plantas también.

¿Qué creemos si se encuentra el cráneo de un dinosauro y todos los dientes, menos unos pocos delanteros, son planos? (Que son herbívoros.) ¿Qué creemos si se encuentra el cráneo de un dinosauro y todos los dientes, menos unos pocos delanteros, tienen puntas filosas? (Que son carnívoros.)

¿Qué comen los cocodrilos? (pescado, mamíferos grandes, y se ha sabido que atacan y comen a los humanos) ¿Qué comen los lagartos? ¿Qué comen las tortugas? (Muchas tortugas no tienen dientes; comen mayormente insectos, babosas, otros animales pequeños; pueden comer plantas pero sólo las partes blandas porque no tienen dientes que puedan moler el alimento.)

¿Qué observaciones hicimos que nos ayudaron a especular sobre lo que comieran los dinosauros? ¿Qué observaciones usamos para decir si un dinosauro es un carnívoro o un herbívoro? Recuerden, las observaciones nos ayudan a hacer buenas especulaciones. Esas observaciones nos ayudan a clasificar a los dinosauros en muchas diferentes maneras.

LECCION 6 *El Ciclo Vital del Dinosauro*

Captando la Idea

¿Qué hemos aprendido sobre la manera en que nacen los dinosauros? Es verdad, como los reptiles actuales, los dinosauros salían de un huevo . Se muestra la palabra "reptil" usando una etiqueta de palabras. Se muestra un retrato y se le describe diciendo que los reptiles: se arrastran, tienen cuatro patas, están cubiertos de escamas; depositan huevos. Se usa el juego de fotos laminadas recortadas de revistas de animales y reptiles para que los estudiantes los vuelvan a clasificar cuando sigan trabajando en el **Mathematics Center**.

¿Qué creen que les habrá pasado a los dinsoauitos después de nacer? Es verdad, tenían que aprender a encontrar alimento y agua. Si eran herbívoros, tenían que buscar las plantas que les gustaran. Si eran carnívoros, tenían que aprender a buscar presa y capturarla. Ya que eran animalitos y menos grandes que los animales maduros, tenían que tener cuidado de que sus enemigos naturales no los encontraran y comieran. Pronto se maduraban. Entonces esos dinosauros jóvenes y maduros apareaban, y la dinosaura depositaba huevos nuevos en un nido. Los huevos se rompían y nacían más dinosauros. Esto se llama **un ciclo vital.** Nacen nuevos miembros de un grupo, crecen hasta madurarse, aparean y nacen otros nuevos, entonces se envejecen y mueren. Un ciclo vital es como un patrón. ¿Cuál es el patrón del ciclo vital de los dinosauros? (Nacer, madurarse, aparear y hacer dinosauros nuevos, envejecer y morir; y entonces se vuelve a repetir el patrón con los nuevos dinosauros.)

¿Murieron todos los dinosauros por su edad avanzada, o creen que los dinosauros tuvieran enemigos naturales? A veves algunos de los dinosauros más grandes atacaban a los más pequeños. Con frecuencia otros animales robaban los nidos y se comían los huevos de los dinosauros. También había otros animales que vivían durante la edad de los dinosauros, por ejemplo, los tigres de dientes de sable, osos enormes, y mastodontes que se parecían a los elefantes de la actualidad. Los herbívoros tenían muchas plantas que comer, y los carnívoros se comían a los herbívoros.

Hicieron unos patrones de dinosauros en el **Mathematics Center** ¿Cómo se veían sus patrones? ¿Repitieron los mismos grupos de dinosauros muchas veces? Algunos de ustedes podrán compartir sus patrones con la clase.

Los estudiantes y la maestra discuten el nacimiento de los dinosauros, incluyendo una hipótesis sobre los huevos, el tamaño, color, textura, el tiempo requerido para salir del huevo.

LECCION 7 *La Naturaleza y el Cambio*

Captando la Idea

¿Cómo ha cambiado la tierra desde la edad de los dinosauros? Sabemos que había muchos animales que existían entonces, pero no existen en la tierra ahora. Algunos de estos eran los dinosauros, mastodontes, osos gigantescos, tigres con dientes de sable, y panteras enormes, cuyos fósiles se han encontrado en California. ¿Hay animales que viven hoy que sean del mismo tamaño que los dinosauros gigantescos? El animal más grande sobre la tierra es la Ballena Azul. ¿Es tan grande como era el Sismosauro? ¿Cómo lo saben?

Sabemos que algunos lugares que habían estado debajo del agua ahora son desiertos, y que se han dividido los continentes. ¿Cómo sabemos eso? Se han descubierto fósiles de pescados y otros animales acuáticos donde ahora hay desierto.

El clima es diferente porque no hace tanto calor ni es tan húmedo como antes; hay menos plantas; se han separado los continentes formando grandes océanos entre ellos; ha cambiado la superficie de la tierra, creando nuevas montañas y valles; y hay gente que vive en todas partes de la tierra. Lo que no ha cambiado son: las plantas necesitan el sol para producir alimento; las plantas producen alimento para sí mismas y para todos los animales sobre la tierra; si la tierra ya no puede producir plantas, entonces **todo lo vivo llegará a estar extinto.**

unidad

1 Plantas y Semillas

● ● ● Información de Fondo para la Maestra

Los seres humanos, otros animales y plantas son organismos vivientes que existen en la tierra. Las plantas son los únicos organismos que pueden sustentarse produciendo su propio alimento. A su vez, proveen alimento para animales y humanos, a través de la "cadena alimenticia".

Casi todas las plantas tienen una característica en común que las hace diferentes de los animales. Las plantas, como los árboles, flores, frutas y vegetales, producen **clorofila,** una sustancia que las permite convertir la energía solar en elementos nutritivos, o alimento. Los humanos, así como los animales, por otra parte, obtienen su alimento o consumiendo plantas o consumiendo otros animales. Los humanos comen carne así como plantas también. Sin embargo, algunas plantas no pueden utilizar la luz del sol y la tierra para producir su propia fuente de energía. Por ejemplo, los mohos, son **parásitos** que obtienen su energía directamente de la planta o animal en que viven — **su huésped.** Además, las plantas como los mohos no se reproducen por medio de semillas; se reproducen creando esporas.

Las plantas florecientes crecen de las semillas. Una semilla que brota deberá absorber agua antes de empezar a crecer. También requiere que la tierra esté firmemente colocada a su alrededor y que reciba el calor del sol. Dentro de la semilla se encuentra un minúsculo **embrión,** rodeado de una cantidad de alimento. Al comenzar a brotar el embrión, las raíces crecen hacia abajo y un tallo crece hacia arriba. Una vez que el tallo penetre la superficie de la tierra hasta la luz del sol, se forman las primeras dos hojas reales y la planta comienza a producir su propio alimento. Cuando las plantas gozan del agua, la luz del sol, y los minerales apropiados en la tierra, crecen, producen alimento, y emiten oxígeno.

Muchas plantas no tienen que crecer de semillas. Por ejemplo, una papa no es una semilla pero se puede reproducir haciendo brotar raíces de una parte especializada de la papa. Otras plantas (algunos cactus) pueden comenzar a crecer si una pequeña parte de ellas cae a tierra. Después de echar raíces, si se pone la papa firmemente en la tierra, recibirá alimento y producirá más papas. Algunas plantas echan rizomas subterráneos de los que periódicamente brotan plantas nuevas . Las plantas no florecientes crecen de esporas. Como una semilla, una espora se desarrolla para convertirse en embrión. A diferencia de la semilla, la espora no contiene alimento para que pueda crecer el embrión. La planta que se desarrolla deberá sacar su alimento de un huésped.

Los mohos son plantas que crecen en su huésped, sacando alimento directamente de él. No requieren ni luz ni tierra ya que no producen su propio alimento de la manera en que lo hacen las otras plantas, pero sí requieren humedad. El alimento que comen los mohos son el pan, mermelada, queso, fruta, plantas florecientes, tierra pantanosa, y hojas etc. en las que viven. Estos alimentos se llaman "huéspedes". También éstos se deberán presentar para que no haya ningún concepto erróneo con respecto a los dos tipos de plantas.

Aunque los niños de menor edad están familiarizados con las plantas, es posible que muchos de ellos no hayan tenido la oportunidad de examinarlas de cerca, plantar semillas y observarlas crecer. Las primeras actividades para esta unidad, entonces, incluirán el trabajar directamente con las plantas para desarrollar las ideas principales de una manera global y examinar los diferentes aspectos de las plantas y la vida vegetal. En esta unidad los estudiantes aprenderán de las partes de las plantas, sus semillas, del proceso de fotosíntesis, harán distinciones entre plantas examinando y plantando semillas, haciendo echar raíces a los vegetales, y trasplantándolos. Los estudiantes cultivarán mohos y los compararán con otros tipos de plantas.

Se podrá motivar a los estudiantes a que estudien plantas y semillas haciéndolos diseñar y construir terrarios en los que se estudiarán tanto las plantas como los animales pequeños. Un terrario es un hábitat artificial para plantas que con frecuencia se cierra herméticamente para que ni entre ni escape el aire. Se podrá meter a animales pequeños en el terrario para que crezcan en un ambiente que sustente la vida.

Glosario

Las hojas son las partes de la planta en que se produce el alimento por fotosíntesis. Las hojas absorben dióxido de carbono del aire, agua de la tierra, y energía de la luz solar.

Las flores son las partes reproductivas de la planta. Los pétalos de la flor y el olor de la flor atraen las abejas y los insectos para polinizar la flor. Después de la polinización, los pétalos se caen y se desarrollan las semillas en la parte de una flor llamada el ovario. El ovario mismo usualmente llegar a convertirse en lo que llamamos fruta.

Los tallos sostienen las partes superiores de las plantas. El agua y los elementos nutritivos de la tierra pasan por el tallo en un sistema de tubos. El alimento de las hojas pasa hacia abajo por los tallos a las raíces. Los tallos también almacenan alimento.

Las raíces de las plantas anclan las plantas en la tierra. Se sacan el agua y los minerales de la tierra a través de las raíces. Muchas plantas como las zanahorias, almacenan alimento en las raíces.

Las semillas contienen un pequeño embrión de una planta adentro. Las mitades de las semillas contienen alimento que proporciona energía y materiales para el crecimiento hasta que la planta eche las primeras hojas arriba de la superficie del suelo.

Los pétalos son las estructuras de colores vivos que forman la parte exterior de la flor.

El botón es un pequeño brote lateral en el tallo de una planta que no ha madurado todavía ni ha llegado a su crecimiento y desarrollo completo. Es una flor incompleta sin abrir.

El nudo es un brote espeso e hinchado de una planta (como en el tronco de un árbol).

El estigma es una porción del pistilo que recibe los granos del polen.

La **antera** es la parte del estambre en las plantas semilleras que consiste en microesporagia, produce y contiene polen, y aunque a veces es sésil, normalmente se encuentra en un tallo.

El **sépalo** es una estructura protectiva (como un pétalo) que cubre el botón de la flor.

El **polen** es un polvo fino que durante la germinación produce un tubo que entra al ovario.

El **moho** es una planta que no produce su propio alimento y crece directamente en el huésped.

La **espora** es un diminuto cuerpo unicelular en descanso que puede producir un nuevo individuo vegetativo al ponerse favorables las condiciones.

Las **rizomas** son tallos o ramas elongadas de una planta, en forma de tubo que producen brotes por arriba y raíces por debajo de la tierra y de las cuales puede comenzar a crecer una planta nueva.

Las **algas** son cuerpos unicelulares, vegetativos y en forma de animal. Producen clorofilo que determina los colores de verde, café y rojo.

El **moho** es una masa vegetal que se extiende y que vive en otras formas de vida, que se llaman huéspedes.

Los **hongos** son estructuras vegetativas acuáticas y terrestres que viven sobre la materia muerta o en descomposición, o en una asociación simbiótica con otro, normalmente para beneficio mutuo. Un hongo tiene la forma de filamento tubular y bifurcado qu se bifurca cada vez más, y forma redes conectadas e irregulares. Algunos filamentos se compactan en patrones densos y ordenados que producen champiñones, por ejemplo. Como los mohos, los hongos tienen la habilidad de producir esporas y de aventarlas para mayor distribución.

Los **líquenes** son asociaciones simbióticas de algas y hongos.

LECCION 1 *Las Plantas son Cosas Vivientes*

Captando la Idea

Se debe volver a juntar a los estudiantes, mostrándoles los variados tipos de plantas y/o cuadros. Los estudiantes deben señalar cada parte de las plantas que han investigado; las hojas, flores, tallos, raíces y semillas. Ya que cada parte de una planta tiene una función importante, discútala al ir señalándose la parte de la planta.

LECCION 2

Usando la Energía del Sol

Captando la Idea

Después de haber tenido los estudiantes la oportunidad de realizar todos los experimentos arriba, pregúnteles qué creen que necesite una planta además del agua. Es verdad, las plantas necesitan luz. Les hace falta la energía del sol para producir alimento. El proceso de producir alimento para las plantas se llama — **fotosíntesis.** Escriba la palabra **foto - síntesis** en un cartel. Se les pide a los estudiantes que lean la primera parte y que digan a qué otra palabra se parece. Foto se refiere a la luz. La segunda parte, síntesis, quiere decir "unir". La fotosíntesis, entonces, significa unir con la luz. Los estudiantes discuten lo que es "unir con la luz". (El agua, alimento nutritivo de la tierra y el dióxido de carbono del aire y la energía de la luz se sintetizan para hacer azúcar y fécula por medio de la fotosíntesis.)

Se discute con los estudiantes lo que encontraron al hacer análisis de las frutas y legumbres. ¿Cómo hicimos análisis para el azúcar? (Probar). ¿De dónde vino el azúcar? Las plantas lo produjeron. ¿Cómo hicimos análisis para la fécula? (Usamos la prueba del yodo.) ¿De dónde vino la fécula? Las plantas lo produjeron.

Se les pide a los estudiantes que describan lo que sucedió con la hoja cubierta por el papel que no pudo recibir la luz. Es verdad, se volvió de un color amarillo pálido a uno blanco, como las plantas en el clóset. Cuando una planta usa la luz para producir alimento, es verde. Eso significa que **la clorofila**, una sustancia producida por la planta, está funcionando para convertir la energía del sol en alimento para la planta.

Las plantas verdes producen alimento y oxígeno del agua, dióxido de carbono, y minerales por el proceso de fotosíntesis. Absorben el dióxido de carbono del aire, agua y minerales de la tierra, y energía de la luz solar. Durante la fotosíntesis, se unen el dióxido de carbono y el agua en presencia del clorofilo para formar azúcar y oxígeno. La planta utiliza algo del alimento producido por una planta verde para crecer y producir hojas y fruto. El alimento restante es convertido en fécula y guardada en la planta. ¿En dónde se guardaba en las plantas que observamos?

Si los estudiantes demuestran interés en la causa de por qué la planta se vuelve hacia la luz, se puede discutir lo siguiente: Las plantas contienen una química llamada **auxina** que promueve el proceso en que se alargan las células de las plantas. Se acumula la auxina en la parte oscura del tallo de la planta. La auxina extra causa que las células en la parte oscura se alarguen forzando así que los tallos se doblen hacia la luz. Este movimiento hacia la luz se llama fototropismo y geotrofismo. 'Foto' significa luz y 'tropismo' significa movimiento.

LECCION 3 Flores, Raíces, Tallos y Hojas

Captando la Idea

En vista de la nueva información que han recibido los estudiantes sobre raíces, tallos y hojas, se discute la fotosíntesis. Se discute la clorofila.

Preguntas adicionales para discusión

1. Describan estas hojas por teléfono a alguien que nunca las haya visto.
2. ¿En qué se parecen estas hojas?
3. ¿Cómo se difieren algunas hojas?
4. ¿Qué se puede decir sobre el color de estas hojas?
5. ¿Qúe se puede aprender tocando las hojas, u oliéndolas?
6. ¿Qué se puede decir sobre la forma de las hojas?
7. ¿Qué tan larga era la hoja más larga/corta?
8. ¿Por qué es que algunos estudiantes sacaron diferentes medidas de sus hojas?
9. ¿Cómo se veía diferente la hoja al verla por el lente de aumento? ¿En qué manera eran parecidas o diferentes las estructuras venosas? ¿Se puede usar una palabra de la geometría para describir las venas en esas hojas? (redes, paralelo, cortar)

LECCION 4 Las Plantas se Reproducen

Captando la Idea

Refiriéndose a la planta floreciente, se señala la flor y se les dice a los estudiantes que esta planta necesita flores para hacer plantas nuevas. Se señalan las semillas, si es que se pueden ver en la planta; De otra manera se usa una foto o diagrama de una flor con semillas.

Refiriéndose a un helecho, se señalan las esporas que aparecen en el reverso de las hojas, si es que se pueden ver en la planta; de otra manera se usa una foto o diagrama de un helecho. Se les dice a los estudiantes que esta planta **no necesita** flores para hacer plantas nuevas; en lugar de eso se reproduce creando esporas.

Refiriéndose a una papa, se señalan los "ojos". Se les dice a los estudiantes que esta planta **no necesita** ni flores ni esporas para hacer plantas nuevas; en lugar de eso se reproduce echando brotes o rizomas. Se les señala, si es que se pueden ver en la planta; de otra manera se usa una foto o diagrama.

Los estudiantes discuten la reproducción de las plantas examinando las plantas mismas y fotos de los órganos reproductivos de las plantas, incluyendo las semillas, esporas, rizomas señalando las diferentes partes conforme se vean en las fotos.

¿Cuál es la diferencia entre una semilla y una espora? (Una semilla contiene un depósito de alimento para que el embrión viva hasta que pueda producir su propio alimento. Una espora es un cuerpo pequeño que consta de una cobertura protectiva y que solamente puede comenzar a producir una planta nueva si son apropiadas las condiciones y se le coloca en un huésped apropiado.

Se les dice a los estudiantes que los científicos han identificado más de 350,000 tipos de plantas. Estas plantas forman parte de dos categorías básicas — las plantas florecientes y los no florecientes. Las que producen flores crecen de semillas mientras que las plantas no florecientes como helechos, musgos, mohos, y añublos crecen de esporas.

Los estudiantes hablan de las diferencias en los métodos de reproducción de estas plantas y el de los frijoles.

LECCION 5 *Polinización — de la Flor al Fruto*

Captando la Idea

Después de que los estudiantes hayan tenido la oportunidad de disecar y estudiar las distintas partes de las flores, se vuelven a reunir para discutir lo que han observado. Se les dice a los estudiantes que cada parte de la flor es necesaria para producir semillas que llegarán a ser plantas nuevas y maduras. Una flor contiene las semillas que crecen para formar plantas nuevas. La flor se convierte en fruto para producir más plantas iguales a ella.

Se diseca una flor señalando cada parte. Para que comience el proceso de reproducción de la planta, se llevan granos de **polen** (células machas de **la antera) al estigma** (parte hembra) de una planta a otra. Este proceso se llama polinización.

Cuando el polen se posa en el estigma, produce un tubo que va hasta **el óvulo** y lo **fertiliza.** Este tubo es tan pequeño que, normalmente, no lo podemos ver aún si usamos un lente de aumento. Después de haberse fertilizado las semillas, **el receptáculo de la semilla (o fruto)** comienza a engrandecerse y se caen los pétalos. Al crecer el fruto, casi siempre se llena de alimento nutritivo, es dulce y es posible que emita un olor para atraer a los pájaros. Los pájaros comen el fruto y las semillas, pero por causa de su cobertura dura, no son digeridas. Entonces los pájaros esparcen las semillas en su excremento. ¿Qué creen que pasará si una de esas semillas cae en tierra húmeda?

¿Cómo llega el polen de la antera al estigma? La Naturaleza ha encontrado muchas maneras para fertilizar a las plantas. En **la Actividad** — los polinizadores de la Naturaleza, ¿qué aprendieron de las maneras en que llegaba el polen de un lugar a otro?

Con frecuencia el polen ocasiona alergias en la gente. Cuando el viento esparce el polen de un lugar a otro, la gente lo aspira y puede causar una reacción alérgica.

LECCION 6 Las Semillas

Captando la Idea

¿Cómo se forma una fruta como la manzana? ¿Qué parte del árbol es? ¿Cómo se fertilizó el árbol? El óvulo de la planta fue fertilizado y llegó a formar una semilla. El fruto contiene la semilla. Si se siembra la semilla en la tierra, tiene la capacidad de llegar a ser una planta nueva. Sembramos semillas de frijol que habían sido fertilizadas. Cuando las metimos en una bolsita de plástico con agua, germinaron y comenzaron a crecer.

La siguientes preguntas pueden servir para guiar la discusión sobre cómo se esparcen las semillas:

- ¿Cómo creen que llegaron estas semillas al campo de donde las recogieron?
- Encuentren la flor de un diente de león blanco. Examinen uno de los mechoncitos blancos. Encuentren la semilla. ¿Qué tiene la semilla para ayudarla a ir de un lugar a otro? ¿Qué le hace moverse de un lugar a otro?
- Examinen las piernas de los pantalones y los calcetines. ¿Ayudaron a una semilla a ir de un lugar a otro?
- Hagan una lista de las maneras que han descubierto en que las semillas llegan de un lugar a otro.

LECCION 7 Las Plantas Satisfacen Muchas Necesidades Humanas

Captando la Idea

Las plantas son la clave de la vida sobre la tierra. Proporcionan alimento para sí mismas, para los animales, y para los humanos. ¿Qué otras cosas hemos encontrado que proporcionan las plantas?

Se les dice a los estudiantes que durante los tiempos antiguos las plantas eran la fuente principal de las medicinas y hoy día todavía son una fuente significativa de medicinas. Frecuentemente se cultivan las plantas en jardines especiales y son estudiadas por la capacidad que tienen de curar enfermedades. La Aloe Vera y la jojoba son populares en la elaboración de cosméticos. El ginsén es una raíz que se usa en China para ayudar a la recuperación de enfermedades. Se usa la menta para aliviar los malestares estomacales. La dedalera contiene una medicina que se usa para tratar enfermedades del corazón, y la chinchona produce quinina que se usa para tratar el paludismo. Hay algunas plantas que producen productos que pueden curar enfermedades o causar la muerte. La cocaína puede ser un anestésico potente, pero también puede ser mortífera. La amapola del opio produce morfina, codeína y heroína — que, si se utilizan propiamente, pueden ayudar a quitar el dolor, pero también pueden causar la muerte si se abusa de ellas.

Después de repasar la lección sobre la Fotosíntesis, los estudiantes discuten que en el proceso de la fotosíntesis, las plantas usan el dióxido de carbono, pero forman oxígeno al producir azúcar y otros carbohidratos. Sin las plantas, el oxígeno requerido por los humanos no podría restablecerse y moriríamos.

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1 El Cuerpo Humano

Información de Fondo para la Maestra

El estudio del cuerpo hmuano puede ser una experiencia informativa, y por lo tanto, de gran utilidad para un joven. Aunque todos creamos que somos parecidos en lo que respecta a nuestro cuerpo, a la misma vez es posible que tengamos la idea de que son misteriosos. Al mirarnos en el espejo, vemos algunas de las partes del cuerpo, pero sabemos que hay otras partes u órganos que no se pueden ver, aún mientras están funcionando. Aprendemos a manejar muchas de las funciones del cuerpo en un nivel consciente - tales como el movimiento y el pensamiento. Sin embargo, hay otras funciones que se llevan a cabo inconscientemente por nuestro cuerpo. Estas acciones inconscientes, como el palpitar del corazón, la respiración y la digestión, normalmente no se pueden observar. Los jóvenes tienen una curiosidad natural con respecto a su cuerpo. Esta curiosidad les puede motivar para aprender más acerca del cuerpo humano.

Los estudiantes se interesan en medir la temperatura del cuerpo con un termómetro, especialmente si desarrollan alguna noción sobre la razón de su uso. El principio básico de su operación es que la materia se expande al absorber calor. Los termómetros contienen una substancia que fácilmente se expande al calentarse. El mercurio, en su estado líquido, y el alcohol son substancias que se expanden al absorber calor. Ya que el mercurio es más caro que el alcohol, la mayoría de los termómetros contienen alcohol colorizado para indicar la temperatura.

La escala de un termómetro para medir la temperatura ambiental se marca a base de unidades llamadas grados (°), que aparecen en múltiples de diez. Normalmente, los puntos de referencia de un termómetro son los grados en que se congela y hierve el agua. Sin embargo, para medir la temperatura del cuerpo las escalas de las termómetros orales indican los grados entre los 92 y los 105. Se divide cada unidad en la escala en cinco subunidades. Un estudiante observador tal vez pregunte acerca de las diferencias entre estos dos tipos de termómetros.

A consecuencia, se ha calibrado un termómetro oral para que cada marca grande indique un grado y cada marca pequeña mida 2/10 de un grado. Al leer las indicaciones del termómetro, los estudiantes aprenden a girarlo en los dedos hasta poder ver el nivel del líquido coloreado marcado en la escala. Tendrán que practicar esto por un rato hasta poder verlo en cada intento.

El propósito de esta unidad es el de proporcionar información básica tocante a los sistemas biológicos del cuerpo que se utilizan para realizar sus funciones asombrosas. Al aprender los niños cómo los músculos y huesos les ayudan a moverse, cómo los dientes y la lengua les ayudan a digerir la comida, o cómo la sangre ayuda a mantener cálido al cuerpo y protegerlo de los organismos invasores y dañinos, llegarán a apreciar el cuerpo y los métodos científicos requeridos para aprender de las actividades del cuerpo, tanto las que se pueden ver como las que no se ven pero que son necesarias.

LECCION 1 *Los Humanos Crecen y Cambian*

Captando la Idea

Dígales a los estudiantes que como organismos humanos, los humanos crecen y cambian. Los cambios a veces son lentos y no los podemos observar, pero podemos usar las matemáticas para hacer un registro de ellos. Los humanos crecen en maneras muy diferentes - los cuerpos se hacen :nás grandes. Pero a la misma vez aprendemos muchas cosas nuevas. Aprendemos a no llorar si no nos salimos con la nuestra ni a enojarnos cuando tenemos que hacer algo que no nos gusta. Aprendemos a llevarnos bien con nuestros amigos y a compartir lo que tenemos. Todo esto ıequiere cambio.

1. Pídales a los estudiantes que describan las maneras en que ellos han cambiado enfocando en sus fotos actuales y las de ellos cuando eran niños.
2. ¿Qué operación matemática usamos para encontrar una diferencia? ¿Qué diferencias encontramos? Correcto. en la estatura, el peso. ¿Qué otras cosas? ¿Han aprendido a hablar, a caminar, a correr? ¿Qué otras cosas han cambiado?
3. En cada oportunidad la maestra usa los nuevos términos cambio y crecimiento para avudarles a los estudiantes a que los usen propiamente durante el resto de la unidad.

ACTIVIDAD
Usando Décimos

Captando la Idea

Después de que los estudiantes han terminado sus reportes sobre las familias, explíques que han estado usando unos números nuevos que se refieren a una **porción de algo.** En el cuento, hablamos de la familia **Décimos.** ¿Por qué crees que se llama la familia Décimos? Sí, porque hay 10 personas en la familia. Cada persona en ésta familia es un décimo. Si hubieran 5 miembros de la familia, ¿cómo se llamarían? Cinco Décimos.

Explíqueles a los estudiantes que estos números nuevos que han usado para indicar una porción de algo se denominan **fracciones.** Actualmente, la palabra "**fracción**" significa una "parte" de algo, o una porción. El número nuevo, denominado una fracción, se forma con dos números: por ejemplo, el 1 y el 5, significan un quinto; el 3 y el 10 significan tres décimos, etc.

Al usar éstas familias de números, ¿descubriste algún patrón? Sí, cada número nuevo tiene 2 nombres. Por ejemplo, si tres quintos de la familia eran niños pequeños, entonces el número nuevo, tres quintos, se forma con 2 números—el 2 y el 5. El primer número se refiere de quién o de cuántos estamos hablando, y el segundo número se refiere a la familia, así como un apellido; esto es lo que estos 2 números tienen en común.

Dígales a los estudiantes que los dos números que se necesitan para hacer una fracción se llaman **el numerador**, que siempre es **el primer número. El segundo**

número se llama **el denominador**. El número que tiene en común cada miembro de la familia es el denominador. Cuando sólo hay dos números en una familia, esta familia se llama las Mitades, y no lo que tal vez hayas pensado — los Doses. A ellos les gusta ese nombre mejor.

LECCION 2 Nuestras Células: Unidades Minúsculas de Crecimiento y Cambio

Captando la Idea

Toda cosa viviente se compone de células. Los organismos más pequeños — la bacteria — se componen de una sola célula. Las células más grandes son las yemas de los huevos de gallina. Muestre el diágrama. Las paredes de las células se llaman la membrana.

Las células son las unidades más pequeñas del cuerpo humano y no se pueden ver sin un microscopio. Las células que realizan la misma función se localizan en formas que producen "tejidos" como la piel, los músculos, los huesos y otros órganos como el hígado, los pulmones, y los riñones.

Los tejidos son grupos de células que realizan la misma función, por ejemplo, el tejido de los músculos, o el tejido de los huesos.

Los órganos son tejidos que se agrupan para realizar una función específica, como el corazón o el hígado.

La maestra les dice a los estudiantes que el cuerpo humano se compone de muchas células.

1. Las células tienen formas y tamaños diferentes.
2. El cuerpo produce más de un billón de células cada minuto.
3. Algunas células son de músculos, algunas son de huesos, otras son de la sangre, de la piel, o de los nervios.
4. Cada célula puede producir células nuevas separándose en dos células distintas; decimos que las células se **dividen.**
5. Las células funcionan para que los humanos crezcan.
6. Las células funcionan para que los humanos se curen partes lastimadas del cuerpo produciendo células nuevas.
7. Las células de la sangre llevan alimento y oxígeno a todas las otras células del cuerpo para que éstas se desarrollen y reproduzcan, o producir células nuevas.
8. Hay células especiales que el cuerpo necesita para reproducirse.
9. Dentro de la membrana celular hay una substancia llamada citoplasma.
10. Dentro de la célula, junto con el citoplasma se encuentra el núcleo (el corazón o centro) que controla las acciones de la célula. El núcleo crece y luego se separa en dos partes para formar dos células nuevas.

LECCION 3 *El Cuerpo — una Forma Compleja*

Captando la Idea

Los órganos externos son aquellos que están en la parte exterior y que fácilmente se pueden ver y describir. **Los órganos internos** son aquéllos que están en la parte interior del cuerpo y que no se pueden ver. Tenemos que usar instrumentos y equipo como las radiografías para ver los órganos internos dentro del cuerpo.

Vamos a hablar de las medidas que han tomado para describir al cuerpo. Miren el perfil de Juan. Juan, al lado del diagrama de tu cuerpo has escrito que mides 43 pulgadas de alto. También has escrito que mides 109 centímetros y que mides 3 pies y 1/2 de alto. ¿Por qué has usado esos números diferentes? ¿Por qué son 43 pulgadas, 109 centímetros y 3 pies y 1/2? ¿Qué es una unidad normativa? ¿Son iguales todas las unidades normativas?

LECCION 4 *El Corazón — una Bomba Sin Parar*

Captando la Idea

¿Qué se aprendió al completar la primera actividad — en la que se midió la palpitación del corazón al descansar y al hacer ejercicio? ¿Qué nos sugirió eso? ¿Esa actividad tenía algo que ver con la actividad del apio que demostró que el agua coloreada fluiría hacia arriba a las hojas? ¿Qué tienen que ver esas actividades con la de la temperatura del cuerpo? (Se hace una pausa para esperar las respuestas de los estudiantes. Al sugerir ideas ellos, escríbalas para más discusión.) Es verdad, el corazón bombea la sangre por todo el cuerpo. Por supuesto, ésa es una función de primera importancia porque la sangre que llega hasta las células hace muchas cosas.

Muestre el diagrama del corazón. Se discute sobre el hecho de que el corazón es uno de los órganos más importantes del cuerpo. Bombea sangre por todo el cuerpo, enviándola por **las arterias** y **las venas. Las arterias** son canales como tubos flexibles que llevan la sangre con oxígeno de los pulmones a las células del cuerpo. **Las venas** son canales que llevan la sangre llena de dióxido de carbono de regreso al corazón y pulmones. La sangre pasa por los pulmones para llenarse de oxígeno y dejar el dióxido de carbono, luego pasa por el hígado y los riñones para dejar otros desechos. Además de llevar oxígeno a las células del cuerpo, la sangre también ayuda a llevar alimento en forma de azúcar y proteínas a las células. Al circular la sangre por todo el cuerpo, lo mantiene caluroso.

Vamos a hablar del experimento con la temperatura del cuerpo.

1. Los estudiantes se comparan las temperaturas; se comparan los resultados con otros grupos.

2. Se hace un hipótesis acerca de la temperatura del cuerpo. ¿Por qué se mantiene la temperatura del cuerpo a los 98 grados F.?

En el **Art Center** los estudiantes recortan el diagrama del corazón. En la **actividad** — El Corazón se le colorea y localiza en su lugar apropiado en el diagrama del cuerpo. Explíqueles a los estudiantes que las arterias tienen un color rojo porque llevan la sangre que está llena de oxígeno a las células del cuerpo, y que las venas tienen un color azul porque están devolviendo los deshechos corporales para ser evacuados. Usando el código de dos colores, se puede trazar por donde va la sangre y lo que hace.

Después de haber tenido los estudiantes una oportunidad de participar en todas las actividades, se discute: **las arterias** son canales, como tubos flexibles, que llevan la sangre con oxígeno de los pulmones a las células del cuerpo. **Las venas** son canales, tubos flexibles, que llevan la sangre llena de dióxido de carbono de regreso al corazón y pulmones.

En el **Mathematics Center** los estudiantes:

1. siguen trabajando en la Actividad — Las Matemáticas del Cuerpo, Partes I y II
2. completan la Actividad — Velocidades.

ACTIVIDAD

La Temperatura del Cuerpo

Captando la Idea

1. ¿De dónde creen que viene el calor que mantiene al cuerpo caluroso?
2. Hemos aprendido que el calor es un tipo de energía; ¿de dónde viene esta energía de calor? (Las células queman el alimento con el oxígeno que les lleva para crear energía de calor y otros tipos de energía que necesita el cuerpo.)

LECCION 5 *Los Pulmones: un Intercambio de Gases*

Captando la Idea

1. Use el modelo construido para **la Actividad** — Cómo Funcionan los Pulmones para discutir la estructura y funcionamiento de los pulmones. Use el diagrama **Actividad** — Los Pulmones. Explique cómo funcionan los pulmones enseñándoles a los estudiantes otras fotos y diagramas, así como el modelo también, poniendo el enfoque en:
   1. **Los pulmones** son dos órganos en cada lado del **torso** que realizan la misma función.
   2. Los pulmones inhalan aire que contiene **oxígeno** por la nariz y la boca.
   3. Dentro de los pulmones hay unos sacos, llamados bronquíolos, en los que se **intercambia el oxígeno por el dióxido de carbono traíado** por las células sanguíneas.

4. La sangre, llena de oxígeno, pasa por el corazón y por las arterias a las células del cuerpo, para llevar el oxígeno y recoger el dióxido de carbono.
5. La sangre, llena de dióxido de carbono, regresa a los pulmones por las venas y se comienza el ciclo de nuevo.
6. Un músculo largo y fuerte llamado **el diafragma** funciona para sacar aire de los pulmones cuando están llenos. Los abre cuando necesitan aire fresco. El diafragma se encuentra debajo de los pulmones.
7. Los pulmones tienen la capacidad de llenarse de aire cuando **inhalamos.** Y luego al sacar aire **exhalamos.** ¿Cuánto aire contienen los pulmones? Podemos descubrir esto en uno de nuestros experimentos.

2. Ahora los estudiantes discuten la idea de la Capacidad de los Pulmones. ¿Cuál es otra palabra para capacidad? (volumen, tamaño o cantidad). En los centros los estudiantes se turnan para describir cómo funcionan los pulmones. Comparan la capacidad de los pulmones con otros miembros del grupo. Si un miembro de la clase, incluyendo la maestra, o una maestra de otra clase, toca un instrumento musical (la flauta, la trompeta, uno de lengüeta etc.) podría demostrar a la clase la manera en que se toca. El músico podría discutir cómo mantiene fuertes los pulmones para tocar bien.
3. Discutan: ¿Por qué se respira con mayor rapidez al correr?
4. Los estudiantes colocan recortes de los pulmones en los lugares apropiados sobre los diagramas del cuerpo durante la primera lección. Nota: **se dejan los pulmones sin pegarse** al pegar la tráquea en el lugar apropiado. Se debería permitir que se levanten los pulmones para poder ver los órganos que se hallan abajo.

En el **Mathematics Center** los estudiantes completan **la Actividad** — ¡No detenga su aliento!

LECCION 6 *Los Músculos y los Huesos — una Máquina Magnífica*

Captando la Idea

Usando el modelo de los músculos y los huesos que han hecho los estudiantes, se repasan la contracción y relajamiento de los músculos que trabajan en unión para hacer mover un brazo. Durante las clases de Educación Física, el maestro podría ayudarles a los estudiantes para que muevan un brazo o una pierna y toquen los músculos para identificar el que se relaja mientras que el otro se contrae para hacer que se mueva la extremidad. Luego, se mueve la extremidad en dirección contraria para ver cómo se sienten los músculos.

Dígales a los estudiantes que los huesos no sólo hacen que se mueva el cuerpo, sino que también lo protegen. El cráneo es un buen ejemplo de cómo un hueso protege el cerebro. Las costillas son otro buen ejemplo de cómo los huesos protegen los órganos importantes del cuerpo como el corazón y los pulmones.

Se invita a un médico a visitar la clase para hablarles a los estudiantes de los huesos y músculos.

LECCION 7 *El Estómago y los Intestinos — los Procesadores de Alimento*

Captando la Idea

Dígales a los estudiantes que el estómago realiza una actividad similar al procesador de comida. El cuerpo no puede utilizar la comida que metemos en la boca en la forma que se encuentra. La comida necesita preparación; necesita ser procesada. El procesamiento comienza en la boca. La boca comienza la digestión cortando la comida en pedacitos y mezclándolos con la saliva. El proceso sigue en el estómago.

La maestra les distribuye galletas o un bocadito a los estudiantes y les pide que adivinen cuáles podrían ser los ingredientes. La maestra escribe las respuestas en un cuadro grande de papel. Los estudiantes comen las galletas o el bocadito, y hacen un hipótesis de lo que sucederá al comerlo. Se vuelven a escribir las respuestas en un cuadro grande de papel. Luego la maestra lee el cuento: **What Happens to a Hamburger.**

La maestra presenta o un modelo de un cuerpo humano en el que se ven el estómago y los intestinos, o un retrato y/o diagrama del aparato digestivo. Les dice a los estudiantes que otra función muy importante del cuerpo es que puede utilizar comida para sacar energía. El cuerpo no puede usar La comida para energía en su forma original. Lo tiene que convertir en un líquido para que la sangre pueda llevar el alimento a las células del cuerpo para energía. Use el diagrama que viene incluido para señalar las diferentes partes del cuerpo que procesan la comida al digerirla.

En cuanto entra la comida en la boca, la saliva comienza a mezclarse con la comida al ser masticada. Esto significa que comenzamos a digerir la comida. Si el alimento es un líquido, como la leche, no lo masticamos, sino que va directamente al estómago donde se digiere más. La digestión es el proceso en que la comida es convertida por las químicas en la boca, el estómago, y los intestinos en una forma líquida que pueden sacar las células del revestimiento intestinal. El proceso de digestión continúa en los intestinos, que son tubos largos que llevan el alimento digerido del estómado y luego lo eliminan, o se deshacen de lo que queda como desechos.

El agua no es alimento. Por lo tanto, no se digiere. Se utiliza en el proceso de digestión. Esa es una razón por la que debemos beber la cantidad necesaria de agua todos los días para que el cuerpo funcione bien.

La maestra discute la función del estómago y los intestinos usando un modelo/diagrama de éstos. Se pueden escribir fragmentos de oraciones al discutir el proceso los estudiantes. Se utilizan estos fragmentos en el **Writing Center.**

El Estómago

1. El estómago es como una bolsa de plástico estirado que guarda alimento al digerirlo. Se necesitan aproximadamente diez minutos para que la comida que se pasa pueda llegar al estómago.
2. La comida llega al estómago por un tubo llamado **el esófago.**
3. Unas glándulas pequeñas en el estómago producen ácidos que digieren la comida.

4. Al entrar la comida al estómago, los músculos comienzan a mover las paredes del estómago.
5. Los músculos estomacales trituran la comida para mezclarla.
6. Los ácidos y la trituración ayudan a desmenuzar la comida en pedacitos de menor tamaño, o digerirla.
7. El estómago contiene una válvula o puertita que se cierra para mantener la comida adentro.
8. El estómago del adulto puede estirarse para contener casi dos cuartos de alimento.
9. Cuando el estómago ha digerido la comida hasta donde pueda, se abre la válvula y el alimento va al intestino delgado.
10. ¡Cuando el estómago está vacío, se encoge como un globo sin aire!

Luego la maestra dirige el enfoque a:

Los Intestinos Delgado y Grueso

1. El intestino delgado es un músculo de aproximadamente veinte pies de largo.
2. La pared del músculo empuja el alimento a través de las vueltas del intestino delgado.
3. Se digiere el alimento al ser empujado por el intestino delgado.
4. Las enzimas digestivas desmenuzan la comida en partecitas minúsculas.
5. Se requieren de dos a cuatro horas para el proceso de la digestión.
6. Después de digerirse la comida, pasa a la sangre donde proporciona energía al cuerpo.
7. Unas cositas muy pequeñas llamadas microvellosidad o vellos detienen el alimento en el intestino delgado .
8. Los vellos absorben todo el alimento utilizable y lo pasan a la sangre.
9. Los vellos ayudan a pasar el alimento hacia abajo al intestino grueso.
10. El intestino grueso recibe los desechos del intestino delgado.
11. Se requieren de diez a doce horas para que los desechos en el intestino grueso completen su recorrido.
12. La pared muscular empuja los desechos a través de cinco pies del intestino grueso.
13. Se saca el agua de los desechos.
14. Los desechos son evacuados del cuerpo por el recto.
15. Se requieren aproximadamente veinticuatro horas para que la comida pase desde la boca al recto.

Los estudiantes usan los recortes de cada uno de los órganos: el estómago, el intestino delgado y el grueso y los localizan en su lugar apropiado en el diagrama del cuerpo. Los estudiantes colorean los órganos usando los colores sugeridos en las fotos que han visto en los libros de referencia.

LECCION 8 *El Hígado, los Riñones, la Piel — los Grandes Eliminadores*

Captando la Idea

Ya que la piel cubre todas las partes externas del cuerpo, es fácil verla y observarla. En cambio, el hígado y los riñones son órganos internos. Esto hace difícil que los niños piensen en ellos más allá de haber oído las palabras hígado y riñones. Por lo tanto es importante mostrar una variedad de fotos y si es posible, modelos del torso humano que muestran los dos órganos. Se señala el hígado y los niños usan los dedos y las palmas de las manos para localizar el área aproximada de su propio hígado. Los riñones se encuentran en parejas en los dos lados de la columna dorsal. Estos tres órganos comparten una función muy importante - eliminan los desechos corporales.

La maestra les dice a los estudiantes que el cuerpo funciona en una manera parecida a una máquina que necesita energía para andar. Al producir energía de la comida que digiere, el cuerpo produce derivados llamados "desechos". El cuerpo tiene que deshacerse de estos desechos; lo hace, en parte, por el hígado, los riñones y la piel. La sangre recoge desechos de todas partes del cuerpo y los lleva al hígado, los riñones y la piel. Entonces se separan los desechos de la sangre y son evacuados en diferentes maneras. Si el cuerpo no puede deshacerse de estos desechos, se enferma.

Los estudiantes discuten el concepto "desechos" usando ejemplos como cáscaras de vegetales, o de cacahuates u otros.

Los estudiantes completan **la Actividad** — Huellas Digitales.

Los estudiantes localizan y pegan (en su lugar apropiado) los riñones, la vejiga, el hígado, el bazo, la vesícula biliar y el páncreas.

LECCION 9 *El Cerebro — la Computadora Maestra*

Captando la Idea

La maestra les dice a los estudiantes que pongan una mano en la frente y la otra en la parte trasera de la cabeza, inmediatamente arriba del cuello. En las manos tienen el cráneo que contiene **el cerebro.** Si pasan los dedos hacia abajo por el cuello, pueden tocar los huesos del cuello que soportan **la espina dorsal.** El cerebro está conectado a la espina dorsal. El cerebro controla todas nuestras acciones, tanto las voluntarias como las involuntarias, porque funciona como una computadora. Pero funciona de una manera parecida a un circuito eléctrico. (Ahora se pueden repasar las preguntas hechas al final de **la Actividad** — Los Nervios para aclararles la analogía a los estudiantes.)

El cerebro transmite las impresiones a través de la espina dorsal desde el cerebro hasta los brazos, las piernas. **Los nervios** funcionan como alambres que transmiten la impresión.

Los estudiantes discuten las siguientes ideas usando diagramas y/o dibujos.

El Sistema Nervioso — El Cerebro, la Espina Dorsal, y los Nervios

1. El cerebro parece arrugado como una pasa de ciruela, pero es mucho más grande.
2. Llegará a pesar entre dos y tres libras cuando sea cerebro de adulto.
3. Es muy frágil y blando.
4. El cráneo lo protege.
5. El cerebro está conectado a la espina dorsal.
6. La médula espinal contiene muchos nervios juntos y la protegen los huesos de la espina dorsal.
7. Los nervios son como alambres telefónicos que transmiten impresiones desde el cerebro hasta el cuerpo entero.
8. Algunas de las impresiones pasan a las diferentes partes del cuerpo a través de la espina dorsal.
9. La espina no solamente transmite impresiones del cerebro, sino que también controla algunas acciones involuntarias (el parpadear de los ojos al acercarse algo).
10. El cerebro mantiene palpitando al corazón, respirando a los pulmones y les dice a los músculos cuándo deben moverse. El cerebro piensa y recuerda cosas.
11. El cerebro es donde vemos, oímos, saboreamos, olemos, y sentimos.

ACTIVIDAD

Los Nervios Forman un Circuito

Captando la Idea

1. ¿Qué tipo de energía fluye desde la batería hasta el foco? (Electricidad, eléctrica)
2. ¿Cómo tiene que transmitirse la electricidad? (En una trayectoria cerrada)
3. ¿Qué otra palabra se oye similar a circuito? (Círculo; un círculo es una trayectoria cerrada que necesita la electricidad para pasar desde la batería hasta el foco.)

LECCION 10 *La Reproducción — Comienza un Nuevo Ser Humano*

Captando la Idea

Hay muchos sucesos que tienen que llevarse a cabo antes de que nazca un ser humano.

1. El primer suceso es que una joven y un joven tienen que crecer para llegar a ser adultos para que puedan tener hijos. El crecer, o llegar a ser un adulto, significa que cambian las diferentes partes del cuerpo; por ejemplo, las piernas se hacen más largas y fuertes.
2. Cuando los niños han crecido hasta ser casi adultos, el cuerpo comienza a formar nuevos órganos que son importantes para formar bebés.
3. En las niñas se forman dos sacos de óvulos que contienen muchas células que llegan a ser bebés. Estos dos sacos están conectados al **útero.** El útero se encuentra muy al interior de su cuerpo y debajo del estómago. El útero es un órgano como una bolsa en donde el bebé puede crecer. En las niñas también se forman pechos que producirán leche para ayudarle a dar de comer al bebé después de nacer. Pero la niña no puede hacer un bebé sola.
4. Los niños que son casi adultos comienzan a cambiar. Ellos también tienen bolsas donde **la esperma,** que también son células especiales, comienzan a formarse. Se localizan estas dos bolsas entre las piernas. Los niños tienen un **pene** que también crecerá.
5. Cuando el niño y la niña llegan a ser adultos y quieren tener un bebé, el hombre usa el pene para depositar las células espermáticas en el cuerpo de la mujer para que la esperma pueda pasar al lugar donde se une a la célula ovular en el cuerpo de la madre.
6. Las células espermáticas son pequeñas en comparación con las células ovulares de la mujer. Las células espermáticas tienen colitas que les permiten moverse para encontrar el óvulo. Comienza un nuevo ser humano con la unión de las dos células — la célula ovular de la mujer y la célula espermática del hombre.
7. Al unirse las dos células, comienzan a desarrollarse y a dividirse para crear nuevas células. Estas células se dividen rápidamente, y dentro de nueve meses el nuevo bebé que se está formando dentro de la madre está lista para salirse y vivir por cuenta propia. En ese momento hay un **nuevo ser humano.**

ACTIVIDAD *Una Célula de Huevo*

Captando la Idea

Dígales a los estudiantes que un huevo de gallina es una célula. La cáscara es la membrana exterior que guarda el contenido del huevo. La clara del huevo es el citoplasma y la yema del huevo es el núcleo.

1. Vamos a describir el huevo antes que rompiéramos la cáscara. (Los estudiantes reportan sus observaciones.)
2. Después de romper la cáscara, ¿cuántas partes vimos? (La cáscara, clara y la yema y, en algunos de los huevos, un pequeño objeto adherido a la yema)
3. Los huevos que tienen un objeto pequeño y claro adherido a la yema han sido **fertilizados;** las dos células — la célula del huevo (la parte amarilla) y **la esperma** (el objeto pequeño y claro) se han unido.
4. Si se hubieran guardado los huevos fertilizados en un lugar caluroso, se habrían desarrollado para formar polluelos. Los huevos que no se hubieran fertilizado, no habrían producido polluelos.

unidad

1 La Buena Salud

● ● ● Información de Fondo para la Maestra

Los niños necesitan desarrollar buenos hábitos que los lleven a la buena salud y seguridad a una edad temprana. Al ir aprendiendo de los sistemas del cuerpo y de sus funciones relacionadas, los estudiantes asocian esas funciones con la necesidad de mantener su salud por medio de hábitos apropiados con respecto a la nutrición, aseo o higiene, y ejercicio apropiado y descanso. También pueden desarrollar una conciencia de los grandes peligros relacionados con el uso de sustancias no apropiadas como los cigarrillos, inhalantes y otras drogas.

Ya que puede aumentarse una comprensión de los hábitos apropiados de salud cuando hay conciencia de las capácidades del cuerpo, las funciones y limitaciones (p. ej. no puede utilizar el humo de los cigarrillos como elemento nitritivo), se recomienda que esta unidad sobe la salud y seguridad sea precedida por la unidad sobre el cuerpo humano. Está última unidad proporcionará la información requerida para que el estudiante comprenda la necesidad de desarrollar y mantener esos hábitos.

LECCION 1 La Buena Salud = El Buen Vivir

Captando la Idea

Se les muestra a los estudiantes los cuadros de las personas que están divirtiéndose en diferentes actividades. Se describe cómo se ven esas personas. ¿Dónde están? ¿Adentro o afuero? ¿Hace frío o calor? ¿Les importa el tiempo a las personas saludables? ¿Son activas, sonrientes? ¿Se ven vigorosas? ¿Les están brillando los ojos? Hagan una lista de otros descriptores que indiquen que las personas saludables se divierten y pueden disfrutar de la vida.

Se discute lo que los estudiantes tuvieron que hacer para mantener su balance en la barra fija. ¿Qué quiere decir la palabra balance? ¿Qué creen que la idea del "balance" tenga que ver con la buena salud? (No se puede sólo jugar, o dormir o comer o trabajar o sólo hacer una cosa para la buena salud. Se necesita un balance.)

¿Cómo ayuda el sudor, que es humedad, o agua, al cuerpo para que se enfríe después del ejercicio, el juego o el trabajo fuerte? (Sabemos que para que se evapore el sudor, necesita absorber calor; al evaporarse el sudor, saca calor del cuerpo para enfriarlo.) Eso quiere decir que necesitamos tomar agua para reemplazar el agua que perdemos al sudar.

¿Qué aprendimos que significa "igual"? Igual es otra manera de decir "es lo mismo que", o "es otro nombre para". Usamos 'igual' para decir los números en diferentes maneras, como aprendimos en la actividad sobre matemáticas, pero aunque se utiliza 'igual' en distintos modos, todavía significa lo mismo. Cuando decimos que la buena salud es igual al buen vivir, ¿cómo estamos usando la palabra 'igual'? (La buena salud es otro nombre para el buen vivir; la buena salud es lo mismo que el buen vivir.)

También trabajaron en la Fábrica de Galletas de Almendras agrupando las galletas en grupos de cinco. No solamente se divierte uno comiendo las galletas de almendras, sino que también tienen muchos ingredientes que le dan al cuerpo energía y materiales que le ayudan a crecer. Estudiaremos más sobre esto en la próxima lección.

LECCION 2 *Eres lo que Comes*

Captando la Idea

¿Que necesita el cuerpo para hacer su trabajo? (Comida) También decimos que el cuerpo necesita una **nutrición apropiada.** ¿Qué proporciona la comida? (Energía) ¿Qué alimentos proporcionan energía? (Las frutas, legumbres, y granos por razón de que nos dan azúcar y fécula para energía.) Decimos que la nutrición apropiada es el **primer** principio de la buena salud. ¿Qué significa esto? (Espera para las contestaciones de los estudiantes.)

Ahora, vamos a hablar de lo que hicimos en el **Mathematics Center.** Hemos usado **los números ordinales.** Los números ordinales nos indican la posición de un objeto. Miren la palabra 'orden'. ¿Pueden encontrar parte de esa palabra en 'ordinal'? Sí, 'ord' se halla en orden y ordinal. Eso es lo que nos indican los números ordinales — el orden o posición de los objetos. Los números ordinales están relacionados con **los números cardinales.** Los números cardinales son los que conocemos más — nos indican cuántas cosas hay en una unidad o grupo.

¿Por qué crees que decimos que la nutrición es el primer principio de la buena salud? Sí, la nutrición apropiada es el primer principio de la buena salud porque sin la nutrición el cuerpo no puede seguir viviendo con buena salud por un período de largo tiempo. ¿Qué pasa cuando estamos enfermos o no tenemos mucha energía? ¿A caso estamos contentos? ¿Podemos hacer las cosas que queremos? No, la nutrición es importante, y por eso decimos que es el primer principio de la buena salud.

Cuando estuvimos estudiando sobre las comidas que nos dan la energía, ¿cuáles experimentos completaron? ¿Qué aprendimos en nuestro experimento usando el iodo? Es verdad, que muchos alimentos que comimos contienen fécula que es un alimento que nos da energía.

Los especialistas en la nutricíon, las personas que estudian los tipos y cantidades de alimento que necesita la gente para tener buena salud, miden la cantidad de energía alimenticia que requieren los organismos vivos usando la unidad de calor que se llama **una caloría.** Se utiliza esa unidad para indicar cuánto alimento necesitamos diariamente. Podremos balancear nuestras comidas y no subir de peso si no comemos demasiada grasa y demasiada fécula.

Pero, no es suficiente la fécula en nuestra dieta. ¿Qué más necesitamos? ¿Qué proporcionan el pescado, el pollo, el pavo, y la carne de res? (Esos alimentos nos dan proteínas que se requieren para desarrollar músculos grandes y renovar todas las células.)

Como lo vimos en las actividades sobre la nutrición apropiada, todos los alimentos nos dan energía, y nos ayudan a desarrollar nuestro cuerpo, pero todos los alimentos nos dan más de una cosa y menos de otra que necesita el cuerpo. Muy pocos alimentos nos dan **todo lo que necesita el cuerpo** a la misma vez. Por eso necesitamos comer **comidas balanceadas.** Los estudiantes consideran: ¿Le es necesaria **la grasa** al cuerpo? ¿Es un alimento importante? ¿Cuánta grasa deberíamos tener en nuestra dieta diaria?

Trabajaron en una actividad que requería que balancearan el cuerpo para caminar de un extremo de la barra al otro. ¿Que tuvieron que hacer para mantener su balance? Es verdad, no podían inclinarse demasiado hacia un lado o otro — tenían que quedarse en el medio. ¿Qué tienen que hacer a montarse en una bicicleta? Se puede pasear en una bicicleta sólo si se balancea en ella. Lo mismo sucede con nuestro cuerpo y las comidas balanceadas. Se nos dan energía y nutrición al comer 'comidas balanceadas'. ¿Qué creen que son 'comidas balanceadas'? (Se hace una pausa para que respondan los estudiantes.) Sí, las comidas balanceadas son las que incluyen alimentos de cada uno de los cinco grupos alimenticios. No tenemos gran cantidad de una cosa y muy poca de otra. (Se muestra el cuadro sobre la **Pirámide de la Comida.**)

La **Pirámide de la Comida** es una guía, una sugerencia, del tipo y cantidades de comida necesarias para mantener la buena salud. La Guía nos dice que debemos escoger con mayor frecuencia las comidas dentro del grupo del **Pan,** que incluye la harina de avena, el germen de trigo, el arroz, y la pasta. **Diariamente** debemos comer de 6 a 11 porciones de las comidas en este grupo. Del siguiente grupo, el de las **Verduras** o de las **Legumbres,** debemos comer de 3 a 5 porciones diariamente, y del grupo de las **Frutas** debemos comer de 2 a 4 porciones diariamente. Diariamente se debe comer de 2 a 3 porciones del grupo de la **Leche.** La carne de res y de pollo, los frijoles pintos, los huevos, y las nueces forman parte del grupo de la **Carne,** y diariamente debemos comer de 2 a 3 porciones. En lo alto de la pirámide hay un triángulo pequeño que incluye la grasa, los aceites, y los dulces. Como cualquier comida incluye grasa y azúcar, no se considera éste como un grupo particular de la comida. No obstante, para mantener la buena salud, uno debe usar la grasa, los aceites, y el azúcar escasamente, o con mucho cuidado. La grasa y el azúcar son importantes, pero no proveen la energía y las sustancias fundamentales que otras comidas en una dieta balanceada proveen.

También dijimos que el agua es una de las necesidades del cuerpo. ¿Todos los seres vivientes necesitan agua para vivir? Vamos a ver la cantidad de agua que necesitan los organismos vivientes.

LECCION 3

¡Popeye Tiene Razón!

Captando la Idea

Los estudiantes discuten la importancia de tomar la cantidad apropiada de agua cada día.

1. ¿Por que requería más de esos vasos pequeños (se señalan las fotos de los vasos en el cuadro.) que de estos vasos más grandes para satisfacer la cantidad diaria requerida de agua?
2. Demuestren en por lo menos tres maneras diferentes cómo pueden satisfacer la cantidad diaria requerida de agua para buena salud.
3. Si hacen mucho ejercicio todos los días, ¿se va a necesitar más, menos o la misma cantidad de agua para la cantidad diaria requerida de agua? ¿Por qué creen eso?

Los estudiantes discuten el experimento sobre mascar chicle y especulan sobre el por qué y cómo cambió el chicle.

1. ¿Por qué había una diferencia en los dos pesos?
2. ¿Qué perdió el chicle que tiene peso?
3. ¿Qué pasó al azúcar o los dulcificantes?
4. ¿Qué hará el azúcar en su cuerpo?
5. ¿Cómo afecta el azúcar al cuerpo?
6. ¿Es necesario el azúcar para que su cuerpo funcione bien? ¿Qué pasa si el cuerpo recibe demasiado azúcar?

Los estudiantes discuten la noción de una dieta balanceada que incluye el tomar suficientes calorías para darle energía al cuerpo. También es importante que los humanos no coman más alimento que el cuerpo pueda utilizar. Si comemos demasiado, el cuerpo almacena la energía extra en forma de grasa en el cuerpo. Demasiada grasa puede causar problemas de salud. Los pediatras han recomendado que los niños consuman las siguientes cantidades de calorías cada día para darles las calorías que necesitan, y para mantener una dieta balanceada.

ACTIVIDAD

Comamos Nuestras Espinacas

Captando la Idea

Se les dice a los estudiantes que cada rompecabeza representa algún alimento que necesita el cuerpo para trabajar, jugar, o mantenerse saludable. La pieza faltante es lo que podría llamarse un mineral o una vitamina. Los minerales y vitaminas no son alimento como la carne, pan o fruta, pero son sustancias que necesita el cuerpo para las células funcionen bien.

1. ¿Qué creen que tiene que hacer una célula del cuerpo si necesita un mineral o una vitamina para hacer su trabajo? Es verdad, tiene que bus-

carlo. Pero si no puede encontrarlo, ¿qué creen que sucede entonces? No lo hace; lo saca de otra parte del cuerpo; o se priva de ellos.

2. Vamos a descansar ahora y comer nuestra gelatina. ¿Cómo? ¿No les gusta? ¿Por qué? Es verdad, a veces no sirven los sustitutos. En realidad no necesitamos el azúcar que hay en la gelatina, pero no servía de bocadito.
3. Eso es lo que sucede a los alimentos cuando les faltan minerales o vitaminas. No puede hacer el trabajo bien.
4. ¿Cómo sabrán si están recibiendo todas las vitaminas y minerales que necesitan? Es verdad, cuando comen una dieta balanceada.
5. Vamos a ver esta lista de vitaminas y minerales escrita en esta caja de cereal.
6. Uno de los minerales requeridos es el hierro. Por eso a Popeye le gusta la espinaca — así saca el hierro que necesita para pelearse con Bluto.

LECCION 4 *D - S - R para la Buena Salud*

Captando la Idea

En las actividades que completamos, aprendimos que el cuerpo necesita descansar para poder hacer unas cosas muy importantes. Aprendimos que el cuerpo:

1. produce muevas células todos los días,
2. elimina desperdicios del cuerpo, y
3. lleva alimento a las células.

Eso significa que el cuerpo necesita tiempo para hacer todas esas cosas. Necesita ir más despacio. ¿Deja de palpitar el corazón alguna vez? ¿Deja de pensar el cerebro alguna vez? ¿Deja de circular la sangre por el cuerpo alguna vez? No, todas estas cosas tienen que continuar. El descanso y el sueño son necesarios para mantenerse saludable. Cuando el cuerpo duerme, la palpitación del corazón y la respiración van más despacio.

LECCION 5 *Nuestra Amiga — la Espuma*

Captando la Idea

Demuestre cuadros de bacterias y explique que son muy pequeñas y que no se pueden ver sino a través de un microscopio. Las bacterias necesitan alimento para cercer. Crecen en muchas cosas, pero también pueden crecer dentro de nuestro cuerpo. Crecen en la boca, en la nariz, entre los dientes, debajo de las uñas, en el pelo y en las orejas. Tenemos que mantener todo nuestro cuerpo limpio para que la bacteria no crezca en él. Las bacterias son una causa de enfermedad y el mantenerse limpio y vacunarse ayudan a proteger en contra de la enfermedad.

Se les pide a los estudiantes que observen una marca en la palma de la mano de la maestra antes y después de lavarse las manos con agua y jabón. Se explica que la gente puede ver la marca y deciden que se necesita lavar las manos. Las bacterias son muy pequeñas y no las podemos ver. La tierra y otras marcas son indicaciones de que puede haber bacteria en las manos y que se deben de lavar.

Se discute el experimento con la papa pelada al ir haciendo los estudiantes sus observaciones diarias sobre las dos papas. Se transfieren con facilidad las esporas del moho desde las manos a la papa. Se multiplican rápidamente. Después de unos días, es probable que se forme el moho en la papa pelada con las manos sin lavar. Se notará poco o nada de crecimiento en la papa pelada después de lavarse bien las manos. Se hace notar que los frascos estaban limpios antes de los experimentos.

Las observaciones diarias, particularmente después de que el moho empiece un crecimiento rápido, les ayudan a los estudiantes a darse cuenta de la importancia de lavarse las manos antes de tocar la comida. Si está disponible un lente de aumento potente, los estudiantes pueden observar cómo se ve el moho. Se les recuerda a los estudiantes que aunque parecieran limpias las manos antes de pelarse la primera papa, no lo estaban.

Al final del día los estudiantes quitan la venda de la herida imaginaria y comparan la piel cubierta con la que está a su alrededor. Los estudiantes discuten cómo protege la venda a la herida de la bacteria que causa infección y enfermedad.

LECCION 6 *El Ejercicio es Para la Vida*

Captando la Idea

Se lee el libro **The Sand Lot.** Se discuten las ideas de lo que realmente es el ejercicio. ¿Puede ser divertido? ¿Tiene que ser como el trabajo? De muestra la etiqueta de palabras "ejercicio". El ejercicio es cualquier actividad que haga trabajar fuerte al cuerpo. Se tiene que hacer ejercicio con regularidad para ponerse y mantenerse físicamente sano.

Muchas de las partes de nuestro cuerpo están diseñadas para el movimiento, como las manos, pies y brazos. ¿Cuáles son otras partes que tienen que moverse? (dedos, corazón, pulmones). Es necesario el ejercicio regular para mantener a estas partes en buena salud. El ejercicio regular hace que el corazón palpite de una manera fuerte y eficiente. Un corazón fuerte bombea más sangre con cada palpitación que un corazón débil. También se necesitan pulmones fuertes. El ejercicio hace que los pulmones inhalen más oxígeno que sin ejercicio. Se hace una lista de diferentes maneras en que los niños pueden hacer ejercicio.

LECCION 7 Practicar la Seguridad Ayuda Nuestra Salud

Captando la Idea

Se introduce vocabulario como, drogas, medicinas, recetas médicas en una discusión. Los estudiantes nombran algunas medicinas que se usan para una enfermedad específica. Se discute con los estudiantes la diferencia entre una droga y una medicina. Se discute la idea de que únicamente los médicos pueden recetar algunas medicinas, y el por qué. Se discute la idea de que aunque un farmaceútico ha estudiado y sabe de medicinas, el farmaceútico no puede recetar ciertas drogas — únicamente los médicos.

Di NO a las Drogas.

Una droga es algo que no sea alimento, agua, ni aire que puede alterar la manera en que el cuerpo funciona. Algunas drogas pueden ser de ayuda como las que están en las medicinas que hacen que uno se sienta mejor cuando está enfermo. Pero, aun estas medicinas pueden ser perjudiciales si no se usan correctamente.

También se encuentran las drogas en productos que no sean medicinas. Los productos caseros como el diluyente de pinturas, el pegamento para aviones de juguete, el cemento de hule, las insecticidas, y los limpiadores de hornos pueden ser muy perjudiciales si se usan en el cuerpo. Ninguno de estos productos se debe de usar en nuestro cuerpo.

LECCION 8 Las Profesiones de Salud

Captando la Idea

1. Los estudiantes discuten entre sí y hacen una lista de los diferentes profesionales de salud de que sepan ellos.
2. Usando folletos de un departamento de servicios de salud local para sugerir ideas, los estudiantes hacen una lista de otros profesionales de salud y describen las labores que realizan.

unit

K Five Senses

Prior Knowledge

The student has

1. described objects
2. sorted objects
3. counted orally to 10
4. pointed to pictures/objects that are the same or different.

Mathematics, Science and Language Objectives

Mathematics

The student will

1. summarize data on a graph
2. classify objects by shape, size and color
3. duplicate patterns
4. order objects by size
5. create and describe sets and subsets
6. determine quantity in sets and subsets up to five and two fives as 10, etc.
7. estimate number of objects they can see, feel in given sets.
8. explore idea of size in relation to distance.

Science

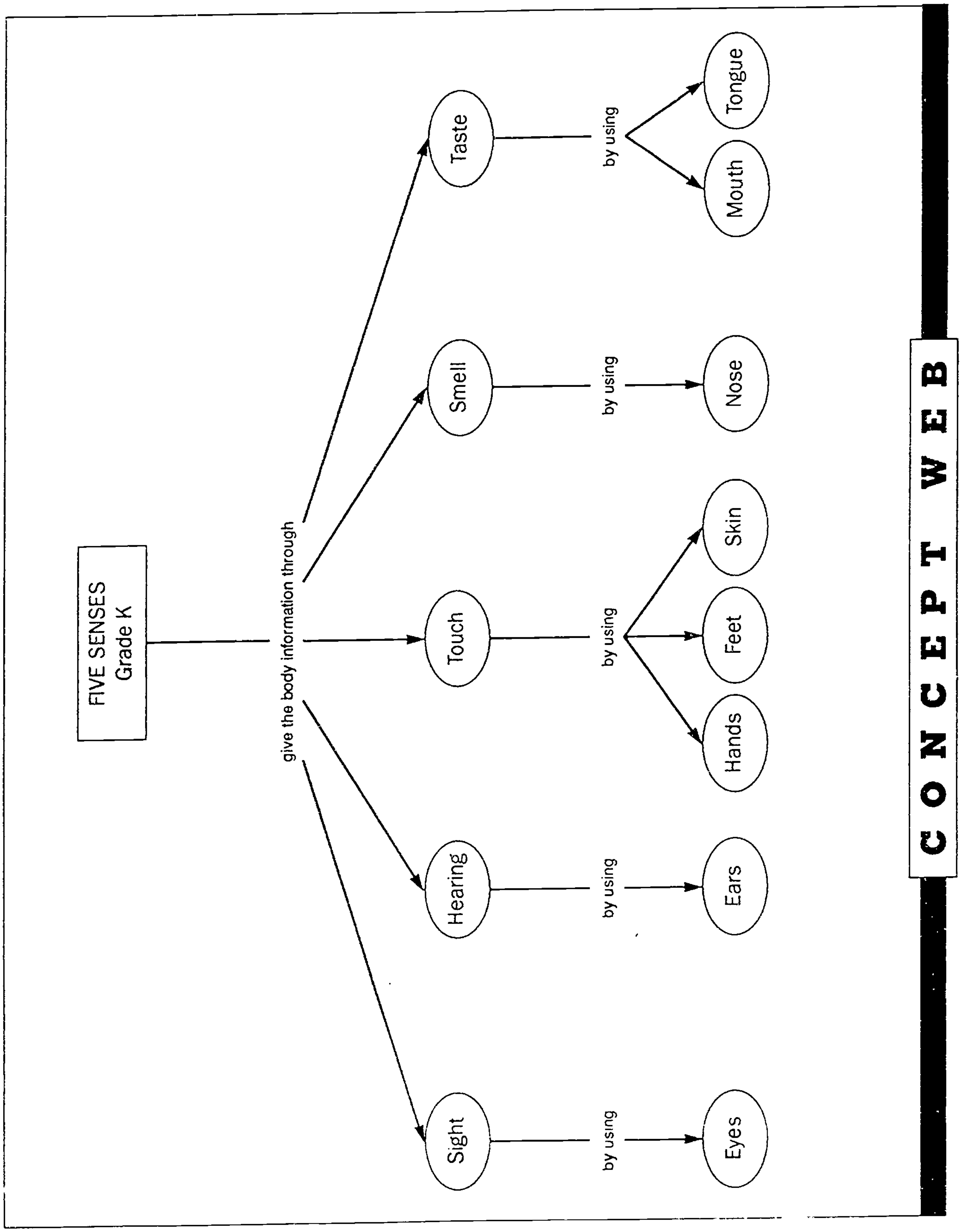
The student will

1. name the five senses
2. use one of the five senses to discover properties of objects in the environment
3. name a body part used for each sense
4. compare objects using only one sense
5. classify objects using only one sense
6. become aware of various physical impairments
7. describe how the five senses work together
8. describe ways to show proper care of eyes, ears and nose
9. practice safety procedures relevant to the five senses
10. describe how each sense works.

Language

The student will

1. create a class Big Book on the five senses
2. provide and use relevant theme vocabulary where appropriate
3. use relations such as top, bottom, direction, space and location (above/below, front/back, near/far)
4. listen to taped sounds and stories
5. match written text with illustrations of each of the five senses
6. develop predictable language/pattern reading.


CONCEPT WEB
FIVE SENSES
Grade K
give the body information through
Sight
Hearing
Touch
Smell
Taste
by using
Eyes
Ears
Hands
Feet
Skin
Nose
Mouth
Tongue

VOCABULARY

touch el tacto	smell el olfato	taste el sabor	sight la vista	hearing el oído
odor olor	tongue lengua	eyes ojos	loud fuerte	skin cutis
rough áspero, a	nose nariz	see ver	smooth liso, a	strong fuerte
salty salado, a	shape figura	high alto, a	hard duro, a	weak débil
sweet dulce	color color	low bajo	soft suave	different diferente
bitter amargo	size tamaño	sound sonido	hot caliente	same igual
sour agrio	ears oídos	cold frío	feel sentir	texture textura

● ● ● Teacher Background Information

Without the information we receive through our five senses we could not function as the beings we are. Each sense is important in its own right, but each has limitations. On the other hand, one sense can be used to compensate for another. The most effective way to receive information, of course, is to use all our senses in harmony.

Another important aspect of learning about our senses is to become aware of physical handicaps that may cause difficulty for people who do not have access to these senses, though **this does not make people different or lesser.** These marvelous gifts of sensing the world we live in must be protected and cared for.

In this unit the teacher background information is quite lengthy and has been placed within each lesson. The teacher will have easier access to the information if it is closer to the other instructional material of the unit.

Perhaps more information has been added than a teacher may wish to provide the children. However, it is available; what the teacher deems reasonable should be made available to the children.

LESSON FOCUS

■ LESSON 1 ***The Five Senses***

BIG IDEAS We learn about the world through our five senses. The number five has other names.

■ LESSON 2 ***Sight***

BIG IDEAS The sense of sight helps us recognize each other and learn about color, motion and distance.

■ LESSON 3 ***Hearing***

BIG IDEAS The sense of hearing helps us learn from each other through communication. Sound can produce patterns.

■ LESSON 4 ***Touch***

BIG IDEAS The sense of touch helps us learn about our world by feeling it and learning the size, texture and shape of things.

■ LESSON 5 ***Smell***

BIG IDEAS The sense of smell helps us enjoy life and helps us learn about unsafe conditions.

■ LESSON 6 ***Taste***

BIG IDEAS Taste helps us, among other things, to select and enjoy food. There are four familiar tastes.

■ LESSON 7 ***Altogether, Now***

BIG IDEAS We learn best about our world when we use our five senses at the same time.

OBJECTIVE GRID

Lessons	1	2	3	4	5	6	7
Mathematics Objectives							
1. summarize data on a graph		•	•	•	•	•	
2. classify or sort objects by shape, size, sound and/or color		•	•	•	•	•	
3. duplicate patterns			•				
4. order objects by size		•	•	•	•	•	
5. create, describe and count the objects in sets and subsets		•					
6. determine quantity in sets and subsets up to five and two fives as 10, etc.	•	•	•	•	•	•	•
7. estimate number of objects students can see, feel in given sets		•		•			
8. explore idea of size in relation to distance.	•						
Science Objectives							
1. name the five senses	•						•
2. use the five senses to discover properties of objects in the environment	•	•	•	•	•	•	•
3. name a body part used for each sense		•	•	•	•	•	
4. compare objects using only one sense			•	•	•	•	•
5. classify objects using only one sense			•	•	•	•	•
6. become aware of various physical impairments			•	•	•	•	•
7. describe how the five senses work together							•
8. describe ways to show proper care of eyes, ears, skin and nose.		•	•	•	•	•	
9. practice safety procedures relevant to the five senses		•	•	•	•	•	
10. describe how each sense works.		•	•	•	•	•	•
Language Objectives							
1. create a class Big Book on the five senses							•
2. provide and use relevant theme vocabulary where appropriate	•	•	•	•	•	•	•

Continued on next page ▶

Lessons	1	2	3	4	5	6	7
3. use relations such as top, bottom, direction, space and location (above/below, front/back, near/far) to describe	•	•	•	•	•	•	•
4. listen to taped sounds and stories		•	•				
5. match written text with illustrations of each of the five senses		•	•	•	•	•	•
6. develop predictable language/pattern reading.		•	•	•	•	•	•

LESSON 1 The Five Senses

BIG IDEAS We learn about the world through our five senses. The number five has other names.

Whole Group Work

Materials

Book: **My Five Senses** by Aliki
Word tags: see, hear, feel, taste, smell, texture
Collection of various objects that students can sort by shape, size, texture
Chart for relevant words
Laminated picture/diagrams of the ear, eye, nose, tongue, finger (to show feeling)
Counters

Encountering the Idea

Tell the students they will begin the new unit by going outside to take a little barefoot walking trip. Ask them to talk to each other about their experiences on the trip to help them remember everything they can about the trip. Students go on a walk for at least 15 minutes. Ask questions during the trip.

Once the class returns to the classroom, have students brainstorm by describing what they experienced, describing their trip. If the students don't mention each of the five senses, ask questions: Did you smell something? What did you hear? See? What did you feel? When you smelled the cafeteria food, could you taste it? Did you see a dog (some other animal)? How did you know it was a dog? Did you see the mountains? How far are they? What color is the sky? Did you see any cars? What were they doing? What parts of your bodies did you use to get all this information? Discuss how they learn from seeing, hearing, touching, smelling and tasting.

The teacher develops a word bank or a chart using student responses. Tell students that at the learning centers they will complete many different activities that will help them learn more about how humans learn.

Exploring the Idea

At the **Art Center** students cut out pictures from magazines that show people using the five senses.

At the **Writing Center** students complete frame sentences: "I see ________ with my eyes, I hear ________ with my ears," etc. Students supply the words. The teacher writes the words on a chart for students to use for this lesson and subsequent lessons.

At the **Mathematics Center** students sort objects by color, size, shape, texture, etc.

Students use the laminated pictures of the body organs that represent the five senses to show that the number five has other names such as two plus three and one plus four. Using the pictures to group, the students show that one plus four is the same as four plus one. Using cube counters, the students show that one row of five red cubes matches a row of four white and one yellow, three brown and two black, etc.

Getting the Idea

1. After students complete their activities, ask them to review their experiences on their walk. What did they learn about the world on their trip? What did they use to learn on their trip? What is in the world besides people? How do you know? What kinds of sounds are there? How do you know? What is important about our senses? We learn about the world.
2. Read the book **My Five Senses** by Aliki to the students. Discuss the book. The students show the class the pictures they cut out of the magazines at the **Art Center** and why they chose those pictures. How were the people using their senses?
3. Collect student work for a class Big Book.
4. The students show the other members of the class how they sorted the objects in the **Mathematics Center** and explain why they chose those categories. How many categories did they form? How many objects did they put into each category? Did they put some objects into more than one category? Which ones? Why?

Closure and Assessment

Oral Assessment

1. Why do we need our five senses?
2. What can we do with our senses?
3. Tell me two other names for the number five.

Performance Assessment

1. Assess the students' performance on the sorting task at the **Mathematics Center.**
2. Assess the students' performance on the writing task at the **Writing Center.**
3. The students, using cubes, show two other names for the number five.

LESSON 2 Sight

BIG IDEAS The sense of sight helps us recognize each other and learn about color, motion and distance.

Whole Group Work

Materials

Book: **Brown Bear, Brown Bear, What Do You See?** by B. Martin, Jr.

Various leaves; a small plant or flower; a diagram of the eye; pieces of carpet, floor tile and sandpaper; binoculars; a microscope with prepared slide; hand lenses; a telescope; action pictures cut in half; photos of people wearing glasses; a seashell; an insect; several wind-up toy cars; a stapler; toy telephones; attribute blocks

Word tags: iris, pupil, eyebrow, eyelid, eyelashes

Encountering the Idea

Students, here we have a collection of leaves. Call your friend in and describe this leaf to your friend over the telephone. One or two students demonstrate and then students continue at the **Science Center.** You can't touch the leaves, only describe what you see.

Exploring the Idea

1. At the **Science Center,** using the sense of sight **only,** a student describes the properties of a leaf. At the center, the students take turns comparing the properties of various leaves. In describing a leaf, students use numbers such as one,two,three as appropriate to describe the leaf. This leaf is dark green. Look, you can see its veins. This one has five points on it. This one has only three. This one has some fuzz on it. This leaf has jagged edges, but this one has smooth edges. After they have finished their work at the center they will report to the class.
2. The students go on a "sighted" (eyes open) walk and a "non-sighted" (blindfolded) walk. The students choose partners and take turns being blindfolded. The students compare the two walks, stressing the important role the eyes play in our everyday lives. When taking the walk, the students take care to observe the colors in the environment. They also note if they saw things moving, and if they saw things that were far and close. On returning they contribute to a list of objects observed and objects' colors. Teacher writes the responses on a chart.
3. Students do **Activity** — Blind Man's Bluff.
4. Students begin **Activity** — Colorful Eyes.
5. Students do **Activity** — Eye Care.

On another day the students go outdoors to use binoculars and a telescope, alternating between the close-up and distant lenses. On returning to class, the students use hand lenses to observe their hands and fingers. They describe to each other what they see with the binoculars, telescope and magnifying lens that they can't see without them.

In small groups, the children contribute to a list of occasions (or draw illustrations) when binoculars, telescopes and magnifying lenses are used. They share the lists with the class.

At the **Mathematics Center:**

1. Students make a list of colors observed on a seashell (or on an insect, a small plant or a flower.) They count the number of colors. They compare the sizes and shapes of the shells, and other objects.
2. Students sort objects by color.
3. Students sort attribute blocks or jar lids by size. Order them from smallest to largest.
4. Students begin **Activity** — Colorful Eyes.

At the **Art Center** the students:

1. use colors made by mixing different tempera paints in their drawings. They say which color they want to make and then proceed to experiment with the colors until they get the one they want.
2. make a class mural of a rainbow first by cutting out magazine pictures of one color, then a different color, etc. Glue pictures on a large sheet of butcher paper to form a class rainbow.
3. draw a picture of how an object such as an airplane looks when it's far away and another picture of the same object when it is near.

During **Physical Education,** the students run relay races: hopping, skipping, running, rolling, etc. counting in sets of five and making tally marks { | | / | | }. They combine the sets of five to say two fives are 10 — then fingers. The winners report to the class.

Getting the Idea

Show the students the book **Brown Bear, Brown Bear, What Do You See**? Ask the students to predict what the story is about; read the book. Discuss the story with the students.

1. Students, discuss how difficult it was for you to identify a person by just feeling and guessing. How do we recognize each other by sight? What things do we look for? Students discuss how they rely on hearing and feeling to move around when they can't see. How is this feeling the same as when you walk around in the dark? Is it easy to catch the beanbag with your eyes covered? Which way is easier — with your eyes open or closed? Why? What part of your body do you use to see?
2. While showing a diagram of the eye, the teacher tells the students about the various parts of the eye and their functions. For example: Our senses are the way we find out about the world we live in. We learn with our senses. We see with our eyes, and sight tells us about things that are outside of our bodies. Our eyes give us pictures, or images, of the way things look. You can see to read, to tell where you're going, to play games or to find your friends. Your eyes show you light, color, shape, and size. Your eyes can help you decide how far something is.

   There are many parts to your eye, and each one of them helps you to see. The light goes in through an opening called the **pupil.** That's the black dot in the center of your eye. The iris, or colored part around the pupil, can change the size of the opening, letting in more or less light. The lens focuses the light rays on the **retina;** the **cornea** protects the lens. When you look at your eyes in the mirror, you're only seeing a part of them. The whole eye is shaped like a round ball, most of it is inside your head and protected by your skull. Your **eyelids** and **eyelashes** protect your eyes too. Your eyelids make it possible for you to close your eyes, shutting out the light when you are tired. Closing your eyes makes it easier for you to go to sleep.

Light strikes something and bounces off. This reflected light, the light that bounces off the thing you are looking at, travels into your eyes through the pupil. As the light enters the eye, it passes through the lens. The lens helps to take out the fuzzy look of the thing you are looking at, focusing the image. As the light goes through the lens, it turns upside down! When the upside down image shines on the back of your eye, it strikes the **retina.** The **retina** contains the **optic nerve** that sends the message of what you are looking at to the brain. The **rods** and **cones** help us see shapes and colors and are a part of the retina. The **optic nerve** carries the message to your brain.

Then the brain decides what you are seeing. The brain decides what to do. When you look at the word **CAT,** your eye sends a message to your brain that you are looking at some writing in your book. Then your brain figures out or remembers the word, and you read **CAT.** Look at this word tag: **EYE.** Can your brain, with the help of your eyes, tell you what the word is?

Are **tears** important? Why? Yes, they keep your eyes wet, but they also help them stay clean. Did Brown Bear shed tears? Every time we blink, we wash the surface of the eye with tears. We can wash out dust and other things that get into our eyes. We should not rub them when they itch, though. What do you think we should do? Well, we can blink several times to make the dust or other object come out. We can also get help in cleaning out our eyes, but that should be done by an adult with clean water and cotton.

Let's try this now. Hold your head straight and look straight in front of you. Now, without moving your head, look over here. (Point to a spot that will require the students to move their eyes only.) How did you get your eyes to move? Yes, the eyes have **eye muscles** that move your eyes from side to side and up and down and around without moving your head. Let's try that. Can you feel your eye muscles moving your eyes? How does moving your eyes help you read?

Some people cannot see things as well as other people. Young people can usually see better than older people. When they have trouble seeing things that are close but can see things that are far away easily, they are called **farsighted.** When the opposite happens, and they can't see things that are far away but can see things that are near, they are called **nearsighted.** Wearing glasses helps correct seeing problems.

Organizing the Idea

1. Students complete **Activity** — Colorful Eyes.
2. Discuss and compare the class graph with that of another class.
3. Draw and label the parts of the eye.

   At the **Writing Center:**
4. Given action pictures that have been cut in half, children imagine what the other half of the picture might look like. The children then select a picture they would like to illustrate and complete the missing half. The children dic-

tate a sentence about the picture. Example: I see a (boy, girl) running.

5. Students make a class book based on **Brown Bear, Brown Bear.** They draw a picture of a classroom object, then write their names and the name of the object under the picture. All the students' pictures are bound together and read using the pattern of **Brown Bear.**
   Example: "Ricky, Ricky, what do you see?
   "I see a flag waving at me."
6. Cellophane glasses activity. Students make cutout glasses using different colors of cellophane paper. The students write or illustrate a story about what they saw with their glasses.

Closure and Assessment

Oral Assessment

1. What part of the body do we use to see?
2. What are some things you can see?
3. How could you tell what an object was if you couldn't see it?
4. Name at least three important parts of the eye.
5. Why is our eye like a camera?
6. Why do we need tears?
7. How do you care for your eyes?
8. Why is it important to take good care of your eyes?
9. What part of the eye gives the color?

List of Activities for this Lesson

▲ Blind Man's Bluff

▲ Colorful Eyes

▲ Eye Care

ACTIVITY
Blind Man's Bluff

Objective
Students count to five.

Materials
Two blindfolds; bean bag

Procedures

Part I
1. One child is blindfolded. The other children sit close together in a circle on the floor.
2. Spin the blindfolded person around three times, then release.
3. The children clap hands to signal to the blinded student where they are.
4. The blinded student finds another child and sits on the child's lap.
5. The blinded student feels the child's face, shoulders, arms, hands, legs and clothing. The blinded student tries to relate shape, size, and texture of the mystery child's hair and facial features to those of a child she/he knows.
6. The blind person tries to identify the child on whose lap he/she is sitting.

Part II
1. Working in pairs, one student is blindfolded. The partner leads the blindfolded student around the room.
2. After being blindfolded, the students make a list of things heard, felt and smelled.

Part III
1. Two students stand up and toss a bean bag back and forth counting to five.
2. The two students are blindfolded. They try to catch the beanbag again.
3. The activity is repeated without the blindfold.

ACTIVITY
Colorful Eyes

Objective
Students investigate eye color found most frequently among the boys and girls in the classroom.

Materials
Prediction graph; eye marker for prediction graph; eye color graph; eye markers for eye color graph; glue stick; small mirror; model of the eye

Procedures
1. Students predict which eye color they think will be found most often in the classroom by placing an eye marker on the prediction graph under the eye that is colored the color that they think will be found most often.
2. Students take turns looking into the small mirror to determine their eye color.
3. Students place an eye marker with their name on it onto the eye color graph under the color of their own eyes.

Student name

Brown	☑	☐	☐	☐	☐
Blue	☐				
Green	☐				

Discussion
1. Did the color that you thought we would find most often turn out to be the one that we did?
2. If we visited another classroom, would we find the same eye color more than any of the others? Why? Why not?
3. Would we find the same eye color to be the most common if we had looked at the girls' eyes? Boys' eyes?

ACTIVITY
Eye Care

Objective
Students list different ways of caring for their eyes.

Materials
Magazine photos of people wearing glasses

Procedures
1. Use magazine photos to make a display showing people wearing glasses.
   - Are there famous entertainers or politicians shown?
   - How does wearing glasses change how people look? What do glasses make them look like?
   - What eye care products do you find advertised in magazines?
2. Discuss good eye care and list examples, such as using protective gear in sports and on the playground, and avoiding dangerous toys and pointed objects. Students make a list of ways to keep eyes safe.
3. Organize eye exams for your class. Ask the school nurse for her assistance.

LESSON 3

Hearing

BIG IDEAS The sense of hearing helps us learn from each other through communication. Sound can produce patterns.

Whole Group Work

Materials

Book: **Hearing** by M. Rius, J. M. Parramón and J. J. Puig, then placed in the **Library Center**
Bag of large lima beans for the **Mathematics Center**
Sticks, balls and bells that produce sound
Sealed containers each holding one object or several different objects
Tape recording of five different sounds; pictures of corresponding objects
Radio
Earplugs
Yogurt containers or paper cups
A pencil
Lengths of string at least 12-feet long
Language chart
Tape recording of a fire alarm, a police siren, a shout for help; or other sounds signaling danger
Pamphlets showing a diagram of an ear, which can be obtained from an ear doctor

Encountering the Idea

The teacher goes behind a desk or tall bookcase so the students **cannot see** what she is doing. She rings a bell and asks the students to guess what she did. She repeats this with various objects that students cannot identify. She then writes a note on a piece of paper, and again, asks what she did. The students say they don't know because they can't see or hear. What sense were you using before? Hearing. Without hearing it is hard to learn about the world. We would have to use another sense.

What causes sound? You have to hit something? Is that the only way? You can talk. What else? These are the questions we are going to investigate in the centers, today, but before going to the learning centers, we are going to have group play.

1. The teacher claps her hands, taps her foot, rings a bell, etc., a certain number of times. The students count and tell how many times they heard a sound.
2. A child creates a pattern with different sounds (clapping, snapping his/her fingers, dramatic sound effects, high or low voices, loud or soft voices, musical instruments, stamping feet, etc.). Students repeat the patterns and create their own.

Tell students that sounds help us identify things. In one of the activities, students will try to identify sounds. They will then select their favorite sound and graph the information.

Exploring the Idea

At the **Science Center,** the students
- complete **Activity** — Sound is Vibration.
- complete **Activity** — Talking Tubes.
- complete **Activity** — Objects Vibrate.
- complete **Activity** — Hold the Phone, as below.

Students do the following:
1. Each pair of students receives two yogurt containers and a length of string.
2. The students make a hole in the bottom of each container with a pencil.
3. The students thread the ends of the string through the holes in the containers from the outside in, making a knot at each end of the string to keep the string ends from slipping out of the holes.
4. One partner stands at one end of the classroom while the other partner moves as far away as needed to make the string taut.
5. Each partner takes a turn speaking into the "phone" while the other listens at the other end. Keep the string taut.

At the **Mathematics Center:**
- The teacher prepares several sealed containers holding one object or a combination of several different objects. Students shake the containers and describe the sounds they hear. They predict what's inside. They record their predictions and then open the containers and compare predictions with actual results.
- Students shake several sealed containers and predict what's inside. They then try to find and match one container with another that has the same objects inside.
- Students take turns wearing blindfolds and listening to a partner drop beans on the table. One player drops one then two beans in succession, for example: drop ... drop drop. The blindfolded student says three - why? One plus two or one plus one plus one. The students use different sound patterns through five.

At the **Listening Center**, students listen to a prepared tape of various sounds and then guess what objects made the sounds, by matching sounds to picture cards. Then they sort the picture cards of sounds by soft and loud. Students listen to the sounds and arrange the pictures in the order in which they heard them.

At the **Music Center** the students identify the deepest, highest, loudest and softest sound in the taped sounds.

At the **Writing Center,** children wear earplugs to experience being hearing-impaired. Discuss and record emotions they felt on a language chart or individual sheets that can be compiled into a class book. The students discuss lip reading and sign language.

Getting the Idea

1. Read the book **Hearing.** The students discuss hearing as one of the five senses that we use to learn about the world we live in. They discuss the things they heard on their outdoor walks. Were all the sounds they heard pleasant? Was there noise? Music? Did they hear laughter? Crying? What did they learn about the world through the sense of hearing? Students make suggestions that are written on a chart to be used later in the **Writing Center.**
2. After discussing with the students the activity with the paper "phones", ask for suggestions as to how they work. After the students have given their ideas,

explain that when the talking partner speaks, the air in the container vibrates. The string carries the vibrations to the container at the other end, and the listening partner hears them as sounds.

3. What makes the sounds that our ears pick up? (Vibrations that travel in the air.) Things need to vibrate before we can hear them. Did the paper phones vibrate? The rubber band? Your throat?
4. As you show a diagram of the external and internal ear, describe how the **ears** work. Play the tape recording of one of the sounds, or play a radio. Ask the students to place their hands on the radio to feel the vibrations. Tell them we can hear the music or the voice coming from the radio or tape player because it is vibrating — it is making the air vibrate or move back and forth. As the air moves back and forth, or vibrates, it makes **sound waves.** The sound waves travel through the air in all directions. The waves reach the **outer ear** and travel through the **ear canal.** As they travel in the ear canal, they strike the **eardrum,** and make it begin to vibrate. These vibrations make other parts of the ear, called the **middle ear,** vibrate.

   As the middle ear begins to vibrate, a small part in the **inner ear,** called the **cochlea,** begins to vibrate. The cochlea is a small bone shaped like a seashell that is filled with liquid. As the shell, or cochlea, begins to vibrate it makes the liquid inside it vibrate. The vibrations of the liquid tickle tiny hairs that line the cochlea, causing them to vibrate and send a message to the **auditory nerve.** This nerve also acts like an electrical wire and sends the message to your brain. Remember, all of this has to do with vibrations.

   When the brain receives the sound message, again it figures out what the sound is, what is making the sound (the vibrations from the radio) and what you should do about it (enjoy it if it is your favorite group). In the morning if you hear your mother telling you to get up to go to school, you get up and hurry.

   Your ears do more than just hear sounds — they help us keep our balance. The **inner ear** helps us know if we are sitting, standing, lying down, or hanging upside down! You know also that you can make yourself very dizzy and even sick to your stomach by spinning yourself around for a long time.

   Sounds can also help us get away from danger. Ask the students to describe the process that they follow when there is a fire drill. What warns us of danger?
5. Ask students why they think that the class favorite sound was ________ in the survey. After their explanations, ask them if all the sounds they hear are pleasant? unpleasant? What does their sense of hearing tell them about sounds?
6. What else does our sense of hearing do for us? (It warns us of danger.)

Organizing the Idea

1. Students study a sign language chart and pick out three words that they learn to sign. They show what they have learned to the class.
2. Working in pairs, students practice lip reading from each other. They decide on a message first and say it without sound, and the partner reads the lips.
3. Discuss with the students the proper care of ears. They make posters for hall display indicating proper ear care and safety. At the **Writing Center,** students dictate sentences listing what you should do and should not do to your ears.

Applying the Idea

Invite a piano tuner to demonstrate to the class how the sense of hearing helps him or her perform the job. What kind of training does it take to become a piano tuner?

Invite a police officer, fire fighter or soldier to tell the class what the hearing requirements are for the type of work he or she does. Why is the sense of hearing important for each one of these jobs?

Closure and Assessment

Oral Assessment

1. How do we communicate with each other?
2. What part of you body do you use to hear?
3. Could you communicate if you couldn't hear? How?
4. How would you feel if you couldn't hear? Why?
5. Why and how do you have to take care of your ears?

Performance Assessment

Put pictures of objects in a box. Students sort them by things they can hear (that make noise) and things they can't hear (don't make noise).

Written Assessment

Given labels for ear parts and a diagram of the ear, students place labels on a ear diagram.

List of Activities for this Lesson

▲ Sound is Vibration

▲ Talking Tubes

▲ Objects Vibrate

▲ Favorite and Alarming Sounds

ACTIVITY
Sound Is Vibrations

Objective
Students can say that sounds are caused by vibrations in things.

Materials
Different-size bottles; same-size bottles; water; wooden spoon or stick; seven-eight glasses that are the same shape and size

Procedures
The teacher demonstrates that the vibration of air in a container causes sound.
1. Fill bottles of different sizes and bottles of the same size with the same and with different amounts of water.
2. Students predict what will happen if they blow across the tops of the bottles. The students then go ahead and blow on the bottles, trying to see if there is a pattern among the different sounds the bottles make.
3. The students try to sequence the sounds from lowest to highest.
4. If the students are interested, they can make a water marimba. Fill several same-size drinking glasses with water at different levels and strike lightly with a wooden spoon or stick.
5. Students discuss high and low tones in relation to the amount of water in the identical containers.

Getting the Idea

1. What was vibrating that was causing the bottles to make different sounds? (The air inside the bottle.)
2. Did all the bottles have the same amount of air in them? (No, the ones that had a lot of water had only a little bit of air at the top.)
3. When you were hitting the glasses in the water marimba, what was vibrating? (The glasses and the air were vibrating. That is why all the glasses have to be the same shape and height, otherwise the sounds would be different.)

ACTIVITY
Talking Tubes

Objective
Student can say that sound travels.

Materials
Paper-towel tubes; a ticking clock or timer; plastic tubing six feet to eight feet in length (available at hardware or pet stores); two funnels; masking tape

Procedures
1. Place a ticking clock or timer on one end of a wooden table. Place one opening of a cardboard tube on the other end of the table. The students take turns holding an ear to the other end of the tube to hear the ticking coming through the tube.
2. Attach a funnel to each end of the plastic tubing, using masking tape. Partners stand six to eight feet apart while one whispers a message to her/his partner too quietly for the partner to hear. The first child then whispers the message into one of the funnels while the second child listens through the other. The partners take turns listening and whispering.

Getting the Idea

Explain to students that the ear is something like a tube with a funnel. Sound comes in through the outer part of the ear — which is like the funnel — and travels through a tube called the auditory canal.

Ask the students to list every object that was vibrating to make the sound heard. (The clock, when it ticked, vibrated, and because it was sitting on the table made the wood vibrate; the sound traveled through the wood and through the air in the cardboard tube to the person's ear.) When the students whispered without the aid of the funnel, the sound was not loud enough to be heard from that distance, but it did cause vibrations, otherwise you could not have heard whispering. The sound waves also traveled through the air and though the funnel.

After this activity, the teacher gives the rest of the explanation of the way the ear functions in hearing.

ACTIVITY
Objects Vibrate

Objective
Students can say that sound is produced when objects vibrate.

Materials
Tuning fork; pan with water; cereal flakes; rubber band; drum; radio; paper towels

Procedures
Students:
1. Strike a turning fork and dip it in water.
2. Sprinkle cereal flakes on a drum, then tap the top of the drum.
3. Stretch a rubber band between two fingers and pluck it; stretch the elastic farther and pluck it again.
4. Put your hand on the top of a playing radio. Describe sounds and changes of sounds of different objects.
5. Put your fingers on the front of your throat, very close to your "voice box." Be careful that you don't press hard enough to hurt yourself. Make a noise. Describe what you felt in your throat as the noise was coming out.

Questions
- What did you feel when you touched the turning fork after you hit it?
- What did the rubber band do when you plucked it? What did it do when you stretched it farther and then plucked it?
- What was each one of these objects doing as it was making a sound, including your throat?

ACTIVITY
Favorite and Alarming Sounds

Objective
Students say that sounds can warn us of danger.

Materials
Sticks; balls; bells
Tape of sound of the siren, cry for help, fire bell, etc.

Procedure
Hide several objects (sticks, balls and bells that produce sound) behind a box or board. Students listen to the sounds each object makes and guess what it is. The students make a graph of the number of students that prefer a particular sound; they graph the data and from the graph, select the class favorite sound.

	X			
	X			
X	X			
X	X			X
X	X			X
X	X	X		X
X	X	X	X	X
X	X	X	X	X
bell	whistle	bubble gum pop	toy pistol	rubber band

Students listen to the sounds of the siren, cry for help, etc. How are these alike? People are in danger and our sense of hearing helps us detect that danger.

LESSON 4

Touch

BIG IDEAS The sense of touch helps us learn about our world by feeling it and learning the size, texture and shape of things.

Whole Group Work

Materials

Book: **Touch** by M. Rius, J. M. Parramón and J. J. Puig.

Paper and pencil for each student; fingerpaints; four or five boxes, each having different-textured materials; paper towels

One-inch squares of sand paper, cotton cloth, plastic, wool cloth, silk, orange peel, hand lotion (greasy), tape (sticky), piece of adhesive tape with dirt stuck on it (grainy); other things of different textures

Three pans of water; one is at room temperature, one is cold, and the other is fairly warm, the differences being sufficient for the students to sense them. In one of the pans put some sand, in another small pebbles and in another some other objects they can feel; it doesn't matter which material goes into which pan.

Word tags: smooth, soft, hard, grainy, rough, skin, etc

Encountering the Idea

Ask the students what part of the body they use to see. Eyes. To hear? Ears. Taste? Tongue. Feel? All over the body? Does your hair "feel" it when you cut it? What about your fingernails? Why doesn't it hurt when you cut your fingernails? You feel with your skin. Only the skin? If you break a bone does the bone hurt inside? Can you feel under your skin? Yes, your sense of feeling is everywhere in your body. We will discover a lot of the answers to these questions as we perform our activities.

After this discussion, begin the lesson by going on an outing. Students go out into the playground and take several sheets of paper and a pencil. Students select things to trace on paper, e.g., brick wall, sidewalk, leaf, penny, etc. When the students return to the classroom, they describe the textures using appropriate adjectives and write about the textures in their journals.What did you trace on this paper? (A wall.) How do you know this is a leaf? Is it rough, smooth?

At the **Science Center,** the students work on these activities:

1. Each child removes a shoe and sock and feels the inside of several "feeling" boxes with a bare foot. The students describe what they feel.
2. The students put their hands in a pan of cold water and describe how it feels. Then they put their hands in a pan of water at room temperature and describe how it feels. Then they put their hands in a pan of warm water (make sure it is not too hot) and again they describe what they feel. Can they feel **the water temperature and the texture at the same time?**

3. Ask students to put a bare foot into the pan with water at room temperature and ask them what they feel. Again, can they feel that they are touching something wet and something rough **at the same time**? Ask the students, if they were to put their **bare foot** into the cold water would it feel colder than if they touched it with their hands? Why do they think that cold (or warm) feels colder (or hotter) on the soles of the feet than on the hands? Do they like to walk bare foot on grass? rough stones? Why? Why not?
4. Place several objects of various sizes and shapes in a bag. Ask a child to reach into the bag to find an object and to identify it using only the sense of touch. The child shows the object, then asks another child to find a bigger or smaller object than the first. Can they feel several things **on the same object**?
5. Read the book **Touch** by M. Rius, J.M. Parramon and J.J. Puig to the class. Discuss the main idea of the book. Tell students that they will investigate more about the sense of touch in several activities. The first activity involves going outside to discover more about the sense of touch.

Exploring the Idea

At the **Mathematics Center:**

1. The students graph the class's favorite texture. Discuss which is favorite, least favorite, etc. Students graph the class "Touch" preference and discuss during the **Getting the Idea** phase.
2. The students working in pairs take turns giving each other beans to count. One student is blindfolded and puts hands over his/her ears. The partner gives the student the beans, again in patterns, for example: 1 + 1 + 2 = 4, but is very careful not to make noise that would give away the number of beans he/she has. The students count the beans **using only the sense of touch.**
3. Students make patterns by using rough, smooth, bumpy textures, for example, rough, rough, soft, sticky, rough, rough, soft, sticky, etc. They describe their patterns verbally and draw in journals.
4. Students order by size the various objects they selected from the bag during the whole group activity, from largest to smallest and then smallest to largest.
5. The students sort the objects by shape into categories, or if the objects are not geometric shapes, then students sort in any way they wish — function, color. etc.

At the **Writing Center,** the students construct a barefoot book in which they draw and write about how things feel with bare feet — which feelings they like and which they don't.

At the **Science Center,** the students construct a "Feelie Book" in which they tape or glue a different material or object on each page. Students label each page as rough, scratchy, bumpy, soft, smooth, etc.

At the **Art Center,** students fingerpaint pictures of what they like to touch. They write a word describing what they have painted as "soft", "hard", "rough", "smooth", etc.

Getting the Idea

1. Discuss the textures that students have worked with during the Whole Group activity and at the centers. As the students discuss what textures they felt, show the word cards.

2. At this time, the students report on the work they did at the **Mathematics Center** and show their graphs. They explain their graphs and describe the patterns they made using the appropriate adjectives.
3. What did we learn about our world by touching? Can we touch the moon? Can we touch a star? What sense do we need for that? Can you touch thunder? Can you touch a cloud? What senses do we need for that?
4. What did we learn about size and shape of things using our sense of touch?
5. Show the students the diagram of the epidermis. Tell them: The sense of touch is also very important. We use it in several ways. Since our **skin** covers all of the body, our skin protects us, and at the same time it gives us information about what is around and outside your body. When we touch something our skin tells us if that thing is strange or familiar, wet or dry, hot or cold, rough or smooth, hard or soft. Many times it gives us messages about all of these things —all at the same time. The skin protects our body in another way — it keeps out harmful organisms that cause disease and infection. For example, if we cut a finger, we put a Band-aid over the finger to keep out dirt that carries organisms that cause infection. The skin is like a giant Band-aid over our body that helps keep out organisms.

   All the information we receive by our sense of sight and by our sense of hearing comes to our brain through **nerve endings.** It is the same with our skin. The **epidermis,** or the top layer of your skin, contains many, many nerve endings all over your body. These nerve endings send messages to your brain telling you what kind of thing you are feeling. Then your brain figures out what it is, and if there is something you need to do about it. For example, if your friend puts a piece of ice on your neck, the nerve endings in the skin of your neck send a message back to your brain that says: **ICE!** Your brain decides that you don't want ice on your neck and it sends a message back to your body to **move** and maybe even **yell.**

   Your sense of touch can do several things. When someone or something touches you, you can feel that it is touching you, but you can feel that you touch it back. You can also feel how hard something is touching you. We use special nerve endings to feel pressure. Sometimes, if we press too hard, we get a bruise on our skin.

   One thing that we don't like about our sense of feeling is that we can feel pain. If we touch something that is hot, it hurts us, and we immediately take our hand away. That is one way our sense of touch protects us.

   Body hair and fingernails are also part of the skin. Your hair does not have nerve endings on it and does not send messages to the brain. Cutting our hair and nails when they get too long causes no pain. Fingernails and hair, however, also protect our bodies.

Applying the Idea

Something for you to think about and research

Invite a physician to speak to the class about how she or he uses the sense of touch to help diagnose illness. What do they touch when a person is well, or when they are sick? Why does a doctor put a thermometer in your mouth? What does a thermometer do? Why does a person's skin feel hot when he or she is ill?

Closure and Assessment

Oral Assessment

1. How does the sense of touch help us learn about the world we live in?
2. How can you tell if one thing is bigger than another if you can't see it?
3. What else can you learn about something that you can't see, but you can feel? (Shape: round, straight, bent, curved, broken.)
4. What part of your body do you use for the sense of touch?
5. How do you take care of your skin?

Performance Assessment

1. Count and tell how many apples there are in this bag, without looking. Tell your teacher how you did it.
2. Can you tell if I have more apples or more oranges in this bag without looking? Show your friend and if he or she agrees your idea is correct, then show your teacher.
3. Put on a blindfold. Using these shapes, sequence them by making a pattern; then, tell your teacher what pattern you made.

LESSON 5 *Smell*

BIG IDEAS The sense of smell helps us to enjoy life and helps us learn about unsafe conditions.

Whole Group Work

Materials

Book: **El cuento de Ferdinando** by M. Leaf

Matches; diagram of the nose; sandpaper; cinnamon stick; cutout pictures of flowers; cotton ball or fabric; pictures or picture books of animal noses; various pieces of food (apple, potato, orange, lemon, grapefruit, etc.); four containers with clear liquid (water, mineral oil, vinegar, alcohol)

10 baby food jars, each one containing a scent (alcohol, garlic powder, onion, cinnamon, etc.) for the **Science Center**

Encountering the Idea

1. Read and discuss **Ferdinando,** a story of a bull who loves to smell flowers. Identify the smells in the story. List them on a chart as pleasant and unpleasant for use at the **Writing Center.**
2. Give students four containers with clear liquid (water, mineral oil, vinegar, alcohol). Students classify the content in the containers according to whether it **smells or does not smell.**
3. Light a match. Ask students what they smell. What does the smell tell them? Discuss and list how the sense of smell warns us of danger. Example: smoke from fire, bad smell in rotten foods, smell of gas from stove. Brainstorm other ways the sense of smell helps us in times of need.
4. Use pictures or picture books of animal noses and have the children name the animal that goes with the nose.

Exploring the Idea

At the **Science Center:**

1. Students complete **Activity** — Using Your Nose.
2. Each child opens one baby food jar at a time and sniffs. Each child places a picture of what she thinks is inside on top of the jar. Then students compare results and decide on the correct match after discussion.
3. Working in pairs, students take turns being blindfolded and trying to identify food substances given to eat. Next, they pinch their noses and remain blindfolded while they eat the food (apple, potato, orange, lemon, grapefruit, etc.). They check to see which foods they could identify without smelling them.

At the **Mathematics Center:**

1. The students graph which nose the class liked the best.
2. Create sets of noses (snouts, trunks, etc.) by sorting pictures.
3. Create nose patterns (with pictures or prints of noses).

At the **Art Center,** the students

1. mix aromatic oils or extracts into tempera paints and use to paint pictures.
2. rub a piece of sandpaper with a cinnamon stick. Students cut the sandpaper into squares and punch a hole at the top of each square. They put a piece of yarn through the hole to make a necklace. Students verbally express what a cinnamon smell reminds them of.
3. draw or trace and cut out pictures of flowers. In the center of each flower, glue a cotton ball or fabric dipped in aromatic oil or extract. Children display their flower garden and describe it using appropriate vocabulary related to the senses. Students write descriptive words on butterfly cutouts and hang or staple around the flowers. Students discuss why butterflies are attracted to flowers (sight, smell).

At the **Drama Center,** the students pantomime smelling different smells such as flowers, smoke, mud, perfume, dirty socks, rotten eggs, etc. One of the students pantomimes one event, and a partner guesses what the smell is. They take turns.

Getting the Idea

1. Use the diagram of the nose to explain the following about the sense of smell:

   The sense of smell is very important to a person. Our nose helps us know more about the world we live in than we do when we just touch things and people or just see them. We say that some things smell good and that some don't. We say that some foods taste good and some don't. How can the nose do this?

   The sense of smell starts with your nose, but it includes other parts of your head and your brain. Let's use the example of the burning match to help us understand how this sense works.

   Here is how your nose works. When the match started to burn, tiny little particles of ash that came from the match floated through the air. These small pieces of material are too small for us to see, but the nose is sensitive to them and can smell them as they travel through the air into your nose. When the small pieces of ash "tickle" the nerve endings of the **olfactory nerve,** which is like an electrical wire on a telephone, the olfactory nerve carries the message to your brain telling it that you are smelling a burning match. This nerve is located (here, pointing on the diagram) high up on the nasal passage. We don't always smell an odor right away because it takes time for the small particles to travel in the air and then into your nose to the nerve endings. When you have a cold, and your nose is all stuffed up, why do you think you can't smell something like perfume or taste your food?

   Human beings have a very weak sense of smell. As people evolved and began to use reason more, they didn't need to smell things quite as well as other animals did. They could use their eyes and their brains in a different way. There is one way your sense of smell is different from all your other senses. After sensing a particluar smell for a while, your sense of smell gets tired. When you first come into the house, you can smell dinner cooking, but after that your olfactory nerves get overtired and then you don't smell anything at all.

Some people develop their sense of smell for a special use. A perfume maker can tell all the different flowers from each other by their different smells. A wine maker has the same talent for telling wines from each other by their smell.

Smell is one of the ways we have of knowing about our world and enjoying what it has for us. Close your eyes and smell a rose, or after a long winter, go outside. That nice green smell tells you spring is here.

2. Discuss the use of noses by animals and by people.
3. Which senses do you use in tasting? Can you taste something if you can't smell it? Which of the foods can you still taste even if you can't smell them?

Organizing the Idea

At the **Writing Center,** classify the pleasant and unpleasant smells listing them on a chart for later reference. Students choose an animal they would like to be and fill in the frame sentence: If I were a _________ , I'd like to smell a _________ .

Applying the Idea

Discussion

Present this situation to your students:

You go on a trip in your car with your family. You take sandwiches to eat, but you stop at a restaurant to have dinner. The next day you want to eat your sandwiches, but when you open the package, the sandwich smells "funny." What should you do?

Closure and Assessment

Oral Assessment

1. How can the sense of smell warn us of danger?
2. If a person is blind, how can he tell if there's a fire or other danger?
3. Why is the sense of smell so important?
4. Describe the best smell and the worst smell you've experienced. How did it make you feel?
5. What part of your body do you use to smell with?
6. How does the sense of smell help us enjoy life?

List of Activities for this Lesson

▲ Using Your Nose

ACTIVITY
Using Your Nose

Objective

Students investigate the relationship between how a given food looks and how it tastes.

Materials

One enveloped unflavored gelatin; sugar; food coloring (different color for each group); water

Procedures

Day 1 — Divide class into small groups. Each group makes unflavored gelatin and places it in the refrigerator overnight to set.

Day 2 —

1. Each group looks at one color of gelatin and guesses possible flavors simply by sight. They graph their favorite color gelatin.
2. Repeat using only sense of smell and graph favorite-smelling gelatin.
3. Finally, taste and brainstorm possible flavors. Graph favorite-smelling and favorite-looking gelatin.

Ask students:

1. What did the graphs show?
2. Did you change your minds about your favorite gelatin after you had tasted and smelled it?
3. What role did your eyes and nose play in tricking your senses?
4. What foods look better than they taste?

LESSON 6 Taste

BIG IDEAS Taste helps us, among other things, to select and enjoy food. There are four familiar tastes.

Whole Group Work

Materials

Book: **Taste** by M. Rius, J. M. Parramón and J. J. Puig

Mirrors (one for every two students, at least); chart; fruits to cut into small pieces; toothpicks; Q-tips, two for each student; pictures of people eating; pictures of foods people can eat and foods **people should not** eat; small pieces of various foods for taste test (including sweet, sour, salty, bitter; e.g., cookie, lemon, cracker, banana peel); glasses of salt, sugar, lemon, and baking soda dissolved in water; individual, small diagrams of the tongue; water and cups for cleaning tongue; bag of M&M candies; Sweet Tarts candies; fruits to cut into small pieces (include lemons and banana peel or grapefruit peel); small pieces of pear, apple and potato for each child

Word cards: sweet, sour, salty, bitter, tongue, taste

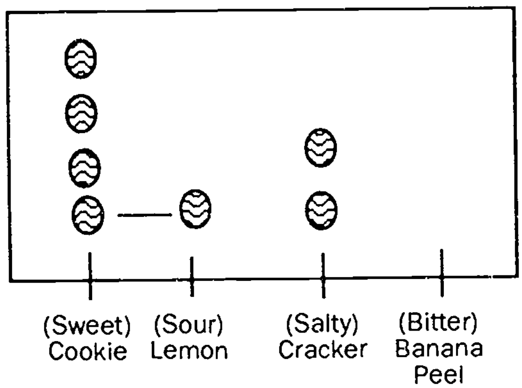
Encountering the Idea

Introduce the lesson by having students dip one end of a Q-Tip in the solutions of salt, sugar, lemon, and baking soda, one substance after another, and having students taste each. After each student has tasted the liquid, the students describe the flavors. Students clean their tongues after each tasting. Ask the students to explain what helps them taste the different tastes that were in the solutions. Help them speculate about what happens on the tongue for them to be able to taste. As the students give suggestions, write the relevant ones on the chart to be used later in the **Writing Center.** The students relate each taste to foods that have similar tastes making a list to be used later.

Before reading **Taste** to the students, ask them what they think it might be about. After reading the book, have them compare their predictions with the content of the book. Caution students that they need to be careful about what things they taste. Tell the students that in the learning centers they will learn more about taste.

Exploring the Idea

Students collect data to be used in selecting the class favorite taste. They predict which among the common flavors such as salty, sweet, sour, or bitter is preferred. Several small pieces of various foods can be prepared and offered to the students to eat. This way, there is a common sample from which to select the foods they like and those they do not. They make a tally of how many people like a particular food by grouping by fives (||||/ |). Tell the students that in collecting this information they have to make sure that everyone's vote is counted. They can do this by making one and only one mark for each person's vote, such as drawing a happy face if they like. Ask the students: Did each person draw one and only one face? Does each happy face have a person who drew it? If that's true, then we know that everyone voted, and voted only once. What do you do to see what the **favorite** food is? Yes, count the happy faces for each food and compare. Which food got the most votes? How do you know? How can we tell when one number is greater than another? What is one way? Yes, you can match the happy faces to see which taste received more votes. What about Banana Peel? How many voted for that? What number tells us that Banana Peel did not get any votes? Yes, the number zero.



At the **Mathematics Center:**

1. The students, working in small groups, use the taste graph to select the class favorite food and decide whether it is salty, sweet, sour or bitter. They report their selection to the class during the "Getting the Idea" phase of the lesson.
2. Children wash and cut different fruits into small pieces and sort the pieces of fruit in as many ways as possible. They discuss the outcomes.
3. After the fruit is cut, each child is given a wooden skewer or toothpick and creates a patterned fruit kabob focusing on a number such as five, six (one more than five) or some other number.

At the **Writing Center:**

1. The students locate and label the taste spots of the tongue.
2. Students complete sentences:
   _________ tastes like _________ . (This is relating one taste to some other similar taste).
   You can taste _________ . You should not taste _________ . (Three things that can be tasted and one that should not be tasted.)

At the **Science Center,** students complete **Activity** — Taste Areas.

Getting the Idea

1. Discuss why it is difficult to try counting by using **taste only.**
2. Compare and discuss the results of the favorite food survey. Which foods do more people like and do not like? How do you know?
3. When you looked through the magazines for pictures of people eating, which tastes did these foods have: sweet, sour, salty, or bitter? Which pictures were the easiest to find in the magazines? Can you guess by looking at the pictures, which taste is in most common foods?

4. The students verbally describe the pattern each created using taste vocabulary — salty, sweet, bitter, sour. Example: salty, salty, sweet, sour, etc.
5. Provide each student with one or two M&Ms candiers and Sweet Tarts, a piece of lemon and a piece of banana peel or grapefruit peel, a piece of apple or pear and a piece of potato. Display the diagram of a tongue and describe the function of the tongue. The **tongue** is the main body part we use for tasting food. Remember, we already talked about the nose helping us in tasting food, but it is the tongue that carries messages about what you are eating to the brain. We know that the senses such as sight, hearing, touch and smell are possible because the nerve endings in the eye, the ear, in the skin and in the nose send messages to the brain, and the brain decides what to do about the message. It is the same with the tongue.

   The tongue is a muscle covered with many small bundles called **taste buds** that have many nerve endings. Different parts of the tongue have small bundles, or taste buds, that perform different jobs. We can only taste four different flavors -- sour, salty, bitter and sweet— because the taste buds can only perform those jobs. For example, at the front of the tongue, taste buds mostly taste **sweet** tastes like sugar and honey. Now, let's all taste the piece of lemon you have at your desk. Can you tell where you are tasting it? Yes, sour tastes make the sides of your mouth begin to water because the sides of the tongue taste **sour** tastes like lemons or vinegar. Now, try tasting the banana peel. Where can you taste it? In the back of your tongue? Yes, the taste buds at the back of the tongue taste **bitter** tastes like grapefruit or banana peel. The taste buds for **salty** tastes are all over the tongue. We can taste salt on every part of the tongue.

   There is another important thing to remember about taste — it is the part **saliva** plays in helping you taste your food. Get one of the M&Ms and put it on the top of your tongue. Can you taste the candy? No, we have to get it wet with saliva, chew it and mix more saliva with the candy before we can begin to taste it. The saliva mixes with the food and spreads the flavors all over the tongue. The different taste buds begin their jobs and you can tell if the candy is sweet, sour, salty or bitter. Let's taste the Sweet Tarts. Where can you taste them?

   Remember, we said that being able to smell something we are eating is an important part of tasting it. When you have a cold and your nose is stuffed, can you smell your food? Does your food have a good taste, or does it all taste the same? Try this experiment: Close your eyes and hold your nose. Now, taste the pieces of pear, apple and potato you have. If you don't smell the food, can you tell the difference between the taste of pear, apple and potato?

   Do you think it is a good idea to taste something that is not familiar to you to find out what it is? Why? Yes, it could be something that is not good to eat. Some things look good, but **can be very dangerous.** If we are offered food we don't know about (for example, when we go trick-or-treating during Halloween) or we want to find out what kind of food something is, we should not taste it. We should ask a parent or relative if it is safe to taste it.

Organizing the Idea

At the **Science Center:**

1. The students cut out pictures of foods and glue on appropriate areas of the tongue.
2. Provide students pictures of many different foods. Students sort the pictures in as many ways as possible related to tastes. Provide pictures of things that **should** and **should not** be tasted.
3. Students, using a mirror, look at and describe their tongues. Encourage them to describe the texture, color, etc. of the tongue using the vocabulary learned in previous lessons.

Applying the Idea

Do animals have a sense of taste? Design an experiment to see if a cat (or dog) has a sense of taste.

Closure and Assessment

Oral Assessment

1. What are the four familiar tastes?
2. What part of the body do we use to taste?
3. What does the sense of taste teach you about the world we live in?
4. How does taste help us select and enjoy food?
5. What would happen to you without the sense of taste?
6. Describe how the sense of taste and the sense of smell are related.
7. What are some things that should not be tasted?

Performance Assessment

1. Tell your friend how the sense of taste and the sense of smell are related.
2. Using a mirror, point to the places on your tongue where you would most likely taste a candy bar, potato chips, lemon juice, and a grapefruit peel.
3. Using these two-color chips, show your partner all the ways you can make four, five, six or any number you want to show.

three plus one   two plus two   one plus three

List of Activities for this Lesson

▲ Taste Areas

ACTIVITY
Taste Areas

Objective

The students say that they taste different flavors on different parts of the tongue.

Materials

Variety of food samples; water; paper cups (one for each type of food); chart paper; box of toothpicks; markers; blindfold

Procedures

Students work in pairs.

1. One partner wears a blindfold.
2. Using a toothpick, place a small amount of one type of food on the region of the tongue identified as "1" in the illustration. The blindfolded student judges the taste with the mouth still open so the food sample is not spread to other regions of the tongue.
3. Record the judgment each time. Rinse the mouth with water between tastes.
4. After placing the first food type on all four regions of the tongue and recorded, taste the next food.
5. The partner performs the test.
6. Stu dents draw and write about the flavors the tongue tastes.

LESSON 7 *Altogether, Now*

BIG IDEAS We learn best about our world when we use our five senses at the same time.

Whole Group Work

Materials

Book: **El País de los Cinco Sentidos** by E. Larruela
Small package of candies, such as M&Ms, chocolate kisses, or Skittles, wrapped so the candies can't be seen
Objects such as an alarm clock, telephone, peanuts, a picture of a television, a bell, a whistle
Pictures of people using more than one sense
A peanut in the shell for each student
Chart
Five boxes placed in **Science Center**

Encountering the Idea

Begin the lesson by giving each student a peanut. Ask the students to describe the peanut to the class. If they do not report on all of these observations ask: How does it look? How does it feel? How does it smell? Sound? The students crack open the peanut. Repeat the questions. The students taste the peanuts. The students dictate simple sentences and an experience with peanuts. Write the relevant words on a chart for later use at the **Writing Center.**

Tell the students that in the centers they will work with all the five senses to see how the senses work together to give us more information than is available when we use only one sense.

Exploring the Idea

At the **Science Center**, students label each of five boxes with the name one sense. Several objects such as an alarm clock, a telephone, peanuts, a picture of a television, a bell, a whistle, etc. are sorted by one sense used with these objects. The categories will vary among students. Discuss how we often use more than one sense when using objects and classifying them.

Student complete **Activity** — We Need Five Senses.

Students complete **Activity** — All Five.

At the **Mathematics Center,** students working in groups of four receive a small package of candy. Students describe what they see; estimate how many candies are in the package; smell the package and describe the smells. They graph the class favorite; first based on sight (do not open wrapped candies), second on smell (smell unwrapped candies). After opening the package, count the pieces to check the number estimates. Then students taste the candy and graph their favorite.

At the **Writing Center:**

1. Students write about their experiences with food as a story with the title "Foods That Taste Better Than They Look" or about "Foods That Look Better Than They Taste."
2. The students write and complete frame sentences such as:
   I can (*smell*) a peanut and I can (*taste*) a peanut.
   I can (*feel*) a flower, and I can (*smell*) a flower.
   I can (*smell*) a (*pizza*). But I can't (*smell*) a (*glass of water*).
   I can (*feel*) air, but I can't (*smell*) it.

At the **Drama Center,** in an oral presentation, students try to persuade the rest of the class to try their favorite fruit in a different manner. Examples: putting red pepper on an orange; eating bananas with peanut butter and mayonnaise in a sandwich.

8. Is it easier or harder to live without all five of the senses? Why?
9. What part of our body do we use for the sense of sight? Hearing? Touch? Smell? Taste?

Getting the Idea

Read and discuss the book **El País de los Cinco Sentidos** by E. Larruela.

Organizing the Idea

1. Students draw or cut out pictures showing people using more than one sense. Students tell what senses the pictured people are using. How many pictures could students find for each sense?
2. Student compile completed work into a class Big Book.

Applying the Idea

Problem Solving

Working in pairs or in small groups, students show with two-color counters that 0 plus five and five plus zero are other names for five. Can they show another name for four? Another name for zero?

Closure and Assessment

Oral Assessment

1. How can we identify each fruit without looking?
2. Can you feel color? Smell it? Hear it?
3. Can you feel light? Smell it? Hear it? Taste it?
4. Can you feel a star? Hear it?
5. What are the five senses?
6. Why is it important to use all five senses?
7. What would happen to someone who didn't have all five senses? Why? Can a person substitute one sense for another?

Performance Assessment
Using these counters, show all the different names for five.

three plus two   two plus three   one plus four   four plus one

List of Activities for this Lesson

- ▲ We Need Five Senses
- ▲ All Five

ACTIVITY
We Need Five Senses

Objective

Students say that they obtain more information if they use more than one sense to identify substances.

Materials

Five blindfolds; chart paper and marker

Five baby food jars, each containing one of the following: salt, sand, granulated sugar, powdered sugar and cornstarch

Procedures

1. Choose five volunteers who have not seen the jars containing the five substances.
2. Seat the volunteers at a table, blindfold them and give each one a paper and pencil.
3. Place one of the jars in front of each volunteer.
4. Ask each student to feel the content of the jar and whisper it to the teacher. The volunteers are not to taste what is in the jar, and they are not to say aloud what they think it is.
5. The teacher records the written responses on a chart.
6. Rotate the jars one position to the right.
7. Again have the volunteers feel the contents and whisper to the teacher what they think the substance is. Record the results on the chart.
8. Continue until each of the volunteers identifies all five substances using only the sense of touch.
9. Be sure the chart is where volunteers will not see it, and remove the blindfolds.
10. Place the jars in front of the volunteers in a different order from that of step 4.
11. Ask each volunteer only to look at the substance in the jar and whisper to the teacher what it is. The volunteers are not to taste or feel the substance. They are not to give their answers aloud, and they must not look at each other's responses.
12. Again rotate the jars, recording the responses of each participant.
13. When all five substances have been identified by all five participants by both touch and sight, let them use other ways to identify the substances. If they suggest tasting, assure them that none of the substances is harmful to taste.

Discussion

How accurate were the responses from the sense of touch alone? From the sense of sight alone? From a combination of these, and possibly with help from the sense of taste? How do the senses depend on each other? How do all five senses help us to know what is happening around us?

ACTIVITY

All Five

Objective
Student say that we can learn more about the world if we use our five senses at the same time.

Materials
Pieces of orange, carrot, celery, cantaloupe, grapefruit, potato, apple, pear, banana, with the peel of each cut off; wrap each piece in a piece of paper napkin; names of each fruit or vegetable on cards

Blindfolds for ⅓ of the children in the class

Procedures
1. Do not show the students the food or tell students which foods you are using; tell them that they are to identify each food using only one sense at a time.
2. Blindfold one group of students (about ⅓ of the class) and give them a combination of three wrapped pieces of food (for example, apple, pear, potato) to identify by smell only.
3. After identifying the foods by smell, the children pick out the cards with the names of the foods they guessed, open the packages and check the results.
4. Next, blindfold another group (about ⅓ of the class) and give them a combination of three wrapped pieces of food to identify by touch only.
5. After identifying the foods by touch, and selecting the appropriate name cards, the children open the packages and check the results.
6. The last group does not wear blindfolds. Give this group the three wrapped pieces of food to identify by touch, smell and appearance. They, too, select the appropriate name cards.

Discussion
- Which group of children was able to identify the foods most easily? Why?
- If this had been a contest, would it have been fair to award the prize to the last group? Why?
- What does this activity tell you about the way we learn if we use our five senses?
- Which foods were the easiest to guess? Why?
- Which foods were the hardest to guess? Why?

References

Annotated Children's Books

Aliki. (1962). *My five senses.* New York: Harper Collins Publishers.
This book gives a good overview of the five senses and explains that sometimes we use just one or two senses, sometimes all five.

Brenner, B. (1977). *Caras.* New York: E. P. Dutton.
Photographs show the reaction of the senses to both pleasant and unpleasant stimuli.

Broekel, R. (1988). *Tus cinco sentidos.* Chicago: Children's Press.
The book explores the five senses through photographs and answers questions posed by the author.

Larreula, E. (1984). *El país de los cinco sentidos* Madrid: Editorial Teide, S.A.
In this fantasy world all senses are separate and only one sensation can be experienced at a time. The senses unite and become what we are today.

Murphy, C. (1986). *Tus sentidos.* Boston: Editorial Norma, S.A.
This pop-up book of the senses describes the location of each of the senses and how each helps us know our world.

Radlauer, R. S., & Perez, W. (1960). *About four seasons and five senses.* Chicago: Melmont Publishers.
This volume contains many illustrations. The text for each subsection is followed by an open-ended question.

Sands, S. (1991). *Kids Discover: The five senses.* New York: Kids Discover, 1(3).
This magazine issue discusses each sense separately with diagrams, photos and pictures. It also stresses the need for using all five senses in experiencing life.

Tymme, J. (1978). *I like to see: A book of the five senses.* Racine, WI: Western Publishing Company.

Sight

Brown, M. (1979). *Arthur's eyes.* Boston: Little, Brown and Company.
Arthur's friends tease him when he gets glasses, but he soon learns to wear them with pride.

Flores, R. (1979). *Caracolitos: Ojitos.* Oklahoma City: Economy Company.
Carlota meets an octopus with eight eyes that tells how he sees different things with each eye.

García Sánchez, J. L. (1978). *El niño que tenía dos ojos.* Madrid: Ediciones Altea.
This is the beautiful story of a boy born with two eyes on a planet where all inhabitants have one eye. He learns to overcome his "defect" and lives a full life.

Holt, J. (1977). *All eyes.* Oklahoma City: The Economy Company.
Jana meets an octopus with eight eyes that tells how he sees different things with each eye.

Martin, B. Jr. (1970). *Brown bear, brown bear, what do you see?* New York: Holt, Rinehart and Winston.
A predictable rhyming book that explores sight, colors, animals, etc., in an entertaining manner.

Rius, M., Parramón, J. M., & J. J. Puig. (1983). *La vista.* Hauppauge, NY: Barron's Educational Series.
This book explores, through beautiful illustrations, the wonders of our sense of sight.

Rius, M., Parramón, J. M., & J. J. Puig. (1985). *The five senses: Sight.* Hauppauge, NY: Barron's Educational Series. (Translated from Spanish: *La vista*)
A short scientific explanation of our sense of sight, with a diagram of the eye.

Smith, K. B., Crenson, V., & Sorms, R. S. (1988). *Colección mil preguntas: Viendo.* Buenos Aires: Editorial Sigmar.
The sense of sight is explored through questions and answers with interesting explanations and illustrations.

Williams, L. (1985). *¿Qué hay detrás el árbol?* Madrid: Ediciones Hymsa.
Before discovering the truth, two children allow their imagination to run freely as they try to guess what could possible be behind a tree.

Hearing

Alexander, M. (1978). *Pigs say oink: The first book of sounds.* New York: Random House

Cole, J. W., & Welch, K. (1977). *All ears.* Oklahoma City: The Economy Company.
Rena and Nathan meet Listen Bug, an insect that helps them become aware of sounds they had never stopped to listen to.

Colección Piñata: Sonidos y ritmos. (1985). Mexico: Patria.
This book explores the wonders of sound.

Flores, R. (1979). *Caracolitos: Escucha.* Oklahoma City: The Economy Company.
Nora and Gabriel meet Escuchi, a small animal that helps them become aware of sounds they had never stopped to listen to.

Gerson, S. (1987). *La orquesta*. México: Editorial Trillas, S.A.

While listening to the instruments play, a cat and mouse become music lovers, not enemies.

Knight, D. (1988). *Colección quiero conocer: El mundo del sonido*. Mexico: Sistemas Técnicas de Edición, S.A. de C.V.

Experiments and colorful illustrations are used to explore sound.

Rius, M., Parramón, J. M. & Puig, J. J. (1983). *El oído*. Woodbury, NY: Barron's Educational Series.

This book illustrates the most enjoyable sounds in the world.

Rius, M., Parramón, J. M., & Puig, J. J. (1985). *The five senses: Hearing*. Hauppauge, NY: Barron's Educational Series.

A short scientific explanation of our sense of hearing, with a diagram of the ear.

de Podendorf, I. (1979). *Sonidos*. Chicago: National Textbook Company.

This is an interesting presentation of sounds and how they are a part of our daily lives.

Smith, K. B., Crenson, V., & Storms, R. S. (1988). *Colección mil preguntas: Oyendo*. Buenos Aires: Editorial Sigmar.

The sense of hearing is explored through questions and answers with interesting explanations and illustrations.

Smith, K. B., Crenson, V., & Storms, R. S. (1988). *Hearing*. New Jersey: Troll Associates.

Questions and answers provide basic information about hearing and the ear.

Wolf, B. (1979). *Ana y su mundo de silencio*. Philadelphia: J. B. Lippincott.

This is a true story of Ana's daily life experiences as a deaf child.

Wood, N., Rye, J. (1991). *Listen...What do you hear?* New York: Troll Associates.

Discusses the phenomenon of sound, how it varies in volume and pitch, how it travels and how it is perceived by the ear.

Touch

Aliki. (1962). *My hands*. New York: Thomas Y. Crowell.

Describes the parts of the hand and all the things our hands help us to do.

Brighton, C. (1984). *My hands, my world*. New York: MacMillan Publishers.

Cole, J. W., & Welch, K. (1977). *Toco Toucán's touch book*. Oklahoma City: Economy Company.

Toco Toucán introduces us to the world of touch.

El rey Midas. (1980). Madrid: Editors S. A.

This is the classical story of King Midas.

Flores, R. (1979). *Caracolitos: El libro de Toco el toucán*. Oklahoma: The Economy Company.

Toco the toucan explores the world of touch.

Goor, R., & N. (1984). *All kinds of feet*. New York: Thomas Y. Crowell.

Presents the different types of feet found in the animal kingdom in the text and photos.

Kline, S. (1985). *Don't touch*. Chicago: Albert Whitman & Company.

Rius, M., Parramón, J. M., & Puig, J. J. (1985). *El tacto*. Hauppauge, New York: Barron's Educational Series.

This book illustrates and describes the different textures we find in the world.

Rius, M., Parramón, J. M., & Puig, J. J. (1985). *The five senses: Touch*. Hauppauge, New York: Barron's Educational Series.

A short scientific explanation of our sense of touch, including a diagram of the skin.

Smith, K. B., Crenson, V. & Storms, R. S. (1988). *Colección mil preguntas: Tocando*. Buenos Aires: Editorial Sigmar.

The sense of touch is explored through questions and answers with interesting explanations and illustrations.

Wood, N., & Willey, L. (1991). *Touch...What do you feel?* Mahwah: NJ: Troll Associates.

Explores the world of touch, examining how it works and what it tell us about our surroundings.

Smell

Allington, R., L., Cowles, K., & Thrun, R. (1980). *Smelling*. Milwaukee: Raintree Children's Books Publishers.

Brown, M. T. (1976). *Arthur's nose*. Boston: Little, Brown and Company.

Unhappy with his nose, Arthur visits the rhinologist to get a new one.

Cole, J. W., & Welch, K. (1977). *My nose knows*. Oklahoma City: Economy Company.

Sniffwell is told that his nose is for smelling, and he learns to enjoy the smells found in his environment.

Flores, R. (1979). *Caracolitos: La nariz de Pepito*. Oklahoma City: The Economy Company.

Mother rabbit tells Pepito that his nose is for smelling and he learns to enjoy many smells.

Leaf, M. (1962). *El cuento de Ferdinando*. New York: Scholastic.

Ferdinando, unlike other bulls, prefers to sit and smell the flowers, rather than display his strength and ferociousness.

Rius, M., Parramón, J. M., & Puig, J. J. (1985). *El olfato*. Hauppauge, NY: Barron's Educational Series.

This book vividly illustrates the most memorable smells in life.

Rius, M., Parramón, J. M., & Puig, J. J. (1985). *The five senses: Smell*. Hauppauge: NY: Barron's Educational Series.

A short scientific explanation of our sense of smell, with a diagram of the nose.

Pluckrose, H. A., & Fairclough, C. (1986). *Smelling*. New York: Franklin Watts.

Smith, K., Crenson, V., & Storms, R. S. (1988). *Colección mil preguntas: Oliendo*. Buenos Aires: Editorial Sigmar.

The sense of smell is explored through questions and answers with interesting explanations and illustrations.

Taste

Flores, R. (1979). *Caracolitos: Lo sabroso sabrosito*. Oklahoma City: The Economy Company.

All of the different tastes that our tongues can distinguish are depicted with illustrations of children and food.

Lasa, M. (1988). *Voy a cocinar*. México: Sistemas Técnicas de Edición, S.A. de C.V.

This recipe book for children has recipes that are culturally appealing.

Rius, M., Parramón, J. M., & Puig, J. I. (1985). *El gusto*. Hauppauge, NY: Barron's Educational Series.

This book beutifully illustrates all the different tastes.

Rius, M., Parramón, J. M., & Puig, J. J. (1985). *The five senses: Taste*. Hauppauge, NY: Barron's Educational Series.

A short scientific explanation of our sense of taste.

Smith, K., Crenson, V., & Storms, R. S. (1988). *Colección mil preguntas: Gustando*. Buenos Aires: Editorial Sigmar.

The sense of taste is explored through questions and answers with interesting explanations and illustrations.

Vallarta Velez, L. (1983). *Colección Piñata: El azúcar*. (1985). México: Patria.

Everything about sugar is explored through beautiful illustrations depicting Mexican society.

Vallarta Velez, L. (1983). *Colección Piñata: El chocolate*. (1985). México: Patria.

Interesting facts are presented about the origin and the characteristics of chocolate with illustrations depicting Mexican society.

Teacher Resources

Abruscato, J., Fossaceca, J. W., Hassard, J., & Peck, D. (1984). *Holt science*. New York: Holt, Rinehart and Winston.

Poppe, C. A., & Van Matre, N. A. (1985). *Science learning centers for the primary grades*. West Nyack, NY: Center for Applied Research in Education.

Trostle, S. L., & Yawkey, T. D. (1990). *Integrated learning activities for young children* (Getting Started). Boston: Allyn and Bacon.

unit

K Spiders

Prior Knowledge

The student has

1. sorted objects into sets
2. constructed sets of up to eight members
3. ordered objects or events first through sixth
4. used ordinal number words—first, next, last—correctly
5. described objects and phenomena
6. classified objects using one variable.

Mathematics, Science and Language Objectives

Mathematics

The student will

1. depict information on a graph
2. find all possible paths in a geometric figure
3. make a figure on a geoboard; describe it verbally by finding lines of symmetry
4. estimate how many spiderlings are held in a spider's egg sac if the eggs are the size of a pea, a linking cube, lima bean, lentil
5. count or add members of sets by ones, twos, fives, tens
6. use words such as "most", "least", and "as many as" (middle) to describe how many in a group, e.g., spiders/non-spiders
7. order pictures of spiders by size, by other variables
8. use ordinal numbers up to six (first, second, last) to describe the life cycle of spiders to describe the elements in their food chain
9. construct sets of up to eight elements; tell the number in sets of up to eight elements.

Science

The student will

1. list four characteristics of spiders using numbers to describe and count body parts
2. classify pictures of animals as spiders or non-spiders
3. list two parts of the spider's food chain
4. describe at least three characteristics of a spider's habitat
5. list at least four types of spiderwebs
6. name one benefit of spiders to humans
7. name at least two natural enemies of spiders, including man
8. list two animals that are prey of spiders
9. describe a spider's life cycle
10. describe how a spider's web feels, looks and works
11. list special adaptations spiders have made to live in their environment, including how the water spider and the trap-door spider have adapted
12. describe the danger of spider bites

13. make and list predictions about what will happen if an insect is added to a vivarium
14. describe differences between live birth and hatching.

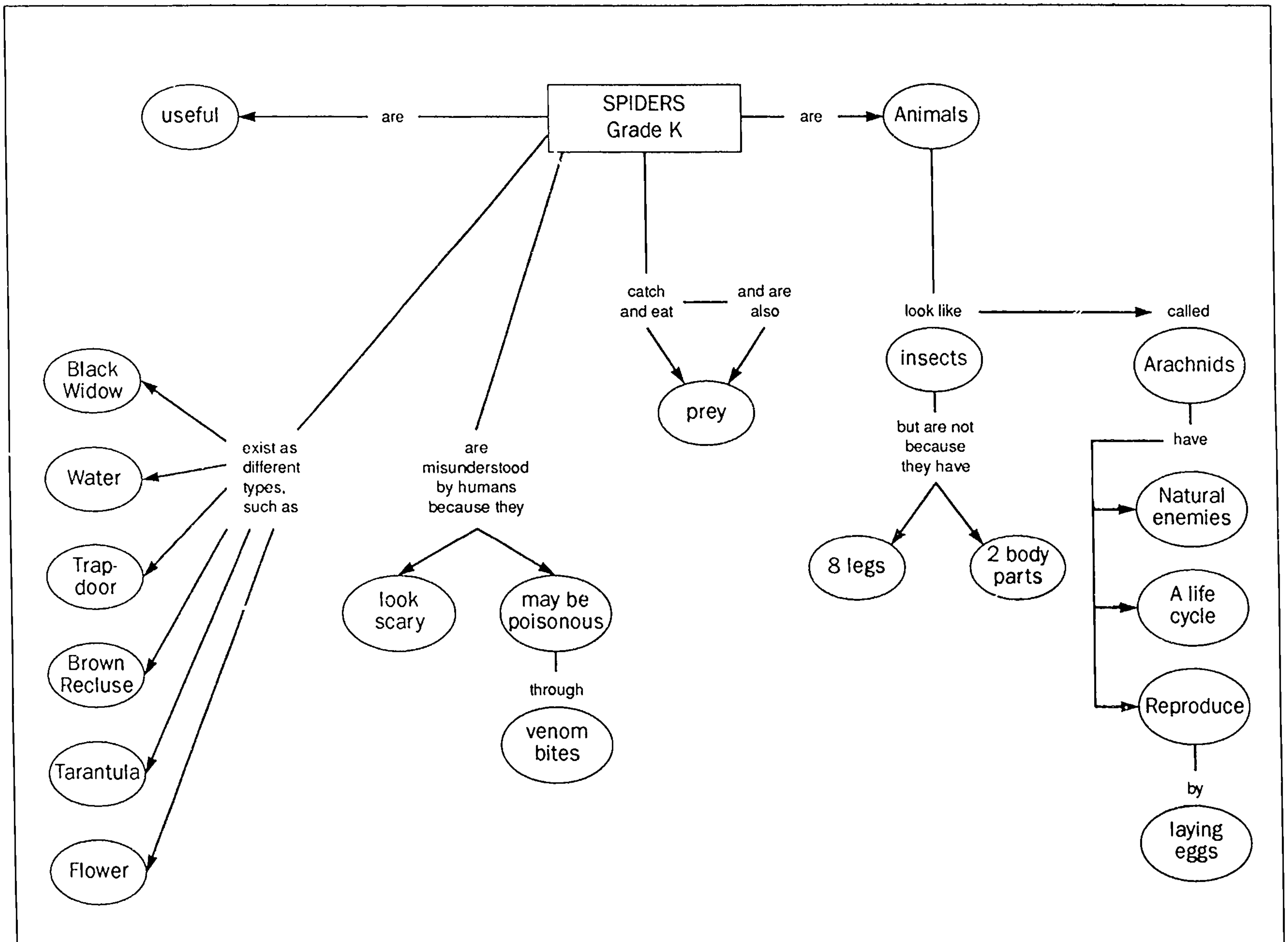
Language

The student will

1. verbalize feelings about spiders in English and/or Spanish
2. act out spider actions, such as spinning a web, ballooning, camouflage
3. write or dictate a sentence about spiders using the theme's vocabulary
4. create a minibook about his/her favorite spider
5. provide information about spiders after observing thm in the vivarium
6. cite or draw an illustration about a story and its author from the several books presented during the unit
7. examine their feelings about spiders
8. write a sentence about spiders using one or more of the day's vocabulary words.

VOCABULARY

spider araña	legs patas	body parts partes del cuerpo	insect insecto
eight ocho	silk seda	web telaraña	arachnid arácnido
spin tejer	feelings sentimientos	vivarium vivero	fangs colmillos
life cycle ciclo vital	food chain cadena nutritiva	egg sac huevera	ballooning (ballooning)
spiderlings arañuelos	prey presa	usefulness utilidad	camouflage camuflage
venum veneno			



CONCEPT WEB

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Teacher Background Information ● ● ●

This unit will help children appreciate the place spiders have in the world and will lessen the fear of spiders caused by misunderstandings. They will begin activities such as building a spider habitat, constructing a web and reading about spiders to develop the theme. There are more than 30,000 different types of spiders known to scientists! Most of them are very tiny animals that help people by eating insects. The banana spider, the trap-door spider, the purse-web spider, the garden spider, and the grass spider are just a few of the interesting animals we're going to learn about.

Spiders are not insects as many people believe. Students will learn the physical differences between insects and arachnids in this unit. Students will also study other distinct characteristics of spiders, such as spiders' contribution to other organisms in nature. Spiders' need for food will be explained as will the concepts of "prey" and "natural enemies."

Spiders belong to a class of animals called arachnids. They have four pairs of segmented legs, and can grow a new leg if they lose one. Most spiders have eight eyes, and they do not have antennae or wings. A spider's body is divided into two sections, the abdomen and the cephalothorax. The legs, eyes, and mouthparts are all in the cephalothorax. Most spiders have poison glands and fangs in their jaws, which they use to inject poison into insects. The venom paralyzes or kills their prey.

Spiders usually have six fingerlike silk glands called spinnerets located beneath their abdomen. The silk comes from inside the spider's body as a liquid, thicker than water. When a spider wants to make a web, it squeezes the silk out of the two small holes at the back of its body called spinnerets. The moment it hits the air, the silk dries into a line that looks like a long strand of hair. Many spiders use their sticky silk webs to catch food, which consists of tiny animals. Some spiders use silk as draglines, which are long lines of silk the spider hangs onto as the wind blows it through the air. The spider can always crawl back up the silk line if it is blown some place it doesn't want to be! Some spiders spin silk webs, and others line their burrows with silk. Many spiders lay their eggs in silken sacs. All young spiders, and some adult males, release long silken threads to float or ride the wind to new areas. This is called ballooning.

Although spiders can live almost anywhere in the world, some like it where it is very humid, and some like it where it is very dry. Some spiders live underground and catch their prey by jumping out at them. Others live in trees and capture their prey in their webs. Others live in our houses. Have you seen them hanging from the ceiling? Many times a spider's common name tells something about the spider. Where do you think the garden spider lives? What about the water spider? A wolf spider? A banana spider?

The **tarantula** is probably the most feared of spiders. It is very big and can stretch itself almost to the size of a one-foot ruler — 10 inches. It is furry, unlike other spiders. It is a **nocturnal** animal and comes out at night to find food. It is large enough to eat many animals that smaller spiders can't catch. It can eat big beetles, toads and frogs. It can even eat small birds, snakes and lizards. Most spiders live one or two years, but the tarantula takes eight to 10 years to become an adult, and then lives a few more years. Tarantulas can become pets in our homes because they can be tamed.

Spiders are considered humankind's friend because they help keep the insect population in check. Humans use spiders' silk to make threadlike lines for microscopes, telescopes and other scientific instruments.

All animals have natural enemies. Birds, insects such as wasps, snakes, lizards, frogs and fish eat spiders. Sometimes spiders eat each other. Humans try to destroy them because we do not understand how useful they are. Spiders try to protect and defend themselves from their enemies. Ask students to consider if they were spiders what they would do to protect and defend themselves. All of us know how to protect ourselves using methods that are very similar to those of the spider.

1. **Escape!** How? (Use the dragline to drop into space and wait; move along the web to a safe place; use powerful jaws on smaller animals; use venom.) Usually spiders are frightened of people and try to escape from us because we appear like giants to them. Humans also try to escape from things that we think are dangerous.
2. **Hide!** A spider can hide by using its colors and patterns for **camouflage** to blend in with colors and patterns. What colors do spiders have? What are the colors of dirt, trees, leaves and grass? Humans will also hide if they sense a danger.
3. **Frighten the enemy!** Many people think that all spiders are poisonous, but in general, very few spider bites will be harmful to humans. **Tarantulas** look frightening, but they are not poisonous. They just scare their enemies and people silly!
4. Use a weapon — venom! Most spiders are not poisonous, but some are: the **black widow** and the **brown recluse** are poisonous and make people very ill with their bites. Many people do not understand that spiders very rarely attack their enemies. If a spider sees an enemy, it will usually try to get away. But all spiders use their poison in self defense, when escape is impossible.

At times, spiders will not attack their prey unless it is moving. Many insects have learned that if they do not move, the spider will not detect their motion vibrations. Spiders that ensnare their prey in their webs do not use their poison. The spiders that hunt for their prey, or hide on flowers and capture insects by grasping them with their fangs when the insects come close by, kill their victims with poison.

LESSON FOCUS

■ LESSON 1 *Spiders ! Scary or Nice?*

BIG IDEAS Humans often do not understand spiders because spiders look scary. Counting and graphs help us show information.

■ LESSON 2 *Spiders Have Special Characteristics*

BIG IDEAS Spiders are animals that look like insects but are not, because spiders have 8 legs and 2 body parts. We can order numbers by using the idea of "one more than."

■ LESSON 3 *Spiders Catch Prey*

BIG IDEAS Spiders catch and eat their prey and are also caught and eaten by their enemies.

■ LESSON 4 *Spiders Are Special*

BIG IDEAS Spiders have a life cycle, and reproduce by laying many eggs. We can count by 1s, 2s, 5s or as many as we want.

■ LESSON 5 *Spiders Have Natural Enemies*

BIG IDEAS Spiders protect themselves from their natural enemies. A spider's web makes many paths.

■ LESSON 6 *Spiders Live Everywhere*

BIG IDEAS We can find spiders everywhere in the world because they have adapted themselves to living in different environments.

■ LESSON 7 *Now We Know Spiders!*

BIG IDEAS Knowing about spiders helps us appreciate them. Information helps us make guesses.

OBJECTIVE GRID

Lessons	1	2	3	4	5	6	7
Mathematics Objectives							
1. depict information on a graph	•						•
2. find all the possible paths in a geometric figure					•	•	
3. make a figure on a geoboard; describe it verbally by finding lines of symmetry			•				
4. estimate how many spiderlings are held in a spider's egg sac if the eggs are the size of a pea, a linking cube, lima bean, lentil				•			
5. count (or add) members of sets by 1s, 2s, 5s, 10s	•	•		•	•	•	•
6. use words such as "most", "least", and "as many as" (middle) to describe how many in a group, e.g., spiders/non-spiders	•			•			
7. order pictures of spiders by size, by other variables	•			•			
8. use ordinal numbers up to 6 (first, second, last) to describe the life cycle of spiders, to describe their food chain, other	•						
9. construct sets of up to 8 elements; tell the number in sets of up to 8 elements	•	•	•	•	•	•	
10. order numbers		•	•		•	•	•
11. makes a guess based on information given.							•
Science Objectives							
1. list 4 characteristics of spiders using numbers to describe and count body parts		•					
2. classify pictures of animals as spiders or non-spiders; other	•	•	•				
3. list 2 parts of the spider's food chain			•		•	•	
4. describe at least 3 characteristics of a spider's habitat				•	•	•	
5. list and describe at least 4 types of spiderwebs			•		•		
6. name one benefit of spiders to humans	•						

Continued on next page ▶

Lessons	1	2	3	4	5	6	7
7. name at least 2 natural enemies of spiders, including man			•		•		
8. list 2 animals that are prey of spiders			•		•		
9. describe a spider's life cycle				•	•		
10. describe how a spider's web feels, looks and works			•				
11. list special adaptations spiders have made to live in their environment, including how the water spider and trap-door spider have adapted			•	•	•	•	
12. describe the danger of spider bites			•		•		
13. make and list predictions about what will happen if an insect is added to a vivarium			•				
14. describe differences between live birth and hatching.				•			
Language Objectives							
1. verbalize feelings and give information about spiders in English	•	•	•	•	•	•	•
2. act out spider actions, such as spinning a web, ballooning, camouflage		•			•		
3. write or dictate a sentence about spiders using the theme's vocabulary		•	•	•	•		•
4. create a minibook about the student's favorite spider			•	•			•
5. provide information about spiders after observing them in the vivarium	•		•	•	•		•
6. cite or draw an illustration about a spider story and its author			•	•			•
7. state justifications for a claim about spiders.	•	•	•	•	•	•	•

LESSON 1 Spiders ! Scary or Nice?

BIG IDEAS Humans often do not understand spiders because spiders look scary. Counting and graphs help us show information.

Whole Group Activities

Materials

Books: **Spiders** by J. Dallinger or **El Gato Araña** by N. Bayley
Collection of pictures of different kinds of spiders and different insects such as bees, grasshoppers, snails, snakes, etc.
Collection of pictures of different-size spiders
Magnifying glasses to observe spiders in the vivarium
Word tags: life cycle, egg sac, ballooning, spiderlings, food chain, vivarium, others, as they are needed

Encountering the Idea

Read a book on spiders to the students; example: **Spiders** or **El Gato Araña.**

Have a short discussion with students about their experiences with spiders. Include where **spiders** are found; what they look like; what they do; and why students are or are not afraid of them.

Construct two graphs to depict students' feelings toward spiders **before and at the end of** the lesson and at the end of the unit. Do **Activity** — Like or Not Like. The second graph shows the new vocabulary and information about spiders.

Exploring the Idea

At the **Science Center**, students place spiders they have collected into their class **vivarium.** Do **Activity** — Spider Vivarium. Students collect insects such as flies, grasshoppers, etc. to feed the spiders. They find out what foods to bring to the vivarium. Students observe the spiders using magnifying glasses when necessary and write or dictate observations about the live spiders. Students describe what they see. (These descriptions can serve as a part of the lesson assessment.)

At the **Music** and **Drama Centers,** sing and act out songs and nursery rhymes. Introduce songs and rhymes to the whole group in the first lesson and keep them in the centers for rest of the unit. Using nursery rhymes, students role play **"Little Miss Muffet"** and **"Eensy, Weensy Spider."**

At the **Mathematics Center,** the students do **Activity** — Like or Not Like.

At the **Art Center,** the students make a wall spider. Students draw or paint individual spiders to place on the bulletin board.

Students can also make flannel board spider body parts by cutting the body parts out of flannel and putting them together with glue or sewing them. The different parts can be made from different-colored flannel. (The teacher can prepare flannel spiders to use in the **Game Center** as puzzles.)

At the **Art** and **Drama Centers**, act out rhymes. Students also make paper puppets related to **Spiders** and **El Gato Araña** and role play an original story.

At the **Writing Center**, students work on a **vocabulary list** by locating new word tags in alphabetical order on the wall spider as they learn them, e.g., life cycle, egg sac, ballooning, spiderlings, food chain.

Getting the Idea

Students verbalize any decisions to qualify their spider preferences after the lesson and write their comments over or under their names on the graph.

Place graph chart in **Mathematics Center** to add to as students work on the unit.

Organizing the Idea

Students construct one set representing the students that like spiders, and another set representing the students that do not like spiders. (Students suggest ways to make these sets.)

Next, name the number of students that **do**, and then the number that **do not** like spiders. Talk about these two sets showing different groups of people.

Example: By using beans, represent the students belonging to the set who like spiders, and make the other set of linking cubes represent students who do not like them. Obtain the number for each set from the graphs at **Mathematics Center.** This can be done for the "after" set also.

Closure and Assessment

The sets constructed in the **Mathematics Center** under **Organizing the Idea** can be part of the lesson assessment.

Oral Assessment

1. What do the markers inside the set represent? How many students like spiders? How do you know? How many do not like spiders? How do you know? Show this in two different ways. (Using sets and using numbers.)
2. Why didn't you put all of the markers inside only one set? (You have to show two different sets because there were two different groups.)
3. Which set has more/less?
4. In which set do you belong?
5. Were the sets different after the lesson? Why?
6. What did we learn about spiders?

Performance Assessment

1. Students will make drawings of sets constructed at **Mathematics Center.**
2. Assess individual graphs constructed by students for student understanding.

List of Activities for this Lesson

▲ Like or Not Like

▲ Spider Vivarium

ACTIVITY

Like or Not Like

Objective

Students collect information and depict it on a graph; count; compare numbers.

Materials

At the **Mathematics Center**

- Chart paper
- Glue or tape
- Post-it notes or pieces of paper with each student's name or initials to glue on chart

Procedures

1. Before the lesson, tak a survey of class members to see whether they like or do not like spiders.
2. Each student places note on the column marked "yes" or "no".
3. Students count notes in each category.
4. Compare the numbers. How many more like (or dislike) spiders than not like (or like)? What do we do to compare two numbers to see which is greater? (We can count; match the squares to see which ones are left over; subtract.)
5. Repeat the survey **after** the lesson. Again, compare the numbers.
   Chart:

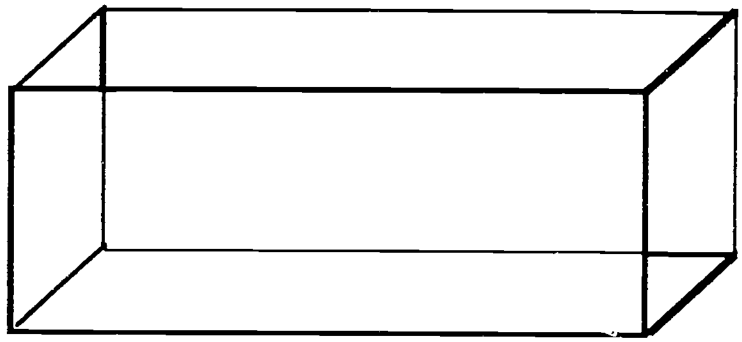
	Before Lesson		After Lesson
Yes	□ □ □ □ □	Yes	
No	□ □ □	No	

ACTIVITY
Spider Vivarium

Objective

Students study spiders by observing them in a "close to natural" state; they describe the spiders' physical features and their eating, mating, and reproducing behavior, if possible from observations.

SPIDER VIVARIUM



Materials

Soil; aquarium tank or very large jar (one gallon); small wet sponge; leaves, rocks, branch; cheesecloth and tape; flashlight; plastic container or net (for catching spiders and insects)

Procedures

1. Place soil in the bottom of an aquarium tank and cover it with a few leaves, rocks and a large branch. Place a small wet sponge in the tank for moisture.
2. Go on a spider hunt. Be sure to capture your spiders (five or six) with a net or plastic container so that you do not hurt them.
3. Place the spiders in your tank. Cover the tank with cheesecloth. Tape the cover in place. Place water on the sponge periodically.
4. Have children observe the spiders over several days. Do they move around much? Do they eat leaves? If you are lucky, the spiders will spin a web on a branch.
5. Add a live insect to the tank and watch what happens.
6. Students begin and maintain a list of substances and animals that spiders eat.
7. Do spiders sense light (darken room and then use a flashlight). Do they like light?
8. Do spiders sense noise?
9. List other ways students have tried to stimulate the spiders to get a response.

LESSON 2 Spiders Have Special Characteristics

BIG IDEAS Spiders are animals that look like insects but are not, because spiders have eight legs, two body parts and spinnerets. We can order numbers by using the idea of "one more than."

Whole Group Work

Materials

Live or dead insects, or large pictures of insects (bees, ants, flies)
Live or dead spiders, or pictures of various types of spiders
Magnifying glasses
Copies of **National Geographic** featuring spiders
Books: **Spiders are Animals** by J. Holloway & C. Harper, **A Look at Spiders** by C. & B. Moon and **La Araña Despistada** by J. Wordman

Encountering the Idea

Read about spiders in **Spiders Are Animals** and **A Look at Spiders;** discuss the readings and brainstorm facts about spiders found in the reading. Ask: How are spiders special? What can we say about them? Let's observe them and see.

Exploring the Idea

At the **Science Center,** students use a magnifying glass to observe a spider's legs, eyes, and other body parts. They make a drawing of the spider's body parts that they observed.

Students specify characteristics: A Spider has ________________ (suggest characteristics such as legs, eggs, body parts) They also write: A Spider does not have ________________ .

Students classify pictures or plastic toys as spider or not spiders.

Students complete **Activity** — Who Am I? and **Activity** — Edible Spiders.

Getting the Idea

After the students have had an opportunity to explore the idea, discuss the following:

Many people believe that spiders are insects — they are not — they look like insects. There are two main features that distinguish spiders from insects — spiders have only two body parts and eight legs whereas insects have three body parts and six legs. During this discussion, show pictures or show live spiders and insects to demonstrate the differences.

Students report on their observations of the spiders. The' illustrate their report with drawings in their journals.

Organizing the Idea

At the **Art Center:**
Students make paper-plate spiders with:
large plate for abdomen
small plate for cephalothorax
strips of construction paper folded accordion style for legs.

At the **Mathematics Center:**
1. Play **Water Spider Race** game (a spinner game with a die and a checkerboard). Students count the number of spaces that the spider can move, depending on the number that comes up on the die.
2. Students predict the number that will come up on the die.
3. Construct a set of "eight" spiders. Make thumbprint for abdomen, other fingerprints for cephalothorax and make legs with marker or crayons.

4. Students complete **Activity** — Ordering Sets and Numbers and **Activity** — Spiders Have Eight Legs. Place at the **Manipulative Center** — spider puzzles; board games related to spiders.

At the **Music** and **Art Centers** — songs on tapes or records of **Little Miss Muffet** and the **Eensy Weensy Spider.** Students draw, color, cut and paste four pictures depicting the sequence of each song while listening to the songs.

Assessment and Closure

1. Students state reasons why spiders are grouped in specific categories, including what distinguishes a spider from an insect. These comments can be written on chart tablet and reviewed later by the whole group.
2. Art Activity — paper-plate spider (shows two body parts and eight legs).
3. Mathematics activity with sets of eight spiders.

Oral Assessment

1. Why did you group the pictures/animals in this manner?
2. Can you put the frog with the spiders? Why/Why not?
3. How many fingers will you use to make a spider's body?
4. How many legs will you draw on your spider?
5. Tell me how a spider is different from an insect.

Performance Assessment

1. Assess paper-plate spiders for student understanding.
2. Assess completed sets of eight thumbprint spiders showing two body parts, eight legs—four on either side of the cephalothorax.
3. Assess for accuracy drawing of spiders observed in the **Science Center.**
4. Assess for understanding categories of spiders and non-spiders.

List of Activities for this Lesson

- ▲ Edible Spiders
- ▲ Spiders Have Eight Legs
- ▲ Who Am I?
- ▲ Ordering Sets and Numbers

ACTIVITY
Edible Spiders

Objective

Students learn the parts of a spider by making cookies in the shape of a spider; they label the parts.

Materials

3 cups peanut butter
3 cups honey
4 cups powdered milk
3 cups powdered sugar
Box of raisins

Procedures

1. Mix the ingredients (except raisins) together in a large bowl.
2. Shape the dough into two shapes for the head (smaller oval shape) and the abdomen (the larger, longer shape).
3. Use raisins for the eyes (spiders can have many eyes).
4. Use pipe cleaners cut into eight lengths that are proportional to the body of the spider to represent the legs.
7. The students label or point to the various parts of the spider's body.
6. There is no cooking necessary!! The spiders are ready to eat.

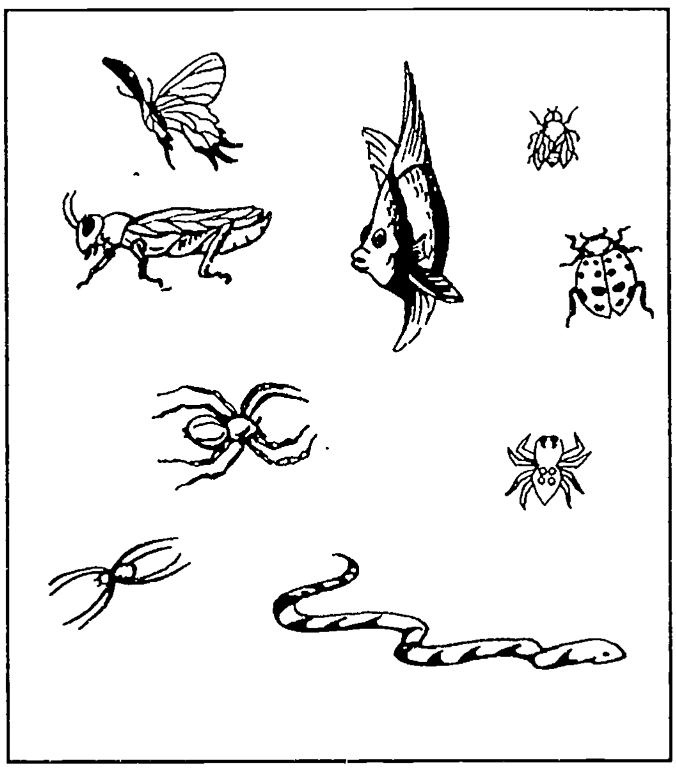
ACTIVITY
Spiders Have Eight Legs

Objective
Students identify spiders by counting eight legs (four on each side) on animal pictures.

Materials
Each student has a copy of a picture of different animals, as below.

Procedures
1. Working in pairs, each student uses his/her picture to identify the spidersby counting eight legs and putting an "x" on the animal that is a spider.
2. If the student does not put an "x" by a picture he/she explains to his/her partner why it is not a spider.

Alternative
Students classify picture cards of animals into two groups — spiders or those that are not spiders.



ACTIVITY
Who Am I?

Objective

The student learns that a spider has eight legs (four on each side of the body), cannot fly, can spin a web, has eight eyes usually but cannot see very well, and is not an insect.

Materials

Cut-out pictures of various types of spiders
Drawings of a spider hanging from a dragline
Pictures or drawings of a spiderweb
Pictures or drawings of a spider's eyes
Word cards — arachnid, spinnerets, silk, dragline
Pieces of silk thread

Procedures

1. The teacher tells a riddle: I am an animal; I have eight legs, I cannot fly because I have no wings; I can spin a web. **Who am I?**
2. The teacher holds up the pictures and tells the students that a spider is not an insect; it is an **arachnid** (a-rak-nid). One special thing about a spider is that it can spin a silk web. The silk comes from inside the spider's body through small holes at the back of the body called **spinnerets.** The silk comes out as a liquid but quickly dries in the air. It is very strong and looks like a long strand of hair.
3. The teacher shows a thin, long piece of silk thread. Spiders also make draglines out of the same sticky, liquid silk. A dragline is a very long strand of silk that allows spiders to hang in the air. They use the draglines to capture prey, the same way as with a web.
4. Spiders have many eyes but cannot see very well.
5. There are over 30,000 different types of spiders that scientists have been able to study. Most of them are very small and not dangerous. They help us by eating insects that we may not want to have around.

ACTIVITY

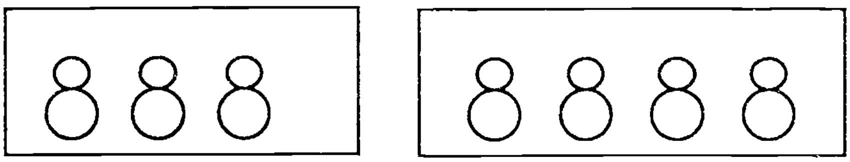
Ordering Sets and Numbers

Objective

The student constructs a set with one more (one less) member than a given set and assigns each set its corresponding cardinal number.

Materials

counters, toy spiders or objects representing spiders
numeral cards 0 through 10



Procedures

Students work in pairs.

1. One student constructs a set of spiders.
2. The second student:
   - constructs a set with one more spider on the right of the smaller set
   - places the appropriate numeral card under each set
   - makes a statement such as: four spiders are more than three spiders; four is one more than three.
3. The two students change roles and continue constructing sets of "one more."
4. Change the task to construct a set that has "one less" spider than the given set.
5. Students continue as in Procedure 2.

LESSON 3

Spiders Catch Prey

BIG IDEAS Spiders catch and eat their prey and are also caught and eaten by their enemies.

Whole Group Work

Materials

Books: **The Very Busy Spider** by E. Carle and **The Spider Makes a Web** by J. Lexau
Pictures of spiderwebs, or observe the webs constructed in the vivarium
Pictures of spiders that do and do not not catch prey with a web
A chain al out 12 inches long, or a picture of a chain
Word tags: prey; camouflage; enemy; food chain; frog; bird; snake; ballooning; spiderlings

Encountering the Idea

You have been observing spiders for a while in our class vivarium. One reason we observe the spiders is to learn some important things about them. For example: What do spiders eat? Where do spiders get food? How do they get food? We also want to know if other animals eat spiders. Are spiders themselves food? If you were a spider, what would you do to hide from your enemies and not get eaten? Look at the spiders in the vivarium. What color are they? Are all spiders brown? Are there green spiders? Red? During the time we spend in the centers, we will try to discover some of the answers to these questions.

Exploring the Idea

First, we will read a story that will give us some ideas about spiders' food and how it is caught. Read: **The Very Busy Spider** or **The Spider Makes A Web.** After reading the book, ask the students: Do you think that other animals eat spiders? Do birds eat spiders? What else eats spiders?

Let's discuss this: If you were a spider, what would you do to hide from your enemies and not get eaten? (Hide, use camouflage.) Look at the spiders in the vivarium. Can you see their camouflage? What is their camouflage? We will be exploring these new ideas in the center activities.

At the **Science Center,** the students

1. sort pictures of safe and unsafe insects and other animals.
2. sort pictures into those that are spider's prey and those that are not.
3. complete **Activity** — Spider Venom.
4. complete **Activity** — A Spider's Breakfast.

Materials

Collection of pictures of various kinds of spiders
Collection of pictures of various kinds of insects and other small animals (lady beetle, fly, bee, wasp, snake, snail, caterpillar, ant, roach, water beetle, grasshopper)

Procedures

1. Students sort the pictures into animals that spiders eat, those they do not eat, and those that are spiders.
2. The students report to the teacher or to the group why they sorted them as they did, including reporting on spiders' characteristic of having eight legs. They count the legs to see if there are eight, and also say that four plus four is eight.
3. The students also count the eyes: spiders usually have eight eyes; other animals usually have only two (ant, grasshopper, caterpillar).

At the **Mathematics Center:**

1. **Activity** — Spider gets the Fly — a spinner game.
   - One student is the spider and the other is the fly. The spider and the fly move on a board the number of times shown on a die or a pair of dice, depending on the students' ability to finds sums of 12 and less. The spider catches the fly when the spider lands on the same square as the fly.
2. Students design a web on paper and then follow the design to draw or make their web on the floor or rug with yarn.
3. Complete **Activity** — Catch a Fly.

At the **Art Center:**

1. Students construct webs with yarn glued to construction paper or with cooled spaghetti. They puts knots on the yarn to represent the sticky parts that hold the prey.
2. Complete **Activity** — Spider Fun.
3. Make paper-bag spider costumes and stress camouflage.
4. Make Black Widow spider with an hourglass design.
5. Make a chain, with at least three to five links with one word written on each link: grasshopper, spider, frog, plant, bird, snake, fish. The link with the word "plant" is first and the second word is "grasshopper" because grasshoppers eat plants; grasshopper is followed by "spider", followed by "frog", etc. Frogs are eaten by birds, snakes and fish, so place those links after the frog link. The students use the words "first", "second", "next" and "last" to describe the links of the chains they make.

At the **Music Center:**

Students sing along and read words written on a chart, and tape the song: "One Elephant" (also found in Spanish).

One elephant went out to play
out on a spider web one day
He had such an enormous day
that he called for another elephant
to come to play.

At the **Writing Center:**
Students examine a spiderweb in the vivarium. They write an illustrated description about how the web looks, feels and works.

For **Physical Education,** students play freeze tag game — getting "stung" by the Black Widow.

Getting the Idea

Discuss how the spider uses a web to catch prey. Show different types of webs and how different spiders catch their prey. Show word cards during the discussion. Discuss how camouflage helps spiders catch their prey and also helps them hide from their enemies.

Discuss the notion of a food chain with the students. Spiders consume many different kinds of insects, but they themselves are prey to other animals. At the bottom of the chain are the plants because they make their own food. At the top of the chain are humans. Humans consume plants, but humans eat meat also. Since frogs are prey to many different animals, several different links are placed within the frog link.

How does a spider use its venom? Are all spiders harmful to humans? Do all spiders bite? Which kinds of spiders have been known to kill humans with their bite? If not all spider bites cause death, in what other way can spider bites be harmful?

Use the **"Trap-door Spider"** as a choral reading. Expand the reading by comparing one spider and the web it spins to another type of spider and the web it makes.

Trap-door Spider hiding underground
In his tunnel where he can't be found.
He digs it deep and lines it with silk
And works very hard until it is built.
Patiently he waits and doesn't make a sound,
So he can feel the vibrations on the ground.
He crawls to the top to get a good view.
If you are an insect .... he might catch you!!
Unknown Source

Discussion

How does the trap-door spider catch its prey? Does it build a web? How do the leaves, sticks and grass help the spider? (The spider senses the vibrations of the leaves and sticks and knows there is prey outside the trap.)

Compare this method to the method the purse-web spider uses to catch its prey.

A spiderling can use its spinnerets as soon as it is born. The spiderling puts out a silk line called a **dragline.** What do you suppose the spiderling uses this line for? (To catch food.) How does it find food? When a spiderling sways on its line, it can catch prey. This is called **ballooning.** Why do you think it is called ballooning?

Organizing the Idea

The class designs and makes a booklet on web-building, stressing the idea of sequence — the students verbally dictate the steps. Provide students with pictures that suggest the various stages of web-building, or students may draw their own pictures. The teacher may also use this activity to assess understanding.

Journal Writing — Write a story of how a spider catches and eats its prey — the student may select any type of spider that the class has discussed. Example: trap-door, wolf, black widow, etc.

Closure and Assessment

1. Write and illustrate a "Facts about Spiders" class Big Book.
2. Students complete **Activity** — Catch a Fly as a culminating activity.

Oral Assessment

1. Tell me about the spider web. What does it look like? How does it feel?
2. If you were a spider, where would you spin your web and why?
3. How does a spider use its web?
4. Students explain how the dissolved sugar cube in **Activity** — Spider Venom is like a spider's venom.

Performance Assessment

1. Assess quality of completed spider webs.
2. Using labeled paper links (with plant and animal names), the student places at least three links, including the spider link, in the correct order in which the organisms exist in the spider's food web.
3. Assess quality of completed Spider Fun and A Spider's Breakfast.

List of Activities for this Lesson

- ▲ Spider Venom
- ▲ A Spider's Breakfast
- ▲ Catch A Fly
- ▲ Spider Fun

ACTIVITY
Spider Venom

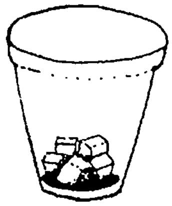
Before performing this experiment the students discuss snakes having a poison similar to spider's venom. Discuss ways to avoid danger of being bitten by spiders. After the discussion, the students perform the spider's venom experiment (sugar cubes and water); use pictures of/or dead black widows or brown recluse spiders.

Objective

Students observe a simulation of the effect of a spider's venom on its prey.

Materials

One styrofoam cup per group
One sugar cube per group
Very warm water



Procedures

1. Give each group a cup with several sugar cubes in the bottom. Explain that cubes are like the inside of an insect's body — hard!
2. Have children pour a few drops of water onto the cubes. What happens? The water dissolves the sugar cubes just as the spider's venom dissolves the insect's body when the spider spreads venom into the insect's body. Because a spider can turn its food to liquid, it can eat without chewing!
3. Discuss how people's diets would change if we didn't have teeth.

Discussion

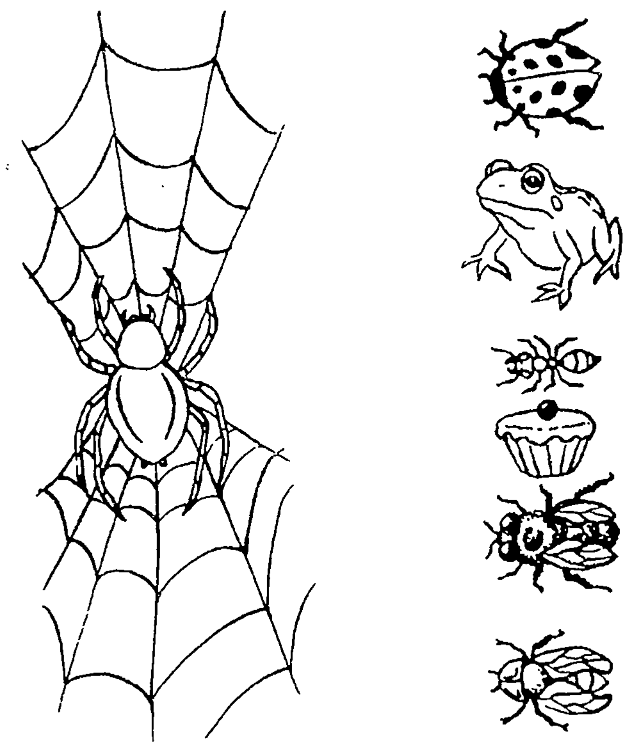
Because the spider can only digest fluid food, predigestion must take place outside the spider's body. Some people believe that spiders suck blood; this is not correct. Spiders inflict a wound with their fangs and, through the wound, inject digestive enzymes into the wound to liquefy the tissues of their prey. Then the spider pumps the insect dry, leaving nothing but an empty shell behind.

ACTIVITY
A Spider's Breakfast

Objective
Students recognize what spiders eat.

Materials
Crayons or markers
Cut-out pictures of insects and other animals, and food substances such as bread and candy, glued on cards

Procedures
Students classify pictures into "things spiders eat" and "things spiders do not eat."



Discussion
1. Which items did you mark that spiders will not eat? Why did you mark those?
2. When you observed the spiders in the vivarium, what did you see them eat? Did you try bread? Something else?

ACTIVITY

Catch a Fly

Objective

Students catch and count popped corn; compare which number is the largest.

Materials

popcorn popper and popcorn
sheet to place on the floor
various utensils to catch the popped corn: sheet rolled into a cone, large spoons, box

Procedures

The children pretend to be spiders who are going to catch flying insects (the popped corn).

1. Place sheet on the floor to catch the popped corn.
2. Pop the corn in the center of the sheet to avoid the corn falling on the floor.
3. The students sit around the popper on the edges of the sheet.
4. As the corn is popping out, the students stay seated and from where they are, try to catch the popped corn with the different utensils or objects they selected. They cannot catch the corn that has fallen on the floor — only the corn that falls into their utensils.
5. After the popper has popped all the corn, the students count the number of "insects" each caught. They compare to see who caught the most.
6. The students can compare to see who got the most "insects" by either counting and comparing to see who has the largest number or by matching the corn, kernel by kernel, to see who has the most left over.

ACTIVITY
Spider Fun

Objective

Students make observations about spiders, naming two kinds of spiders and describing their webs and spiderlings.

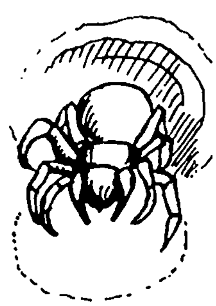
Materials

scissors; glue; popsicle sticks; a tissue box; yarn; cutout of trap-door spiders; flour and water; nylon thread; cardboard tube (from paper towels); newspaper; paints or colors; markers; stapler; tape; construction paper; leaves, small sticks; grass; one balloon per child; small brown paper bags

Procedure

Trap-door Spiders

1. Use the tissue box **with its lid,** to form the trap door for the spider. The spider hides inside the trap (or the box) until it senses through the web that some prey is near.
2. Glue the leaves and small sticks on the sides of the tissue box.
3. Color and then glue the cutout of the trap-door spider on a popsicle stick.
4. Students draw, color and cut out shapes of insects: ants, bees, grasshoppers, flies, etc. (These can also be used for other activities.)
5. Staple pieces of yarn to the insects to dangle close to the opening of the trap door.
6. One student dangles the insect while the the spider pops out of the trap door to get its prey.



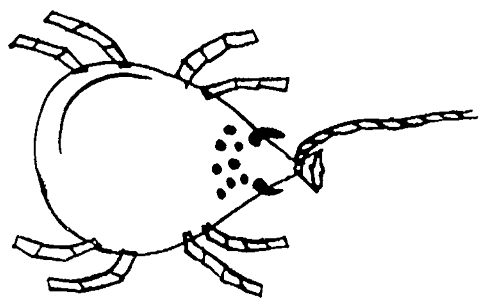
Purse-Web Spiders

1. Cut the cardboard paper towel tube in half to make two webs.
2. Make a paper mache mix with the flour and water.
3. Cut the thread into six-inch to eight-inch pieces; dip them in the mix and wrap them around the tube. Let the thread dry.
4. Color the tubes brown (for camouflage). Make the brown paper bags into rocks by stuffing them with newspaper and gluing or stapling them shut.
5. The purse (web) is now ready. Place it on the side of the rocks. The spider digs a hole under the web. When insects get caught in the web, the spider captures them. (Student pretends to be a spider and hides under the rocks [bags]; another student pretends to be an insect. When the "insect" touches the web, the spider captures it. The "spider" pretends to eat the "insect".)
6. Students take turns being the spider and the prey.

Flower Spiders
1. Each student draws a daisy with a yellow center and white petals.
2. They draw on the white petals a white spider waiting for an insect to come by.
3. The spider waits for the bee, butterfly or other insect to get close enough to it, then it strikes its prey.
4. This spider **does not use its web** to catch its prey. It relies entirely on its camouflage to deceive the insect.

Spiderlings
Each child blows up a balloon and:
1. counts and makes eight construction paper spider legs
2. counts and colors in eight eyes at the front of the balloon
3. makes two fangs on the sides close to the eyes
4. tapes the eight legs to the spider balloons
5. tapes a piece of yarn to the spider
6. hangs the spider from an appropriate place in the classroom.

Students observe that air currents in the room make the spiderlings sway and float.



Discussion
1. How does the trap-door spider catch its prey? Does it build a web? How do the leaves, sticks and grass help the spider? (The spider senses the vibrations of the leaves and sticks and knows that prey is outside the trap.)
2. How does the purse-web spider catch its prey?
3. A spiderling can use its spinnerets as soon as it is born. The spiderling puts out a silk line called a **dragline.** What do you suppose the spiderling uses this line for? (To catch food.) How does it find food? As the spiderling sways on its line, it can catch prey. This is called **ballooning.** Why?

LESSON 4 *The Spider's Life Cycle*

BIG IDEAS Spiders have a life cycle, and reproduce by laying many eggs. We can count by ones, twos, fives, or as many as we want.

Whole Group Work

Materials

Book: **Spider Magic** by D.H. Patent.

Life-cycle sequence cards (to cut out and use in a variety of activities: pictures of spider eggs in the egg sacs; spiderlings molting in order to grow; adults dying or being eaten as part of the food cycle)

Collection of live insects such as flies and others that can serve as food for the spiders

Chart

Word tags: ballooning, habitat, life cycle, molting

Encountering the Idea

We have been collecting and observing spiders for several days now. Have any of our spiders died? Yes, some of them have died, but we keep on bringing new ones into our vivarium. New spiders have to be born, otherwise we would run out of spiders, and we have many of them all the time. Where do new spiders come from? Yes! Spiders come from eggs. Have you seen any of our spiders with eggs? Where are the eggs? Have you seen them through the magnifying glass? In this lesson we will discover many new things about the life and death of spiders.

Exploring the Idea

The teacher reads the book, **Spider Magic,** about the life cycle of spiders. What are the two ways that animals are born? Animals either hatch from an egg or else they are born from their mother when they can live on their own, like kittens or puppies. How are spiders born? Yes, spiders hatch from eggs.

At the **Science Center:**

1. Complete **Activity** — Spider Egg Sacs, as below.

Materials

white tissue paper; water; yarn or string; tacks; lentils, linking cubes, sugar cubes, lima beans

- Students roll out tiny spider "eggs" out of wet, white tissue paper.
- Students put the "eggs" into a small piece of tissue paper about two inches square to form the egg sac. Tie the sac at the top with the string or yarn. Hang the sacs from the string in different places in the classroom.

2. Students review the concept of ballooning by playing with the spiderlings they constructed in the **Art Center.**
3. Complete **Activity** — Spider Life Cycle.

At the **Drama Center:**
The students working in pairs or small groups select a favorite spider, dress to resemble that spider using brown paper bags on which they have drawn the spider's features, and act out a scene.

At the **Writing Center,** students
1. write at least two things in their journals on the life cycle of the spider.
2. describe spiders, their habitats and life cycle using number words, geometric (shapes) descriptions, and the new vocabulary words.
3. use life-cycle sequence cards to construct a book. Students dictate the life cycle to the teacher who writes it on cards, and then the students sequence the cards.

At the **Art Center,** students
1. color the paper bags showing the spider features for the **Drama Center.**
2. construct a spider life cycle cap (use ordinal numbers to name the steps, from one to five or six different steps in the spider's life cycle). A **spider cap** is made of a circular headband, the length of each student's head, and about two inches wide, decorated with pictures depicting the life cycle of spiders. Make a large paper spider outline cutout to form the crown of the cap and glue the legs of the spider to the headband.

At the **Mathematics Center:**
Students estimate, then count, the number of spiderlings that can fit into a spider egg sac. Next, use lima beans to put into the sac to simulate spider eggs; estimate how many can fit, then count. Do the same thing with lentils, linking cubes, sugar cubes or other small objects. Simulate different-size sacs with socks, plastic bags, or other types of material that can hold beans or cubes. Again, students estimate and count.

Getting the Idea

After students have had an opportunity to complete their activities in the centers, discuss the following ideas: What is a **life cycle?** What does the word "cycle" mean? Yes, like a bicycle, it is something that is in a circle. A life cycle means that animals, and plants also, live in a cycle. They are born, become adults, reproduce or make new animals or plants, and then they die. Although the adults die after they have reproduced, there are more new animals all the time. Living organisms preserve themselves in this manner all the time. When all the animals of one kind die out and no new ones are born, we say that animal has become **extinct.** We don't know if any types of spiders have become extinct, but we know that the spider is **certainly not** on the endangered species list. There are too many of them to become extinct, and they have learned to **adapt** themselves to their environment. They will always survive.

All animals need a place to be born and to live. The place where animals are born, live and die is called a **habitat.** It is very similar to the Spanish word, **habitación.** Spiders have habitats where they are born and where they live. Different spiders have different habitats. The habitats are different because the places where spiders live are very different. The spiders have to use what is around them in their environment to make their habitats. Describe some of the habitats you have learned about from the books you have read and looked at.

(Pause for students to give oral reports of the results of their activities.)

New spiders hatch from eggs. How many eggs does a female spider lay? Yes, spiders lay many, many eggs. When the eggs hatch the new spiders are called **spiderlings.** What are two things that new spiders can do as soon as they are born? (Pause to allow for student responses.) Yes, they can spin silk and they can catch and eat prey.

As a whole group, the students write a **cinquain** expressing their feelings about spiders.[1]

Organizing the Idea

1. Working in small groups, students make two lists of animals on a chart — one list of those that reproduce by laying eggs and the other of those that give live birth.
2. Students draw and illustrate a story about a particular spider's life cycle.
3. Students draw and illustrate a story about a particular spiderling and where and how it lives to become an adult.
4. Students complete **Activity** — Spider Minibook.

Assessment and Closure

Oral Assessment

Assess mastery of the use of new language structures and vocabulary in the oral interviews.

1. Are spiders and cats born the same way? Explain how each is born.
2. Why do spiders build an egg sac?
3. Describe ballooning. How is it used, and who uses it?
4. Students explain why more lentils, for example, can fit in the egg sac than lima beans. What does "estimate" mean? Is it like a guess? How is it different from a guess, or is it the same? (An estimate is like a guess. In making an estimate, however, you might be using some information to help you narrow your guess down to just a few choices. In making a guess you might not use any information at all.)

Performance Assessment

Assess understanding of the Big Idea by assessing students' completion and quality of work on **Activity** — Spider Minibook, on the story of a spider or spiderling or on the life style cap.

List of Activities for this Lesson

▲ Spider Minibook

▲ Spider Life Cycle

[1]Cinquain — one formula

1st line - 1 word	— name of animal	Tarantula
2nd line - 2 words	— describe animal	Black, hairy
3rd line - 3 words	— describe actions of animal	Hiding, hunting, jumping
4th line - 4 words	— describe your feeling about animal	Scared stiff, can't look
5th line - 1 word	— group animal belongs in	Spider

ACTIVITY
Spider Minibook

Objective
Students draw and color four pictures depicting the spider's life cycle on separate sheets of paper, which are put together to form a minibook.

Materials
Book pages: paper rectangles, 3 1/2 x 5 inches

Procedures
1. On four separate pages or pieces of paper, students draw four stages of a spider's life cycle: eggs in the sac; spiderlings in the nest hatching and leaving the nest; spiderlings ballooning; adults spinning a web to catch prey.
2. Color the drawings.
3. Label each page or make an observation about the spider in the picture.
4. Sequence the pictures and number the pages.
5. Staple the pages.
6. Make a cover page and illustrate it.
7. Write a story, poem or cinquain (see Lesson One) for the minibook.
8. Place the minibook in the **Library Center** for other children to read.

ACTIVITY
Spider Life Cycle

Objective

The student verbally describes a spider's life cycle in correct chronological order.

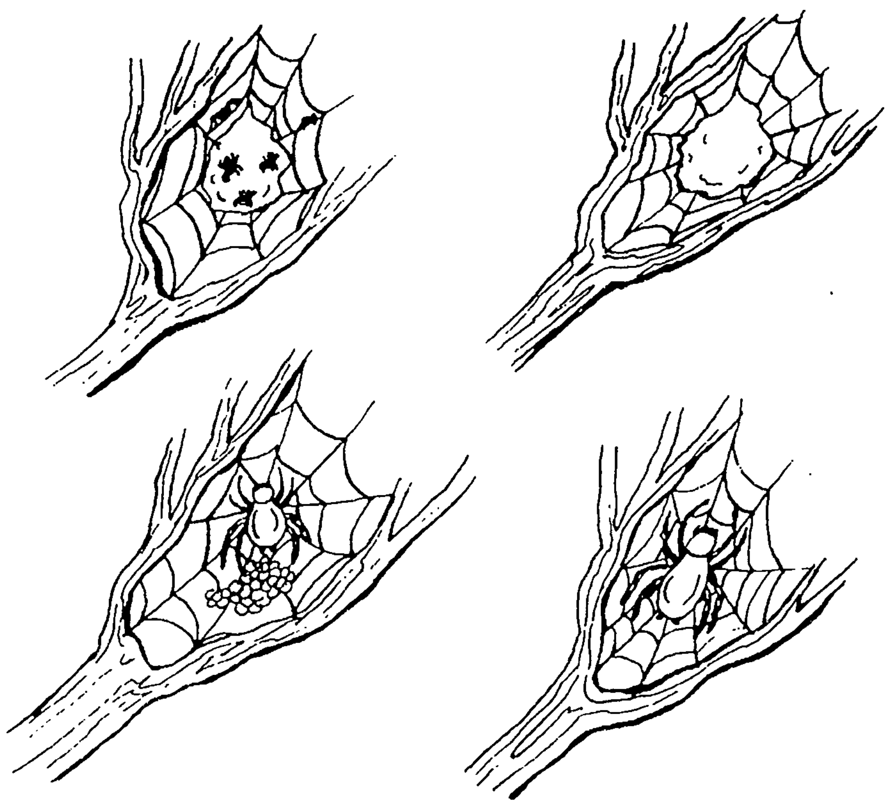
Materials

Set of four cards showing spider laying eggs, the egg sac, the spiderlings and adult spider, as shown below.

Set of pictures of animals that eat spiders: frogs, wasps, birds, snakes, ants, fish or flys.

Procedures

1. Students sequence a set of four pictures depicting the life cycle of a spider.
2. Student either points to and/or writes words (eggs, egg sac, spiderlings, adult) appropriate for the four stages.
3. Students sort a set of pictures into those of animals that eat and those that do not eat spiders.
4. The students count the life cycle cards to ensure there are four. They count them singly, or say that three and one more is four, or that two plus two is four.



LESSON 5 Spiders Have Natural Enemies

BIG IDEAS Spiders protect themselves from their natural enemies. A spider's web makes many paths.

Whole Group Work

Materials

Books: **Spiders** by A. L. Hopf and **The Lady and the Spider** by F. McNulty
An army camouflage jacket and/or pants (green and gray), or
Leopard-spotted material (brown/yellow) to make dresses, skirts
Pictures taped on cards of spider enemies and animals that are not enemies
Frame sentences written on a poster board that students can see:

A ____________ would be afraid of a spider, but a spider would not be afraid of a ____________ .

Encountering the Idea

Show the army camouflage jacket and pants to the students. Ask the students to describe them. Ask the students, "Who wears these kinds of clothes?" Yes, soldiers wear them. Why do you think the soldiers wear clothes colored with these colors and spots? If soldiers are fighting in the jungle, would they be harder to see if they wear these clothes? Why? Yes, because they are the same color as the jungle, and the soldier would blend into the trees and leaves.

What about the tiger's or leopard's spots? What color are they? Yes, black and brown and yellow. Why do you think that tigers and leopards have developed these spots? Yes, to make them blend with their habitat, so their prey won't see them and get away. Yes, they want to hide from the prey and also from their enemies.

Exploring the Idea

Read **Spiders.** Focus on spiders' enemies and spiders' defense mechanisms. Open a discussion on what students would do if they saw a spider on their bed, or shoe, or simply crawling across the floor. Would they kill it or not? Say that spiders have to be careful of all types of animals including humans. Why?

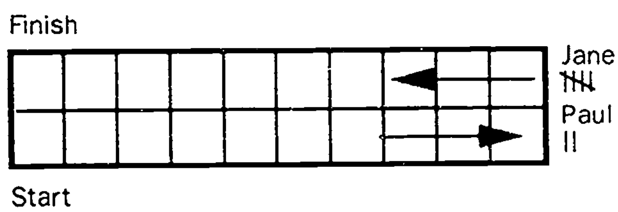
Ask the students to name different animals and write animal names on a poster board. Students predict how different animals would react to spiders. Would an elephant be afraid of a spider? Why? Would a spider be afraid of an elephant?

Read **The Lady and the Spider.** Discuss spiders' defense mechanisms, including camouflage.

At the **Science Center,** the students complete

1. **Activity** — Spiders Can Defend Themselves
2. **Activity** — Spider Enemies.

At the **Mathematics Center,** the students
1. sort pictures of spiders and their enemies
2. sort pictures of animals that are enemies and those that are not.
3. complete **Activity** — Spider Paths
4. play a game.
   - **Game:** two players per card; one die for each pair of students; one playing board, as below.
   - **Rules:** one student is the spider (uses the picture of a spider to move across the playing board), one student is an enemy (uses picture card of a spider's natural enemy).
   - **Object of game:** "Spider" throws the die and moves that number of spaces. "The enemy" throws the die next to try to catch the spider. The players begin moving at Start, move to the right following the arrows on the playing board, then up and on to the Finish Line. If spider reaches the Finish Line, he/she is safe. If an enemy catches up to spider by landing on the spider's square, then the spider is dead. The students take turns being the spider and the enemy. They keep a tally mark to convert to a number to see who wins.



At the **Writing Center:**
1. Students name two or more natural enemies of a spider. Write enemies' names in student journal; illustrate how enemies can harm the spider. Write why spiders should not be killed, or
2. students draw and/or write in their journals three ways that spiders defend themselves.

At the **Art Center** — Camouflage Diorama.
Students draw a garden scene with different-colored plants, flowers, leaves, branches, and other things they like. They place at least three different spiders in their webs in the garden. They draw at least 2 spider enemies in the garden. They color the spiders to blend with the environment.

Getting the Idea

1. List the dangers the spider encountered in **The Lady and the Spider** on a chalk board. Discuss how each of the barriers was removed.
2. Students discuss and share information on spiders found in **Activity** — Spiders Can Defend Themselves.
3. Spiders use their webs to catch their prey and to defend themselves. How do they use their webs to defend themselves? Look at a web under a magnifying glass. You can see that there are sticky drops of silk on some of the strings of the web, but not all. The spider knows how to travel on the web so that she doesn't get stuck; this way she can move very fast along the web and escape.
4. Discuss **weird disguises** with the students.

A **white spider** does not build a web to catch its prey. She relies on her camouflage. The white spider lives on a flower whose petals are completely white. The spider's color is also white. When a bee stops on the flower petal to pick up pollen to make honey, the bee cannot see the spider that looks like a flower petal. The spider springs, jumps on the bee and catches it for food.

One spider is a **deceiver.** The spider **pretends to be an insect.** You know that spiders have eight legs, but an insect has only six legs. How many more legs does a spider have than an insect? Yes, two more. This deceiving spider raises her two front legs and pretends they are antennae, like the spider's feelers. Since many insects cannot see very well, to them the spider pretending to be an insect has only six legs. The insect is fooled, and the spider eats it.

Organizing the Idea

1. At the **Writing Center,** the students complete frame sentences:

   A ______________ would be afraid of a spider, but a spider would not be

   afraid of a ______________ .

2. Students illustrate the list of ways that spiders defend themselves.

Applying the Idea

Students draw themselves as a spider encountering an enemy and draw what they would do to survive.

Ask the students to observe the spiders in their vivarium to see if spiders use a sense of smell to detect their prey or their enemies.

Assessment and Closure

Oral Assessment

1. Why did you sort the pictures in this manner?
2. Tell me why this animal is a spider enemy.
3. If your picture was in this collection, where would you put it?
4. Show and tell three ways a spider can protect and defend herself from an enemy.

Performance Assessment

Assess:
1. Camouflage diorama.
2. Journals in which students draw spiders defending themselves.
3. Drawings of two spider enemies.

List of Activities for this Lesson

▲ Spiders Can Defend Themselves

▲ Spider Enemies

▲ Spider Paths

ACTIVITY

Spider Can Defend Themselves

Objective
Students learn that spiders have many ways to defend themselves from their enemies and name at least three different ways.

Materials
Pictures of spiders defending themselves using their draglines, using their poison fangs, hiding and escaping in their webs, and looking frightening like a tarantula. See **Teacher Background Information.**

Procedures
1. Ask students what they would do if someone was going to attack them. Make a list.
2. Students pantomime how they would defend themselves from attack.
3. Students describe how they think spiders would defend themselves.
4. Students dictate or write in their journals illustrated stories of how spiders defend themselves.

ACTIVITY
Spider Enemies

Objective
Students list at least three spider enemies.

Materials
Pictures (or small plastic models) of various animals, some that are the spider's natural enemies and others that are not

Procedures
1. Students examine the spiders in the vivarium to see if they can observe what things a spider fears.
2. Are spiders afraid of light? How would you find out?
3. Are spiders afraid of noise? Are they afraid of being touched, for example, by a person with a straw or a twig?
4. What happens if you touch a spider's web very softly with a straw or a small twig? Can the spider "feel" the vibrations of the web?
5. Students hypothesize about why spiders would or would not be afraid of light. (Their enemies can see them.)
6. Students will draw or collect pictures of various animals, and then sort the pictures into two categories: Spider Enemies and Not Spider Enemies.

ACTIVITY
Spider Paths

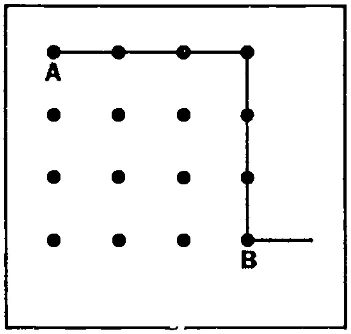
Objective
Students make different paths between two points.

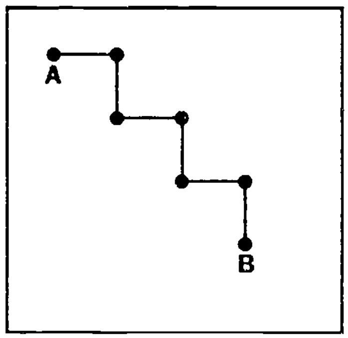
Materials
Geoboards with rubber bands

Procedures
Working in pairs, students make as many paths as they can for a spider to go from A to B (the prey).

Rule: You can't go back or retrace a step.

Discussion
How many paths did you make?
Can there be more?





Draw a spiderweb and show different paths the spider could take to get to the prey.

LESSON 6 *Spiders Live Everywhere*

BIG IDEAS We can find spiders everywhere in the world because they have adapted themselves to living in different environments.

Whole Group Work

Materials

Various reference books on spiders that describe and tell about their habitats
Color pictures of a variety of spiders
Pictures of different spiders' habitats including the trap-door, water, grass, purse-web, tarantula and/or others
Paper, pencil, crayons

Encountering the Idea

All living organisms need a place where they can be safe, eat, sleep or rest, develop from new organisms to maturity and can become adults and be able to reproduce. Spiders are living organisms, so they too need all these things. We know that spiders live in every kind of environment there is on earth. They live in the desert; they live in cold weather. They live in the jungle, and they can live underwater. One of the reasons that spiders can live in many different places on earth is because they have adapted to their environments. They have made changes so they can live where they are. In this lesson, we are going to discover different ways spiders have adapted to their environments.

Exploring the Idea

To begin our lesson, we are going to take a nature walk to discover and observe different spiders and see where they live. The students prepare for the walk by taking jars to capture any spiders they see that are different from the ones they have in the class vivarium. They can also capture insects and other animals to place in the vivarium for spider food.

The students will keep a record in their notebooks of the number of different spiders they find. The students can draw pictures of the spiders they see. When the students return to the classroom, they complete a record of their observations. Some things they can look for are whether the spider was in the shade or out in the sun, and whether the spider was moving or being very still. They can make any other observations they would like.

I Found Some Spider Habitats

Color	Where	Web, or no	Food caught in web	Eggs, or none

At the **Science Center,** students:

1. observe and draw a picture of the habitat of one of the spiders in the vivarium.
2. complete **Activity** — Where Do Spiders Live?
3. read a book describing different spider habitats.

At the **Mathematics Center,** students complete **Activity** — Spider Number Stories.

Getting the Idea

We can find spiders anywhere on earth because they have adapted to the environment to make a **habitat.** For example, if the place where they live, their habitat, is cold or has too much rain or light or enemies are around, some spiders build tents that they use as retreats or hiding places to find shelter from all of this. These spiders roll up a leaf, wrap it and secure it with silk threads. They go into the shelter until they feel safe enough to come out. This way spiders can live under difficult conditions in different parts of the world. Some types of spiders use the tents to jump down on unsuspecting prey.

Some spiders build tents underwater. An aquatic spider builds her tent in the shape of a bell and fills it with air. Other spiders make complete envelopes out of very tough silk for themselves and their eggs until the spiderlings are capable of taking care of themselves.

Spiders do not live in captivity for a long time. Males die soon after they mate, but if kept alone in captivity they may linger for several weeks, usually refusing to eat. Females, on the other hand, live longer. In some species the female dies soon after laying eggs, but in others they may live for several years, laying eggs annually. Some large tarantulas are known to have lived in captivity for as long as 15 years.

Organizing the Idea

Students will draw a picture of a spider they found at home or on the nature walk and write about (dictate) where they found it (its habitat).

At the **Language Center**, the students make a chart:

In a whole group activity, the class suggests words to fill in blanks on four types of spiders. Then they work in small groups to complete the frame sentences.

I am a _________ (type of spider) _________ . You will find me _________

(habitat) _________ . I _________ (do/don't) _________ build a web.

My web _________ (what it looks like or what its used for) _________ .

Assessment

Oral Assessment

1. Do all spiders live in hot, dry places? Where else can you find spiders? Name at least three different habitats that you learned about in reading your book in the **Science Center.**
2. Describe how a trap-door spider builds its web.
3. If you were a garden spider, where and how would you build your web? What would you eat?

Performance Assessment

1. Assess completion of **Activity** — Where Do Spiders Live? and level of participation in and completion of frame sentences in the **Writing Center.**
2. Assess level of completion of a drawing of a spider found around the home and identification of what type (garden, trap-door, etc.) of spider it is and how the student came to that conclusion.

List of Activities for this Lesson

▲ Where Do Spiders Live?

▲ Spider Number Stories

ACTIVITY
Where Do Spiders Live?

Objective

Students say that spiders can live anywhere and name at least three different types of habitats.

Materials

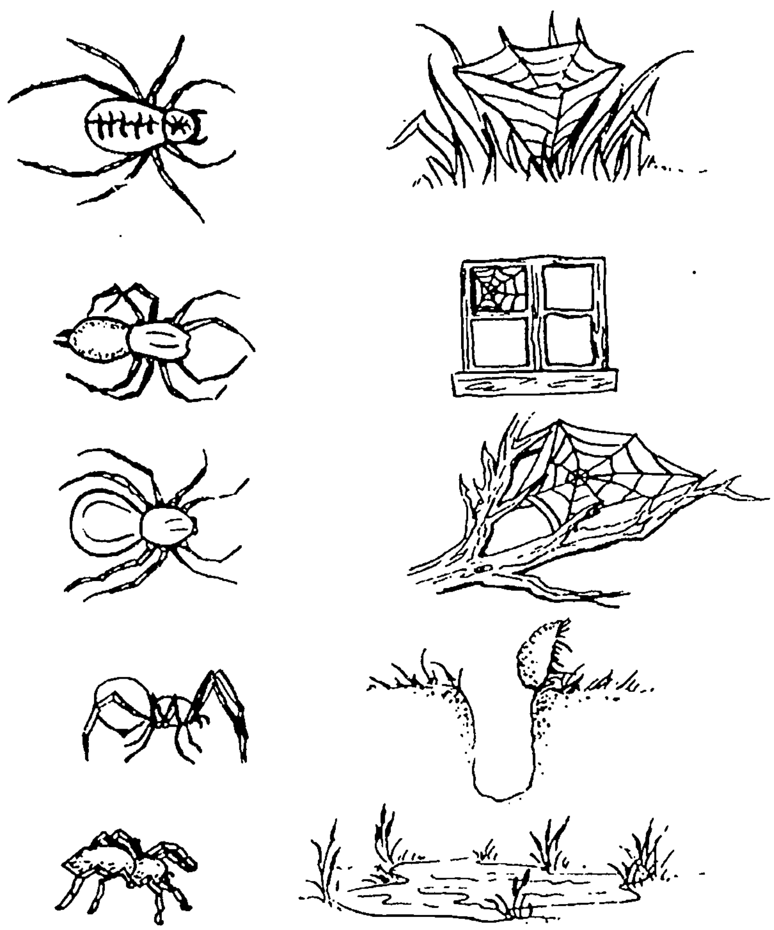
Books that describe and tell about the habitats of various spiders

Pictures of different spiders' habitats including the trap-door, water, grass, purse-web, tarantula, some shown below, and/or any others

Paper, pencil, crayons

Procedures

1. Working in pairs or small groups, the students select at least three different spiders. They look in books to find out all they can about where spiders live and how spiders complete their life cycle.
2. The students draw their spiders in their journals, labeling the type of spider and where it lives.



ACTIVITY
Spider Number Stories

Objective
Students add and subtract using single-digit addends.

Mathematics Story Boards

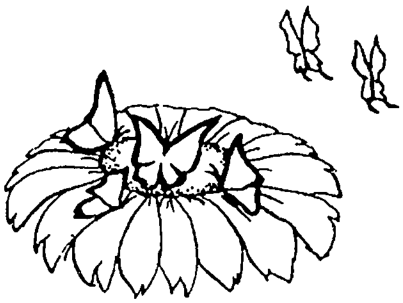
Materials
Laminated poster boards with stories; erasable color markers

In this part of the activity, give the story on the poster. The children finish the story and draw a picture of the story.

Five insects stood by a flower.
Oops! Two of them fell into a spider web.
Ex: *How many did not get caught?*
Number sentence: $5 - 2 = 3$ or $3 + 2 = 5$

Four beautiful blue butterflies were on a sunflower.
Two yellow butterflies came to join them.
Number sentence: $6 - 2 = 4$
Finish the story

______________________________________.



1. There were 11 eggs in the egg sac. Now there are only nine left in the sac. How many eggs hatched? Draw a picture of the egg sac.
2. One frog weighed 23 grams. Now it weighs 14 grams. How much weight has it lost?
3. There are some frogs and toads together in a pond. Make up and draw a number story about the frogs and toads.
4. There are some yellow and some orange fish in an aquarium. Make up number stories about the fish.

Number Story Charts

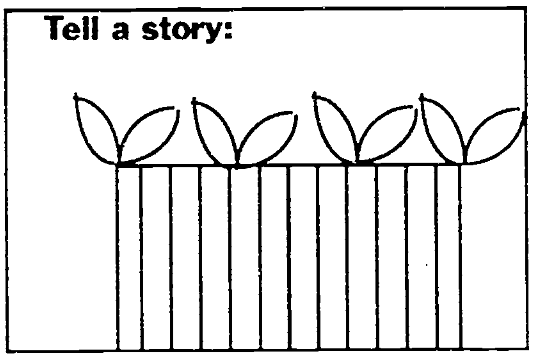
Materials

At least three poster boards that have been laminated after the pictures and/or numbers are put on them; erasable color markers

Procedures

Small group activity.

The teacher places the laminated posters around the room where the students can write on them with the markers. Poster 1: Tell a story about these four butterflies. Poster 2: Draw a picture about the number seven.



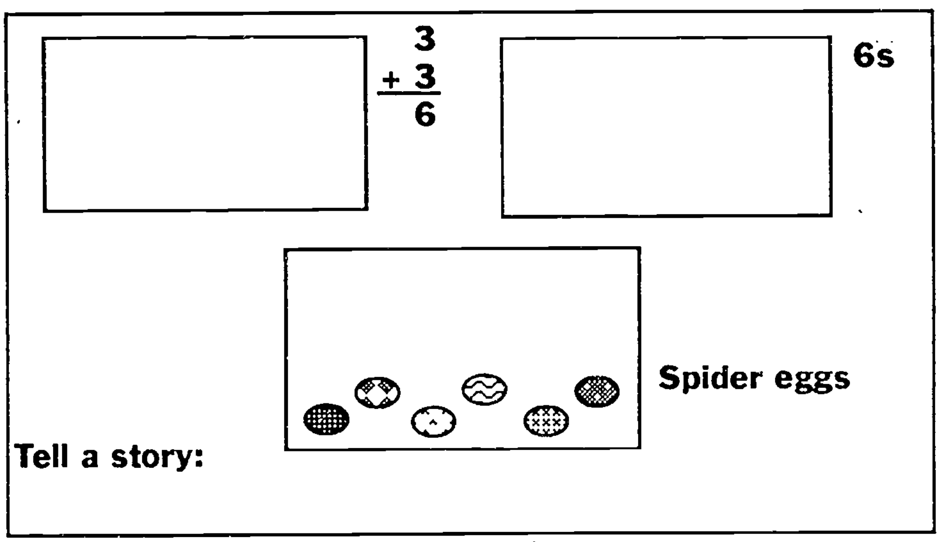
Poster 1

$$\begin{array}{r} 2 \\ 3 \\ +\,2 \\ \hline 7 \end{array}$$

7s

Draw a picture

Poster 2



Poster 3

LESSON 7 Now We Know Spiders! [1]

BIG IDEAS Knowing about spiders helps us appreciate them. Information helps us make guesses.

Whole Group Work

Materials
Book: **Anansi the Spider** by G. McDermott

Encountering the Idea

Read **Anansi the Spider** to the students. Discuss how spiders are remarkable. Ask students to name different things that make spiders remarkable. List key words on a poster strip for use at the **Writing Center.**

Lead the discussion so as to refer to the graphs students constructed at the beginning of the unit. Take a survey at this time. Put the new data on a poster board showing the way students feel about spiders now that they have completed the unit. Use the information in the **Organizing the Idea** phase of the lesson.

Exploring the Idea

At the **Science Center,** the students pretend they are spiders catching flies and participate in **Activity** — Catch a Fly .

At the **Mathematics Center:**

1. Students construct new sets of students liking or not liking spiders by referring to the new graph constructed at the beginning of the lesson. Students list the students in each set and count the members of each set. They identify the set that has more, or fewer, members. The students say which number is greater and why.
2. Students complete **Activity** — Spider Probability!

At the **Writing Center:**

1. Students write individual cinquains on spiders and glue or staple them on the body of the paper-plate spiders they constructed earlier in the **Art Center;** display work on the wall.
2. Students design and make a minibook, in cartoon style, showing a sequence of a spider building a web.

Getting the Idea

Students read the cinquains they wrote at the **Writing Center.** They discuss the ideas in the cinquains among themselves, comparing and contrasting their feelings about spiders.

[1] This lesson can serve as a unit assessment

Ask students if they think that knowing about something helps them develop better opinions about that thing. For example, when they first gave their opinions about spiders, did they know that spiders will not bite or attack unless they have no escape? What else did they learn about spiders that influenced their opinions? Make a list of things the students did not know about spiders. What do they know about spiders now? Explain that after learning new things about spiders people may **still not like them,** but now they have **reasons** for liking them or not liking them.

Organizing the Idea

Construct a third graph to see if students have changed their opinions on liking or not liking spiders. Record their opinions again. The responses should include reasons for changing their opinions based on facts about spiders. Compare the feelings and opinions between the first two graphs and the third graph.

Closure and Assessment

1. Students identify special characteristics of spiders through comparing/contrasting in **Spider Characteristics** sentences. They complete frame sentences such as:

   A ________________ is ________________

   A ________________ is ________________

   A ________________ is not ________________

2. Assess degree of completion of cinquain and the number of ideas expressed in it.
3. Assess degree of completion of minibook and the correct sequencing of the steps in building a spiderweb.

List of Activities for this Lesson

▲ Spider Probability!

ACTIVITY
Spider Probability!

Objective

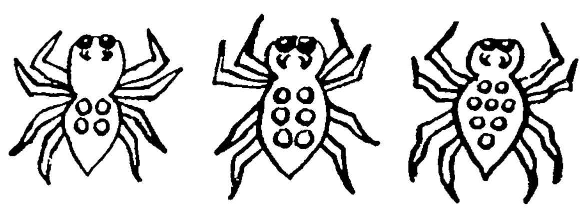
Given information about the number of spinnerets a group of spiders has, the student makes a guess about the number of spinnerets a given spider from the group has.

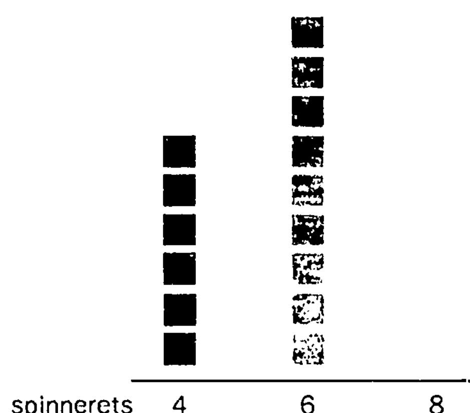
Materials

Multiple cards of pictures of spider spinnerets, as follows: nine with six spinnerets; six with four spinnerets; and two with eight spinnerets.

Procedures

1. The students count the number of spinnerets each spider has.
2. The students place the pictures into three groups — those spiders that have four, six or eight spinnerets.
3. The students place each of the pictures on a pictograph, as below.
4. They count the pictures in each group.
5. Students identify the spinneret-group that has the most spiders in it. (The six group, since it has nine spiders in it.)
6. Students identify the spinneret-group that has the fewest spiders in it. (The eight group, since it has two spiders in it.)
7. Students identify the spinneret-group that has more than the smallest group but less than the largest group of spiders in it. (The four group, since it has six spiders in it.)
8. The students take turns identifying the smallest and the largest groups using the appropriate terminology; they say that six is greater than two, but six is less than nine, and other similar comparisons.





After the students have had an opportunity to classify the pictures according to the number of spinnerets the spiders have, discuss the following ideas with them in a whole group activity.

Discussion

Tell the students that **all** spiders have either four, six or eight spinnerets. Today, a new spider has come to join the group of spiders that students have placed in the pictograph. Show the students an additional card, but do not let them count the number of spinnerets.

1. From the information the students have, which type of spider is the new spider most likely to be — the four, the six, or the eight-spinneret type?
2. Ask the students to make a guess. The students give their reasons for the guess. (The six-spinneret type is the most likely type to appear; from the sample, there are more pictures of the six-spinneret type than of the others.)
3. Ask students, who would guess that the new spider has four spinnerets? (The new spider **could** be of the four-spinneret type, but that is not **as likely to occur** as the six-spinneret type. **Maybe,** the new spider would have four spinnerets.)
4. Ask students, who would guess that the new spider has eight spinnerets? (The new spider **could** be of the eight-spinneret type, but that is not **as likely to occur** as the six or the four-spinneret type. **Maybe,** the new spider would have eight spinnerets, but the probability is that the new spider would not have eight spinnerets.)
5. Would any of the students guess that the new spider has only one spinneret? Why? (**All spiders** have at least four spinnerets. It is not **probable** that the new spider has only one spinneret.)
6. Does the new spider have **at least** four spinnerets? Would you guess that this spider has at least four spinnerets? (Yes, every spider will have four spinnerets; some spiders may have two more, or six; others may have four more, or eight, but every spider will have at least four.

References

Children's Annotated Books

Bayley, N. (1984). *El gato araña*. Barcelona: Editorial Lumen, S.A.

This story explores the life of a garden spider, spinning its web, trapping its prey.

Carle, E. (1984). *The very busy spider*. New York: Philomel Books.

Well illustrated, this book shows the sequence of how a web is built.

Dallinger, J. (1981). *Spiders*. Minneapolis: Lerner Publications.

This contains good pictures of spiders and their webs.

Daly, K. N. (1977). *A child's book of insects*. New York: Doubleday and Company.

This contains pictures of insects to compare with those of spiders.

Holloway, J., & Harper, C. (1990). *Concept science: Spiders are animals*. Clevland, OH: Modern Curriculum Press.

Hopf, A. L. (1990). *Spiders*. New York: Cobblehill Books, E. P. Dutton.

This contains life photographs of spiders, as well as types of spiders.

Lexau, J. (1979). *The spider makes a web*. New York: Hastings House.

This tells how spiders spin webs.

McDermott, G. (1972). *Anansi the spider: A tale from Ashanti*. New York: Holt, Rinehart and Winston.

This is a folk tale about spider and his son.

McNulty, F. (1986). *The lady and the spider*. New York: Harper and Row.

A spider lives in a lettuce head and comes close to being put down the drain, but is released by the lady.

Moon, C. & B. (1983). *Look at a spider*. San Diego: The Wright Group.

This addresses characteristics of spiders, web building and life cycle.

Patent, D. H. (1982). *Spider magic*. New York: Holiday House.

This contains good black-and-white pictures of spiders, their eggs and webs.

Petty, K. (1985). *Spiders*. London: Franklin Watts.

This contains good pictures of different spiders, as well as a sequence of pictures of web building.

Woodman, J. (1988). *La araña despistada*. Spain: Europa Ediciones, S. A., Brimax Books Limited.

This is a fantasy story about a spider. It doesn't give information about spiders, but it is a good story for language arts.

Teacher Resource Books

Conklin, G. (1972). *Tarantula: The giant spider*. New York: Holiday House.

This book contains information about tarantulas.

Martin, L. (1988). *Tarantulas*. Vero Beach, FL: Pourke Enterprises.

This volume contains good big, colored pictures of tarantulas.

Morrill, L. (1979). *Black widow spider, danger*. New York: Holiday House.

This describes black widow spiders.

Parson, A. (1990). *Amazing spiders*. Eyewitness Juniors. New York: Alfred A. Knopf.

Text and photographs introduce fish-eating spiders, spitting spiders and banana spiders.

Rosen, E. (1968). *Spiders are spinners*. Boston: Houghton Mifflin Company.

This is an informative book about spiders done in rhyme.

Victor, J. B. (1979). *Tarantula*. New York: Dodd, Mead and Company.

This is a complete book of tarantulas from characteristics, to molting, to webs.

unit

K Dinosaurs

Prior Knowledge

The student has
1. counted from one to 10
2. measured using string or ruler
3. sorted and sequenced by size
4. participated in whole group discussion/activities
5. become familiar with conventional print.

Mathematics, Science and Language Objectives

Mathematics

The student will
1. classify objects on the basis of one variable and summarize information on a graph
2. sequence sets of objects from smallest to largest and vice versa
3. count from one to as many as she/he can
4. measure objects using non-standard units
5. arrange pictures to show the relative size of a human, a two-story house, and a dinosaur
6. associate a numeral with "how many" in a given set including zero
7. use geometric shapes to form new shapes
8. explore concepts of time
9. explore addition and subtraction using counters.

Science

The student will
1. say that fossils are evidence that dinosaurs, and other plant and animal life, existed on earth many years ago, even though we cannot see them today
2. list at least three conditions that will cause a species to become extinct
3. describe dinosaurs as giant lizards and classify them as either plant eaters or meat eaters
4. say that dinosaurs hatched from eggs and had a life cycle
5. draw, in sequence, the life cycle of a dinosaur and of a reptile
6. say that dinosaurs' bones and other objects (fossils) are found buried in the earth
7. list at least three characteristics of a reptile
8. list dinosaur weapons and describe how dinosaurs defended themselves
9. describe how nature changes in at least two ways and at least two ways in which nature remains the same.

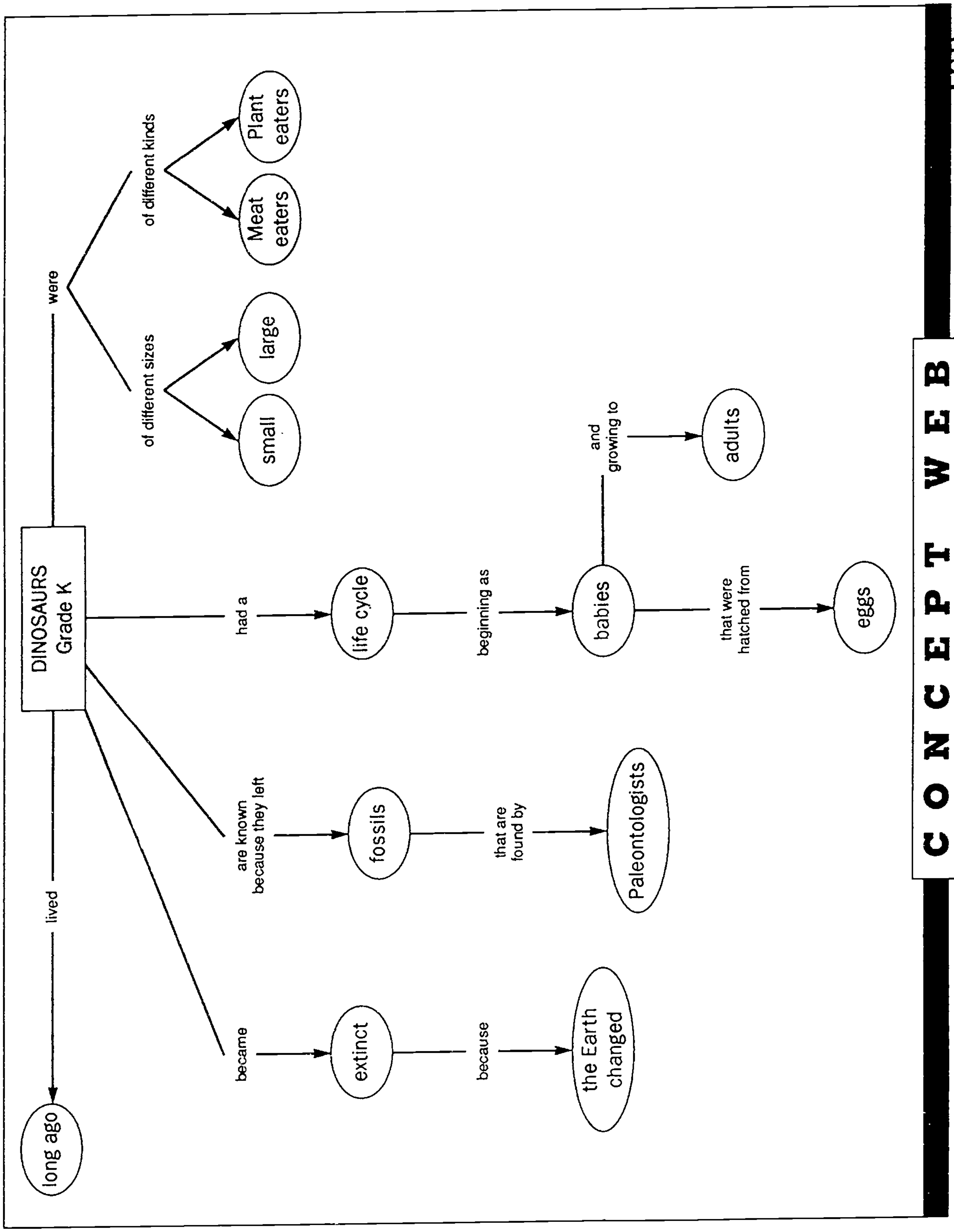
Language

The student will

1. acquire English sounds and intonation patterns
2. develop and share ideas by engaging in conversation
3. participate in role playing and choral speaking
4. develop and use appropriate, relevant vocabulary
5. demonstrate emerging writing by keeping a journal
6. make inferences by predicting story outcomes
7. demonstrate independent writing and dictation.

VOCABULARY

dinosaur dinosaurio	claws garras	horn cuerno	armor blindaje	beak pico
extinct extinto	evidence evidencia	life cycle ciclo de vida	diplodocus diplodoco	brontosaurus brontosaurio
tyrannosaurus tiranosaurio	specie especie	fossil fósil	theory teoría	carnivore carnívoro
erupt hacer erupción	footprint huella	herbivore herbívoro	iguanodon iguanodón	large grande
ord poner en orden	paleontologist paleontólogo	palm tree palma	pteranodon pteranodón	reptile reptíl
sequence poner en surceción	skeleton esqueleto	small pequeño	stegosaurus estegosauruo	triceratops (triceratops)
volcano volcán	baby dinosaur dinosaurito or dinosauricillo		long ago hace mucho tiempo, en tiempo pasado	



CONCEPT WEB
DINOSAURS
Grade K
lived
long ago
became
extinct
because
the Earth changed
are known because they left
fossils
that are found by
Paleontologists
had a
life cycle
beginning as
babies
that were hatched from
eggs
and growing to
adults
were
of different sizes
small
large
of different kinds
Meat eaters
Plant eaters

Teacher Background Information ● ● ●

Dinosaurs, or giant lizards, existed millions of years ago. These giant reptiles lived on earth 200 million years ago, and they became extinct about 64 million years ago, according to fossil finds. Scientists can only guess what they looked like, what they ate, where they lived and how they died. There are several theories of how dinosaurs became extinct: egg-eating mammals ate all the dinosaurs' eggs; a continental shift caused the weather to change, and shallow areas where animals could graze and drink began to disappear; a large star close to earth exploded, emitting deadly cosmic rays that destroyed the dinosaurs; or a meteorite storm on earth caused huge clouds and steam to block the rays of the sun, causing an ice age, during which the warm-blooded mammals that were prey for the dinosaurs could not survive.

Initiate the unit by having students make a list on the bulletin-board-size dinosaur poster of all the things they would like to know about dinosaurs. After making the list, the students make guesses, or suggest hypotheses, about the answers. During the implementation of the unit, whenever a student finds an answer, she/he puts it on the board next to the corresponding question, **after it has been agreed to by the rest of the class.** The student supports the answer by telling where it is found in a book, why a calculation is made, or where there is other evidence to support the claim.

The suggested teaching strategies are role playing and problem solving. As the students pretend they are paleontologists, they travel in a time capsule to the world of the dinosaurs where they can study them in their habitat and make guesses about why they became extinct. The role playing suggests a prehistoric time. The students begin working on a mural, coloring a large dinosaur cutout of butcher paper, on which students will display their work, as they complete it. As the students learn more about the dinosaurs and their time, the students add these details to the mural.

The word "dinosaur" means terrible lizard. Dinosaurs lived in the Mesozoic Era, before people populated earth. The earth was warm and covered with plants at the time dinosaurs lived. All dinosaurs lived on land or were amphibians; none had wings or paddles. Dinosaurs' eggs were not huge, but they were hard shelled, and dinosaurs were meat eaters (carnivores) and/or plant eaters (herbivores).

All dinosaurs walked fully erect. Modern reptiles like lizards and crocodiles walk with their legs sprawling out from their sides. Dinosaurs are the only reptiles that walked like mammals, some walking on two legs, some on four. All four-legged dinosaurs were herbivores. All carnivores were two-legged, although some herbivores were two-legged as well. All dinosaurs had special skeletal features: unique skull openings, hip arrangements that permitted them to walk erect, and straight thigh bones.

LESSON FOCUS

■ **LESSON 1** — *Long Ago*

BIG IDEAS
Dinosaurs existed many years ago; we have found their bones. Zero is the number that tells how many dinosaurs exist today.

■ **LESSON 2** — *Extinction*

BIG IDEAS
Life can cease to exist because the conditions on earth that support it change and no longer meet a life form's needs. Dinosaurs' needs were very large.

■ **LESSON 3** — *Fossils*

BIG IDEAS
Paleontologists dig for fossils to help us learn about the kinds of animals that lived long ago. Good guesses can be made from careful observations.

■ **LESSON 4** — *Types of Dinosaurs*

BIG IDEAS
There were many different kinds of dinosaurs: some walked on land, others flew in the air and others lived both on land and in water. We can use geometric shapes to draw their pictures.

■ **LESSON 5** — *Meat and Plant Eaters*

BIG IDEAS
Dinosaurs existed by eating large quantities of plants like ferns or by eating other animals. We can classify dinosaurs in many different ways.

■ **LESSON 6** — *The Dinosaur's Life Cycle*

BIG IDEAS
Dinosaurs hatched from eggs laid by the female dinosaur; the baby dinosaurs grew to be adults. Mathematics also tells us about patterns in the lives of dinosaurs.

■ **LESSON 7** — *Nature and Change*

BIG IDEAS
The story of the existence and extinction of dinosaurs tells us that change is a part of nature. Change can be observed by making comparisons and by using mathematics.

OBJECTIVES GRID

Lessons	1	2	3	4	5	6	7
Mathematics Objectives							
1. classify objects on the basis of one variable and summarize information on a graph	•	•	•	•	•	•	
2. sequence sets of objects from smallest to largest and vice versa	•	•	•	•	•	•	•
3. count from one to as many as she/he can			•	•	•	•	
4. measure objects using non-standard units	•		•	•	•		•
5. arrange pictures to show the relative size of a human, a two-story house, and a dinosaur							•
6. associate a numeral with "how many" in a given set, including zero	•			•	•		
7. use geometric shapes to form new shapes	•			•		•	
8. explore concepts of time	•						
9. explore addition and subtraction using counters	•	•	•		•	•	•
10. draw and use concept webs	•						•
11. explore large numbers	•	•					•
12. make inferences from information					•	•	•
Science Objectives							
1. say that fossils are evidence that dinosaurs, and other plant and animal life existed on earth many years ago, even though we cannot see them today	•		•	•			
2. list at least three conditions that will cause a species to become extinct		•					• •
3. describe dinosaurs as giant lizards and classify them as either plant eaters or meat eaters				•	•		
4. say that dinosaurs hatched from eggs and had a life cycle						•	
5. draw, in sequence, the life cycle of a dinosaur and of a reptile						•	•
6. say that dinosaurs' bones and other objects (fossils) are found buried in the earth	•	•	•				
7. list at least three characteristics of a reptile			•	•	•	•	

Lessons	1	2	3	4	5	6	7
8. list dinosaur weapons and describe how dinosaurs defended themselves					•	•	
9. describe how nature changes in at least two ways and at least two ways in which nature remains the same	•						•
10. state beliefs based on observation and "evidence"		•	•	•			•
11. describe tools used to make observations			•				•
Language Objectives							
1. acquire English sounds and intonation patterns	•	•	•	•	•	•	•
2. develop and share ideas by engaging in conversation	•	•	•	•	•	•	•
3. participate in role playing and choral speaking	•	•	•	•	•	•	•
4. develop and use appropriate, relevant vocabulary	•	•	•	•	•	•	•
5. demonstrate emerging writing by keeping a journal	•	•	•	•	•	•	•
6. make inferences by predicting story outcomes	•	•	•	•	•	•	•
7. demonstrate independent writing and dictation	•	•	•	•	•	•	•

LESSON 1 Long Ago

BIG IDEAS Dinosaurs existed many years ago; we have found their bones. Zero is the number that tells how many dinosaurs exist today.

Whole Group Work

Materials

Book: **The Day of the Dinosaur** by S. & J. Berenstain
Dinosaur shapes of different kinds and sizes for the **Mathematics Center**
Various books on dinosaurs and prehistoric times for the **Library Center**
Playdough, colors, markers, paints at the **Art Center**
Dinosaur books that have been taped at the **Listening Center**
Plastic dinosaurs, two of each kind, and sorting trays for the **Science Center**
Large cardboard or poster board to make a wall mural of prehistoric times
Word tags to show during shared reading and then placed in the **Writing Center:** long ago; small; large; smallest; largest; zero, and numeral card with 0

Encountering the Idea

With the children seated on the floor so that all can see the illustrations and print, talk about the book, **The Day of the Dinosaur.** Ask the children if they can tell what the story is about. Read the story and show the illustrations to the children, sharing your reactions. Talk about time and size concepts.

Place a large drawing of a dinosaur (see **Appendix A** — Dinosaur) on a bulletin board or hang from the ceiling. Tell students: You will be learning about dinosaurs for the next two weeks, and some of the things you will be doing in this unit are: digging for dinosaur bones, making fossils, eating dinosaur "food," eating dinosaur eggs, and writing and illustrating a class **Big Book** on dinosaurs.

Before sending the students to the centers, explain what each center contains and model the activities, if necessary. Assign or allow children to choose a center. Tell the children that all of them will complete the activities in the **Mathematics, Writing** and **Science Centers.**

Exploring the Idea

At the **Art Center** the students complete three activities.

1. **Activity** — A Picture of Long Ago. Tell the students that in order to understand about dinosaurs, and what they were like, we need to know about the time when they lived. What was the earth like? What kinds of food were available for the giant lizards? We will discover all of this as we read our books.

To learn about the conditions that existed on earth at the time of the dinosaurs the students make a wall mural, A Picture of Long Ago, showing the earth during prehistoric times. They make drawings and cutouts of dinosaur types and shapes to include in the mural. The students make a bulletin board next to the mural to write questions about dinosaurs they would like to explore and their hypothesized answers. As they find the answers to their questions, they include them on the bulletin board.

2. **Activity** — Thumbprint Dinosaurs
3. Students make large and small dinosaur shapes with geometric shapes.

At the **Mathematics** and **Science Centers**, the children complete a **sequencing** and **classifying** activity. They sequence cutouts of various sizes of dinosaur shapes and/or egg shapes, in different ways, such as smallest to largest. They also sort the plastic dinosaurs in a sorting tray in as many ways as they can think of.

Getting the Idea

When we say "It was long ago," what do we mean? Does it mean yesterday? Does it mean many years ago, before you were born? Before your parents were born? It could mean all of these things, but in this unit, when we say "long ago" we are going to mean **a very long time ago.** We will be talking about the time when there were only animals and plants on the land. There were no people. We are talking about a time that we know very little about, because there were no people around to remember it and tell stories about it to their children. The only way we know about what went on at that time is that we can dig in the earth and find the remains of the plants and animals that have not decayed or rotted.

Paleontologists have found fossils, not only of dinosaurs and of plants like ferns and mosses, but of other kinds of animals. (Show pictures of dinosaurs and other animals.) There were huge bears, and mastodons that were like our present-day elephants, and giant tigers called sabertooths because their teeth were sharp like sabers or knives. Most of these animals and plants are now extinct, but there are some animals and plants that still resemble these prehistoric animals. Lizards of today, crocodiles, turtles and whales look in many ways similar to animals that lived on earth at the time of the dinosaurs.

When we say that something is "big", or that something is "little", what do we mean? (Pause for student responses.) Yes, we compare things to see which is taller or longer. What do we mean when we say that something is "the biggest"? Yes, that means that there is nothing that we're talking about that is bigger. We will discover more about "big" things and "little" things by studying the dinosaurs.

When we say that zero is the number that tells us how many dinosaurs there are in existence today, what do we mean? Yes, zero tell us that the set of all dinosaurs on earth today is empty. There are no dinosaurs today. What does the number zero look like? Yes, it is a big circle with nothing in it — like the empty set. Show students a card with the numeral zero.

Organizing the Idea

The students participate in the following activity:

Choral Speaking and Role Playing

Dinosaurs of Long Ago

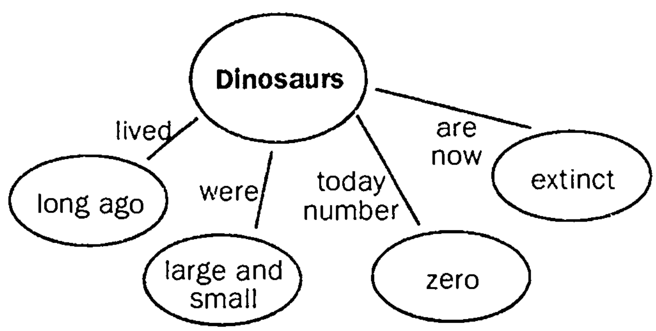
The dinosaurs lived long ago,
and walked like this, and that. (Slow, heavy walk movement.)
Some were large (Stretch hands upwards.)
and some were small. (Crouch down.)
Some liked water (Swimming motions.)
and some just walked on land. (Stomp feet.)
Some had wings, that flapped and flapped. (Flap arms.)
Some had long necks, that stretched and stretched. (Hand on neck stretching upward.)
The meanest, rudest one of all was ferocious Tyrannosaurus Rex.
(Feet apart, hands clawlike, scowl and growl.)
These were the dinosaurs of long ago.
Goodness gracious, where did they go?
Author Unknown
Modified by Maria E. Torres

Closure and Assessment

Reconvening the whole class for closure, engage them in repeating the choral speaking and role playing.

Use the dinosaur drawing to make a concept web to review the Big Ideas, as suggested below. A concept web is a graphic organizer for information that is similar to an outline.

To increase student interest, use shapes and colors to highlight the central figure, a dinosaur in this case.



Oral Interviews

1. What interesting animal did we read about today?
2. What were some of the words we used today when we talked about dinosaurs? (Use words cards from the Writing Center to remind students about the new words learned during shared reading.)
3. How large (how small) were dinosaurs?
4. How long ago did they live?
5. Let's make a list of other things you would like to know about dinosaurs. (Refer to the bulletin board that students started earlier in the lesson.)

Performance

Assess student participation in drawing the wall mural, in sequencing and classifying the plastic models in the **Mathematics** and **Science Centers**, in the choral speaking and role playing and in the level of completion of the thumbprint dinosaurs.

List of Appendices and Activities for this Lesson

- ▲ Appendix A — Dinosaur
- ▲ Thumbprint Dinosaurs

ACTIVITY
Thumbprint Dinosaurs

Objective
Students imagine and make dinosaur shapes and color them.

Materials
One package of uncooked rice
Blue, purple and yellow food coloring
Heavy cardboard
Three containers with lids, for rice
One sheet of construction paper per student

Procedures
1. Make blue, purple and yellow-colored rice with food coloring: Put rice into three separate containers; put several drops of each of the different food colors into separate containers; mix the contents in each container separately to get the desired color.
2. Use heavy cardboard to make the dinosaur templates. Use any one of the dinosaur patterns in **Appendix A** — Dinosaur to make a template.
3. Make the dinosaurs thumbprints:
    - Lay the template on construction paper
    - Brush glue on the construction paper, inside the template
    - Choose colored rice for dinosaur's color
    - Pour rice within the template and let dry
    - Pour excess rice back into the appropriate rice container.
4. Students design different-colored patterns to give texture and color to the dinosaurs.

LESSON 2 Extinction

BIG IDEAS Life can cease to exist because the conditions on earth that support it change and no longer meet a life form's needs. Dinosaurs' needs were very great.

Whole Group Work

Materials

Book: **What Ever Happened to the Dinosaurs?** by B. Most
Measuring tape to measure at least 50 feet or a 50-foot paper chain
Paint brushes, a jar with water, lap chalkboard or similar writing surface
Sorting trays with numerals zero to five written on the appropriate tray
Appendix A — Dinosaur
Word tags: extinction; disappear; evidence; diplodocus; theory

Encountering the Idea

Have you seen a real dinosaur? Do you know how many dinosaurs exist today? Yes, zero is the number that tells us how many dinosaurs are alive today. We will be working with the number zero in the **Mathematics** and **Science Centers** again.

Read the story, **What Ever Happened to the Dinosaurs?** After reading, ask the students if they think some of the author's ideas about dinosaurs could be true. Tell students that they will be writing their stories about extinction at the **Writing Center.**

Exploring the Idea

In our first activity we will discover more about dinosaurs. Students complete **Activity** — Measure a Dinosaur! as shown below.

Materials

50 feet of string; scratch paper, cut and strung into a chain at least 50 feet long
Paper chains of various lengths (heights of several of the students) to compare to the dinosaur chain

Procedures

Children go outdoors, if weather permits, otherwise use a hallway.

1. Children hypothesize as to the size of dinosaurs.
2. They measure 50 feet on a sidewalk or a hallway with the string; make a 50-foot paper chain to represent the length of a dinosaur.
3. Students compare the chain to their own heights.
4. They estimate how much food a dinosaur like the one they measured would need to eat every day. If they compare their height to the height of the dinosaur, can they get a better estimate?

Discussion

When you measured the dinosaur's size and then your own, who was bigger? Who was smaller? If you put some of your chains together, were they **all together** longer or shorter than the dinosaur? How do you know? Yes, you put them side by side to compare.

At the **Mathematics Center,** the students, working in small groups or in pairs,

1. classify the dinosaur models by color, size, and shape, after describing them to their partners
2. count a given number of dinosaurs to place under the correct numeral written on the sorting trays
3. say how many dinosaurs are alive now and point to the numeral that tells that number, and continue sequencing the dinosaur shapes.

At the **Library Center,** the children continue to read and look at the new book that was read for this lesson. Tapes of the book are available for the children to listen to, as they "read" the new book.

Getting the Idea

None of us has seen a dinosaur. If that is true, how do we know that they even existed? (Pause for student responses.) Yes, we may have never seen a dinosaur, but we have seen parts of dinosaurs that have survived over millions of years. These parts, which are mostly bones, that have survived suggest to us that such things as dinosaurs existed.

We know that many of the animals such as the dinosaurs living on earth at the time were very large. That means that they needed a lot of food, whether it was plant or animal food. How much food did you estimate that dinosaurs the size of the one we measured would eat every day? Yes, if we compare our size to theirs and then estimate how much food we eat every day, we can get an idea of how much **more** food they would need.

What would happen if the dinosaurs could not get enough food? Yes, they would die. What else did they need? Air and water. If any of these needs were not met, what would happen to the dinosaurs? Yes, they would die. What would happen if they had many natural enemies and could not protect themselves? Yes, their enemies would kill them.

Introduce the word "evidence"; show it on a word card. Tell the children that there is "evidence", such as that found in fossils, that makes us believe that dinosaurs existed many years ago even though we have never seen one alive. We know how big or how small they were because we have measured their fossils. Tell the students that there are several theories about what happened to the dinosaurs. A theory is like a guess, but it is a guess based on information or on the evidence that is available. In our lesson we will study some of these theories.

Theories about the extinction of the dinosaurs suggest that:

1. maybe their eggs were eaten by the dinosaurs' natural enemies, or by other dinosaurs;
2. maybe the land moved and caused the weather to change; when the weather changed the plants living at that time were not able to thrive and produce the amount of food needed to feed the dinosaurs, and the dinosaurs could not continue;
3. maybe a large star caused an explosion of cosmic rays that killed them all; or,

4. maybe a storm of meteors caused clouds to block the sun, which again affected the plants because they could not produce the amounts of food the dinosaurs required.

All of these suggestions are possible. Scientists, however, still do not know for certain why the dinosaurs ceased to exist. What do you think? What is your theory?

Organizing the Idea

1. Students illustrate and write about the size of the dinosaur they measured, and how it compares to their own height.
2. At the **Writing Center,** students dictate reasons (which the teacher writes on a chart) for why dinosaurs disappeared. Then the students write and illustrate their reasons for why the dinosaurs became extinct. They trace and write the word "extinct."
3. Students complete **Activity** — If I Were A Diplodocus. Students discuss what a diplodocus is and then write or tell about:

   If I were as long as a diplodocus, I would live ________, sleep _______, go out to eat _________, be careful of my _____ . (The students can add to these ideas.)

Closure and Assessment

Complete the lesson with the recitation:

One Friendly Dinosaur

One friendly dinosaur wanted to play peek-a-boo.
She found another, then there were two.

Two friendly dinosaurs looked behind a tree.
They found another, then there were three.

Three friendly dinosaurs went to find some more.
They found another, and then there were four.

Four friendly dinosaurs in the water did dive.
They found another, and then there were five.

Five friendly dinosaurs played in the sun.
They all ran to hide; now there are none.

Oral Interviews

1. How many of you made the dinosaurs "disappear" at the **Science Center**? Let's count.
2. What expression did you use that means the same as "disappear"? (Become extinct.)
3. How many dinosaurs exist today?
4. Teacher: I am going to hold up my hand and show zero, one, two, three, four, or five fingers. As soon as I hold up my hand and you know how many fingers I have up, raise your hand and tell me the number.

5. How do we know that dinosaurs existed many years ago?
6. What do **you** think happened to the dinosaurs?

Performance Assessment

Assess students' participation in the activities and the level of completion of their individual work. For example, assess a student's own explanation for the disappearance of the dinosaurs and work on **Activity** — If I Were a Diplodocus.

LESSON 3

Fossils

BIG IDEAS Paleontologists dig for fossils to help us learn about the kinds of animals that lived long ago. Good guesses can be made from careful observations.

Whole Group Work

Materials

Book: **Bones, Bones, Dinosaur Bones** by B. Barton.

Baby paraphernalia: pacifier; clean diaper; jar of baby food; article of clothing such as a shoe; and, any other objects that would suggest a baby's presence. Arrange these articles on a table where students can easily see and study them.

Chart tablet with sample chart from **Activity** — Fossil Hunting

Hats/caps for the paleontologists

At the **Mathematics Center:** dinosaur crackers and/or cookies for counting and sorting

Word tags: paleontologist; fossils; imprints

Encountering the Idea

Students, guess what happened today before school! We had a visitor, but the visitor could not stay and left before I got here. I don't know who the visitor was, but there are some things that were left here that were not here before. Can you help me guess who this visitor was? Let's look at all of these things and see what kind of detectives we are. Can you list some of these things? Yes, diaper, baby food, pacifier. The shoe is very small. Who do you think our visitor was? A baby! Tell me some more about this baby. Is it big? Oh, the diaper is not the smallest, but medium. Okay, so our baby is a medium-size baby. Do you think it is one year old? What about five years old? Ok, since it's wearing a diaper, it's probably **not!** It's probably younger. Is it a girl? The diaper has pink elephants on it, so you think it was a girl? But, are you certain? Well, it's probably a good guess. What color hair does the baby have? You don't want to guess? Is there a clue that can tell us the color of her hair? Well, I guess our class is full of good detectives. You never saw the baby girl, but you think that she was our visitor.

How do you think our guesses about who our visitor was have anything to do with the dinosaurs we are studying about? Yes, we can make good guesses when we have clues or evidence that helps us guess. That is one of the things that we will learn about today — the evidence that we use to help us learn about dinosaurs!

Exploring the Idea

At the **Science Center** the students, working in pairs, dig for fossils. Bury the models for the bones (chicken) and fossils in the cornmeal or sand. The students role play that they are paleontologists looking for dinosaur bones. The students dig them up using the small brushes and **one hand only** to make sure they do not destroy the fossils. The teacher models how to dig for fossils. Some of the children model also.

Students also complete **Activity** — Fossil Matching, wearing the hats/caps.

At the **Mathematics Center,** the students continue sequencing and counting the dinosaurs, and complete **Activity** — Two Legs or Four Legs? While the students work at the center, they can count and crackers and/or cookies.

At the **Art Center,** the students make fossils by making imprints of hands, leaves, and other objects on playdough. Students complete **Activity** — Fossil Prints.

Getting the Idea

Ask: Who has seen a real dinosaur? Ask students to predict what the book **Bones, Bones, Dinosaur Bones** is about, then read aloud. Point to familiar words. None of us have seen dinosaurs, but we have seen some evidence that they existed. Some of the most important pieces of evidence scientists have to suggest that dinosaurs lived on earth millions of years ago are the fossils or remains of these giant lizards that have survived for millions of years. In our **Science Center,** we are going to discover how scientists who have discovered these fossils take them out of the earth and then study them. From those observations, the scientists make guesses about the dinosaurs.

Talk about a paleontologist as you show the word tag. The teacher shows the chart, Fossil Hunting, with its columns: Where to Look for Fossils; Type of Fossil; Tools to Use; Things to Use for Records. Ask for students' suggestions to put under each column. Record children's comments/ responses on a large piece of paper or a chart to be used later.

What evidence do the paleontologists look for when they hunt for fossils? Are bones the only thing they want to find? What other things are important? (Leaves, to tell us what kinds of plants existed at the time; sea shells, to tell us if that part of the land had been under water; humans' remains such as pottery or human bones to tell us if people lived on earth at that time.) Human bones that are as old as dinosaur bones have never been found, so scientists believe that no human beings lived on earth at the same time that the dinosaurs lived on earth.

The fossils that have been found appear to be of three kinds: actual bones or teeth of animals, prints (impressions) such as footprints or spaces or casts left in stone after the object has decayed away. Which kind of fossils did you make? When you role played that you were paleontologists, what kinds of fossils did you find?

Organizing the Idea

At the **Listening Center,** the children "read" **Bones, Bones, Dinosaur Bones** by listening to a tape.

At the **Writing Center,** the children complete **Activity** — Fossil Hunting, including the chart from that activity; they trace and write the word "paleontologist" on a chalkboard.

Applying the Idea

Working in groups, one student group challenges another to guess about an event from the evidence the group supplies. Students may draw clues, or they may act them out as they would in Charades.

Closure and Assessment

Reconvene the class, using the same role playing activities as in **Lesson 1.**

Oral Interviews

1. What is a paleontologist? What do they do? Do they make guesses about the past? What things do they do to make certain that their guesses are as accurate as possible?
2. What are some other words we use to talk about dinosaurs? Use word tags to remind students.
3. What did we learn about dinosaurs today?
4. Who can count from one to five? Show me three fingers. Show me two. Show me one. Show zero fingers.
5. What other things have been found as fossils besides the actual dinosaur bones? (Imprints of leaves, and casts of footprints left on earth that have hardened over time.)
6. What else would you like to know about dinosaurs?

List of Activities for this Lesson

▲ Two Legs or Four Legs

▲ Fossil Prints

▲ Fossil Hunting

▲ Fossil Matching

ACTIVITY
Two Legs or Four Legs?

Objective
Students construct sets of two, four and five objects.

Materials
Dinosaur models of two- and four-legged dinosaurs
Sorting trays

Discussion
Tell students that all dinosaurs walked fully erect, unlike modern reptiles like lizards and crocodiles that walk on their bellies with their legs sprawling out from their sides. Dinosaurs are the only reptiles that walked like mammals.

Some dinosaurs walked on two legs, some on four. All four-legged dinosaurs were
herbivores. All carnivores were two-legged, although some herbivores were two-legged as well.

Procedures
1. Students sort the dinosaur models into those that have two legs and those that have four legs. They count the legs and say that one plus one is the same as two; two plus two is the same as four.
2. Students draw pictures of the four-legged dinosaurs and give reasons why these would be herbivores (plant eaters).
3. Students draw pictures of the two-legged dinosaurs and give reasons why these would be carnivores (meat eaters).
4. Students draw a set of three dinosaurs and say that three is one more than two, or two more than one.
5. Students draw a set of five dinosaurs and say that five is one more than four, or four more than one, or three plus two.

ACTIVITY
Fossil Prints

Objective

The students simulate fossil prints using clay to explore the concept of a fossil and to make inferences from given information, i.e., humans believe that dinosaurs existed because we have found their fossil remains.

Materials

Various small bones, leaves (ferns, preferred), shells, buttons or coins
A piece of modeling clay the size of an adult fist for each student or student-pair

Discussion

Fossils appear buried in the earth as either actual bones or teeth, or as impressions or prints, or as spaces or casts left in stone after the object has decayed away.

Procedures

1. Press one half of the clay flat and smooth.
2. Place the bone and leaf or other items onto the clay. Make a few impressions in the clay with a button, coin or twig.
3. Roll out the other half of the clay and place it over the objects on the first half. Press the two pieces of clay together gently to keep the clay from breaking. Take care that the clay molds the bone or other objects.
4. After the clay has dried, somewhat, carefully separate the pieces of clay. The prints of the leaves and a cast of the bone can be seen.

ACTIVITY
Fossil Hunting

Objective

The students use new terminology to describe remains of dinosaurs and other prehistoric life.

Materials

Each student group makes a chart to record where to look for fossils. The types of fossils may be actual bones, fossilized plants, and casts or prints of animals. The students make drawings of any of the fossils or tools they want to list.

Fossil Hunting

Where to Look for Fossils	Type of Fossil	Tools to Use	Things to Use for Records

ACTIVITY

Fossil Matching

The students will collect pictures of dinosaur skeletons and their correlating fleshed-out versions. Students will then label each dinosaur picture with the dinosaur's appropriate name. The teacher will provide a wide variety of dinosaur shapes and names for the students to choose from when labeling.

LESSON 4 Types of Dinosaurs

BIG IDEAS There were many different kinds of dinosaurs: some walked on land, others flew in the air and others lived both on land and in water. We can use geometric shapes to draw their pictures.

Whole Group Work

Materials

Illustrations of at least five dinosaur types, see **Appendix A** — Dinosaur

Copies of these illustrations made on heavy paper, cut into three to five jigsaw parts, depending on the number of children who are going to be "fossils"; color code each of the dinosaurs to help keep the parts together and place in baggies

Hats/caps for the paleontologists

Tapes of new dinosaur books for students to listen to and "read" for the **Listening** or **Reading Centers**

Encountering the Idea

If you went to the zoo, what would you expect to find? (Students give responses.) Yes, that would be a good zoo if it had all those different kinds of animals. What would you think of a zoo that had only monkeys? Well, it wouldn't be very exciting. What if it had only tigers? The same thing. In the time of the dinosaurs, the earth was like a zoo — many animals were living on it. There were many dinosaurs and there were different kinds — many different shapes and sizes. They not only looked different from each other, but they also ate different food. But there is one thing that was the same for all of them, and that is one of the things we will discover today.

Exploring the Idea

The children study pictures of at least five dinosaur types, noting features that suggest that dinosaurs may have lived on land, been able to fly or lived in the water. Discuss the features that suggest that they were able to fly or live in the water.

At the **Science Center**, students

1. review and can repeat **Activity** — Fossil Matching; students observe the features of the fossil to match with the imagined picture of the corresponding dinosaur.
2. complete **Activity** — Looking for Fossils, as below.

Materials

Make jigsaw puzzles out of different dinosaur shapes; color-code each of the dinosaurs to help keep the parts together and place in baggies

Hats/caps for the paleontologists

Procedures

- Assign students to be either "fossils" (jigsaw dinosaur body parts) or "paleontologists".
- Each student is given a hat to wear if he or she is a paleontologist; other students are given fossil parts.
- Those holding the fossil parts hide while the paleontologists look for them. The paleontologists work in small groups to "fit the fossil parts."
- Students take turns in the different roles. They report their "findings" to the class.

At the **Mathematics Center,** the students

1. name and identify geometric shapes such as: circle, square, rectangle, diamond, and triangle. They use the shapes to draw several dinosaurs. See **Appendix C**— Geometric Dinosaurs.
2. complete **Activity** — Dinosaur Math Links, as below.

Materials

Pictures of different-size dinosaurs — See **Appendix A** — Dinosaur
Several linking counters or paper clips to measure the pictures

Procedures

- Working in pairs, the students make link chains (using paper clips or any of the commercially made linking counters) to the length of the dinosaurs in the pictures given to the students.
- Each student measures his/her dinosaur with the counters.
- The paired students say which chain, and which dinosaur, is longer by comparing the chains side-by-side, i.e., matching them one-to-one.
- The paired students say how much longer or how much shorter each dinosaur is by counting the unmatched links.

3. complete **Activity** — Class Favorite Dinosaur.

Getting the Idea

How many **different** types of dinosaurs have we studied? Yes, there were many different kinds on earth before they became extinct. Were they all the same size? No, some were small and some were very large. How do we know that some were small and some were large? Yes, paleontologists have found bones of different shapes and different sizes. The shapes of the bones tell scientists many things. For example, if the bones were large, then the animals had to be large. If the footprints were small, then the animals were small.

Where did we have to go to find fossils? Fossils have been found in swamps, in mountains, and in many other places. What tools have to be used to find them?

Ask the students to repeat the names of the different dinosaur types. Which ones were the small ones? The large ones? The carnivores? The herbivores?

When you used your geometric shapes to construct the dinosaurs, which shapes were easy to use? Yes, the ones with straight lines are easy to use because you can fit them together. What about the circular shapes? Yes, if you fit the circles together, there are some spaces left over. You can combine the different geometric shapes to make new shapes.

At the **Listening Center,** the students listen to tapes and "read" tapes of one or two of the new books.

Organizing the Idea

1. Make a language chart to record the students' report from **Activity** — Looking for Fossils, with headings: **Name of Dinosaur, Eats, and Lives on (Land, Sea, Air)**
2. At the **Writing Center,** the children use illustrations from their whole group work to write about their favorite dinosaurs, other prehistoric animals, and/or plants. This work goes into their journals. See **Appendix B** — Dinosaur Shape Book.

Closure and Assessment

Class sings to the tune of "I'm a Little Teapot." Repeat the chorus after each verse.

I'm a Brontosaurus with four feet.
I eat plants, but don't eat meat.
Known as Thunder Lizard, that is true.
'Cause when I walked, the earth just shook.

Chorus
Dinosaurs, Dinosaurs, that we know.
Some were large, some were small.
Fossils tell us this is so,
'Cause I've not seen one after all.

Tyrannosaurus Rex's my name.
King of the dinosaurs, that I am.
I make many run and hide.
'Cause I'm mean and like to fight.

I'm Triceratops, with three horns.
A big, big head, and frilly bones.
I'm a fierce fighter, on four feet.
But I eat plants, 'cause they are neat.

At the **Drama Center** the students develop and act out a play with the title: **A Day in the Life of DINO, the Tyrannosaurus,** or a dinosaur of their choice.

Oral Interview

1. What is the name of your favorite dinosaur? Why did you pick that one as your favorite?
2. Which of the dinosaurs that we have studied was the largest? The smallest? How do you know?
3. How are the different kinds of dinosaurs alike? How are they different?
4. How many different dinosaurs have we studied?

Performance

Assess for mastery of the Big Ideas students' work on **Appendix B** — Dinosaur Shape Book and participation in and level of completion of **Activity** — Class Favorite Dinosaur.

List of Appendices and Activities for this Lesson

- ▲ **Appendix A** — Dinosaur
- ▲ **Appendix B** — Dinosaur Shape Book
- ▲ **Appendix C** — Geometric Dinosaurs
- ▲ Fossil Matching
- ▲ Dinosaur Math Links
- ▲ Looking for Fossils
- ▲ Class Favorite Dinosaur

ACTIVITY
Class Favorite Dinosaur

Objective

Students take a survey of the favorite dinosaur, summarize the information on a bar-graph and count the votes in each category to identify the class favorite.

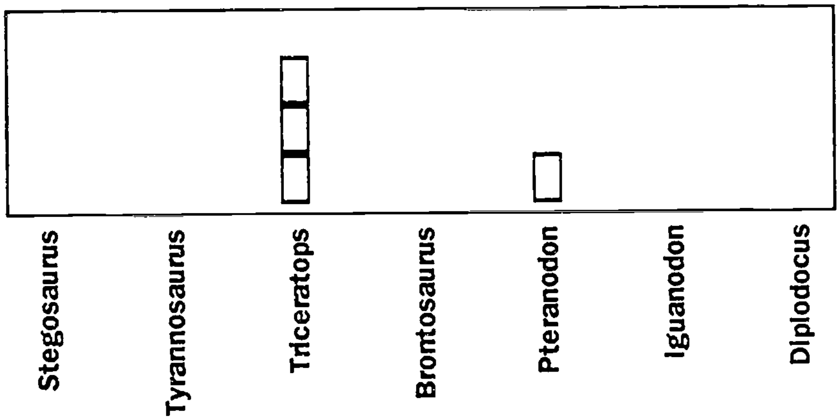
Materials

Chart, as below — names may be replaced by illustrations of the dinosaurs

A small, piece of self-adhesive paper to place on the graph, one per child, with the child's name written on it

Procedures

1. Each student places his/her piece of paper on the bar-graph chart to register a vote.
2. Count the votes for each type of dinosaur.
3. Students count the total number of votes to ensure that everyone voted and that no one voted more than once.
4. The students identify the class favorite dinosaur and the one least liked.



LESSON 5 Meat and Plant Eaters

BIG IDEAS Dinosaurs existed by eating large quantities of plants like ferns or by eating other animals. We can classify dinosaurs in many different ways.

Whole Group Work

Materials

Illustrations of meat eating and plant eating dinosaurs (pp. 12-27 of D. Dixon's **Be a Dinosaur Detective**)
Snack for each child: Two pieces of a hot dog or lunch meat, a lettuce leaf, carrot sticks or other raw vegetable, two pieces of fruit (apples, grapes, bananas, etc.)
Paper plates, napkins, forks for the snack
Chart, similar to the one in **Activity** — Fossil Hunting, with new headings: **Name of Dinosaur, Kind of Food, How Can We Tell?**
A hole punch; one sheet of construction paper per student
A large, hand-held mirror for the **Science Center**

Encountering the Idea

In a whole class discussion the children hypothesize about the food dinosaurs ate. The students' responses are written on a rebus chart. They talk about the differences in the characteristics of the meat-eating dinosaurs and the plant-eating dinosaurs. Show the pictures at this time. If a dinosaur was an herbivore, ate plants only, what kind of teeth did it have? Did it have claws? Did it have a large mouth or a small mouth? What if the dinosaur was a carnivore and ate meat only, what kind of teeth would it have? Would it have claws? We will discover the answers to these questions in this lesson and in the next.

Exploring the Idea

At the **Science Center,** the students examine their own teeth with a large, hand-held mirror to see the varying shapes and the uses of the different kinds of teeth.

- Using the hand-held mirror to see her teeth, the teacher demonstrates to the students what they are to look for when examining their teeth. Tell them that some of them may not have all of their new teeth, but since they are working in small groups, they can share the information they have about each other.
- Say: the front teeth are long, wide and flat; there are four of these. The next ones are long, round and have a point; there is only one of these longer ones on each side of my mouth. The molars are next and are round and short but are rough on the top; we have two or three of the molars on each side of our mouths.
- The same type of teeth are on my upper jaw as on my lower jaw.
- Ask the students to make other observations about their teeth: the size, number, any other characteristics they notice. They report their observations to the class.

Students then complete **Activity** — Dinosaur Teeth.

At the **Mathematics Center,** the children

1. use the counters placed in the center to count and/or sort according to color and kind of dinosaur.
2. may sort the food into meat, vegetables (or leaves) and fruit. The teacher motivates counting by asking: Which of these sets has more? Which has less? How do you know? Do you match them like this? Which set has some dinosaurs that are not matched? Is it the one that has more?
3. Which sets have the same number of dinosaurs? How do you know? Is it because when you match the sets, there are no dinosaurs left over in either set?
4. Students complete **Activity** — Name Matching.

Getting the Idea

We know that there were many different kinds of dinosaurs living on earth many millions of years ago. How do we know that there were many different kinds? How do we know that there was not just **one** kind of animal? The fossils that have been found tell us that there were many different kinds because the fossils that have been found are of different shapes, types and sizes. From this evidence paleontologists can conclude that the dinosaurs were different. We can also conclude that there were many different kinds of plants because of the different plant fossils that have been found.

Each child is given a snack and, while they eat, they count the pieces of food left on their plate. Begin a discussion of the importance of finding different types of dinosaurs' and other animals' teeth, as the students munch on "meat" and on "plants". Scientists have found fossilized teeth that tell us what these different animals ate. In the **Science Center,** you, yourselves, have looked at your teeth and you can see that they are different.

Each type of tooth has a special job. Some teeth are for biting. Which are those? (The student think about which teeth they are using to eat the snack of "meat" and "plants" — the front teeth.) Since many of you are getting your new front teeth, let's describe them. The new front teeth have sharp ridges on them still. But mine (the teacher's front teeth) don't have these sharp points on them. Why do you think that is? Yes, in time the ridges wear off.

Which teeth are for tearing off pieces of meat? (The incisors, which have sharp points on them. These are for biting also.) What are the back teeth for? (For grinding and smashing into smaller pieces so that we can swallow our food.) These teeth are also called **molars.** In Spanish, the word **moler** means "to grind," which is what these teeth do to the food before we swallow.

Which teeth are we using to eat our "plants"? (We bite first, and then we chew; but we don't have to tear the fruit or vegetables.) Humans have both kinds of teeth because humans eat meat, and humans eat plants also.

What do we think if a dinosaur skull is found and all its teeth, but a few front ones, are flat? (That they were plant eaters.) What do we think if a dinosaur skull is found and all its teeth, but a few front ones, have sharp points? (That they were meat eaters.)

What do crocodiles eat? (Fish and large mammals, and they've been known to attack and eat humans.) What do lizards eat? What do turtles eat? (Many turtles are toothless; they eat mostly insects, slugs or other small animals; they can eat plants but only the soft parts, because they do not have teeth that can grind the food.)

What observations did we make that helped us guess what the dinosaurs ate? What observations do we use to say whether a dinosaur is a meat eater or a plant eater? Remember, observations help us to make good guesses. These observations helps us sort the dinosaurs in many different ways.

Organizing the Idea

At the **Art Center,** children make dot dinosaurs. Using a hole punch and construction paper, they cut out as many dots as they need to outline a dinosaur pattern. These patterns may be used later for a wall mural.

The students make a chart illustrating the different types of dinosaurs that they have studied and they categorize dinosaurs by what they eat — plants or meat.

Applying the Idea

Show students a picture of three or four small molars that are placed in a row, as if in a mouth. See **Activity** — Dinosaur Teeth. The molars are flat, broad teeth but have very sharp ridges. Ask the students what they think they can tell about the creature that was the owner of these teeth from looking at them. (If the teeth are small, the creature was small also. Since they are molars and broad and flat, and there are several, maybe the creature was a plant eater. Also, since the ridges are still sharp, maybe it was still very young.)

Closure and Assessment

The children reconvene; use fingerplays and other closing activities from the previous lessons.

Oral Interviews

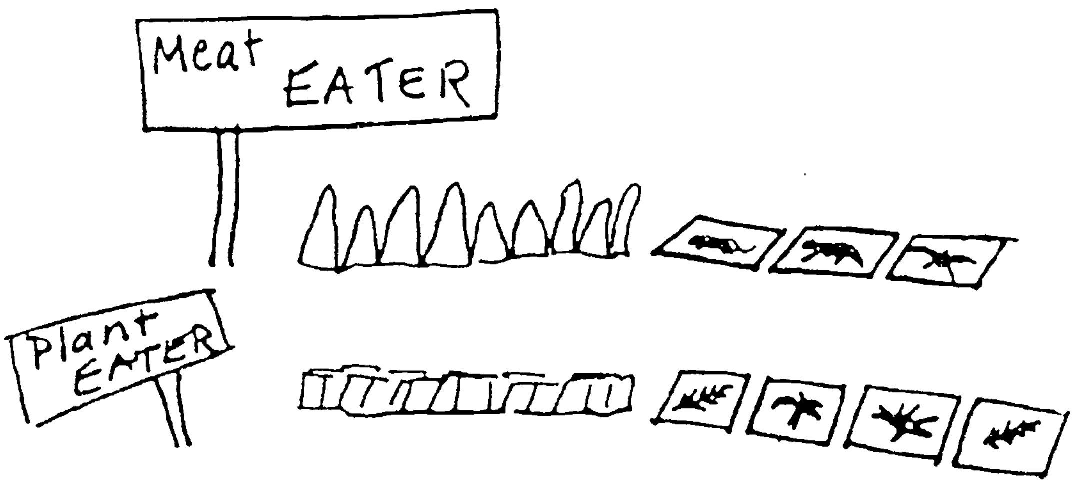
1. Today we learned that some dinosaurs ate plants and others ate meat. How can we tell which dinosaurs ate meat and which ones ate plants?
2. What are some new words we learned today?
3. Pointing to dinosaur counters: Count these dinosaurs. How many yellow dinosaurs do we have? How many red? Which set has more? Which set has less? How do you know?
4. What are two different ways you can use to tell which set has more? Yes, you can match the members of the set one by one, or you can count to see which number is greater.
5. What else would you like to know about dinosaurs?

List of Activities for this Lesson

▲ Dinosaur Teeth

▲ Name Matching

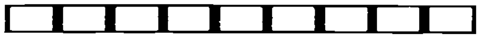
ACTIVITY
Dinosaur Teeth



ACTIVITY
Name Matching

Objective

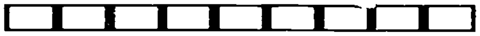
The students form a chain of linking cubes — one link for each letter of a dinosaur word and/or the student's name — to compare the length of different words.



Carnivore

Herbivore

Same



pteranodon iguanodon	one longer
stegosaurus tyrannosaurus	two longer
diplodocus triceratops	one longer
reptile fossil	one longer
claw horn	same

and other comparisons.

LESSON 6 The Dinosaur's Life Cycle

BIG IDEAS Baby dinosaurs hatched from eggs laid by the female dinosaur; the baby dinosaurs grew to be adults. Mathematics also tells us about patterns in the lives of dinosaurs.

Whole Group Work

Materials

Books: **Chickens Aren't the Only Ones** by R. Heller and **Eyewitness Book: Dinosaur** by D. Norman and A. Milner

Chart table or heavy poster board for dictated story about the life cycle of the dinosaurs

Prepared deviled "dinosaur" eggs for closing activity (Any deviled egg recipe will do.)

For the **Mathematics Center:** game — Egg-matching activity. Construction paper to make a nest and dinosaur eggs

For the **Art Center:** silhouettes of a baby dinosaur for stuffing. Wads of paper or cotton to stuff the baby dinosaurs. Yarn or string to lace the dinosaurs together

For the **Science Center** a set of laminated, magazine pictures of animals and reptiles; two trays labeled: **Reptile** and **Not Reptile**

Word tags: reptile; life cycle; pattern; lizard; crocodile; turtle

Encountering the Idea

We have been learning many new things about dinosaurs. One thing we have not talked about is how new dinosaurs were born. What would you guess? How do you think dinosaurs were born? Do you think that they were born live from their mother, like kittens or puppies? Or do you think they hatched from eggs? (Pause for student responses and suggestions.) What does the name "dinosaur" mean? Yes, we said that it means "terrible lizard." So, how do you think lizards are born? We will discover more things about these dinosaurs in our lesson.

Exploring the Idea

Read the title of **Chickens Aren't the Only Ones.** Ask students what they think the story is about. After they give their suggestions, read the book aloud. After reading, ask: What do you think happens when the dinosaur baby hatches from an egg? Let's write our predictions. Write the students' predictions on a chart to use at the **Writing Center** at a later time.

At the **Science Center** the students complete **Activity** — Dinosaur Weapons.

At the **Mathematics Center** the students

1. complete **Activity** — Dinosaur Eggs and **Activity** — Shake and Spill
2. sort and count the laminated pictures that show reptiles and those that do not.
3. complete **Activity** — Dinosaur Patterns, as below.

Procedures

- Place plastic models or picture cutouts of different dinosaurs in the **Science Center.**
- Students use the models to make different patterns. They describe the patterns to their partners.

At the **Art Center** the students complete **Activity** — Baby Dinosaur.

At the **Listening Center** or the **Library Center,** students listen to new tapes of dinosaur books and "read" them.

Getting the Idea

What have we learned about how dinosaurs were born? Yes, like present-day reptiles, dinosaurs hatched. Show the word "reptile" using a word tag. Show a picture of a reptile and describe it saying that reptiles: crawl, have four legs, have a cover of scales and lay eggs. Use the set of laminated, magazine pictures of animals and reptiles for students to classify, again, when they continue work in the **Mathematics Center.**

What do you suppose happened to the baby dinosaurs after they were born? Yes, they had to learn to find food and water. If they were plant eaters, they had to look for the plants they liked. If they were meat eaters, they had to learn to look for prey and catch it. Since they were babies and smaller than the adults, they had to be careful that their natural enemies did not find them and eat them. Soon, they grew to be adults. These young adult dinosaurs mated then, and the female dinosaur laid new eggs in a nest. The eggs hatched, and more dinosaurs were born. This is called a **life cycle.** New members of a group are born; they grow to mature creatures; they mate and have babies; then they get old and die. A life cycle is like a pattern. What is the life cycle pattern of the dinosaurs? (Hatch, grow from babies to adults, mate and make new creatures, grow old and die; and then repeat the pattern with the new babies.)

Did all the dinosaurs die of old age, or do you think the dinosaurs had natural enemies? Sometimes some of the larger dinosaurs attacked the smaller ones. Other animals often raided the dinosaurs' nests and ate the eggs. There were also other animals that lived during the time of the dinosaurs, for example, the saber-toothed tigers, the huge bears, and the mastodons that looked like present-day elephants. Those that were herbivores had plenty of plants to eat, and the carnivores preyed on the herbivores.

You made some dinosaur patterns in the **Mathematics Center.** What did your patterns look like? Did you repeat the same groups of dinosaurs over and over? Some of you may share your patterns with the class.

Students and teacher discuss the birth of dinosaurs and make hypotheses about the eggs — the size, color, texture, and length of time to hatch.

Organizing the Idea

1. Using the rebus story dictated previously, students sequence the sentences to describe the life cycle of the dinosaur. Tell the students that the sentences will be placed in the **Science Center** for them to continue to sequence.
2. Students draw in their journals the patterns they made with the dinosaur shapes. The students also illustrate the life cycle of the dinosaur in their journals, using the words written on the life cycle chart.

3. At the **Drama Center,** the students compose and illustrate a play about a baby dinosaur. Then the students act out the story.

Closure and Assessment

Regroup students; use one of the closing activity songs/verses from before.

Oral Interviews

While students eat their deviled eggs, ask:

1. Besides chickens, what else lays eggs?
2. Describe how a dinosaur is born.
3. How big were the baby dinosaurs? Were they as big as you are now?
4. Were they as big as this room? How do we know how big they were?
5. What evidence do we have about their size?
6. What are two characteristics of reptiles that are the same as characteristics of dinosaurs?

Performance

1. Students show the four legs of a dinosaur in different combinations such as two and two; one and three; three and one.
2. Students sequence the pictures of a dinosaur's life cycle correctly.
3. Students sort the pictures of reptiles and those that are not reptiles correctly.

List of Activities for this Lesson

- ▲ Dinosaur Eggs
- ▲ Baby Dinosaur
- ▲ Dinosaur Weapons
- ▲ Shake and Spill

ACTIVITY
Dinosaur Eggs

Objective

Students complete the jigsaw puzzles they make themselves; students can say that an egg shape is also called an "oval"; students count eggs through the number eight, or other.

Materials

Manila folder stapled at the sides to keep contents from spilling
Label folder "Dinosaur Eggs" and/or "Dinosaurs Laid Eggs"
Construction paper for children to make "dinosaur eggs"
Scissors and glue
Crayons to color the nest and eggs
"Egg" jigsaw puzzles for children to match (two, three per child)
Cards with one numeral: zero, one, two, three, four, five, six , seven, or eight written on each

Procedures

1. Using the jigsaw puzzle pieces, children match them to make the eggs.
2. Students place and glue the completed puzzles on a nest that has been drawn on a piece of paper.
3. Using one of the completed eggs as a pattern, the students trace the egg shape until they have eight eggs (or any other number selected) drawn on a sheet of paper; they color, write names, etc., on the eggs. They draw an imagined baby dinosaur after it has hatched.
4. Students trace and cut out their own egg shapes into puzzle parts and have other students complete the puzzle.
5. After the students have completed the egg puzzles, they draw a container, simulating a nest, to place the eggs in and make sets of one through 10 (or any number selected) eggs.
6. The students place the correct numeral card on each set, and a student's partner checks.
7. They also place the numeral card with 0 on the empty nest.

ACTIVITY

Baby Dinosaur

Objective
Students make a baby dinosaur shape.

Materials
Brown paper bags or pieces of brown butcher paper, one per child
Dinosaur shape for students to trace
Hole punch, scissors (if students are able to use them) and/or stapler
Newspaper or facial tissues

Procedures
1. The teacher or the students trace two dinosaur shapes on the paper bag or butcher paper and cut them out.
2. The teacher or students staple the two shapes together to make the stuffed animal, leaving an opening large enough to insert the stuffing.
3. The students decorate their animals.
4. Stuff pieces of crumpled newspaper or facial tissue into the shapes.
5. When the dinosaur is stuffed, staple the opening.

•Variation: After using several staples to keep the shapes in place, punch holes around the shapes for the children to loop together with yarn. They can make mobiles or hang the shapes from the ceiling or on a wall.

ACTIVITY
Dinosaur Weapons

Objective
The students learn which body parts of the dinosaur were used for defense.


CLAWS


TEETH


HORNS


BODY HEADS

DRAW others (i.e. tail spikes and clubs)

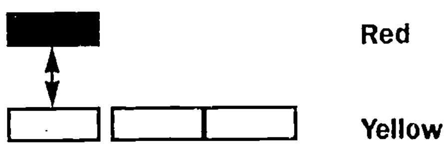
ACTIVITY
Shake and Spill

Objective
Students practice adding to five and subtracting from five.

Materials
Five two-color counters that represent dinosaur eggs; one color is female, the other color is male
Container to represent the dinosaur nest
Paper and pencil to record the results (this is optional, if students have been introduced to writing number sentences)

Procedure
Part One
1. Students put three, four or five two-color counters in the container representing the dinosaur nest.
2. They cover the container with one hand and shake it.
3. They spill the counters on the desk and count how many of one color and how many of the other.
4. They say which set (counters of one color) has more.
5. They say the number sentence the counters represent, e.g., two plus one equals three; three plus one equals four; two plus three equals five, etc., depending on the number of counters they put into the container.

Part Two
1. Students put three, four or five two-color counters in the container.
2. They cover the container with one hand and shake it.
3. They spill the counters on the desk and count how many of one color and how many of the other.
4. The students compare the two sets to say which set (counters of one color) has more.
5. For example, the students put four counters in the container. When they spill the counters there are three yellow and one red. One student says that set yellow has two more than set red, because set yellow has two not matched.



LESSON 7 Nature and Change

BIG IDEAS The story of the existence and extinction of dinosaurs tells us that change is a part of nature. Change can be observed by making comparisons and by using mathematics.

Whole Group Work

Materials

Books: **If the Dinosaurs Came Back** by B. Most and **The Dinosaur Family Reunion** by C. Allen.

Taped music: for example, Saint Saenz' **The Carnival of Animals** for the Dinosaur Parade and for the **Listening Center**

Chart tablet with at least one page per child at the **Writing Center**

Markers, paints, patterns, scraps of fabrics, etc. at the **Art Center**

A four-foot long drawing of the head of Tyrannosaurus Rex for the **Mathematics Center.** See **Appendix B**— Dinosaur Shape Book. A picture can be enlarged to four feet.

Pattern for a six-inch tooth to be measured and drawn by each child and placed in

Tyrannosaurus Rex's mouth. Use tooth in **Appendix D** — Tyrannosaurus Rex's Tooth.

Big paper clips for measuring, and an additional chart tablet

Illustrations of prehistoric conditions on earth depicting the climate, the vegetation, the surface features on earth and the other types of animal life besides the dinosaurs

Encountering the Idea

We have studied many things about dinosaurs, and we have been fascinated with them. It is very exciting to think that no one has seen one of these creatures, and yet we think that we know a lot about them because we have been able to study their remains in the form of fossils. We have learned that these animals existed many millions of years ago, that they were able to live on earth because there was plenty of food for them in the form of plants and animals. Something happened. Scientists cannot say with certainty what caused the dinosaurs to become extinct; nevertheless, they did. But that is not all that changed on earth. That is one of the fascinating and important things that we can study in science — that some things change, and some things stay the same. That is what we are going to be exploring today — change — and one way that it can be observed — by comparing measurements.

Exploring the Idea

Read the book, **If the Dinosaurs Came Back** aloud to the students. Ask them what they think would have to happen for the dinosaurs to be able to come back. What would they need?

They would need a place to live. Where would that be? They would also need a lot of food. Where would they get it? What kind of food would they need? PLANTS AND MEAT. Do you think that people and dinosaurs could live together today? Do you think we could build a zoo large enough for these dinosaurs? How could we protect ourselves from them? Yes, the earth has changed a lot since the time of the dinosaurs. In our centers, we are going to see in what ways the earth has changed.

At the **Science Center,** the students will draw and color two maps of the continents on earth. They will complete **Activity** — The Continents Divide.

At the **Mathematics Center** the students

1. complete **Activity** — Making a Pictograph. Before the students go to the center, explain to the students what a pictograph is.
2. complete **Activity** —Dino Math.
3. measure Tyrannosaurus Rex's teeth. See **Appendix D** — Ty Rex's Tooth.
4. collect information to observe change. See **Appendix E** — A Blue Whale.

Getting the Idea

How has the earthed changed since the time of the dinosaurs? We know that there were many animals that existed then, but they do not exist on earth now. Some of these were the dinosaurs, the mastodons, the giant bears, the saber-toothed tigers, and the giant panthers whose fossils have been found in California. Are there any animals that are the size of the giant dinosaurs living today? The largest animal on earth is the blue whale. Is it as large as the Seismosaurus was? How do you know?

We know that some places that had been underwater are now deserts, and that the continents have divided. How do we know that? Fossils of fish and other aquatic animals have been found where desert is now.

The climate is different because it is less warm and humid than before; there are fewer plants; the continents have separated, forming great oceans between them; the surface has changed, creating new mountains and valleys; and there are people that live on all parts of the earth. Things that have not changed are that: plants need the sun to make food; plants make food for themselves and for all the animals on earth; if the earth can no longer produce plants, then **all life will become extinct.**

Organizing the Idea

At the **Writing Center** the student will work in groups of four children. Each student group may select one of two ideas to write about. Before beginning to write and before going to the centers, all students work together to develop their ideas.

1. The students suggest action words that describe what they think dinosaurs did such as "come", "waddle", "skip", "walk", "jump", "run", "trip", "leap", etc. and other things they think dinosaurs would do if dinosaurs came back. Write children's responses on a chart. Ask "Which word best describes what the brontosaurus must have done?" Choose one student at a time to demonstrate the brontosaurus waddle; the stegosauruses trip two by two; the triceratops run five by five; the pteranodons fly six by six; and the Tyrannosaurus Rex comes in alone. Include other suggestions from the students.

2. The students list how the earth has changed since the time of the dinosaurs and what things have not changed. The climate has changed; there are fewer plants; the continents have separated; the surface on the earth has changed; and there are now people on earth.

The **Art Center** is to be reserved for the group that has completed their work in the **Writing Center** with the teacher and is ready to begin work on one of the two topics in a group Big Book. Each group chooses an idea to be illustrated and goes to the **Art Center** to begin that group's Big Book. The words suggested will be used to write the group Big Book. There will be as many Big Books as you have groups. Peers edit each other's group books. After they are corrected, these Big Books are placed in the **Library Center** for students to read.

A new book, **The Dinosaur Family Reunion,** is placed in the **Library Center** and in the **Listening Center** where students continue to read and listen to **The Carnival of Animals** or some other music tape about animals.

Applying the Idea

1. Do you think that dinosaurs could come back to earth today and survive? Write a story or draw a picture of **The Dinosaur that Came to (your city).**
2. Take the children to a museum with a fossil collection or invite a local paleontologist to visit your class and show a fossil collection.

Closure and Assessment

Reconvene the group. Children share the stories they wrote at the **Writing Center.**

The students then have a **Dinosaur Parade,** marching to the taped music. The students select the dinosaur they want to be and walk in the parade role playing their favorite dinosaur: walk, fly, or crawl.

Oral Interviews

1. What did we learn about dinosaurs today?
2. How big was Tyrannosaurus Rex's head?
3. What can we use to compare to a dinosaur's height? A house? How many houses?
4. How do we know that the size of animals has changed from the dinosaurs' time to our time?
5. How do we know the dinosaurs we read about in **The Dinosaur Family Reunion** were make-believe?
6. What would you do if Tyrannosaurus Rex came into our classroom today?
7. What does a pictograph tell us ?
8. What was the thing you liked best about our work with the dinosaurs?
9. What are some of your favorite words that tell about dinosaurs and their time?

Performance

1. Assess level of completion and participation in writing/illustrating one of the two assigned topics and/or on the story in the application phase of the lesson.

Written/Illustrated Completion/Items

2. The student places the correct illustration or word on the spaces provided or holds up the item as the teacher reads the following text. (Small groups of children can be assessed at a time.) Illustrations/models needed: Dinosaur, plants, meat, eggs, claws, horns, fossils. Teacher can also ask children to write/illustrate their answers in the spaces provided as the text is read.

Long ago, there lived some terrible lizards, we call ____________________.

Some of these lizards ate ______________________ and some ate

____________________. They laid ______________ in nests on the ground.

They used different things for their protection like ________________________

and ______________________. We know that they lived in the world because

we have found ______________________.

3. Given a set of three (or some other number of items), the child adds two more (or the number needed) to make a set of five. (Teacher may say, "I have three counters. How many more do I need to make a set of five?")

List of Appendices and Activities for This Lesson

▲ **Appendix B**—Dinosaur Shape Book

▲ **Appendix E** — Ty Rex's Tooth

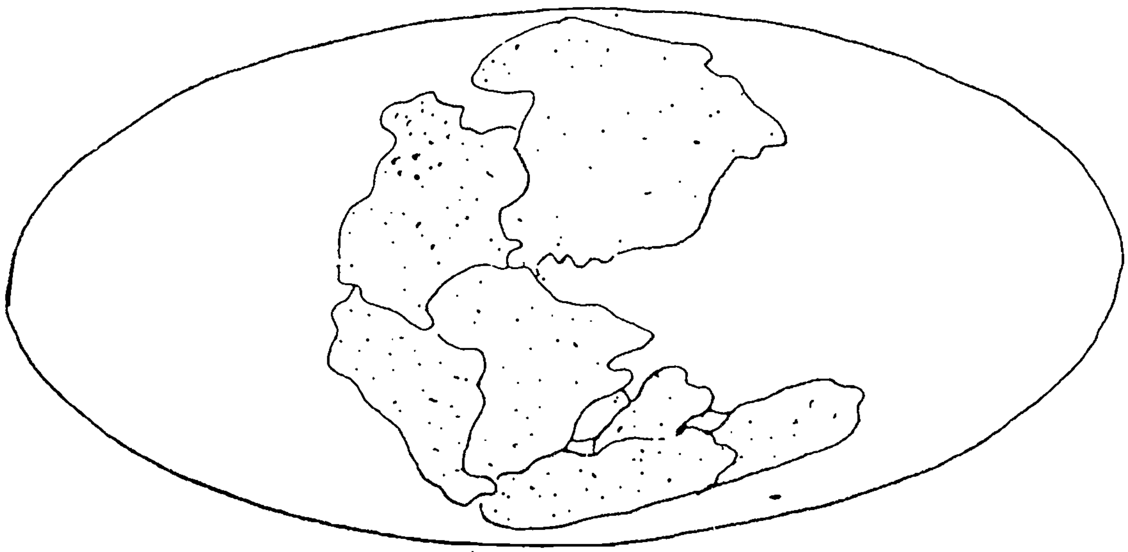
▲ **Appendix F** — A Blue Whale

▲ The Continents Divide

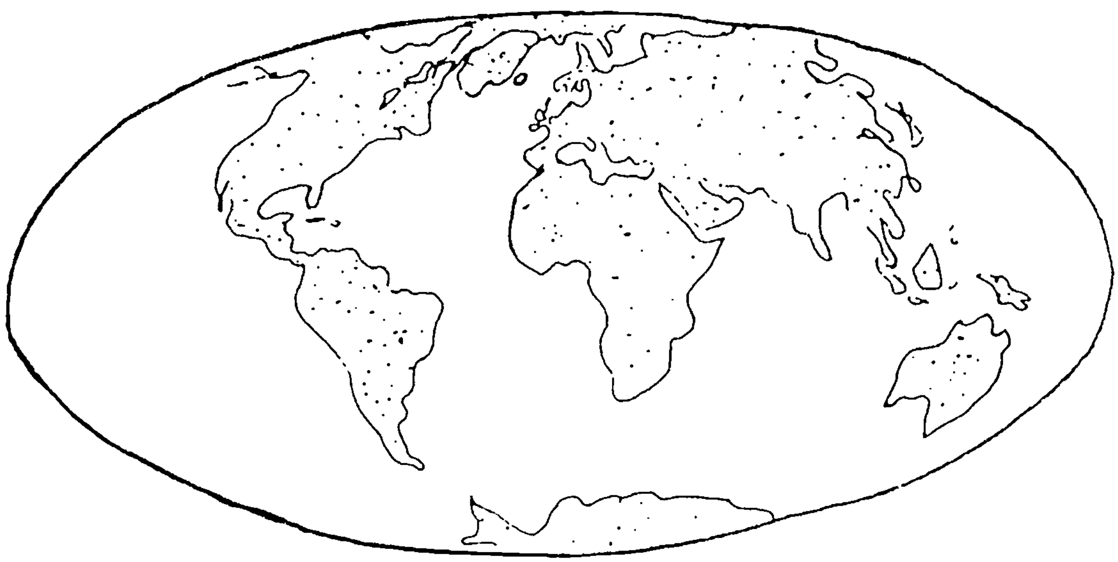
▲ Making a Pictograph

▲ Dinosaur Mathematics

ACTIVITY
The Continents Divide



PANGAEA



TODAY

ACTIVITY
Making a Pictograph

Objective

Students compare lengths to explore ratios and proportion.

Materials

Sets of cutouts for each child to see the relative sizes of a human, a two-story house, and a dinosaur

Paper clips to make chains

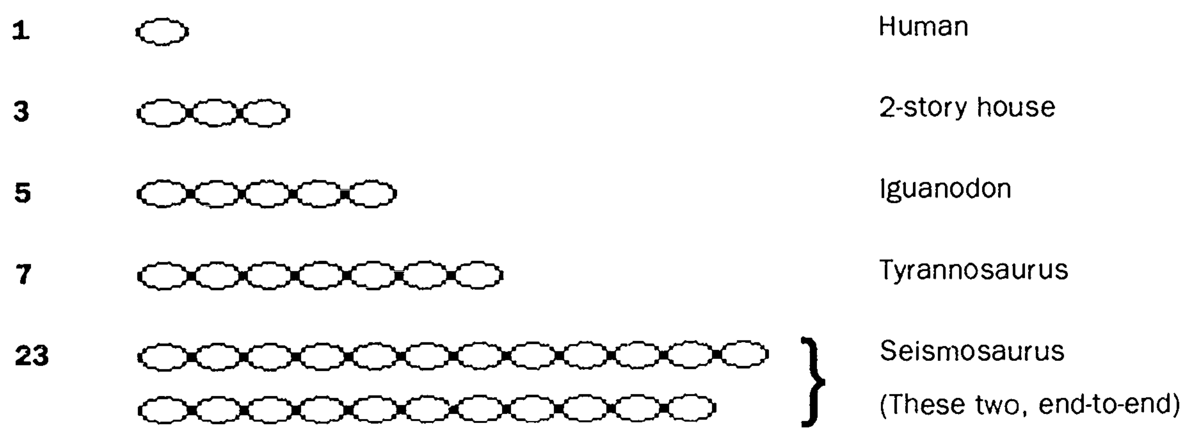
Procedures

If the following heights are used as averages: six feet for a human, 18 feet for a two-story house, and 30 feet for the iguanodon, stegosaurus, or triceratops, then the ratios will be 1:3 for a human to a house, and 3:5 as the ratio of a house to an iguanodon.

If the students select a 40-foot tyrannosaurus instead of an iguanodon, the ratio is 1:3:7, of a human to a house, and a house to a tyrannosaurus.

For the 140-foot dinosaur found in New Mexico, seismosaurus (earthshaker), the ratio is 1:3: 23, still using the average for a human and a two-story house.

These chains, below, are in the ratio of 1:3:5:7:23



1. Using these proportions, the students make a pictograph on a chart.
2. The students measure pieces of string to the size of a person, a house, and a dinosaur they select. Then they draw a scene with a house, a dinosaur, and a person to show the three in ratio and perspective.

ACTIVITY
Dinosaur Mathematics

Objectives

The students count, add and subtract to make dinosaurs.

Materials

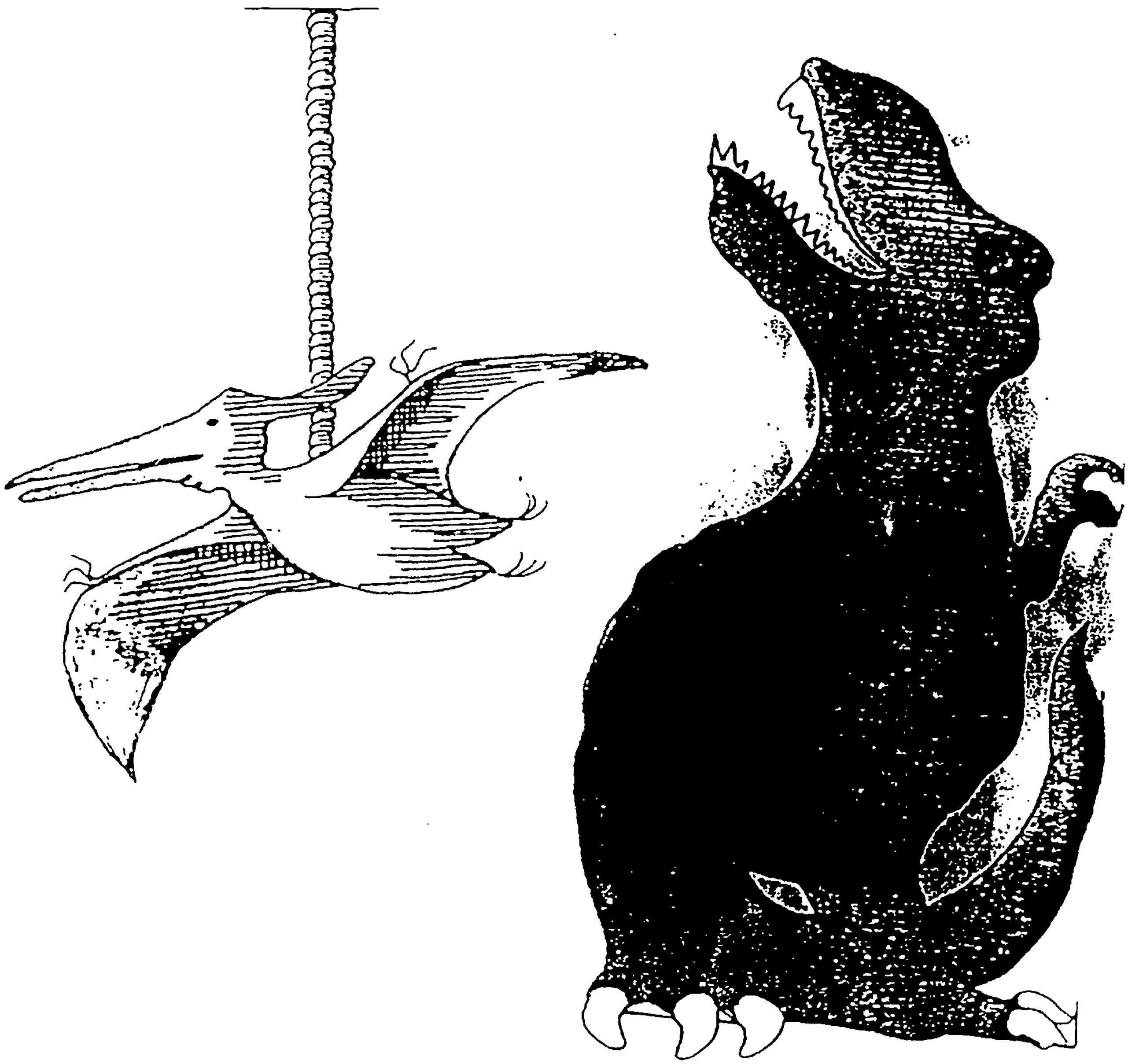
Shapes and counters to construct figures for each student pair or student group
Poster board for chart
Cardboard boxes or other materials to make dinosaur cages
Paper clips or other objects to use as nonstandard units of measure

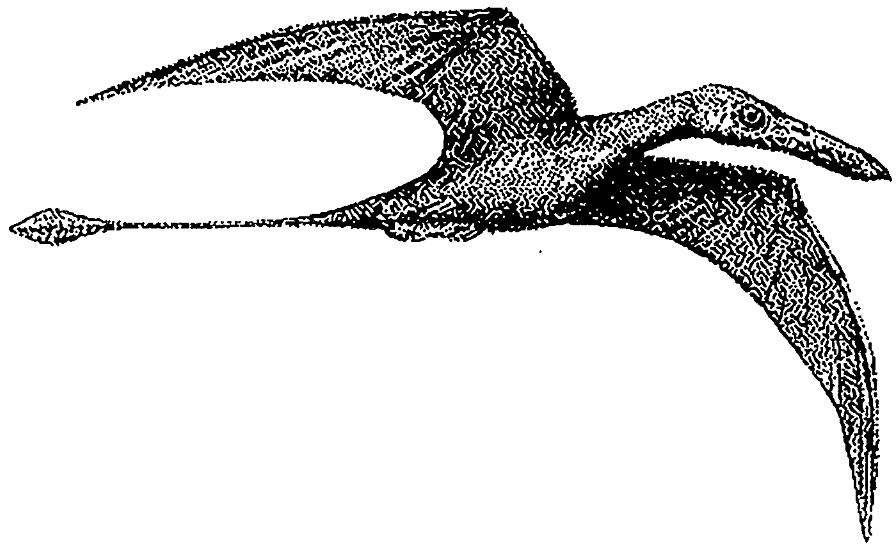
Procedures

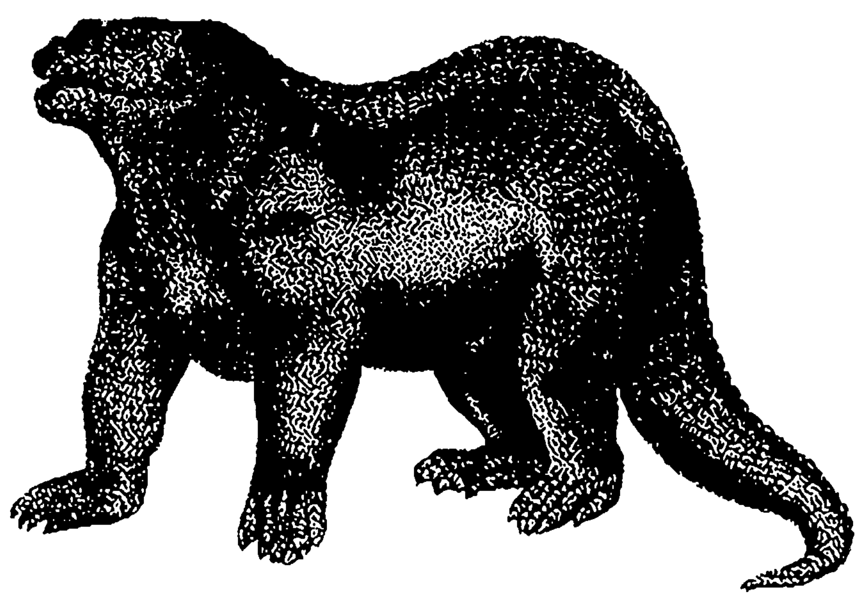
1. Students design dinosaur shapes from various objects such as shapes or counters and other objects available.
2. Students consider the following questions before designing the dinosaur.
   - How much does a dinosaur weigh? (From two to three pounds to between 35 and 50 tons.)
   - How many scales will you draw along the dinosaur's back?
   - Will it have four legs, or two legs and two arms?
   - How long in number of paper clips will your dinosaur be?
   - How tall in number of paper clips will your dinosaur be?
   - How long will your dinosaur's tail be?
   - How long will your dinosaur's legs and/or arms be?
   - If your dinosaur has only two legs and has two arms, how much longer will you make the legs than the arms?
3. Make a cage for the dinosaur. How big will the cage be?
4. After designing and making the dinosaur, decide what food it would need. Make a chart to show how much he/she eats every day and each week.
5. After constructing the dinosaurs, the students sequence them by length, then by height.
6. The students sort the dinosaurs they made into carnivores and herbivores.

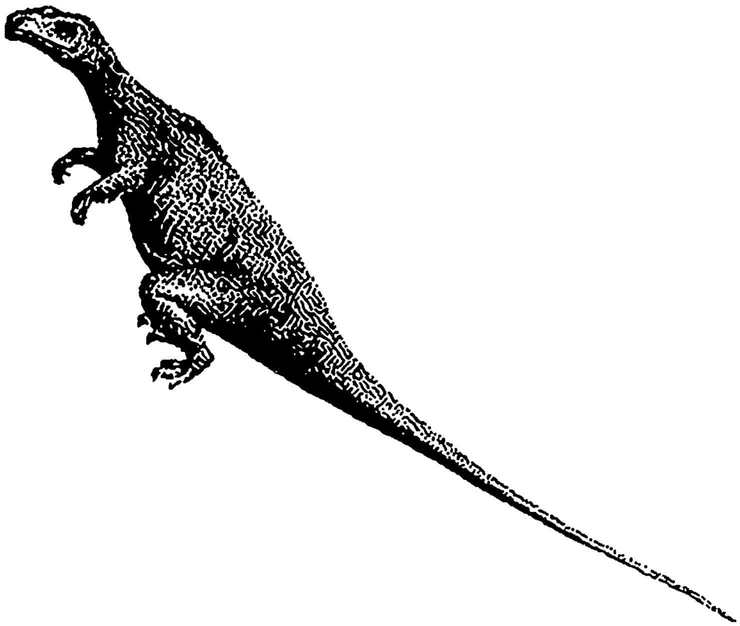
APPENDIX A

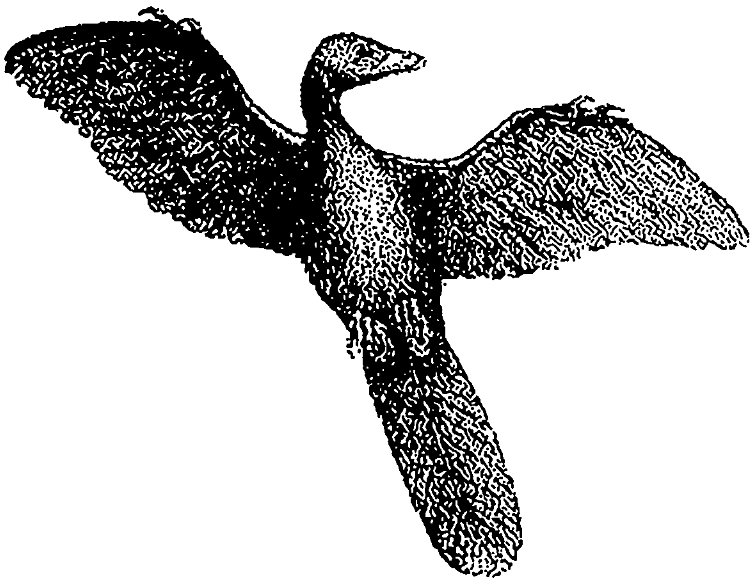
Dinosaur

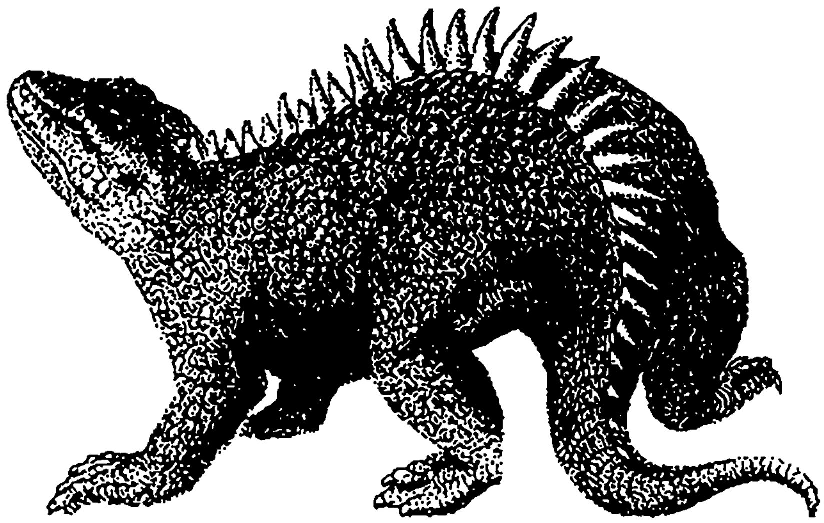


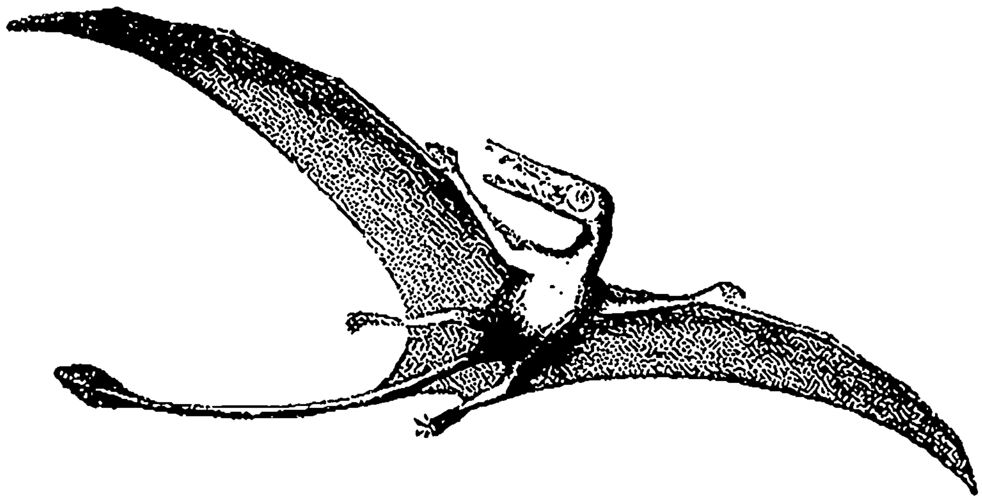


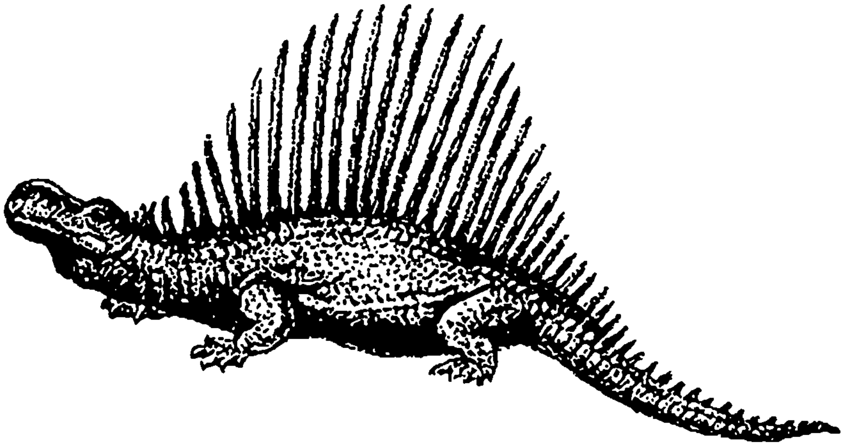


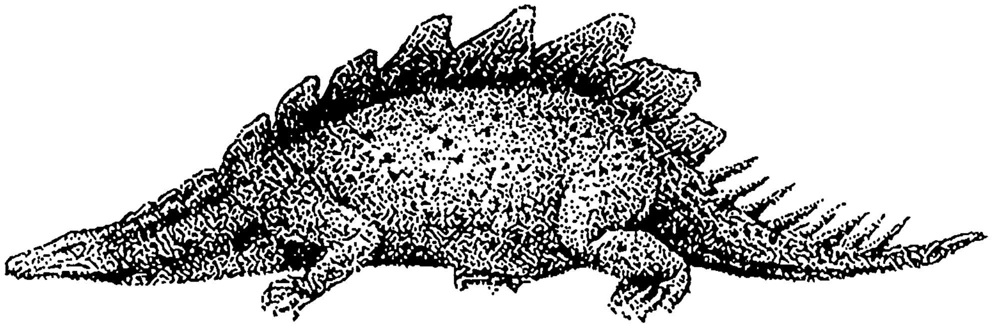












APPENDIX B

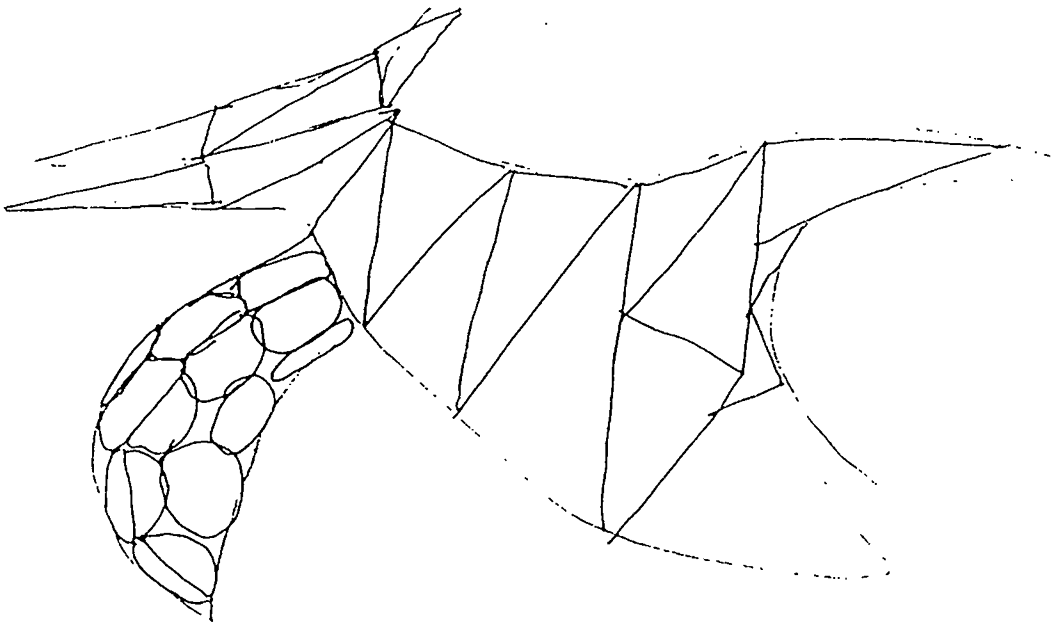
Dinosaur Shape Book

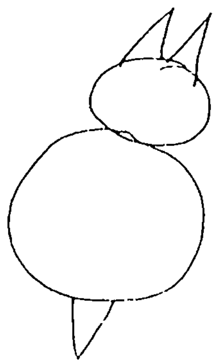
Take a picture of one of the dinosaurs' head and enlarge it to approximately 7½ inches in length and about 4 inches in height. Use the picture to make covers for the students' books on dinosaurs. Cut out additional pages in the same shape.

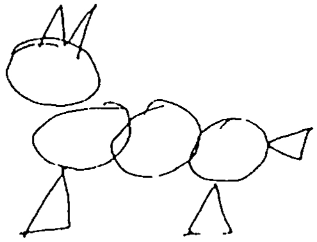
APPENDIX C

Geometric Dinosaurs

After the student make various dinosaur models with the geometric shapes, they sort the geometric shapes by color, size and any other variable they wish and then count the number of geometric shapes they used to make their figures by variables sorted, and then by the total number of shapes they used.

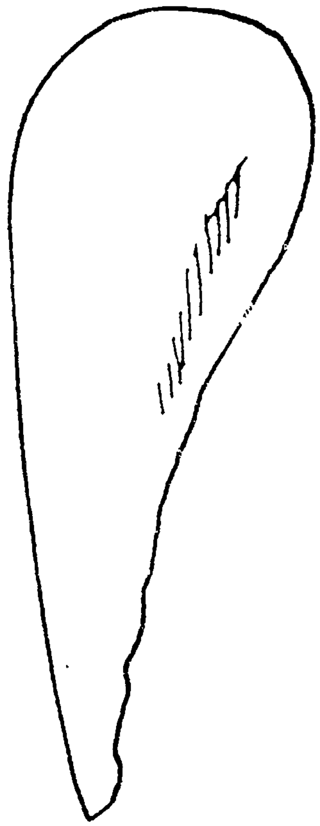






APPENDIX D

Ty Rex's Tooth



APPENDIX E

A Blue Whale

Materials

Sets of cutouts for each child to see the relative size of a human, a two-story house, and a dinosaur.

Paper clips to make chains, or string

The following heights are used as averages to measure the difference in size of the largest animal in the present-day and the largest animal during the time of the dinosaurs : six feet for a human, 18 feet for a two-story house, and 140- feet for seismosaurus, the ratios will be 1:3: 23.

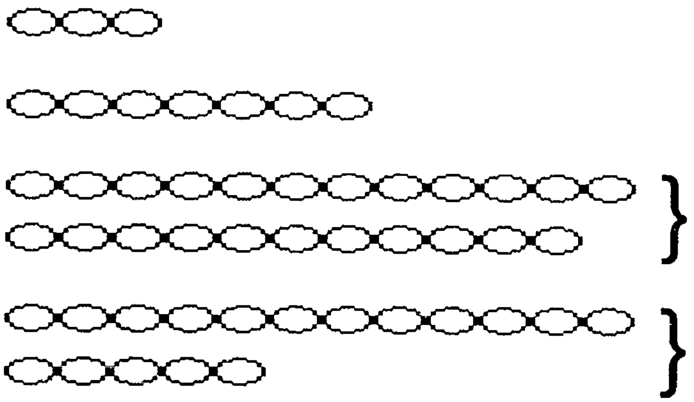
These chains, below, are in the ratio of 1: 3: 7: 23 : 17

3 — 2-story house

7 — Tyrannosaurus

23 — Seismosaurus (These two, end-to-end)

17 — A Present-day Blue Whale (These two, end-to-end)



Procedures

1. The students measure pieces of string to the size of a person, a house, a dinosaur they select, and the blue whale.
2. Students draw a scene showing three of the objects shown above, one of which is a blue whale.
3. The students compare the size of the blue whale to seismosaurus and to tyrannosaurus.
   Which is the largest animal? When did seismosaurus live?
   Was tyrannosaurus bigger than today's blue whale? How do you know?
4. Is the blue whale smaller than seismosaurus? How do you know?
5. If the blue whale is the largest animal on earth today, do you think there are any animals the size of seismosaurus? Tell the class your reasons for what you think.

References

Annotated Children's Books

Allen, C. (1989). *The dinosaur family reunion.* Allen, TX: DLM Teaching Resources.

This predictable storybook has the dinosaur family coming to a reunion, one by one, two by two, etc. It also highlights verbs that children can act out and say.

Barton, B. (1989). *Dinosaurs, dinosaurs.* New York: Thomas Y. Crowell.

This is almost a wordless book. It is well illustrated, showing the different kinds of dinosaurs.

Barton, B. (1990). *Bones, bones, dinosaur bones.* New York: Thomas Y. Crowell.

Large-sized print, an almost wordless book, this shows paleontologist looking for bones.

Berenstain, S. & J. (1987). *The day of the dinosaur.* New York: Random House.

Labeled a first time reader, this 30-page publication can be used to teach the concepts of "long ago"; different sizes and shapes of dinosaurs and fossils. It contains good illustrations and names of the dinosaurs while the text is written in rhyming manner. It begins with "Long ago, long, long ago, before many things we now know - before cities, towns, and roads, before people, before birds, frogs, and toads - long, long, long before - it was the day of the dinosaur."

Brandenberg, A. (1989). *Digging up dinosaurs.* New York: Thomas Y. Crowell.

Labeled as a "Let's-Read-and-Find-Out Science Book," this book is good for read-aloud in kindergarten. It is one of the few primary books that includes the paleontologist, geologist and other experts working with fossils. It also emphasizes the caution these experts take when digging up dinosaurs' fossils. This is a sample sentence: "At the museum, scientists unwrap the fossil."

Carrick, C. (1986). *What happened to Patrick's dinosaurs?* New York: Clarion Books.

Patrick invents his own explanation of why dinosaurs became extinct.

Dixon, D., & Lings, S. (1988). *Be a dinosaur detective.* Minneapolis: Lerner Publications.

In its question/answer format, this publication has many charts and diagrams. It contains easy-to-follow projects. It is colorful and large enough for children to see during a read-aloud session.

Donnelly, L. (1987). *Dinosaur day.* New York: Scholastic.

A boy and his dog go hunting for dinosaurs. Almost a wordless book.

Emberley, M. (1980). *Dinosaurs: A drawing book.* Boston: Little, Brown and Company.

This appears to be a good book for children and teachers, too. It shows how to draw the different dinosaurs; easy to follow steps.

Heller, R. (1981). *Chickens aren't the only ones.* New York: Grosset & Dunlap.

Chicken aren't the only ones laying eggs. Many others do, including dinosaurs.

Kindersley. (1991). *Dinosaurs.* New York: Macmillan Books.

Illustrated in beautiful colors, this publication names the dinosaurs.

Moseley, K. (1984). *Dinosaurs: A lost world.* New York: Putnam Publishing Group.

Presents current information in a "pop-up" format.

Most, B. (1978). *If the dinosaurs came back.* San Diego: Harcourt, Brace, & Jovanovich.

This fantasy depicts dinosaurs helping build skyscrapers and catching lost kites, if they were to come back. Available in a big book also.

Most, B. (1984). *Whatever happened to the dinosaurs?* New York: Harcourt, Brace, & Jovanovich.

This is a clever book about extinction possibilities. It is a humorous book, portraying the dinosaurs at large in cities, in jungles, undergrounds, and even in disguise.

Most, B. (1987). *Dinosaur cousins?* San Diego: Harcourt, Brace, & Jovanovich.

Using clever words and vivid illustrations, the author points out the similarities between animals of today and the dinosaurs of yesterday.

Most, B. (1990). *Four and twenty dinosaurs.* New York: Harper Collins Children's Books.

Beautifully illustrated, this book combines dinosaurs and nursery rhymes.

Most, B. (1991). *A dinosaur named after me.* New York: Harcourt, Brace, & Jovanich.

This book encourages creative thinking. Ryan wants Tyrannosaurus Rex to be called Ryanosaurus Rex, etc.

Norman, D., Milner, A., & Keates, C. (1989). *Eyewitness books: Dinosaurs.* New York: Alfred A. Knopf.

Realistic drawings and photographs make this volume a useful source of information regarding early discoveries, eggs and nests, birth and growth, claws, footprints, and other dinosaur facts.

Robinson, E. (1987). *The dinosaur ball.* Allen, TX: DLM Teaching Resources.

This is a predictable storybook, using numbers.

Sattler, H. R., & Zallinger, J. (1984). *Baby dinosaurs.* New York: Lothrop, Lee & Shepard Books.

Based on rare baby dinosaur fossils, this discusses early life of dinosaurs.

Shapiro, L. (1979). *Dinosaurs.* New York: Simon & Schuster.

This is an entertaining "pop-up" book.

Talbott, H. (1988). *We're back!: A dinosaur's story.* New York: Crown Publishers.

A product testing firm from outer space brings seven dinosaurs to the 20th Century. The seven dinosaurs get into a lot of trouble. Will they stay on earth?

Other Resources

At Possibilitoys, 1206 W. 39th Street, Austin, Texas 78705 (512) 467-9044

- Dino 300 Card Game
  For 2-5 players ages 6-12
  The object of the game is to form as many sets of dinosaurs as possible. Cards contain a body part of a dinosaur. Color and numerically coded. Sets contains from three to five pieces. 13 different dinosaurs.
- Dinosaurs Jigsaw Puzzle, for ages 3 and over.
  International Playthings, Inc.
  Riverdale, New Jersey 07457
  Has 34 pieces. When puzzle pieces are lifted out, the puzzle board has a natural history museum scene - Hall of Dinosaurs.
- Dino Checkers
  Ed Insights
  Dominguez Hills, CA 90220
  Has board and dinosaur game pieces.
- Dino Kaleidoscope
  Gemini Precision Products
  Zellenople, PA 16063

Available from Lakeshore Learning Materials, 2695 E. Dominguez St., P.O. Box 6261, Carson, CA 90749

- Dinosaurs Flannel Board Concept Kit—$13.95
  Described as "incredibly realistic, beautifully colored flannel board objects."
- Dinosaur Counters—$14.95
  Described as "Adorable dinosaurs counters........"
  Set contains 100 plastic stegosauraauses in five colors. 1½ incles long.
- Dinosaur Counters - Classroom Pack—$39.95
  Set consists of 300 dinos in three species and five brilliant colors.
- Dino-Sorters—$10.95
  Tough plastic dinos in 12 different species, 96 in all.
- Dinosaur Feward Jar—$19.95
  192 colorful rubber dinos come in a see-through jar.

At Toys to Grow On, P.O. Box 17, Long Beach, CA 90801. Customer Severice 1-800-874-4242

- Giant Vinyl Dinosaurs—$29.50
  Set of dinos; stegosaurus is 16 inches long.
- Dinosaurs Collection Box—$16.95
  40 durable dino from 5"-long dimetron to a 1½ pteranodon.
  Set contains 3 eggs with baby dinos inside.
- Carnegie Museum Dinosaur Collection—$115.00
  Authentic reproductions i solid vinyl. 11 dinosaurs and two humans, with fiberglass playscape (22" x 36") and 4 bags of sand.
  Set of figures only—$75.00
- Dinosaur Mobile (all ages)—$24.95
  Three-dimensional mobile has five detailed animals on heavy tagboard. Portion of purchase goes to benefit wildlife and conservation.

Unit Bibliography

Allen, R. V., Sampson, M. R., & Teale, W. H. (1989). *Experiences for literacy: Dinosaurs land.* Teacher's Guide. Allen, TX: DLM Teaching Resources.

This is the teacher's guide to a literacy program. A musical tape, dinosaur posters, and a big book are included in the packet.

Begly, S., & Yoffe, E. (October 28, 1991). How dinosaurs lived. *Newsweek*, 52-58.

An article on new theories and old bones that may reveal the lifestyles of the dinosaurs. Dinosaurs appear to be enjoying a renaissance as paleontologists find new species every year. Fossils of the largest dinosaur, Seismosaurus, was found in New Mexico.

California State Department of Education. (1988). *Environmental education guide.* Hayward, CA: Author.

This curriculum guide for kindergarten through sixth grade contains eight units. Each unit is organized around a theme and integrates content areas. Easy to follow, this guide contains evaluation activities for each lesson.

Charlesworth, R., & Lind, K. K. (1990). *Math & science for young children.* Albany, NY: Delmar Publishers.

This publication is designed for teacher inservice in early childhood education. It presents an organized and sequential approach to creating curriculum in mathematics and science that is developmentally appropriate for young children. Three types of learning are emphasized: naturalistic, informal and structured.

Paulu, N., & Martin, M. (1991). *Helping your child learn science.* Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement.

This a handbook for parents, in which they are encouraged to work on nine concepts: organization, cause and effect, systems, scale, models, change, structure and function, variation, and diversity. It includes specific activities parents can provide and/or facilitate.

Peña, S. C. (1991). *Había una vez, dinosaurios.* Houston, TX: University of Houston.

This is a unit on dinosaurs, using children's books in Spanish.

Poppe, C. A., & Van Matre, N. A. (1985). *Science learning centers for the primary grades.* West Nyack, NY: The Center for Applied Research in Education.

Techniques are given to help teachers effectively manage a learning center system. Descriptions of five science learning centers, with eight learning activites based on a particular science theme, are included.

Sandbeck, E. (1989). *Dinosaur: Cut and use stencils.* New York: Dover Publications.

This is a useful and comprehensive collection for arts and crafts projects in the classroom. Has 54 black-and-white stencil designs. Designs and illustrations for graphics and crafts applications may be used for free and without special permission, provided that no more than four in the same publication or project are included.

Warren, J. (1989). *Theme-a-saurus.* Everett, WA: Warren Publishing House.

This is a series of integrated teaching units containing a collection of activities. Developmentally appropriate, the ideas use only inexpensive, readily available materials.

unit

1 Plants & Seeds

Prior Knowledge

The student can

1. group by 10s
2. add and subtract with sums to 18
3. name geometric shapes such as square, circle, rectangle, oval (ellipse).

Mathematics, Science and Language Objectives

Mathematics

The student will

1. collect and summarize data on a graph
2. skip-count by twos and fives
3. demonstrate multiplication of four and five
4. measure length using standard and nonstandard units
5. construct geometric shapes
6. estimate the area of irregular shapes
7. find symmetry of objects
8. use addition and subtraction to summarize data
9. classify according to size, color and shape
10. write the cardinal numbers of sets less than 50.

Science

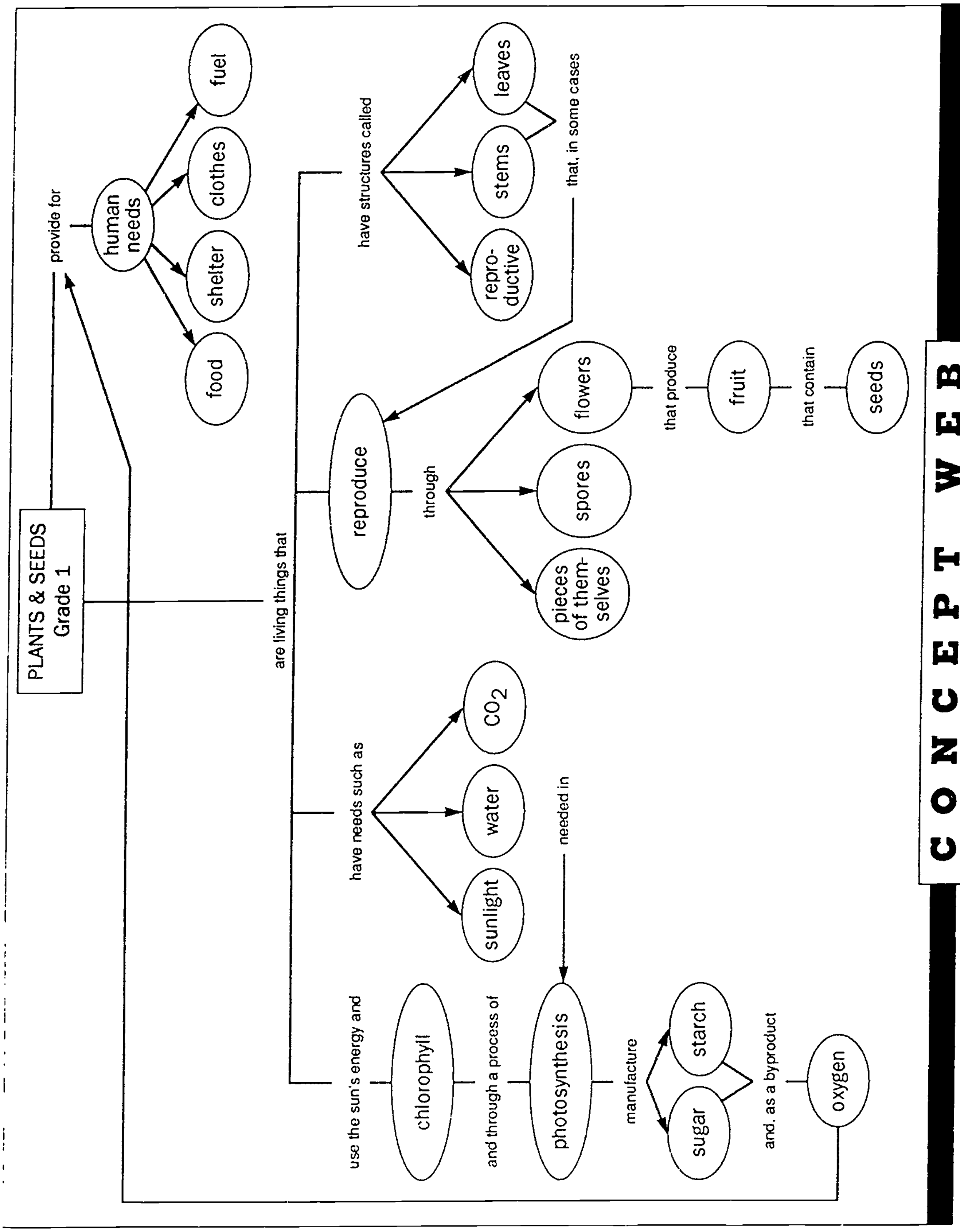
The student will

1. list, describe and identify plant parts
2. explain photosynthesis
3. measure time in days
4. compare and contrast changes in root and stem functions
5. identify cause and effect relationships of plant growth
6. describe a plant's reproductive system
7. list and describe growth of plants without seeds
8. describe growth of parasitic plants that don't require sun
9. predict results of phenomena.

Language

The student will

1. refer to favorite plant and seed books for information
2. describe experiments with plants and seeds
3. write or verbally describe a plant process
4. follow written directions to plant a seed
5. describe plants and seeds, verbally and in writing.


PLANTS & SEEDS
Grade 1
provide for
human needs
food
shelter
clothes
fuel
are living things that
have structures called
repro-ductive
stems
leaves
that, in some cases
reproduce
through
pieces of them-selves
spores
flowers
that produce
fruit
that contain
seeds
have needs such as
sunlight
water
CO_2
needed in
use the sun's energy and
chlorophyll
and through a process of
photosynthesis
manufacture
sugar
starch
and, as a byproduct
oxygen
CONCEPT WEB

225

224

VOCABULARY

mold moho	nutrition alimento	plant planta	seed semilla	stem tallo
flower flor	bud capullo	node nudo	petal pétalo	germinate germinar
anther antera	stigma estigma	pollen polen	spore espora	photosynthesis fotosíntesis
leaf hoja	sprout brote, retoño	host hueste	sepal sépalo	one hundred cien
count contar	add sumar	subtract substraer, restar	group grupo	chlorophyll clorofila
parasite parasito	circle círculo	square cuadro	rectangle rectángulo	root raíz
embryo embrión, germen	own propio (a)	humus mantillo	fungus hongo, fungo	
vein vena, nervadura	phototropism fototropismo	ones unidades	tens decenas	
numeration numeración	place value valor de posición	group by tens hacer grupos de decenas		

● ● ● Teacher Background Information

Human beings, other animals and plants are the living organisms that exist on earth. Plants are the only organisms able to sustain themselves by producing their own food. In turn, they provide food for animals and humans, through the food chain.

Almost all plants have one common characteristic making them different from animals. Plants, such as trees, flowers, fruits and vegetables, produce **chlorophyll,** a substance that allows them to convert solar energy into nutrition, or food. Humans, as well as animals, on the other hand, obtain their nutrition either by consuming plants or by consuming other animals. Humans eat both meat and plants. Some plants, however, are not able to use sunlight and soil to produce their own source of energy. For example, molds are **parasites** obtaining their energy directly from the plant or animal they live on — **their host.** Furthermore, plants such as molds do not reproduce through seeds; they reproduce by creating spores.

Flowering plants grow from seeds. A sprouting seed must absorb water before it will start to grow. It must also have soil firmly packed around it and have warmth from the sun. Inside the seed is a tiny **embryo,** surrounded by stored food. When the embryo starts growing, roots grow downward and a stem grows upward. Once the stem breaks through the surface of the soil into the sunlight, the first two true leaves form and the plant begins to make its own food. When plants have water, sunlight and the proper minerals in the soil, they grow, manufacture food and give off oxygen.

Many plants do not have to grow from seeds. A potato, for example, is not a seed, but it can reproduce itself by growing roots from a specialized part of the potato. Other plants (some cacti) can begin to grow if a small piece of the plant falls on soil. After growing roots, if then the potato is anchored in the soil, it will receive nutrients and produce more potatoes. Some plants send out underground rhizomes that send up new plants periodically. Nonflowering plants grow from spores. Like a seed, a spore develops into an embryo. Unlike a seed, the spore does not contain food to enable the embryo to grow. The plant that develops must get its food from a host.

Molds are plants that grow on their hosts, taking nutrients directly from them. Molds do not require light or soil since they don't produce their own food the way other plants do, but they do require moisture. The food molds eat are the bread, jelly, cheese, fruit, flowering plants, rooting logs and leaves, etc. that they live on. These foods are called "hosts". Introduced information about molds so that there is no misconception about the two types of plants.

Although young children are familiar with plants, many may not have had the opportunity to examine them closely, to plant seeds and watch them grow. The first activities for this unit, then, will include working directly with plants to develop the main ideas and will include examining different aspects of plants and plant life. Students will learn about the parts of plants and their seeds and about the process of photosynthesis. Students will make distinctions among plants by examining and planting seeds, rooting vegetables and transplanting them. Students will grow molds and compare them to other types of plants.

Motivate students by having them design and construct terrariums to study plants and seeds and small animals. A terrarium is an artificial habitat for plants, which is often sealed so no new air can get in or out. Small animals placed in the terrarium will grow in an environment that sustains life.

Glossary

Leaves are where a plant's food is made by photosynthesis. Leaves take in carbon dioxide from the air, water from the soil and energy from sunlight.

Flowers are the reproductive parts of a plant. A flower's petals and its scent attract bees and insects to pollinate the flower. After pollination, the petals fall away and seeds develop in the part of a flower called the ovary. The ovary itself usually becomes what we call fruit.

Stems support the upper parts of plants. Water and dissolved nutrients from the soil travel up the stem in a system of tubes. Food from the leaves travels down the stems to the roots. Stems also store food.

Roots of plants anchor the plants in the soil. Water and minerals are taken from the soil through the roots. Many plants, such as carrots, store food in their roots.

Seeds contain a tiny embryo of a plant inside. The seed halves contain food that supplies energy and materials for growth until the plant grows its first leaves above the ground.

Petals are the brightly colored structures that form the outer part of the flower.

Buds are small lateral growths on the stem of a plant. Incompletely opened flowers, buds are not yet at full growth and development.

Nodes are thickened or swollen enlargements of a plant (as on the trunk of a tree).

Stigma is a portion of the pistil that receives the pollen grains.

Anther is the part of the stamen in seed plants that consists of microsporangia, develops and contains pollen and, though sometimes sessile, is usually borne on a stalk.

Sepal is a protective structure (like a petal) that covers the flower bud.

Pollen is a fine dust that on germination produces a tube that goes into the ovary.

Mold is a plant that does not produce its own food, growing directly on its host.

Slime Molds are naked creeping vegetative masses that live on hosts. Slime molds produce large flowing masses that join together and develop spores.

Spores are minute unicellular resting bodies that can produce a new vegetative individual when conditions become favorable.

Rhizomes are elongated tube-shaped stems or branches of a plant that produce shoots above and roots below the soil and from which a new plant can begin to grow.

Algae are unicellular vegetative and animal-like bodies. They produce chlorophyll that determines the plants' colors of green, brown, red.

Fungi are aquatic and terrestrial vegetative structures living on dead or decaying matter, or in symbiotic association with each other, **usually** for mutual benefit. A fungus has the form of a tubular branched filament that branches increasingly, intermeshing into irregular networks. Some filaments pack together in dense orderly patterns producing, for example, mushrooms. Like molds, fungi have the ability to produce spores and to disperse them for greater distribution.

Lichens are symbiotic associations of algae and fungi.

LESSON FOCUS

LESSON 1 ***Plants Are Living Things***

BIG IDEAS Plants are living things that reproduce and have needs such as sunlight, water, and food including carbon dioxide and minerals. We can measure the growth of plants by length and area.

LESSON 2 ***Using the Sun's Energy***

BIG IDEAS Photosynthesis is a process in which a plant uses light energy, chlorophyll, carbon dioxide and water to manufacture carbohydrates for plant food.

LESSON 3 ***Flowers, Roots, Stems and Leaves***

BIG IDEAS Many plants have roots, stems, leaves and reproductive organs; the green leaves make plant food. Geometry helps us describe nature.

LESSON 4 ***Plants Reproduce***

BIG IDEAS Plants reproduce through organs that we call "flowers", through organs that look like flowers or through making spores. One single plant can make many new plants and is said to "multiply" itself.

LESSON 5 ***Pollination — from Flower to Fruit***

BIG IDEAS Pollination and fertilization are the first steps in the process of a new plant's development. We need large numbers to describe the many plants in nature.

LESSON 6 ***Seeds***

BIG IDEAS Seeds are the fertilized ovules of a flower that grow to adult plants when planted. Fruits carry the plant's seeds and vary in size, shape and capacity. Subtraction helps us compare by finding differences among plants.

LESSON 7 ***Plants Provide Many Human Needs***

BIG IDEAS Without plants, people could not live on earth; plants give us oxygen, food, shelter, clothing, beauty and many other things. We can summarize data about plants in different kinds of graphs.

OBJECTIVE GRID

Lessons	1	2	3	4	5	6	7
Mathematics Objectives							
1. collect and summarize data on a graph	•	•	•	•	•	•	•
2. skip-count by 2's and 5's							
3. demonstrate multiplication by 4 and 5							
4. measure length using standard and nonstandard units	•		•	•			
5. construct geometric shapes			•				
6. estimate the area of irregular shapes			•			•	
7. find symmetry of objects							
8. use addition and subtraction to summarize data	•		•			•	
9. classify according to size, color, or shape	•	•	•	•	•	•	•
10. write the cardinal numbers of sets less than 50.	•	•	•	•	•	•	•
Science Objectives							
1. list, describe and identify plant parts	•	•	•	•	•	•	•
2. explain photosynthesis		•					
3. measure time in days							
4. compare and contrast changes in root and stem functions	•	•	•	•	•	•	•
5. identify cause and effect relationships of plant growth	•	•	•	•	•	•	•
6. describe a plant's reproductive system				•			
7. list and describe growth of plants without seeds				•			
8. describe growth of parasitic plants that don't require sun				•			
9. predict results of phenomena.	•	•	•	•	•	•	•
Language Objectives							
1. refer to plant and seed books for information	•	•	•		•	•	
2. describe experiments with plants and seeds	•	•	•	•	•	•	•

Continued on next page ▶

Lessons	1	2	3	4	5	6	7
3. write or verbally describe a plant process	•	•	•	•	•	•	•
4. follow written directions	•	•	•	•	•	•	•
5. describe plants and seeds, verbally and in writing.	•	•	•	•	•	•	•

LESSON 1 Plants Are Living Things

BIG IDEAS Plants are living things that reproduce and have needs such as sunlight, water and food including carbon dioxide and minerals. We can measure the growth of plants by length and area.

Whole Group Work

Advance Preparation

Bring some plants to class. As these plants grow, they will be used in other activities. The plants need to be kept alive until the end of the unit and then may be taken home. See suggested schedule for initiating the activities.

One week prior to initiation of unit, plant four-to-six nonflowering plants such as jade, moss and ferns

Obtain: four-to-six flowering plants with flowers, roots and leaves
four-to-six vegetables such as potatoes, carrots, beans, cabbage, chiles
15-20 containers with lids
Magnifying lenses
A balance to mass the plants
Sheets of clear plastic to roll into tubes
Collection of buttons of various sizes
Play-money coins
Pinto beans
Glass tumblers
Sponges

Materials

Books: **Jack and the Beanstalk** by B. Schenk de Regniers and **Everything Grows** by Raffi & B. McMillan, placed later in the **Library Center**
Several different plants, at least one a flowering plant
A picture of a flowering plant
A collection of various types of seeds
Word tags: petal, bud, node, stigma, anther, sepal, leaf, stem, root

Encountering the Idea

Read the story of **Jack and the Beanstalk** to the students, stressing the unusual way the bean plant grew. Is this the way plants grow? Was the plant alive? How do you know? Show students several of the plants brought to class. Ask: Are plants living or nonliving things? How do you know? (They grow, live, die, reproduce, have needs, etc). The students examine plants by noting shape, color, types of leaves, flowers, patterns in the leaves or flowers, etc. Ask students to describe how the plants are alike. (They need water, food and sun.) Tell students that in order to learn more about plants, they will make individual terrariums (or one large class terrarium) in which they will plant seeds that they'll watch grow into adult plants. See **Activity** — Making a Terrarium. Tell students that in order to study plants, we have to collect data, or information, about the plants so we can see how plants grow, change and reproduce.

Exploring the Idea

Students begin exploring plants by examining different types of plants — flowering plants and nonflowering plants (including vegetables) in the **Plant Center.** Tell students that observing a plant means looking at the different plant parts and guessing their function — what each part does. Point out that some of the plants have flowers and others do not. Do **Activity** — Plants. Tell students that they will continue making observations on a daily basis at the **Plant Center.**

Take a plant and examine its different parts. As you point to a part, ask students to name it, if they can. Tell them the function of each part. Use a picture to show the parts.

At the **Mathematics Center,** the students measure length and estimate area of the leaves.

How fast do plants grow? How much new area do they cover each day? Make a chart to keep track of how much the plants grow each day. Do **Activity** — Measuring Area or Cover. This is part of a daily (or weekly) observation routine to collect and summarize data on a table.

Seed Collection

Each student begins a seed collection: selects different seeds, glues them on a chart and labels them as she/he learns the names.

Getting the Idea

Reconvene the students and again, showing the various plants and/or pictures, have students point to each of the plant parts they have investigated: leaves, flowers, stems, roots and seeds.

Since each part of a plant has an important function, discuss it while pointing out the plant part.

Organizing the Idea

Tell the students they will be learning about living things — plants — in this unit and that in order to learn about living things they will have to make many observations because living things change. In order to collect and summarize data, we have to organize what we are going to do and how we are going to do it. At this point the students begin **Activity** — Making a Terrarium and **Activity** — Beans in a Baggie. Students begin **Activity** — Plants Have Special Needs. These activities require that students begin the activity and then make observations of the plants to note their growth and other change; consequently, the plants will need time to grow.

Closure and Assessment

What did we learn from reading **Jack and the Beanstalk**?

How do you know that plants are living organisms?

Can we see plants grow? If we can't, then how do we know that they are growing? (Measuring and counting help us see the differences in the plants.)

What things about a plant can we measure that show the plant is changing? (Area or cover and length.)

How do we measure cover or area? (With another cover, or with a unit area.)

How do we measure length? (With another length, usually a ruler that shows standard units of length.)

Name some of the important parts of a plant and point to (and/or draw) them as you say them.

What part of the plant makes a new plant usually? (The flower part.)

List of Activities for this Lesson

- ▲ Making a Terrarium
- ▲ Plants
- ▲ Measuring Area or Cover
- ▲ Plants Have Special Needs
- ▲ Beans in a Baggie

ACTIVITY
Making a Terrarium

Materials

Potting soil — activated charcoal, crushed rock, pebbles or broken clay pots
Small plants
Various containers (one-gallon clear wide-mouthed bottle; clear plastic shoe box; one-gallon plastic milk bottle cut in half; a large fish bowl)

Procedures

1. Select a display area in diffused light.
2. Determine how many and what type plants will be included in the terrarium. Determine the size of the plants by the size of the container.
3. Choose a container — glass or plastic. Humidity is the key to a thriving terrarium garden. Find airtight coverings that can be removed periodically.
4. Prepare the soil layer.
   a. Use only a sterilized commercial potting mix, or make your own.
   b. Make your own potting mix. Blend equal amounts of
      1. coarse river sand
      2. garden loam or good garden topsoil
      3. one half each charcoal and perlite
      4. spread mix on baking sheets and sterilize by baking in a 300° oven for at least 30 minutes
      5. place bottom drainage layer as follows
         (a) crushed rock, pebbles or broken clay pots
         (b) a second layer — charcoal
         (c) a top layer — potting mix.
   c. Use a fertilizer only initially. Fertilizers tend to speed up plant growth to an undesirable extent.
   d. Plant selected plants in the potting soil.
   e. Add stone, wood or accents.
   f. Add small animals such as newts and salamanders (optional).

Teacher Information

Large terrariums may be sealed; they continue to grow and develop for many months. The plants will continue to produce oxygen, and moisture will be released in the air and may form water droplets inside the container. The terrarium is then said to be **balanced**. As a class project, you may want to convert a 10-gallon aquarium by including plants and animals such as newts and salamanders.

It is important in balancing a terrarium that you choose plants that require similar amounts of moisture and sunlight.

ACTIVITY
Plants

Objective
The students describe the plants and seeds, analyze and categorize them.

Materials
Two flowering plants of any type, with flowers, roots and leaves
Two nonflowering plants such as jades, mosses, ferns
Two vegetables, such as potatoes, carrots, cabbage, beans, chiles

Procedures
1. Students examine each plant and describe it.
2. As students describe the plants, the teacher writes the appropriate name of the plant part on a strip of poster board to begin a vocabulary list. The list includes: roots, stem, leaf, node, flower, flower bud, petal, stigma, anther, seeds, sepal and others.
3. Students draw pictures of what they have observed and write the name by each new plant part they discover.
4. The students list the similarities and the differences between flowering and nonflowering plants in their journals.

M	*T*	*W*	*Th*	*F*
Week 1: Students plant beans in different containers. See **Activity** — Plants Have Special Needs Students place potatoes and carrots in containers. See **Activity** — Beans in a Baggie. Lesson 1 **Week 2:** 1. Initiate **Activity** — What Is Mold? 2. Begin Seed Collection **Week 3:** Some of the plants (from week 2) are turned upside down **Week 4:** Continue observation	Begin Seed Collection Observations made on a daily and weekly basis	Form Categories for seeds	Categorize new seeds	Begin observations as to growth — measuring length and area as soon as possible

Suggested Schedule

* Student groups, or the entire class, can make this chart

ACTIVITY
Measuring Area or Cover

Objective
Students estimate circular and elliptical areas using nonstandard circular units; students say that the estimates are rough because the buttons (coins or disks) do not cover all the area.

Materials
Bread with mold growth (must be started a week before activity); buttons, coins, etc.

Phase I
Students begin to measure with nonstandard units the growth of a mold grown on bread, using buttons of the same size or coins to blanket or cover the mold. In measuring an area the same size button, or coin is used to find the area. For example, students can use pennies. However, they can also use nickels. The area of the mold remains the same, but since nickels are larger, fewer nickels will cover the same area. The students make a chart to compare the growth using different circular areas for comparison.

	red button	***white button***	***dime***	***penny***	***nickel***	***quarter***	***other***
Day 1							
Day 2							
etc.							

Phase II
After students have estimated areas using a coin or disk, they use a grid on a transparent sheet marked in centimeters and determine the growth.

Copy the grid below on a transparency and have students estimate the growth of the molds in square centimeters.

make a grid in centimeters

Teacher Information
Students' first notion of area can be related to the idea of a cover or blanket. Students may have already had experience measuring length and the area contained in rectangular shapes. The problem in measuring mold growth, however, is that molds usually grow in circular or oval shapes. It is more difficult to measure circular areas than rectangular ones.

ACTIVITY
Plants Have Special Needs

Objective
Students plant beans in different containers and treat them differently to determine their needs for sunlight, water, air, nutrients and a place to anchor their roots, which is usually the soil.

Materials
For each student group:

20 - 25 beans; absorbent paper towels; four small plant pots or four large baby food jars; self-adhering labels; kitchen plastic wrap

Procedure
1. Label each pot or baby food jar with one of these labels:
   #1. no water
   #2. no sun
   #3. no air
   #4. has water, sun, air, soil
   #5. Fold a paper towel into fourths and label it: No Nutrients (soil).
2. Plant and water three - four beans in each pot or jar that has been labeled
3. **DO NOT WATER** the pot labeled: No Water.
4. Cover and seal the entire pot or jar labeled "**no air**" with plastic wrap.
5. Place three -four beans inside the folded paper towel; wet the towel.
6. Put each of the jars or pots and the paper towel in a window sill or sunny place. Place the one labeled "**no sun**" in a closet or another place where it will be in darkness.

The students observe the plants at approximately the same time every day. They make observations in their journals and chart and date the entries on the growth of each of the plants. When the plants have had time to grow, the students speculate about the needs of each plant. They give reasons for why the plants grew or not and what the plants needed. They also explain how they know that a plant needs all these things.

Plants Need Water, Sun and Air
Each student group has a set of plants that have been given different care treatments. The students review what each plant **was given and was not given.** The students collect the data from each of the groups and combine it into one class chart.

The student groups organize the data and refer to it and discuss which of the plants have grown and which ones have not and speculate as to what caused some of them to die.

	no water	*no sun*	*no air*	*no soil*	*water/sun/air/soil*
Day 1					
2					
3					
4					
5					

ACTIVITY

Beans in a Baggie: Part 1[1]

Advance Preparation

Prepare for this activity during the first day of the unit and continue during the third lesson; it takes about four days for the seeds to germinate.

Objective

Students make and record observations of plant growth and measure length and time.

Materials

For each student group:

- Two clear plastic tumblers (or clear plastic bags)
- Two sponges that will fit around the inside of the tumblers
- Eight to 10 beans that have been soaked overnight for each tumbler
- Powerful magnifying glass

Procedure

1. Place a wet sponge around the inside of the plastic tumblers.
2. Place the beans evenly between the sponge and the tumbler (some of the beans close to the rim of the tumbler), all the way around.
3. Place one tumbler in a warm, sunny place, and place the other in a closet.
4. After the beans have begun to germinate, take out a single bean from each of the tumblers and examine under a magnifying glass. Measure the length of the sprout in centimeters daily. Compare the two sprouts.
5. Make predictions about the growth of the beans.
6. Draw pictures in the journals.
7. Each student group makes a chart:

A Bean Grows

	Predict	*Observed*	*Date*
1. Which grows first, the stem or the root?	________	________	________
2. How many days will it take for the bean to sprout?	________	________	________
3. How many days before the leaves come out?	________	________	________
4. How long is the root the first day it shows?	________	________	________
5. How long is the stem the first day it shows?	________	________	________
6. What color is the root the first day?	________	________	________
7. What color is the stem the first day?	________	________	________

[1] Students continue this activity in Lesson 3

LESSON 2 Using the Sun's Energy

BIG IDEAS Photosynthesis is a plant process in which a plant uses light energy, chlorophyll, carbon dioxide and water to manufacture carbohydrates for plant food.

Whole Group Work

Materials

Book: **A Sunflower as Big as the Sun** by S. Ellentuck
Growing plant with large leaves
Cardboard squares or black construction paper
Apples, oranges, potatoes, celery, carrots, turnips; 24 soda crackers
Medicine droppers; tincture of iodine (one bottle)
Lugol's solution[1]

✗ Warning ✗

Lugol's solution is highly toxic, as is tincture of iodine. Warn students **not to taste** any of the materials containing the iodine.

Word tags: photosynthesis, chlorophyll, sugar, starch, iodine
Reference books and encyclopedias for students to read about sugar and starch

Encountering the Idea

Read **A Sunflower as Big as the Sun.** After reading, ask the students why the villagers were concerned? Why do you think a sunflower has that name?

Students discuss the idea that all living things — humans, plants and animals — need food in order to live. They discuss how this food is obtained. What do we like to eat? What do animals like to eat? Horses? Cows? Cats? Dogs? What is a plant's food? Yes, plants need water. What else? Tell the students that they have begun some activities that will help them learn how plants make their own food.

Exploring the Idea

At the **Science Center,** students work in pairs.

1. The students observe that leaves reach for the sun. Place one of the plants next to a window for three days. If the sun is shining brightly, the students can see the plants begin to seek the light in a matter of a few hours. Rotate the plant 180° and allow it to stand for another three days. Students make observations of the plant on a daily basis and describe what they see. (The leaves of the plant turn toward the window. Rotating the plant changes the direction of the leaves, but within a few days they turn back toward the light.)

[1]Test for starch. Lugol's solution may be purchased from commercial suppliers of science educational materials, obtained from a local high school or prepared. dissolve 10 g of potassium iodide in 100 ml of distilled water, then add 5 g of iodine. Only a few drops of the solution are necessary for the test. A change to a blue-black color is a positive test.

2. Students continue with **Activity** — Leaves, Sun, Roots and Gravity, in which they grow a plant and then turn it upside down and keep it in that position for several days. The students observe how the leaves turn to the sun and the roots turn downward.
3. The students complete **Activity** — Sugar and Starch.
4. Select for special observation one of the plants with large leaves that has been growing for several days. Completely cover one of its leaves with pieces of cardboard, or black construction paper, and seal with tape to ensure that no light gets to that leaf (sandwich the leaf in between the two pieces of paper). After the plant has grown in the sun several days, remove the cardboard from the leaf. The students describe the difference in the color of that leaf and of the other leaves. Ask the students to note the similarities and the differences between that leaf and the leaves of plants that were grown without light (in the closet).

Students continue with **Activity** — Flower Magic.

Getting the Idea

After the students have had an opportunity to conduct all of the experiments above, ask them what they think a plant needs besides water. Yes, plants need light. They need the energy from the sun to produce food. The process of producing plant food is called **photosynthesis**. Write the word **photo - synthesis** on a poster board. Ask the students to read the first part and tell what it sounds like. "Photo" refers to light. The second part, "synthesis", means to "put together." "Photosynthesis", then, means to put together with light. The students discuss what is "put together with light." (Water, nutrients from the soil, carbon dioxide from the air and light energy are synthesized into sugar and starch through photosynthesis.)

Discuss with students what they found when they tested the fruits and vegetables. How did we test for sugar? (Tasted.) Where did the sugar come from? The plants manufactured it. How did we test for starch? (Used the iodine test.) Where did the starch come from? The plants made it.

Ask the students to describe what happened to the leaf covered by paper that could not get sunlight. Yes, it turned pale yellow to white, like the plants in the closet. When a plant is using light to produce food, it is green. That means that **chlorophyll**, a substance produced by the plant, is working to change the sun's energy into food for the plant.

Green plants produce food and oxygen from water, carbon dioxide, minerals and light energy through the process of photosynthesis. They take in carbon dioxide from the air, water and minerals from the soil and energy from sunlight. During photosynthesis, carbon dioxide and water unite in the presence of chlorophyll to form sugar and oxygen. The green plant uses some of the food it makes to grow and produce leaves and fruit. The plant converts the remaining food to starch and stores it. Where was starch stored in the plants we observed?

If students show interest about why plants turn toward the light, you may discuss the following: Plants contain a chemical called **auxin** that promotes the lengthening of plant cells. A buildup of auxin occurs on the dark side of the plant stem. The extra auxin causes the cells on the dark side to grow longer forcing the stems to bend toward the light. This movement toward light is called "phototropism". "Photo" means light and "tropism" means movement.

Applying the Idea

In groups of four, students discuss and report on the following problem: Suppose you had some very special plants that you were growing, and the sun did not shine for many days. One day your special plants began looking wilted and had lost some of their green color, even though you had watered them and taken care of them. What could you do to help them until the sun came out again?

Closure and Assessment

1. What was the lesson(s) learned in **A Sunflower as Big as the Sun**?
2. Verbally explain, or draw and label, how plants make their own food. What do they use and what do they produce during photosynthesis?
3. What is photosynthesis? (A process.)
4. What is chlorophyll? (A substance manufactured by plants.)
5. What part of the leaf faces the sun?
6. Using a fruit and/or a vegetable, show where a plant makes and stores its food.
7. How do plants make sure they get enough sunlight?

List of Activities for this Lesson

▲ Leaves, Sun, Roots and Gravity

▲ Sugar and Starch

▲ Flower Magic

ACTIVITY
Leaves, Sun, Roots and Gravity

See Advance Preparation, page 9

Objective

Students observe that plant leaves turn toward the sun for energy and plant roots turn downward in the direction of gravity.

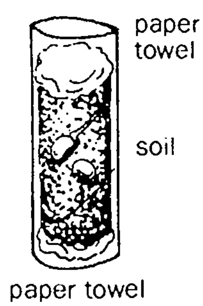
Materials

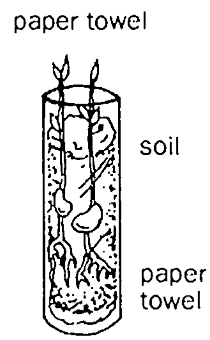
For each student group:

Several beans; planting soil; a clear plastic tube, approximately six inches long and about 1 1/2 inches in diameter, can be made of a plastic sheet wrapped into a tube and sealed to prevent water from seeping out—the two ends of the tube are left open; absorbent paper towels; water

Procedure

1. Plant the beans in the moist soil inside a plastic tube; plant the beans close to the edge of the tube. Secure the soil and seeds in the tube by placing wet paper towels into each end of the tube.
2. Place the tube on one end in a sunny, warm place and secure it so it will not turn over.
3. On a daily basis, water the beans through the paper towels.
4. After the beans have sprouted and the roots and stems are visible, turn the tube upside down and secure it in the same location.
5. When the plant begins to turn its roots and leaves, the students make and write their observations.
6. After several days, place the tube right side up; again the students make and write their observations.





Discussion

1. Explain in your own words what makes the plants' leaves turn up? (Phototropism.)
2. Explain in your own words what makes the plants' roots turn down?

ACTIVITY
Sugar and Starch

Objective
The student say that sugar and starch are two foods produced by green plants.

Materials
For each student group

two soda crackers; pieces of bread, corn tortilla; medicine dropper; tincture of iodine; apple, orange, pineapple, potato, celery, carrot, turnip, other fruits and vegetables

Procedures
1. Students cut open the fruits and vegetables and describe them, noting that the inside part is moist, both in fruits or a vegetables.
2. The students taste the fruits and vegetables and describe the taste — sweet, sour, salty, or bitter. What is the texture of the food? Grainy, smooth, has fibers, hard and tough to bite, "mushy", other. What food is in the fruits and vegetables? Yes, sugar and starch.

> **✗ Warning ✗**
> Lugol's solution is highly toxic, as is tincture of iodine. Warn students **not to taste** any of the materials containing the iodine.

3. On a piece of potato, the teacher places a couple of drops of iodine. The students note that the iodine turns blue. The teacher explains that the test for starch in a food is that if the iodine turns blue, then the food has starch.
4. The students test the various fruits and vegetables for starch on different parts of the plant. The students should not taste items that they have tested for starch with the iodine.

plant	*taste*	*texture*	*test*	*Where is starch? stem, roots, fruit*

Discussion
1. What is a test? When we say that we are testing for starch in a plant, what does that mean?
2. Which foods have starch? Which foods do not have starch?
3. Where did you find that foods store the starch?

ACTIVITY
Flower Magic

Objective
Students describe how a plant winds its way toward light.

Materials
Shoebox with lid; paper cup; three pinto beans; cardboard; scissors; tape; potting soil

Procedures
1. Fill the cup with potting soil.
2. Plant the beans in the soil.
3. Moisten the soil and allow the beans to sprout (about five to seven days). Be sure to keep the beans moist, not wet.
4. Cut two cardboard pieces to fit inside the shoebox. Cut holes in each of the cardboard pieces to allow the plant to pass through.
5. Secure the cardboard with tape to form a maze that the plants will follow.
6. Cut a hole in the lid.
7. Place the bean plant inside the shoebox at one end.
8. Secure the box lid with the hole on the opposite end from the plant.
9. Open the lid daily to observe the plants' growth.
10. Water the soil as needed.
11. Continue to observe until the plant grows out the hole in the lid.
12. Students discuss their observations with the class.

LESSON 3 Flowers, Roots, Stems and Leaves

BIG IDEAS Many plants have roots, stems, leaves and reproductive organs; the green leaves make plant food. Geometry helps us describe nature.

Whole Group Work

Advance Preparation

Early in the day, place the carnations or the celery stalks in the jars of colored water. In time the students observe that the celery or carnations are turning the same color as the water they were in.

Materials

Book: **The Pumpkin Patch** by E. King
Counting or Cuisenaire rods or different-size geometric shapes
Five to eight different types of plants; several large blades of grass for each student group
Select one plant that has a large root that can be examined by a powerful magnifying lens
Three stalks of celery cut at an angle or three white carnations with stems cut at an angle
Three jars containing water colored dark red or blue with food coloring
Magnifying glasses
Word tags: parallel, intersecting, symmetry,

Encountering the Idea

Read **The Pumpkin Patch.** Begin discussion by reviewing the idea that all living things need food to grow and reproduce. What is a plant's food? Water, and what else? Tell students that they will complete a number of activities at the **Science Center** that will help them answer this question. At the **Mathematics Center,** they will discover how geometry helps us describe nature.

Exploring the Idea

Students complete **Activity** — Important Leaves.
Students complete **Activity** — Fall Leaves.
Students work on **Activity** — Beans in a Baggie.

Activity 1: Parts of Plants

In this phase of the lesson each student group takes five to eight different types of plants per group and separates each plant into the parts they can detect. The students examine the plants by cutting them into parts, labeling the parts and drawing them in their journals.

Each group reports what they found. As they describe their plants in color, stems, roots and flowers, ask them to pay special attention to the leaves. How are the leaves alike or different? Do they have smooth or rough (saw-tooth) edges? Do the leaves have something that looks like veins? Students draw their observations. The teacher gives the students the appropriate name for each plant part and writes the names on a poster board. Each student can point to: the stem, the leaf, the root and the flower. Point out other parts if the students ask about them.

	Plant	
Color	________	
Leaves	________	edge
	________	veins
Stem	________	
Roots	________	
Flowers	________	

Activity 2: Roots and Stems

At the **Science Center**, the students describe to each other their observations of the carnations and/or celery stalks placed in the jars of colored water and draw the results in their journals.

At the **Mathematics Center**, the students

1. complete **Activity** — Petal Fun.
2. complete **Activity** — Tens and Ones.
3. complete **Activity** — Math Trees.

Getting the Idea

In light of the new information the students have received about roots, stems and leaves, discuss photosynthesis. Discuss chlorophyll.

Additional questions for discussion

1. Describe these leaves to someone on the telephone who has never seen them.
2. What is the same about these leaves?
3. How are some of the leaves different?
4. What can you say about the color of these leaves?
5. What can you learn by touching the leaves? By smelling them?
6. What can you say about the shapes of the leaves?
7. How long were your longest and/or shortest leaves?
8. Why did different students get different measurements for their leaves?
9. How did the leaf look different when you looked through the magnifying lens? How were the veinlike structures the same or different? Can you use a word from geometry to describe the veins on these leaves? (Networks, parallel, intersecting.)

Organizing the Idea

Each group draws and labels with the appropriate names in their journals the plant parts they observed. The students may place several plants in a book to press. After the plants have been pressed, students discuss the function of the roots, root hairs and stems of the plants. (Roots: to anchor the plant, and to obtain water and food or nutrients; stem: to transport the water to the leaves, flowers.) The students attach plants to cardboard and label the appropriate parts.

Students report to the class the results of the new plant growth in the "Baggie" experiment.

The students hypothesize as to why the plants turned the color of the water in the experiment with the carnations or celery stalks in the jars. After they offer suggestions, tell them that the tiny tubes they could see in the cuts are called **xylem.** The xylem run up the stalk to the flower petals or leaves. The colored water moves through the xylem allowing the color to be distributed throughout the cells in the petals, causing the color change. Minerals in the soil are carried to plant cells in this way, providing nutrients to the flowers and leaves. The minerals dissolve in water as did the red and blue coloring. The mineral-water solution travels up to the leaves and flowers, where the dissolved materials remain, as did the red or blue color.

Closure and Assessment

Performance Assessment

1. Draw three parallel lines.
2. Draw a network that shows the veins of some leaves.
3. Draw in sequence the growth of roots, stems, leaves and flowers.
4. Draw a tree that has one line of symmetry.
5. Draw a flower that has two lines of symmetry.

Written Assessment

1. Why are leaves important to plants?
2. What color are plants that make food through photosynthesis? (Usually green with some exceptions, i.e. the Wandering Jew.)
3. What is the function of roots? Stems? Flowers?

List of Activities for this Lesson

▲ Important Leaves

▲ Fall Leaves

▲ Beans in a Baggie

▲ Petal Fun

▲ Tens and Ones

▲ Math Trees

ACTIVITY
Important Leaves

Objective
Students say that plants take in carbon dioxide and use it to manufacture their food in the green leaves.

Materials
Leaves gathered previously (include a bean plant and grass leaves); heavy book; picture of a plant similar to the one below; sheet of paper; magnifying glass; knife or single-edge razor blade

Procedures
1. Use the leaves you brought to school and spread them flat on your desk.
2. Look at them carefully and compare their roots, stems and leaves.
3. In what ways are they alike? In what ways are they different? Can you think of reasons why?

Network of veins (bean)

Veins run parallel (grass)

Choose some of your most interesting leaves and spread them out on a piece of paper. Put a heavy book on top of them. This is called "pressing". After several days, remove the weight.

Leaves are very important to plants and to many forms of life on earth.

4. Select a bean leaf and a grass leaf. Describe each one. How are the leaves alike? Different?
5. Each leaf has veins. Are the veins arranged in the same way? The bean leaf has a main "spine" and tiny veins extend from it. The grass has veins that run alongside each other, parallel to each other.
6. What are the veins for? Cut a leaf at a vein. Look at it with a magnifying glass. What is in it? (A liquid.)
7. What do you think that liquid is?

Teacher Information
Leaves are important to many plants because leaves manufacture food through their "chlorophyll factories." Plants also "breathe" through their leaves. In the daytime, during photosynthesis, leaves give off oxygen. In darkness, their chlorophyll factories shut down, but the plants still produce carbon dioxide. During this time they also use oxygen or respire as we do. Pressing, preserving and displaying leaves in creative ways may add aesthetic dimensions to the unit. One way to preserve leaves is to laminate them in a dry-mount press. Pressing them with a warm iron between sheets of waxed paper will also preserve them.

ACTIVITY
Fall Leaves

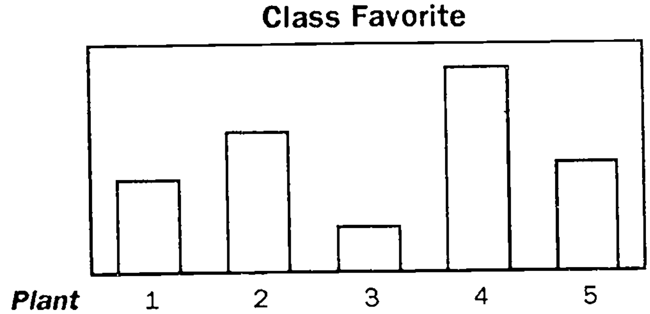
Objective
Students measure length and width and estimate area.

Materials
Poster board for group record of investigation; rulers; magnifying glasses; leaves collected by students taped or glued and labeled on a large poster bo

Procedures
1. Using the magnifying glasses, the students describe the leaves on the "leaf board" to each other and record their observations.
2. The students measure at least four of the leaves.
3. The students point out the leaves' veins, the colors, the type of edge (smooth or rough) and the size.
4. The students decide where, on the leaf, they will measure the length and width.
5. The students estimate the area with coins or the square centimeter grid and record it.
6. The students report the length of the longest or shortest leaf, and the widest or most narrow leaf, and the one with the largest or smallest area.
7. The children select and graph their favorite leaf on the "leaf board."
8. The students draw a picture of what the leaf they selected looks like through the magnifying glass.

Plant	Leaf (color, edge)	Length	Width	Area

Class Favorite



ACTIVITY
Beans in a Baggie: Part 2[1]

Advance Preparation
Prepare for this activity during the first day of the unit and continue during the third lesson; it takes about four days for the seeds to germinate.

Objective
Students make and record observations of plant growth and measure length and time.

Materials
For each student group:

two clear plastic tumblers (or clear plastic bags)
two sponges that will fit around the inside of the tumblers
eight to 10 beans that have been soaked overnight for each tumbler
Powerful magnifying glass

Procedure
1. Place a wet sponge around the inside of the plastic tumblers.
2. Place the beans evenly between the sponge and the tumbler (some of the beans close to the rim of the tumbler), all the way around.
3. Place one tumbler in a warm, sunny place, and place the other in a closet.
4. After the beans have begun to germinate, take out a single bean from each of the tumblers and examine under a magnifying glass. Measure the length of the sprout in centimeters daily. Compare the two sprouts.
5. Make predictions about the growth of the beans.
6. Draw pictures in the journals.
7. Each student group makes a chart:

A Bean Grows

	Predict	*Observed*	*Date*
1. Which grows first, the stem or the root?	________	________	________
2. How many days will it take for the bean to sprout?	________	________	________
3. How many days before the leaves come out?	________	________	________
4. How long is the root the first day it shows?	________	________	________
5. How long is the stem the first day it shows?	________	________	________
6. What color is the root the first day?	________	________	________
7. What color is the stem the first day?	________	________	________

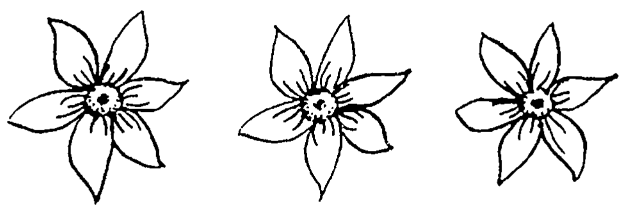
[1]Students began preparing this activity in Lesson 1

ACTIVITY
Petal Fun

Objective
Students use counting to mass and descibe flower petals.

Materials
Four flowers for each student group
Balance to mass leaves; objects to mass leaves and/or flower petals, such as paper clips or staples

Procedures
1. Students examine different flowers, count the number of petals and describe the shape of the petals.
2. The students make flower shapes of their own and describe them, noting the differences between the shapes of their flowers and the ones they examined.
3. Students count the total number of petals. In counting the petals, for example, they count three groups of six petals each, which gives a total of 18, or they skip-count by twos and fives.
4. The students find symmetry in the flowers, if the flowers have it. For example:



Questions
1. How many leaves are on each branch of the flower? Count by twos and also by fives to check.
2. How are the flowers the same or different in shape, size and thickness of the leaves and of the petals?
3. How much does a leaf mass? Since you cannot mass one leaf with your scale does that mean that leaves do not have mass? Explain.
4. How many leaves do you have to put together to begin to mass them with the balance you have in class?

Plant	Number of petals on the flower	Mass of 5 petals (staples)

5. Do flowers have different numbers of petals?
6. Do some numbers appear more often than others? Which ones? Are two, three and five common numbers?

ACTIVITY
Tens and Ones (Decenas y Unidades)

Objective

The student counts any given set of leaves (or seeds) by grouping by 10s and ones.

Materials

Cuisenaire rods; laminated place value chart; three sets of dot number strips with zero through nine dots on each strip; erasable markers; pair of dice; Unifix cubes; popsicle sticks in singles and bundles of 10

Prior Knowledge

1. The students can count to 10 (make sets of 10), can make any number of sets of 10 (three sets of 10, etc.).
2. Students can count by saying the number names and matching them one to one with the objects in a set, e.g., making cube chains of a given length lesser than or equal to 10.
3. Given a set lesser than or equal to 20 objects, students can group by 10s and write on a place value chart (PVC) the number of 10s and the number of ones in the set.
4. Given a numeral lesser than or equal to 20, students can represent it with cubes or other counting objects.

Procedures

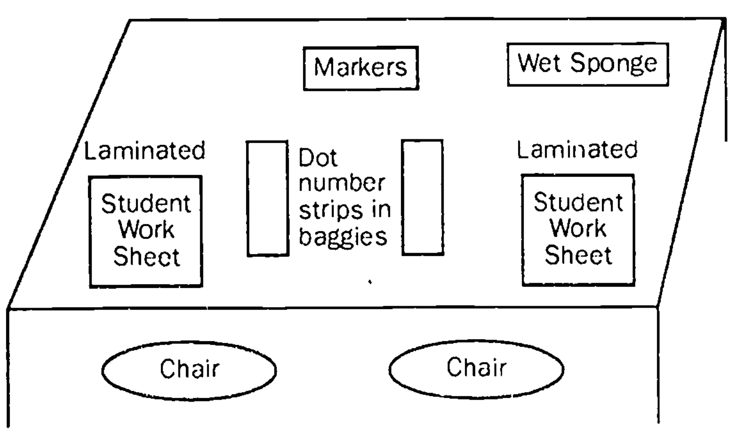
At most two students work at the center.

Completed Center	
1. Ana	3/25
2. Joe	3/25
3. Rosa	3/26

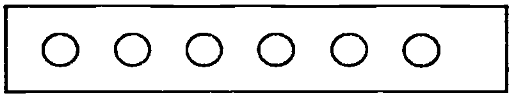
NUMERATION (PLACE VALUE)

PLACE VALUE BOARD

Tens	Ones
Decenas	Unidades



1. Remove **dot number strips** from the plastic bag and shuffle. Place the strips face down on the table. The first player (FP) picks up one number strip and then another. Using the two numbers from the strips, the player finds the total number of dots by counting and writes the corresponding addition number sentence on the laminated student work sheet. The sum of the two numbers on the number strips is the number that the student will construct on the adjacent PVC. The second player (SP) checks the first. They take turns writing the number sentence and constructing the numbers.
   Dot number strip for six:



_6_ + _7_ = _13_

T	O
D	U
1	3

2. Roll **a pair of dice**, one at a time, to get two numbers that will represent the 10s place and the ones place. The first die gives the 10s place. The second die gives the ones place. The student constructs the number with Unifix cubes and writes it on the PVC. Players take turns.
3. Shuffle and stack **numeral cards** that have a given number of dots on one side and the corresponding numeral on the back. The FP picks a card; the SP picks a second card. The FP makes the corresponding numeral using rods, cubes, popsicle sticks, etc. The SP checks. The two players alternate making the numeral and writing it on the work sheet.
4. Continue these activities, but the numbers change to sets lesser than or equal to 20. Students may add more numbers as they begin to understand the concept.

Assessment

Do student assessment for this activity on an individual basis. The teacher need not give more than three examples of each of the two tasks below to check for mastery of the objective. Students who are unsuccessful in the assessment repeat the activities playing both with students who have completed the work in the activity and those who may need more work.

1. The teacher gives the student a number of objects lesser than or equal to 20. The student counts the cubes to 10 and says or writes the corresponding number of 10s and ones on a laminated place value chart.
2. The teacher gives the student a numeral lesser than or equal to 20. Then the student constructs a number with the corresponding number of 10s and ones using cubes, rods, etc.

ACTIVITY
Math Trees

Objective

The student constructs trees using given shapes. The student finds lines of symmetry, if shapes have them and finds parallel and intersecting lines.

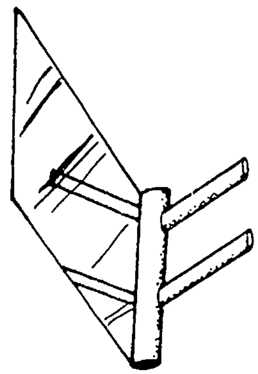
Materials

Different-size counting sticks, Cuisenaire rods and geometric shapes
Small mirror per student group

Procedures

Students work in pairs or small groups.

1. The students make tree shapes using different-size Cuisenaire rods, counting sticks and geometric shapes.
2. The students describe and discuss the shape of their trees to their partners. In counting branches, they skip-count by twos and fives.
3. One way students can observe the trees is by looking at the opposite edges of the rods. These edges are parallel to each other. When two or more lines drawn on a sheet of paper are always the same distance apart from each other, we say they are parallel. When lines touch or cross, we say they intersect.
4. Students find other edges on the rods that are parallel. Which ones intersect?
5. Students find lines of symmetry in the trees.
6. Using a small mirror to help them, the students make a mirror image of the trees they make.



7. The tree and the image together make a symmetric figure.
8. Does this figure have a second line of (approximate) symmetry?
9. Repeat the above activities, as appropriate, with flowers and leaves.

LESSON 4 Plants Reproduce

BIG IDEAS Plants reproduce through organs that we call "flowers", through organs that look like flowers or through making spores. One single plant can make many new plants and is said to "multiply" itself.

Advance Preparation

Place a carrot or potato in water, as shown in **Activity** — Plants Without Seeds, a week prior to the implementation of this lesson. Mold is also needed and can be grown in a few days on a piece of cheese, bread or some jelly placed in a plastic bag in a dark, warm place.

Whole Group Work

Materials

Flowering plant or picture of one; mold growing on cheese, bread or jelly; a potato with several eyes; ferns, or mosses; magnifying glasses; potatoes, others from **Activity** — Plants Without Seeds; three different simple flowers such as the lily, poppy or pansy, for each student pair

Word tags: reproduce; womb; multiply; flower; seed; organ; spore

Encountering the Idea

Begin discussion of the lesson by telling students that all living things die, but before plants die they make new plants that are copies of themselves. Ask students how animals are born. Some form in the mother's womb while other animals hatch from eggs. Ask students to express their ideas of how new plants begin. Show student a variety of seeds. Ask students where the seeds come from. Yes, the seeds come from flowers. What is their function? In the learning centers, we are going to discover why flowers and seeds are important. Are there other ways that plants reproduce, other than by producing seeds?

Before students go to the centers, show a piece of mold growing on bread, jelly or cheese. Tell students that this is a plant also. How can it grow without soil or light? If these plants don't have flowers, how can they reproduce. make new plants?

Show the potato growing in water only. How can this plant grow in water only? Where will it gets its food? Does the potato plant have flowers? How will new plants be produced?

Tell students that in the centers they will explore the different ways plants reproduce.

Exploring the Idea

At the **Science Center:**

1. The students observe the growth and reproduction processes and discuss them on a daily basis using the beans planted in **Activity** — Beans in a

Baggie, from **Lesson Three.** Students make drawings in their journals and label the parts of the plant as it emerges from the seed.They will see that the seed divides in half, roots appear, then the stem and leaves, as the beginning of a new plant.

2. Students work on the **Activity** — Plants Have Special Needs to see that, in general, plants need soil and light to grow and reproduce. As they work on **Activity** —Molds and Fungi, students discover that there are plants that reproduce by forming spores, which are not the same things as seeds. They will note these differences during the **Organizing the Idea** phase of the lesson.
3. The students complete Activity — Plants Without Seeds.
   At the **Mathematics Center,** the students complete **Activity** — Plants Multiply.

Getting the Idea

Referring to the flowering plant, point to the flower and tell students this plant needs flowers to make new plants, if you can see them on the plant; otherwise use a picture or diagram of a flower with seeds.

Referring to a fern, point to the spores that appear on the underside of the leaves, if you can see them on the plant; otherwise use a picture or diagram of a fern. Tell students that this plant **does not need** flowers to make new plants; instead it reproduces by creating spores.

Referring to a potato, point to the "eyes". Tell students that this plant **does not need** flowers or spores to make new plants; instead it reproduces by developing shoots or rhizomes. Point to them, if you can see them on the plant; otherwise use a picture or diagram.

The students discuss plant reproduction by examining the plants and pictures of the reproductive organs of plants, including seeds, spores and rhizomes, pointing to the different parts as they appear in the pictures.

What is the difference between a seed and a spore? (A seed contains a food supply for the embryo to live on until it can produce its own food. A spore is a small body that has a protective shell and that can begin to produce a new plant **only** if conditions are appropriate and the spore is on an appropriate host.)

Tell students that scientists have identified more than 350,000 kinds of plants. These plants fall into two basic categories — flowering and nonflowering plants. Those that produce flowers grow from seeds while nonflowering plants such as ferns, mosses, molds and mildew grow from spores.

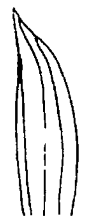
The students discuss the differences in methods of reproduction of these plants and that of the beans.

Organizing the Idea

Students make a chart of different plants and indicate method of reproduction, such as **Flower, No Flower** or **Spore.** They draw pictures on the chart of the plants and the reproductive organs or the spores.

Applying the Idea

1. Complete this drawing of a plant that reproduces by flowering.

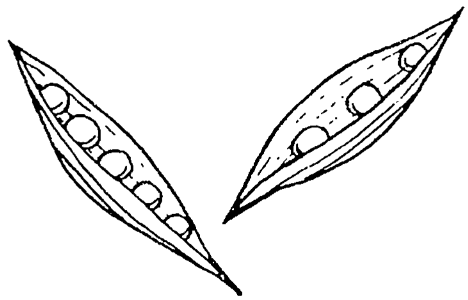


2. Each student brings to class two plants that the class has not studied yet. Each student group determines whether the plants are flowering plants or whether they reproduce through spores or rhizomes (shoots). The group reports on results to the class.

Closure and Assessment

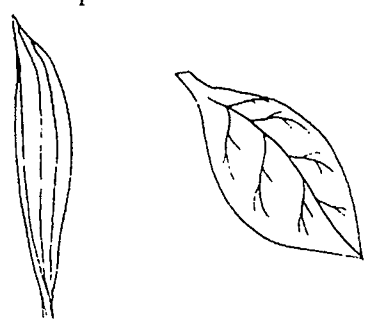
Given a fern, a potato and a lily (or any representative of the different types of plant reproductive mechanisms) ask student to use the plants to describe the different ways that plants reproduce.

Ask students to describe how a plant can "multiply" itself, producing many more individual plants from a single plant.



Which pod has more peas? Show me in two different ways how you can tell. (By one to one matching, and by saying that one pod has five peas and the other has only three; five is greater than three.)

Which of these leaves shows parallel veins and which one shows a network?



List of Activities for this Lesson

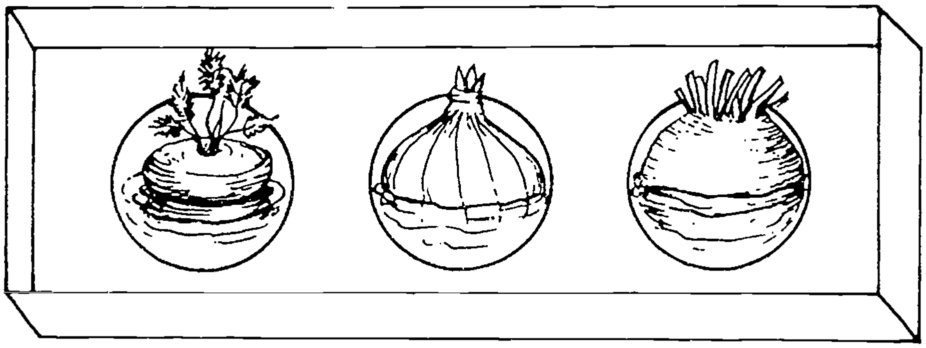
- ▲ Plants Without Seeds
- ▲ Plants Have Special Needs from Lesson 1
- ▲ Molds and Fungi
- ▲ Plants Multiply

ACTIVITY
Plants Without Seeds

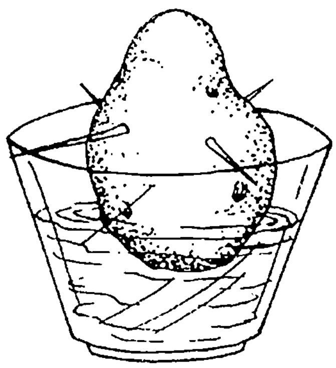
Objective
Students name three plants that grow without seeds.

Materials
Toothpicks; water; margarine containers or plastic tumblers; container lids; fresh carrot top (about 1/2-inch height), small potato, small sweet potato, onion cut in half and beet top (about 1/2-inch height)

Procedures
1. Place the carrot top, onion section and beet top in individual container lids. Be sure that the carrot top (the green part) is outside the water.



2. Insert three or four toothpicks evenly spaced into the potato, and do the same with the sweet potato. Place them into a plastic tumbler half-filled with water.



3. Add water to each plant at least daily for two weeks.
4. After the plants begin to sprout, the children discuss their observations. They can count and chart the growth of the sprouts. The students compare the rate of growth of the plants. Which grew the fastest? Slowest? Which has the most growth?
5. After two weeks, the students transplant some of the vegetables into a pot to keep in the classroom.
6. The students continue to observe the growth of each plant. The students discuss any differences between the plant's growth without soil and the growth after being potted.

ACTIVITY
Molds and Fungi

Objective

Students predict that molds and fungi grow on living things or things that once lived, but not on metal or rock.

Materials

Moist bread, jelly, cheese, avocado, orange, grapes, cake, cream or milk, other foods
Margarine container with lids (clean and thoroughly rinsed of soap)
Powerful magnifying glasses
Miscellaneous living (or once-living) and nonliving things, such as cut-up fruit, melons, potatoes, cheese, bread, wool, nails, magnets, rocks and wood
Containers of mold from previous activities
Student drawings
Books and pictures from the Media Center, public library, and home

Part I

Procedures

1. Place each food (it must be moist) in a separate container and cover with its lid.
2. Place each sealed container in a dark, warm place.
3. In about six days remove the lid of each container and observe the contents.
4. What has happened to the food?
5. The students select different food items from the table.
6. Put each item in a plastic container with the top sealed and predict on which food the strange plants will grow or not grow.
7. Place the containers in a warm, dark place.
8. After five or six days, open the containers and observe the results.
9. Were the predictions correct?

Part II

Procedures

1. Participate in a class discussion. Share and compare findings among students.
2. Students ask any questions they may have.
3. Students use pictures they have drawn and containers to design a display and bulletin board about molds and fungi.

Discussion

(Can be done during the **Getting the Idea** phase.)

1. Do these plants need light to grow? Soil? Why?
2. What is their shape? Draw it on your chart.
3. Where did they get their food (nutrients)?
4. What is the color of these plants? Do they have stems? Leaves?
5. Do these plants have an odor?
6. Where do these plants grow?
7. Do these plants have seeds? Flowers? Why? Why not?
8. How do they make new plants? (They make spores.)

Extension

This activity will introduce molds and fungi in a controlled environment. Most children have seen molds and fungi but only in the context of something that has "spoiled". Molds and fungi can be both harmful and helpful in our lives. The containers used in these activities should be clean and thoroughly rinsed. Soap residue may retard the growth of molds and fungi.

This activity is designed to help students see relationships, to reason and to hypothesize. The most obvious conclusion should be that molds and fungi grow on living (or once-living) things and not on nonliving things. Molds use the once-living materials for food. Given enough time and proper conditions, mold will cause wood to rot, but probably not within the time allowed for this activity.

Select one material such as bread and repeat the activity, changing one variable, for example, dry bread in a warm, dark place compared with moist bread for the same length of time in a warm, dark place. Will dry bread support the growth as well as moist bread? Repeat in a freezer.

Teacher Information

After the students have studied molds and fungi, the teachers can prepare an informational audio tape. The tape is optional but it may help answer questions or reinforce concepts identified during the discussion. Try to help children discover the answers through sharing among themselves and through reference sources. Avoid telling them more than is necessary. The following are concepts you may want to include on the audio tape or in your summary:

1. Most molds look slimy. Many are white or clear, but they may be a variety of colors.
2. Molds and fungi grow best in warm, damp, dark places. Mold is a problem in parts of the United States where the climate is humid and warm.
3. Mold often damages food, leather, clothing and paper. Some molds cause diseases in man, plants, food, crops and animals.
4. Many molds and fungi are helpful. They cause wood, leaves and other materials to rot, forming humus that makes the soil rich. Man uses fungi to make drugs, such as penicillin. Molds and fungi also produce carbon dioxide, which green plants use to make food. Some fungi grow on cheese and help ripen it.
5. Mold and fungi reproduce by releasing spores, which travel through the air or are carried by animals.

▲ ACTIVITY
Plants Multiply

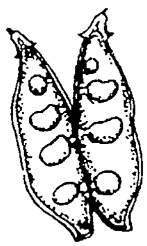
Objective
Students join equivalent groups of objects to find the sum as an introduction to the concept of multiplication as repeated addition.

Materials
One unshelled pea pod for each student.

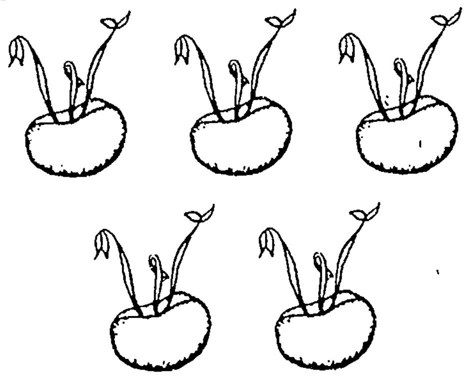
Procedures
1. Students open the pea pod and remove the individual peas. Do not use those peas that may be rotten or judged incapable of germinating. Students draw a picture of the pod in their journals.
2. Count the peas.

Discussion
1. Suppose each pea is planted and grows to an adult plant. How many plants do you now have?
2. Each new plant produces four pea pods. How many pea pods do you have?
3. Each of these new pods produces four peas.
4. Draw a picture of the pea pod you started with and count the plants, pods and peas of the new plants. Skip by twos, threes or fives to help count correctly.

Peas in the Pod



One Plant from Each Pea in the Pod



Peas in Each Pod in Each Plant

Five peas give us five plants. Each plant has four pods. 4 + 4 + 4 + 4 + 4 = 20. **4 groups of 5 is ______ pods.**

Each pod contains five peas. 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 = 50. Then, 10 more 5 — 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 = 50 , **or 20 groups of 5 is ______ peas.**

From one pea pod having five peas, we now have 100 peas. **Why do plants multiply?** (The numbers get large very fast.)

5. Draw other pea plants and the peas using different numbers. Work with your partner to count the plants, the pods and the peas.
6. What happens if you start with small numbers in each pod? With large numbers?
7. What would happen if you opened a pod that had only one pea? Draw it.
8. What would happen if you opened a pod and it did not have any peas in it? Draw what would happen.

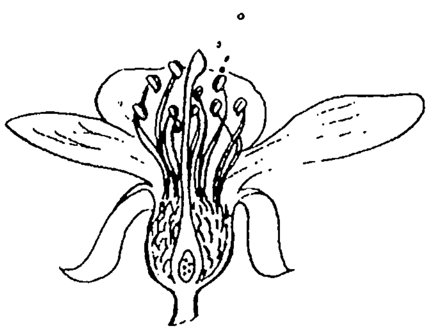
LESSON 5 *Pollination — from Flower to Fruit*

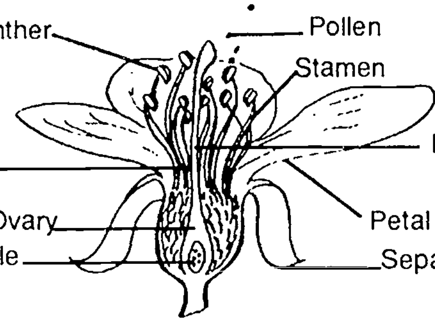
BIG IDEAS Pollination and fertilization are the first steps in the process of a new plant's development. We need large numbers to describe the many plants in nature.

Whole Group Work

Materials

Magnifying glasses
Three flowers for each student (three different simple flowers such as the lily or poppy)
Diagram of the parts of a flower (as shown below) — petals, stamens, anthers, stigma — for each student group
A rose that has a "rose hip" still attached
Reference books on flowering plants
Word tags: anther, stigma, pollen, ovule, carpels, fertilize, germinate, pollinate





Encountering the Idea

Each group of students gets a flower to look at while the teacher begins the lesson. Show students a flower such as a lily or another simple flowering plant. Tell the students that they will be studying the flowering plants. Why are the flowers important to this plant? Yes, the flower is the part that will produce new, individual plants. Ask students to point out and describe the various parts of the flower, if they can. Let them try to guess what the function of each part is. Tell them that at the learning centers they will learn what the parts of the flower do and why that function is important.

Ask the student to suggest questions that they might answer during the lesson such as:

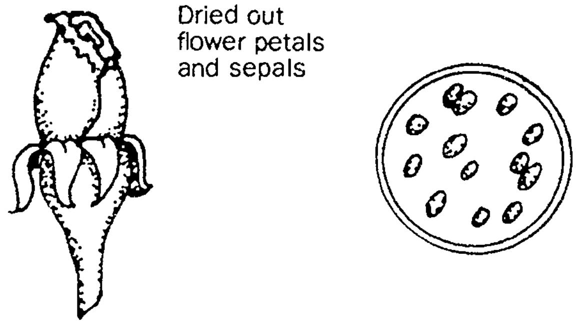
- Why do flowers usually have such beautiful and bright colors?
- Why do some flowers have such a beautiful scent?
- Why do some flowers have thorns?
- When does an adult plant begin to make a new plant?

Exploring the Idea

At the **Science Center**, students

1. complete **Activity** — The Parts of a Flower
2. complete **Activity** — Rose Hips as described below.

Take a rose plant that has a fertilized, well-developed red receptacle. Cut across the receptacle to show a cross section. This rose has been pollinated and fertilized by pollen to germinate into a new plant.



At the **Mathematics Center**, the students examine the pollen grains contained in a flower. Students estimate the number of pollen grains each might contain. They discuss how to write a large number that would tell how many grains each pollen container holds. Students take turns telling the class the largest number they know and how it is written. Is this number large enough to count all the pollen seeds in one flower? Students use a 100s, 10s and ones chart to show large numbers. They may add a column for the 1,000s if they need to.

Thousands* *Millares	***Hundreds* *Centenas***	***Tens* *Decenas***	***Ones* *Unidades***

Students can place pollen grains on a sheet of white paper to count them. They can group by 10s, then by 10 10s, 10 100s, if necessary, and so on to help them see how many grains it would take to group 100, 1000, and so on.

Students complete **Activity** — Nature's Pollinators.

Getting the Idea

After the students have had an opportunity to dissect and study the various parts of the flowers, they reconvene to discuss what they observed. Tell the students that each part of the flower is necessary to produce seeds that will become become new adult plants. A flower contains the seeds that grow into new plants. A flower changes into a fruit in order to produce more plants like itself.

Dissect a flower and point to each part. For the process of plant reproduction to begin, grains of **pollen** (male cells from the **anther**) are carried to the **stigma** (female part) from one plant to another. This process is called "pollination".

When the pollen lands on the stigma, it produces a tube that goes to the **ovule** and **fertilizes** it. This tube is so small that usually we can't see it even if we use a magnifying glass. After the seeds are fertilized, the **seed receptacle (or fruit)** begins to grow very large and the petals fall off. As the fruit grows, it usually becomes packed with nutrients, is sweet and may give off a scent to attract birds. The birds eat the fruit and the seeds, but the birds cannot digest the hard-coated seeds. Then the birds scatter the seeds in their droppings. What do you think will happen if one of those seeds lands in moist soil?

How does pollen get from the anther to the stigma? Nature has found many ways to fertilize plants. In **Activity** — Nature's Pollinators, what did you learn about how pollen travels from one place to another?

Pollen often causes allergies in people as the pollen is spread by the wind to many places. People breathe pollen in and can react to it by developing an allergy.

Organizing the Idea

The students write and draw observations in their journals. In their descriptions the students use numbers to state quantities and say if these are estimates or actual counts (e.g., number of petals in each flower, number of stigma, anthers, etc.). Descriptions should include color, shape and approximate size. The students in each group take turns editing their partner's work before students present it to the class.

Applying the Idea

Each student brings to class two flowers that the class has not studied yet. Each student group identifies as many parts of the flower as possible. The group reports on results to the class.

Closure and Assessment

Oral Interviews

1. Why are fruits sweet and full of nutrients? (To feed the plant embryos; to attract birds, bees and other insects in order to pollinate the plant.)
2. Why are some flowers colorful, and why do they have a sweet scent? (To attract birds, bees and other insects in order to pollinate the plant.)
3. What is pollen, and what does it do? (Pollen is composed of the tiny grains on anthers that fertilize the flower.)

Performance Assessment

Draw in a set of pictures the sequence for plant reproduction. (The flower is pollinated, a tube grows into the ovule and fertilizes it for the new plant to begin developing.) Students could also create a class mural.

List of Activities for this Lesson

▲ The Parts of a Flower

▲ Nature's Pollinators

ACTIVITY
The Parts of a Flower

Objective
The student can name and describe at least four parts of a flower.

Each student group dissects a lily and two other flowers. They put each dissected flower on a sheet of white paper to see the parts through the magnifying glasses. Using the labeled picture of a flower, they help each other find the stamens (male parts) and carpels (female parts). The students draw the flowers in their journals, coloring the parts as they see them. The students complete the following activity:

Materials
Three to five flowers; transparent tape; magnifying glasses; white paper; roll of plastic wrap

Procedures
The students study one flower at a time. The teacher says:

1. Put your flower on a sheet of white paper and examine it to find the flower parts that are the same as the ones in the pictures.
2. Use a magnifying glass and take apart the flower carefully.
3. First find the petals, then the sepals and then the pistil.
4. Find the stamens and the arther.
5. Preserve your flower for further study by taping the parts to your sheet of white paper. Label the parts before you forget what they are.
6. Cover your paper with plastic wrap and place it where it will not get damaged. Complete a chart, as below.
7. Ask your teacher to help you find out why each part of a flower is important.

Name of flower	***Petals***	***Leaves***	***Anther***	***Stigma***	***Seeds' shape***	***Pollen color***	***Perfume odor***
	Shape	Shape	Shape	Shape			
	Color						

ACTIVITY
Nature's Pollinators

Objective
Students list and describe at least three methods by which plants are pollinated and seeds scattered.

Materials
Reference and picture books about the pollination of flowers.

Procedures
Ask students:
1. If you wanted to get pollen from an anther to a stigma, how could it be done?
2. Allow students to suggest ways for example: carry it in a bucket; toss it; let the wind carry it; get someone to do it for you.
3. How does nature do it?
4. Students make a chart to show how nature pollinates its flowers.
5. Students discuss what they learned in the reference books about pollination.
6. How does nature pollinate flowers?
7. Make a wall chart as below.

Nature's Pollinators

Pollinators	***How***	***Type***
Insects		
Honey bee	Has a special basket on its legs to carry pollen to other plants	Cross-pollination
Bumblebee	Brushes pollen on its body and carries it to the stigma	Self-pollination
Butterfly Moth	Sucks nectar through a long tube, a proboscis	Cross-pollination
Fly	Pollen sticks to its body and it carries the pollen to another flower that smells rotten	Cross-pollination
Wind	Carries pollen to other plants	Cross-pollination
Water	Causes dry pods to explode seeds into air	Cross-pollination
Hummingbird	Hovers, inserts beak into flowers. Brushes pollen onto its head while the stigma receives pollen from another plant	Cross-pollination

LESSON 6 Seeds

BIG IDEAS Seeds are the fertilized ovules of a flower that grow to adult plants when planted. Fruits carry the plant's seeds and vary in size, shape and capacity. Subtraction helps us compare by finding differences among plants.

Whole Group Work

Materials for the Seeds Center

Book: **More Than Just a Vegetable Garden** by D. Kuhn or **The Carrot Seed** by R. Krous
Beans grown in the **Activity** — Beans in a Baggie
Seeds of the following plants: tomato, bell pepper, apple, banana, orange, lemon, peach, avocado, pea pod (in halves to count the seeds)
One or two fruits that can be studied each day to help students focus on task
Magnifying glasses
Fresh apple, orange, tomato, nuts, other fruits
Sheets of white paper

Procedures

In preparation for this lesson the students bring their seed collections and do the following:

1. Visit a vacant lot or field in late spring or early fall.
2. Try to find plants in the field that that have bloomed and are producing seeds or "turning to seed."
3. Try to find seeds from trees. (Nuts, other trees.) Try to include dandelions.
4. Collect as many different kinds of seeds as you can.
5. Put the seeds you have gathered on a clean white sheet of paper on your desk. Examine them with a magnifying glasses.
6. Begin discussion on and comparisons of the seeds during the **Getting the Idea** phase of the lesson.

Encountering the Idea

Read **More Than Just a Vegetable Garden** or **The Carrot Seed.** Show an apple, an orange, a tomato. What are these? Yes, they are fruits. Cut several in half to show the core containing the seeds, the fleshy part containing the food for the embryo and the protective skin. In preparation for this lesson you collected a number of seeds that we will not study. You will discover many new things about seeds. You might even learn that something is a seed that you had no idea is a seed!

Exploring the Idea

In the **Science Center,** the students

1. do **Activity** — Parts of a Seed
2. do **Activity** — Looking At Seeds.

In the **Mathematics Center**, the students

1. do **Activity** — Nutty Patterns
2. do **Activity** — Estimating, Counting and Sorting Seeds
3. do **Activity** — Seeds Travel.

In the **Drama Center**, the students read **Little Brother of the Wilderness: The Story of Johnny Appleseed** by M. LeSueur and write and enact a skit.

Getting the Idea

How is a fruit, like an apple, formed? What part of the tree is it? How was the tree fertilized? The plant ovule was fertilized and grew into a seed. The fruit contains the seed. If the seed is planted in the earth, it is now capable of becoming a new plant. We planted bean seeds that had been fertilized. When we put them in a plastic bag with water in it, they germinated and began to grow.

The following questions can serve to guide the discussion on how seeds scatter.

- How do you think these seeds got to the field where you picked them up?
- Find a white dandelion top. Examine one of the tiny white tufts. Find the seed. What does the seed have to help it travel? What makes it travel?
- Examine your pant legs and socks. Did you help a seed to travel?
- Make a list of ways that you discovered that help seeds travel.

Applying the Idea

Problem-Solving

1. Ask students: Can you think of a fruit that does not have seeds? Why do you think that all fruits have seeds? At the grocery store or supermarket look for seedless grapes. Buy a few or obtain a few from someone who grows grapes. Examine them closely. Do they have seeds? Report to the class.
2. Give a student an apple seed and ask the students to show the different parts — the coat, the spongy part containing the food for the embryo and the embryo. The students tell the class why they think that a plant as large as an apple tree can grow from this tiny seed.

Closure and Assessment

At the grocery store or supermarket, look at the vegetable and fruit section and list the names of the plants that you see labeled on the counters. Find at least three plants and describe them in as many ways as possible; be sure to notice each plant's method of reproducing.

List of Activities for this Lesson

- ▲ Parts of a Seed
- ▲ Looking At Seeds
- ▲ Nutty Patterns
- ▲ Estimating, Counting and Sorting Seeds
- ▲ Seeds Travel

ACTIVITY
Parts of a Seed

Objective

The student points to three parts of a seed (such as a bean or a nut) and tells the function of each part.

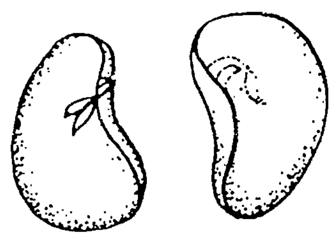
Materials

Different kinds of seeds (lima beans, pinto, butter); two beans per student
Magnifying glasses, at least one per two students

Procedures

Students soak beans (lima or pinto) overnight in water, then make observations of the major seed parts and compare a dry bean with the one soaked overnight. The students to try to find three parts to the seeds that have split into two parts overnight.

1. The students collect data on the dry bean as given in the chart below.
2. Students place beans (one per student) in a cup to soak overnight.
3. The students open the soaked bean and use a magnifying glass to look at the three major parts. (The outer coat or seed coat; the spongy part or stored food; and the embryo or beginning plant containing the root, stem and leaves.)



	Color	Texture	Mass	Length	Other
Dry Seed (before soaking)					
Soaked Seed					

Discussion

This can be a part of the **Getting the Idea** phase of the lesson.

1. Point to the coat, the stored food and the embryo of your seed.
2. What color is the coat? The food? The embryo?
3. How many pieces did the seed open into?
4. Did your germinated seed have a stem and a leaf? What about your partner's seed? Why did they look different?

ACTIVITY
Looking at Seeds

Objective
Students make observations of size, shape and color of various seeds and count the seeds in a piece of fruit.

Materials
Assorted pieces of fruit such as apples, oranges (in sections), avocado, peach, cherry, banana, tomato, grape
Record for each piece of fruit per student group

Procedures
1. Students make observations of each piece of fruit.
2. They draw the shape of the fruit on the sheet provided for the data.
3. Students count the seeds and draw and describe seed shapes.

Name of Fruit ______________________
(picture)
Shape and color of fruit ______________________
Shape and size of seeds ______________________
Color of seeds ______________________
Number of seeds ______________________

Discussion
After students complete their observations of the fruits they were given, they discuss the following ideas.
1. Which fruit has the most seeds? The least? How do you know? What is the difference between the two amounts?
2. Where are the seeds located in the fruit?
3. Are the seeds inside a container or loose inside the fruit? Are they attached? Why are they attached to the fruit?
4. Are all seeds the same size?
5. Which fruit shape is the most common? Seed shape? How do you know?
6. What is the difference in size between the largest seed and the smallest seed?

ACTIVITY
Nutty Patterns

Objective

Students name, count and sort assorted nuts and draw graphs to summarize information.

Materials

Various unshelled nuts (can be brought to class by students); nut shapes; nut shape pattern cards[1]; nutcracker

Procedures

1. Students have a bag of assorted nuts; the children sort the nuts and place them on a floor graph. The students discuss how the graph was made and what it shows.
2. The students change the real graph to a representational graph by drawing pictures of nuts corresponding to the number of nuts in each category. The representational graph is placed on the chalk board.
3. The students talk about the attributes of the nuts. Students also taste each type of nut. Students discuss their observations about the attributes and tastes of each nut.
4. Students use a nutcracker to crack the nuts. They discuss how the nuts look without the shells.
5. Show the students an example of a pattern card and tell them they will make their own patterns with the nut shapes at the **Plant Center.**

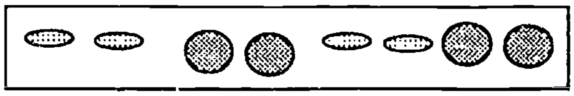
Discussion

1. What are nuts? (Seeds.) What did we find out about these nuts? How did we sort these nuts? How are these nuts the same and different? Where do nuts come from?
2. How many walnuts... peanuts... almonds... etc. do we have?
3. Which nut is there more of? Which nut is there less of?
4. How can we show how many nuts we have if we don't want to use the nuts?
5. What kind of patterns can you make using the shapes of nuts?
6. Which nut do you like best? Why?
7. Which is the class favorite? The least liked? Make a graph.

Walnuts
Almonds
Peanuts
Pecans

FLOOR GRAPH: Place nuts on the floor in their own category

[1] Pattern card: a laminated card with a pattern on it for students to duplicate or change



ACTIVITY

Estimating, Counting and Sorting Seeds

Objective

Students count seeds by grouping by 10s and ones and saying the number; students find differences between estimates of the numbers and actual counts.

Materials

Various amounts of dry pinto beans, lima beans, lentils, corn, sunflowers and any other seeds available at the supermarket; cups; paper to draw chart and record data

Procedures

1. Each student receives an assortment of seeds in a cup.
2. The student sorts the various seeds into separate labeled containers.
3. The students estimate how many seeds are in each cup.
4. The students find the number of seeds in each cup and compare with their estimates.

Seeds

	Pinto	*Lima*	*Lentil*	*Corn*	*Sunflower*	*Other*
Estimate						
Counted						
Difference between the two						

Order the labeled cups having the least to the most seeds.

____

____

____

____

____

How many seeds in all? ____________________

To find the number of seeds in all, group the seeds into groups of 10. Put down how many 10s you have and how many ones you have left over. Now, read the number. Ask your friend or your teacher to help you if you are not sure.

____________________ 10s ____________________ ones

____________________ (number or numeral)

ACTIVITY
Seeds Travel

Objective
Students name at least three ways in which seeds scatter.

Materials
Paper or plastic bags; magnifying glasses; scissors or knives; white paper

Procedures
1. Direct students to visit a vacant lot or field in late spring or early fall. Be sure you wear long pants and stockings.
2. Explore the field. Try to find plants that have bloomed and are producing seeds or "turning to seed."
3. Look at trees in your neighborhood (especially in the fall). See if you can find seeds or nuts on or around these trees. Be sure to include dandelions.
4. Collect as many different kinds of seeds as you can. How many different kinds of seeds did you collect?
5. Put the seeds you have gathered on a clean white sheet of paper on your desk. Examine them with a magnifying glass. How many seeds of each kind did you find?
6. How do you think seeds travel?
7. Find a white dandelion top. Examine one of the tiny white tufts. Find the seed. What does the seed have to help it travel? What allows it to travel?
8. Estimate and then count how many seeds are on one dandelion top.
9. Examine your pant legs and socks. Did you help a seed to travel?
10. Make a list of ways that you discovered that help seeds travel.

Organizing the Idea

Students complete a chart, similar to the one below, naming the scattering agent, the method by which the seed scatters and the plants whose seeds scatter in that way.

Scatter Seeds

What	*How*	*Which Plants*
Wind	seeds explode, some seeds have parachutes	balsam flower, thistles, poppy
Water currents	float	lotus
Birds	scatter undigested seeds in droppings	many kinds
Cattle, etc.	seeds stick to hair with hooks	burrs

LESSON 7 Plants Provide Many Human Needs

BIG IDEAS Without plants people could not live on earth; plants give us oxygen, food, shelter, clothing, beauty and many other things. We can summarize data about plants in different kinds of graphs.

Whole Group Work

Materials

Book: **The Giving Tree** by S. Silverstein, **The Lorax** by Dr. Seuss and Aesop's fable "The Fox and the Grapes"
Magazines
Reference books on medicinal herbs
Chart
Word tags: oxygen, shelter, clothing, beauty, cotton, milk, rice krispies, oatmeal, bread, bacon, eggs, environment, conservation

Encountering the Idea

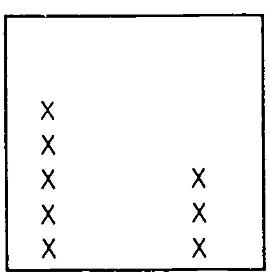
Read **The Giving Tree.** What did the tree provide?

In a brainstorming session, list things plants provide. Put them into categories such as food (candy), shelter, clothing, beauty, things we use (pencils, furniture, wood carvings, medicine) and beauty (flowers, perfume, cosmetics). Students may look in magazines to help them suggest things to put on the list.

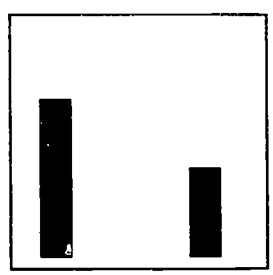
Before going to the learning centers, the class participates in a collection of data on the number of students wearing cotton clothing or not wearing cotton, and complete a graph on a chart summarizing the information. Some clothes are blends of cotton and rayon, etc. Where would students place these? The graph shows two categories — Cotton and No Cotton. Each student who is wearing a piece of clothing made of cotton puts an X on "Cotton", and each student not wearing cotton puts an X on "No cotton."

Exploring the Idea

In the **Mathematics Center,** students count the Xs and summarize the information. In addition to the graph showing the Xs, draw a bar graph to represent the same information. Students discuss in their groups which graph they like better and why. Do both graphs give the same information?



Cotton No Cotton



Cotton No Cotton

Students list the foods they had for breakfast or lunch and underline or highlight those foods they ate that came directly from plants.

Students begin work on **Activity** — Grapes to Raisins.

Getting the Idea

Plants are the key to life on earth. They provide food for themselves, for animals and for human beings. What other things have we found that plants provide?

Tell students that in ancient times plants were the main source of medicines and are still a very significant source of medicines today. Plants were often grown in special gardens and studied for their ability to cure illness. **Aloe vera** and **jojoba** are very popular in making cosmetics. **Ginseng** is a root used in China to aid the recovery from illness. **Peppermint** is used for stomach ailments. **Foxglove** contains a medicine to treat heart disease, and the **cinchona tree** produces quinine that is used to treat malaria. There are some plants that produce products that can cure illness **or** promote death. **Cocaine** can be a powerful anesthetic, but it can also be deadly. The **opium poppy** produces morphine, codeine and heroin — which if used appropriately can help people relieve pain, but these substances can also be deadly if misused.

After reviewing the lesson on **photosynthesis**, students discuss how in the process of photosynthesis, plants use carbon dioxide but release oxygen, as they make sugar and other carbohydrates. Without plants, the oxygen that humans require could not be replenished, and we would die.

Organizing the Idea

In the **Science Center**, students work on **Activity** — Fruit and Vegetable Nutrition.

At the **Writing Center**, the students count the Xs in each category in the Cotton/No Cotton Graph and summarize the information by completing the following sentences:

____________ students wore ________ clothing today.

____________ students did not wear ________ clothing today.

Students write in their journals about medicinal herbs and the illnesses they treat. Students list the parts of their school and/or house that are made of wood.

After reading in reference books, the students make a list of medicinal herbs and the illnesses they treat.

Read Aesop's fable "The Fox and the Grapes."

Applying the Idea

Save Our Planet

Read aloud Dr. Seuss' book, **The Lorax**. What did the trees have to say about the environment and conservation of plants?

The Story of Paper

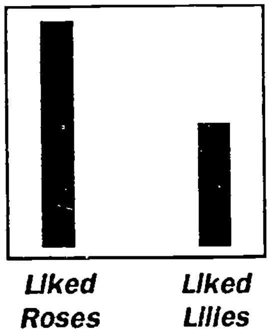
Use pictorial library books or the encyclopedia to help explain how paper is made. Involve the class in a newspaper recycling drive by having them bring in old newspapers from home.

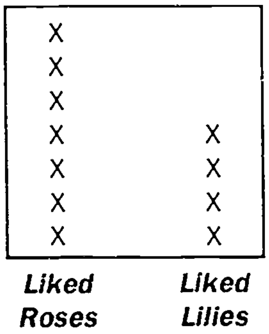
Closure and Assessment

Oral Interview

In a first grade class in your school, the children collected information about flower preferences. They summarized this information on a graph.

- What can you tell from the first graph? From the second graph?
- Do you know how many children liked roses? How many liked lilies?
- Can you tell which flower was preferred? Roses or lilies? Why?
- What information do you need to tell you how many children liked roses? Which graph gives you this information?
- Lead students to construct their own questions such as: How are the graphs the same? How are they different? Which one do you prefer to use to get the most information? Why?





Performance

Design and illustrate or construct a plant of your own. Decide: its method of reproduction; its habitat (where it lives: desert, wet climate) size, color, leaf structure, etc. Show the plantto your teacher and to your parents.

Explain your choices when you show your plant.

Writing

Name at least three ways plants are important to humans. List the most important one first and tell why.

Why are plants and trees important to our health?

Why do plants need us?

List of Activities for this Lesson

▲ Grapes to Raisins

▲ Fruit and Vegetable Nutrition

ACTIVITY
Grapes to Raisins

Objective
The students say that raisins come from grapes.

Materials
A pound of grapes; two boxes; chart for recording observations; pieces of fine gauze

Date	Box 1 Observations	Box 2
1	Look, taste, smell	

Procedures
1. Show grapes to class and ask them if they know how they grow. Students describe the grapes: look, feel, number, color, taste and smell.
2. Students speculate what will happen to grapes if they are left out in the sun.
3. Put the grapes in two boxes, cover the grapes with a fine gauze. Put one box outside in direct sunlight or in a sunny spot by a window. Leave the second box inside the classroom, away from the sun.
4. Record daily student observations. List "no change" if none is observed.
5. After some of the grapes have changed color, the children count and sort the grapes by color. Record the results.
6. When all the grapes have turned into raisins, the students discuss what they found out about grapes and raisins.
7. Was there a difference in the results in the two boxes?
8. Did all the grapes turn into raisins? Did any of them rot?
9. Repeat this with banana slices, apple slices, green chile peppers.

Discussion
1. What effect did the sun have on the grapes? Why?
2. How long did it take for all of the grapes to turn into raisins?
3. Did all of the grapes change at the same time? Why do you think that happened?
4. How is a raisin like a grape? How is it different?

Teacher Information
Grapes dry fastest in hot, dry weather, so the best time to do this investigation is in September or in early October. It may take up to three weeks or more for all the grapes to turn into raisins.

ACTIVITY
Fruit and Vegetable Nutrition

Objective
The student names at least three fruits and three vegetables and lists three human nutrition resources they provide.

Materials
References in which students can find out if rice is a grain like wheat, etc.

Corn, fresh or canned, or corn meal; carrot; cabbage; tomato; peanuts or pecans; apple; orange; banana; pear; bread; grains of rice or rice meal; pinto beans; other fruits, vegetables, roots or grains that serve as food

Procedures
1. Students apply the iodine test to each of the foods brought to class.
2. Sort the foods into those that 1) have starch, 2) do not have starch, 3) have sugar, 4) do not have sugar.
3. Sort the foods as to 1) vegetables, 2) fruits, 3) grains, 4) roots, 5) nuts, and so on.
4. The students make a list of the foods they have examined and include whether the plant provides sugar, starch or both.
5. Students make a list of some of the most important foods in a given country, such as
   - China: rice
   - Mexico: beans and corn
   - Russia:
   - Other:

Getting the Idea

Fruits, vegetables and grains provide other forms of nutrition besides energy nutrition such as starch and sugar. They may provide important building materials called **proteins,** as beans do, and also they provide substances called **vitamins** that help a person to use the food for energy and to build new body cells and tissue. Fruits and vegetables provide us with many nutritional substances that are not only healthy but delicious to eat.

UNIT ASSESSMENT

Give a student a peanut. Ask her/him to open it and describe the peanut, pointing out three major parts and to complete the sentences.

A  is a ___(seed)___. It has ___(3)___ parts which

are the  ___(coat)___ that protects the growing ___(plant)___,

the spongy part that is stored ___(food)___, and the ___(embryo)___ that is

the new  ___(plant)___.

Individual Interviews

Oral

Give a student a cactus, a succulent or some other plant and have him/her describe it.

- Does it have leaves? Stem? Root? Flower? Seeds?
- What is its shape? Where does it live? What can you predict about this plant? How would you guess it reproduces? Flower/seeds? Spores? Using a piece of itself? Why? (The exact answer is not as important as the student being able to hypothesize and give reasons.)

Written

1. Students recall the steps for changing grapes to raisins by rewriting their observations into a written report. The students take the report home for parents to read.
2. Make two charts; one in the shape of a grape, and the other in the shape of a raisin. The students write words that describe grapes and raisins on the appropriate chart.

References

Annotated Children's Books

Carle, E. (1987). *The tiny seed.* Saxonville, MA: Picture Book Studio.

Beautifully illustrated, this book gives a simple description of a flowering plant's life cycle through the seasons.

Cobb, V. (1989). *This place is wet.* New York: Walker and Company.

Focuses on the land, ecology, people, and animals of the Amazon rain forest in Brazil, presenting it as an example of a place where there is so much water that some houses need to be built on stilts.

Cole, J. (1973). *Plants in winter.* New York: Thomas Y. Crowell.

This book describes how various plants survive during the winter. Leafy and evergreen trees and plants with underground stems, bulbs, shoots and seeds are differentiated.

Cross, D. H. (1983). *Some plants have funny names.* New York: Crown Publishers.

This book "covers some unusually named plants that grow in North America. The information is brief, a few pages on each, perhaps just enough to encourage observation. There are facts on what the plant looks like, its uses, where it can be found. Included are jack-in-the-pulpit, lady's slippers, Indian pipe and marshmallow. The drawings with just a touch of color are appealing and the style of writing is clear and simple."

Demarest, C. L. (1991). *No peas for Nellie.* New York: Macmillan Publishing Company.

Nellie tells her parents all the unusual things she would rather eat then her peas, and while doing so she finished eating them all.

Ehlert, L. (1987). *Growing vegetable soup.* San Diego: Harcourt Brace Jovanovich.

Beautifully illustrated, this book tells how a father and child grow vegetables and then make them into a soup. It has a soup recipe.

Ellentuck, S. (1968). *A sunflower as big as the sun.* Garden City, NY: Doubleday.

Everytime Uncle Vanya brags about his sunflower, the sunflower grows. The villagers become concerned when the sunflower prevents them from getting sunlight.

Florian, D. (1991). *Vegetable garden.* San Diego: Harcourt Brace Jovanovich.

Beautifully illustrated with little text, this volume tells how a family plants a vegetable garden and helps it grow until harvested.

Jaspersohn, W. (1989). *How the forest grew.* New York: Greenwillow Books.

This book traces the growth of a Massachusetts hardwood forest. The book recounts each stage of the forest's growth and explains the reasons for the succession of different types of plants and animal life.

Jordan, H. J. (1960). *How a seed grows.* New York: Thomas Y. Crowell.

Begins by explaining that the seeds of different plants are different and grow differently. Then suggests that the student plant and care for some bean seeds in order to observe how they develop; thus, it effectively teaches the beginner how a seed grows into a plant.

King, E. (1990). *The pumpkin patch.* New York: Dutton Children's Books.

Text and photographs describe the activity in a pumpkin patch — from planting to harvesting.

Krauss, R. (1945). *The carrot seed.* New York: Harper and Row.

Easy to read with good illustrations. This is a simple story of how everyone kept telling a boy that the carrot seed would not grow.

Kuhn, D. (1990). *More than just a vegetable garden.* New York: Silver Press.

Discusses how seed plants are alike and different, the purpose of a flower on a plant, and helpful/harmful garden insects.

LeSueur, M. (1947). *Little brother of the wilderness: The story of Johnny Appleseed.* New York: Alfred A. Knopf.

Patent, D. H. (1990). *An apple a day: From orchard to you.* New York: Cobblehill Books/Dutton.

This may have to be read by the teacher. It shows an overview of how apples are planted and harvested.

Raffi. (1989). *Everything grows.* New York: Crown Publishers.

This volume contains photographic illustrations to an original song depicting many different living things and their growth.

Schenk de Regniers, B. (1985). *Jack and the beanstalk.* New York: Atheneum.

In verse form and good illustrations, this is the classic tale about the magic beans.

Selsam, M. E., & Hunt, J. J.(1976). *A first look at flowers.* New York: Walker Publishing Company.

This introduction to plant study includes illustrated pages on bacteria, algae, bryophytes, fungi, ferns, gymnosperms, and angiosperms. The author shows how each class differs from the others, and provides games where the reader is invited to match names and pictures.

Selsam, M. E., & Hunt, J. (1978). *A first look at the world of plants.* New York: Walker and Company.

Text and corresponding back-and-white illustrations direct children's attention to flower shapes, arrangement on the stalk, petal formation, location and number of stamens and pistils, etc. Nine flowers pictured in the text appear again on the last pages for a recognition test.

Silverstein, S. (1964). *The giving tree.* New York: Harper and Row.

As a young boy grows up, the tree gives her leaves, her apples, her branches, her trunk, and finally a stump.

Wexler, J. (1987). *Flowers, fruits, seeds.* New York: Prentice-Hall Books for Young Readers.

Photographs of plants and trees present an array of flowers, fruits and finally seeds; the text make the point that the function of flowers is to produce fruit and that of fruit, to protect seeds, from which plants grow.

Teacher References

Simon, S. (1970). *Science in a vacant lot.* New York: Viking Press.

A book of projects involving nature study in a typical empty city lot.

Webster, V. R.(1982). *Plant experiments.* Chicago: Children's Press.

A manual of simple experiments with plants.

unit

1 The Human Body

Prior Knowledge

The student has

1. constructed sets of objects lesser than or equal to 100
2. added and subtracted with single-digit addends
3. found linear measurements in inches and centimeters
4. estimated linear measurements
5. drawn circles, squares, ellipses and rectangles

Mathematics, Science and Language Objectives

Mathematics

The student will

1. count tallys and convert to numbers
2. collect data by counting, adding and subtracting
3. make appropriate number comparisons
4. measure height in inches and centimeters to nearest 1/2 unit
5. write and solve original addition and subtraction problems that appropriately describe and compare lengths and volume
6. estimate linear measurements
7. make and read a graph summarizing collected data
8. identify and draw geometric shapes.

Science

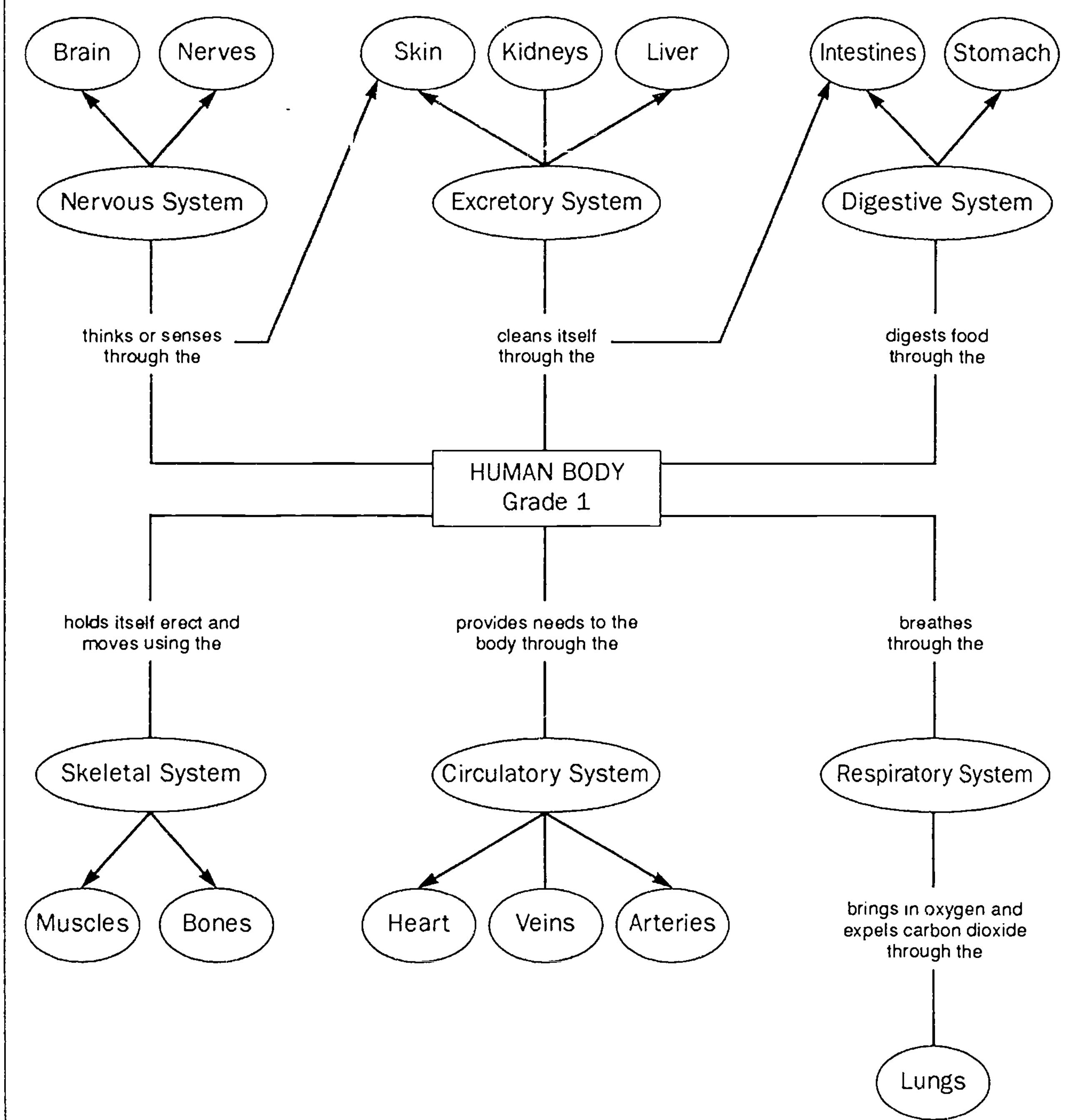
The student will

1. describe several ways people change as they grow
2. identify and describe characteristics of the human body
3. using a body diagram:
   a. explain how the heart pumps blood throughout the body
   b. describe the functions of the liver, kidneys and skin
   c. locate and give function of muscles and bones
   d. describe the body parts that help digestion
   e. discuss the function of the brain
   f. describe the reproductive function of the body.

Language

The student will

1. read or refer to a favorite story or book on the human body
2. ask related questions on the human body
3. report verbally on a function of any of the human body parts
4. sequence the events of a body function
5. work with a peer to write an illustrated story about a body function.


Brain
Nerves
Skin
Kidneys
Liver
Intestines
Stomach
Nervous System
Excretory System
Digestive System
thinks or senses through the
cleans itself through the
digests food through the
HUMAN BODY Grade 1
holds itself erect and moves using the
provides needs to the body through the
breathes through the
Skeletal System
Circulatory System
Respiratory System
Muscles
Bones
Heart
Veins
Arteries
brings in oxygen and expels carbon dioxide through the
Lungs

CONCEPT WEB

VOCABULARY

graph gráfica	growth desarrollo	head cabeza	neck cuello	hands manos
legs piernas	feet pies	physical físico	arms brazos	knees rodillas
windmill molino	breathing rate índice de respiración	heartbeat latido cardiaco	bones huesos	muscles músculos
lungs pulmones	capacity capacidad	volume volumen	skull cráneo	brain cerebro
liver hígado	kidneys riñón	intestines intestinos	stomach estómago	nerves nervios
cells célula	gall bladder vesícula biliar	waste excremento	bladder vejiga	spleen bazo
pancreas páncreas	spinal cord médula espinal	reproductive organs órganos reproductivos		

Teacher Background Information

The study of the human body can be a very enlightening and, thereby, a very rewarding experience for a young child. Although all of us believe we are familiar with our individual bodies, we may also feel that they are mysterious. As we look at ourselves in the mirror we see some of our body parts, but we know that there are other parts or organs that we cannot see, even as they function. We learn to manage many of the body's functions at a conscious level — such as through movement and thought. However, there are other functions that our bodies perform unconsciously. These unconscious actions such as the beating of our hearts, respiration and digestion are generally not observable. Young children have a natural curiosity about their bodies. This curiosity can motivate them to learn about the human body.

Students will find it interesting to measure body temperature with a thermometer, especially if they develop some notion for the basis of its use. The basic principle in its operation is that matter usually expands as it absorbs heat. Thermometers contain a substance that readily expands when heated. Mercury, in its liquid state, and alcohol are substances that expand as they absorb heat. Since mercury is more expensive than alcohol most inexpensive thermometers contain colored alcohol to give the temperature reading.

A thermometer scale for the ambient temperature is marked in units called degrees (°), shown in multiples of 10. The reference points of a thermometer are usually the freezing and boiling points of water. To measure body temperature, however, oral thermometers show scales between 92° and 105° F. Each unit on the scale is divided into five subunits. An observant student may ask about the differences in these two types of thermometers.

An oral thermometer has been calibrated so that each large mark shows one degree and each small mark measures 2/10 of a degree. When reading the thermometer, the students learn to rotate it in their fingers until they can see the level of the colored liquid against the scale. They will need to practice this for a while until they can do it consistently.

It is the purpose of this unit to give basic information about the biological systems with which the body performs its amazing functions. As children learn how muscles and bones help them move, how teeth and tongue help them digest their food or how the blood helps keep the body warm and protected from invading harmful organisms, they develop an appreciation of the body and of the scientific methods needed to learn about the body's seen as well as unseen but necessary activities.

LESSON FOCUS

LESSON 1 — ***Humans Grow and Change***

BIG IDEAS Humans grow and change. Difference in measurement shows growth.

LESSON 2 — ***Our Cells — Tiny Units of Growth and Change***

BIG IDEAS Every part of the human body consists of many tiny living things called "cells". Cells are the building blocks of the body; the body makes over a billion new cells every minute.

LESSON 3 — ***The Body — A Complex Form***

BIG IDEAS Bodies have parts that help us move, think and feel. Measurements help us describe our bodies.

LESSON 4 — ***The Heart — The Nonstop Pump***

BIG IDEAS The heart pumps blood to all parts of the body. We describe the heart's rate in beats per minute.

LESSON 5 — ***The Lungs — A Gas Swap Meet***

BIG IDEAS The lungs take in air and take the oxygen out of the air to send it through the blood to all parts of the body. The lungs have capacity (volume) that we can measure.

LESSON 6 — ***The Muscles and Bones — A Magnificent Machine***

BIG IDEAS Muscles and bones work together to help the body move; bones also protect important body organs. Over 200 bones are in the human body.

LESSON 7 — ***The Stomach and Intestines — The Food Processors***

BIG IDEAS The stomach, intestines, teeth and saliva prepare the food we eat so the body can use it for energy.

LESSON 8 — ***Liver, Kidneys, Skin — The Great Eliminators***

BIG IDEAS Because the body is a living organism, it produces waste that it must eliminate as it uses up energy.

LESSON 9 — ***The Brain — The Master Computer***

BIG IDEAS The brain is like a computer that controls all the body functions; the nerves are the electrical system that helps it work.

LESSON 10 — ***Reproduction — A New Human Begins***

BIG IDEAS Humans reproduce when an egg cell from the mother and a sperm cell from the father unite. The united cells begin to separate many times to form a new human being.

OBJECTIVE GRID

Lessons	1	2	3	4	5	6	7	8	9	10
Mathematics Objectives										
1. count tallies and convert to numbers			•							
2. collect data by counting, adding and subtracting	•			•	•	•		•		
3. make appropriate number comparisons	•			•	•		•	•	•	
4. measure height in inches and centimeters to nearest 1/2 unit			•		•					
5. write and solve original addition and subtraction problems that appropriately describe and compare lengths and volume	•		•	•	•					
6. estimate linear measurements	•		•	•	•	•				
7. make and read a graph summarizing collected data	•		•	•		•				
8. identify and draw geometric shapes.										
Science Objectives										
1. describe several ways people change as they grow	•									
2. identify and describe characteristics of the human body	•	•	•	•	•	•	•	•	•	•
3. using a body diagram:										
a. explain how the heart pumps blood throughout the body				•						
b. describe the functions of the liver, kidneys and skin								•		
c. locate and give function of muscles and bones						•				
d. describe the body parts that help digestion							•			
e. discuss the function of the brain									•	
f. describe the reproductive function of the body.										•
Language Objectives										
1. read or refer to a favorite story or book on the human body	•	•		•	•	•	•	•		

Lessons	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
2. ask related questions on the human body						•	•			
3. report verbally on a function of any of the human body parts			•		•	•	•			
4. sequence the events of a body function			•		•	•	•			
5. work with a peer to write an illustrated story about a body function.										

LESSON 1 Humans Grow and Change

BIG IDEAS Humans grow and change. Difference in measurement shows growth.

Whole Group Work

Materials

Book: **Love You Forever** by R. Munsch, later added to the **Library Center**
Collection of teacher's and students' baby pictures
Name tags for student names
Graph paper or chart to make a graph
Sentence strips
Reference books on the human body
Word tags: change, growth, height, weight, organism

Encountering the Idea

Showing the book cover and telling children who the author is, ask children to predict what the story **Love You Forever** is about. Read the book aloud. At the conclusion of the story discuss human growth and change. What changed and what stayed the same in the story? Focus on:

- height
- voice (sound, talking)
- movement
- growth is slow, and we cannot see it on a daily basis; we can measure the growth of hair and nails

During the discussion, write students' observations on a chart tablet or on sentence strips for use later at the **Writing Center.**

Exploring the Idea

In order to see human change and growth, students compare current and baby pictures to note the differences. Display current pictures of the teacher and the students on a bulletin board. Students bring baby pictures, labeled on the back, and place them on the board. The students match current pictures with the baby pictures. Teacher helps students make correct identification. After matching the pictures, the students discuss: Who has changed the most, the least?

At the **Science Center, the students find their heights.** On butcher paper fastened to a wall or door frame and marked in nonstandard units labeled with letters, each student marks his/her height. Transfer the information to a graph indicating heights by using letters instead of names. For example, if three students measure to the letter C, enter three tally marks on the graph at the place labeled C. The students convert the tally marks to numbers.

At the **Mathematics Center,** the students

1. utilize the completed graph begun in the **Science Center** to solve problems and to illustrate their own problems on story boards. Students take turns giving the answers.
   Student A is ____ m (or inches, feet).
   Student B is ____ m.
   The tallest student is ______.
   The shortest student is ______.
   How much taller is student A than student B?
   Which letter has the most tally marks? The least? In the middle (between the most and the least)?
2. complete **Activity** — Differences Show Growth
3. complete **Activity** — Mathematics of the Body.

Getting the Idea

Tell the student that as human organisms, humans grow and change. Change is sometimes very slow and we can't see it, but we can use mathematics to record it. Humans grow in many different ways. Our bodies become bigger, and we also learn many new things. We learn not to cry if we don't get our way and not to get angry when we have to do something we don't like. We learn to get along with our friends and share what we have. All of this requires change.

1. Ask the students to focus on their current and baby pictures and to describe the ways in which they have changed.
2. What mathematics operation do we use to find a difference? What differences did we find? Yes, in height, in weight. What other things? Have you learned to talk, to walk, to run? What other things have changed?
3. At every opportunity, the teacher uses the new terms "change" and "growth" to help the students use them appropriately during the remainder of the unit.

Organizing the Idea

1. At the **Writing Center,** students write about how they have changed and grown by describing their pictures and by focusing on the concepts developed in the introduction to the activity above.
2. Students write a poem:
   I was then .....
   I am now .....
3. The student describes and/or draws ways in which he/she has changed the most. The student discusses this with a partner, and the partners take turns editing each other's work. The teacher asks students to summarize the stages of a person's life and writes the responses on a large chart for use by students. The stages are: infant/baby, child, adolescent/teenager, adult, senior citizen.

Applying the Idea

1. What experiment that we started in this lesson shows that humans grow?
2. Are human beings different? Are they alike? Name some ways we can show that people are different.

Closure and Assessment

1. Students draw in their journals pictures of a person from birth to old age in sequence.
2. Students talk about human change: How do we know we are changing? What happens if we stop changing?
3. Students summarize stages of a person's life (infant, child, adolescent, adult, senior citizen).

List of Activities for this Lesson

- ▲ Mathematics of the Body: Part 1
- ▲ Differences Show Growth
- ▲ Using Tenths

ACTIVITY

Mathematics of the Body: Part 1

Objective

Students use addition and/or subtraction appropriately to answer questions about information obtained in class.

Materials

8½ x 11 pieces of laminated construction paper
Erasable marker
Cuisenaire rods or other models that demonstrate place value

Procedure

Students use erasable markers to write on individual story boards made of 8½ x 11 pieces of laminated construction paper. Students write and solve addition and subtraction problems, using classmates' data on height and weight.

The following are sample problems only. Use actual student names and data. Ask:

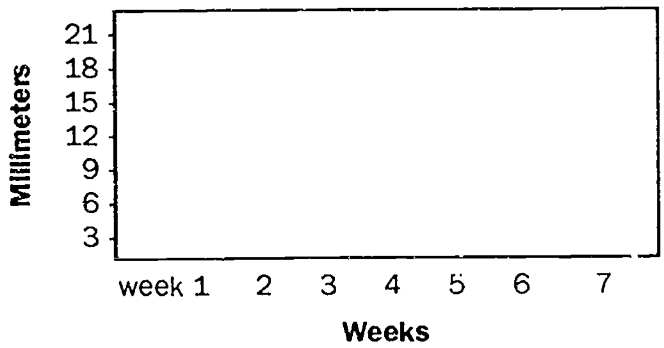
1. Julia is 39 inches tall. Thomas is 34 inches tall. How many inches taller is Julia than Thomas? Draw a picture of Julia and Thomas that shows the difference. Julia (or other student) shows three 10s and nine ones with the manipulatives. Thomas (or other student) shows three 10s and four ones. They decide that by comparing or subtracting, Julia is five inches taller.
2. Yvette is 31 inches tall. Mario is 29 inches tall and Juan is 35 inches tall. If Mario, Juan and Yvette put their outlines head to toe, how long will their three outlines be? Use the manipulatives to help you add. Draw a picture to show the outlines.
3. Of Julia, Thomas and Mario, who is the tallest? Who is the shortest? Who is in the middle? Use the manipulatives to show the students in order by height. Draw a picture that shows how to find the answer.
4. Jenny was 45 inches tall in May. In September, she was 48 inches tall. How much did she grow? How can you see change? What is the difference in the two heights? Use your counters.
5. Martha is 40 inches tall. Jerry is 40 inches tall. What number tells the difference in their heights? Use your counters and show a picture.

ACTIVITY
Differences Show Growth

Objective
The student says that one way to notice that the human body grows and changes is to measure the growth of fingernails and toenails.

Materials
Colored nail polish; ruler marked in millimeters; chart paper

Procedures
1. Each student puts a spot of nail polish next to the cuticle of one fingernail and one toenail.
2. Every week (on the same weekday) check the spot of polish and measure its distance from the cuticle. Record the measurement. Continue to measure the spot until it grows out and has to be cut off when clipping the nail.
3. If the spot of polish begins to wear out, put on some more, exactly on top of the first spot.



4. Record the data for a fingernail and a toenail on the same chart in two different colors.
5. When both nails grow out, use the chart to answer the following questions:
   - What is the weekly growth of the fingernail and of the toenail?
   - Did one nail grow faster than the other? If so, how much faster?
   - Can you tell this by looking at the chart only?

This activity begins during the first lesson and continues for the duration of the unit, and longer as appropriate.

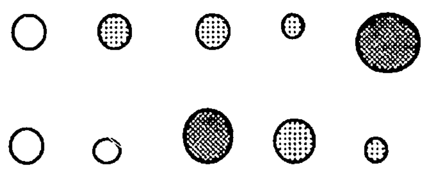
ACTIVITY
Using Tenths

Note: In order to give the students sufficient time to develop the notion of fractions, the class may take several days to complete this activity.

Objective
The student constructs a set (or an area) illustrating a given fraction in tenths, and writes a corresponding fraction for a given part of a line unit.

Materials
Each pair of students has:
   10 objects that are different in color and size (see family picture, below) or actual picture cutouts of a family with 10 members
Paper plate for each student
Pennies and dimes for each student group

Problem
Today we are going to meet a new family — it is the Tenths family. Let me show you what the Tenths family looks like. On your paper plate, make a set showing the Tenths family. How many are there in the family? Yes, there are 10 of them. Each member of the Tenths family is a Tenth. Three tenths of the family are girls. Can you find them? Five tenths of the family are boys. Can you find them? Two tenths of the family are the parents. Can you find them? How many babies do you see in the family? What would you call the three babies? Yes, they are three tenths. How many teenagers do you see? Yes, five of the tenths are teenagers. How many children do you see? Eight. Eight of the Tenths are children, so we say that eight tenths of the family are children.



Exploring the Idea

1. The students working in pairs make some new families. Assign different pairs of students different families such as the Thirds, Fourths, Sixths, Sevenths, Eighths and the Ninths.
2. For example, one pair of students makes a family called the Fifths family. The students show the Fifths family on a paper plate.
3. The students tell what part of the family the parents are; they describe the part of the children, the boys, the girls and anything else they want to tell about their family.
4. All groups assigned to the same family collaborate to share the information about their family; they check each other to make certain they describe the family correctly.
5. All the groups report to the class about their families.

Getting the Idea

After the students complete their reports about the families, tell them that they have been using some new numbers that tell about a **part of something.** In our story, we talked about the **Tenths** family. Why do you think it is called the Tenths family? Yes, because there are 10 of them. Each member of the family is one tenth. If there are five of the family members, then they would be called what? Five tenths.

Tell the students that these new numbers they are using to show a part of something are called **fractions.** The word **"fraction"** actually means a "piece" of something or a part. The new number called a fraction is made up of two numbers: for example, one and five, which means one fifth; three and 10, which means three tenths, and so on.

Did you discover a pattern in working with these number families? Yes, each new number has two names. For example, if three fifths of the family were children, then the new number three fifths is made up of two numbers — three and five. The first numbers tells us who, or how many, we are talking about, and the second number tells us about the family, like a last name; this is what the two numbers have in common.

Exploring the Idea Again

1. Give each student group 10 pennies. The students take turns giving each other a number of pennies; one partner says what fraction of the pennies he/she gave to the other, and the second partner says what fraction the first partner has left. For example, Jesus gives Mia three pennies and says: I gave you three tenths. Mia says: You now have seven tenths of the pennies.
2. When the students can say the correct fraction names after they receive some pennies, they do the opposite: one student says a fraction name, say two tenths, and the partner gives the student two pennies.
3. Each student group now is to work with eight pennies only. They repeat Step 1 above, being careful to use the term "eighths" rather than tenths. They explain to each other why the term is now eighths instead of tenths.

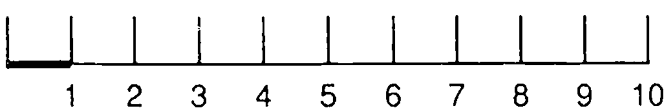
Getting the Idea

Tell the students that the two numbers necessary to make up a fraction are called the **numerator,** which is always the **first number.** The **second** number is called the **denominator.** Each family has a total number in the group of its members, and that number is the denominator number.

When there are only two members in a family, this family is called the Halves, not what you might think — the Twos. They like being called the Halves better.

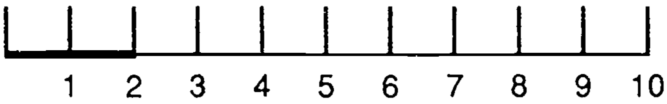
Exploring Again

1. Each student gets a copy of a number line marked in tenths. In this activity they will show the Tenths family in a different way. They will show it as 10 line segments, each segment of the same length. In this first picture we show one tenth.

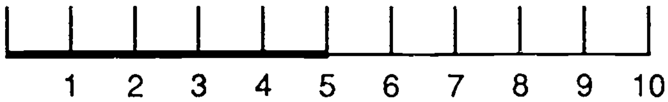


2. The students take turns showing two tenths, five tenths, and other fractions on the number line.

2 tenths



5 tenths

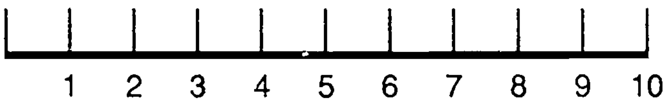


3. The students share the results with members of the group and with the class.

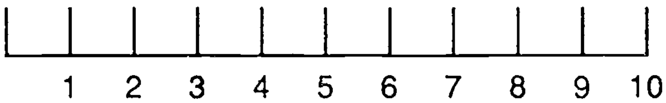
Assessment

Problem Solving

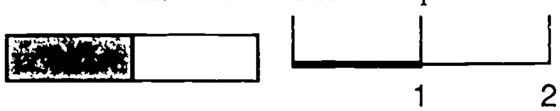
1. What name would you give to the part of the Tenths family that went on a picnic if all 10 of them went on a picnic, as the picture below shows? (10 tenths, all, the whole.) Do you think we could say that **one whole** family went on a picnic? Discuss this with your partner.



2. What name would you give to the part of the Tenths family that went on a picnic if no one went on the picnic? (Zero tenths, none, zero.) Discuss this with your partner.



3. Using objects, students construct a set and parts of the set (or a line segment separated into equivalent parts) and show various fractions. They assign fractions to the different parts of the set (or to the line segment) and name the fractions for a friend or the teacher. For example:



4. A friend or the teacher gives a student a fraction. The student constructs a set or a line segment to show that fraction.

LESSON 2 Our Cells — Tiny Units of Growth and Change

BIG IDEAS Every part of the human body consists of many tiny living things called "cells". Cells are the building blocks of the body; the body makes over a billion new cells every minute.

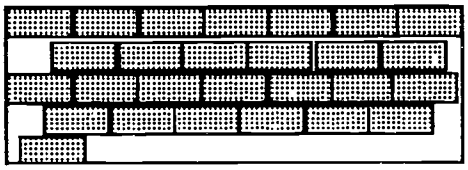
Whole Group Work

Materials

Picture of the night sky showing many stars
Reference books having pictures of different body cells
Diagrams of red and white blood cells, muscle cells and other types
Modeling clay of different colors, sufficient for several student groups
Microscope and slides of different kinds of cells
Bag of sand
Word tags: cell, tissue, nucleus, membrane, cytoplasm, organ, billion

Encountering the Idea

Show students a picture of a brick house. The students, working in small groups, model the clay into small rectangular "bricks" and place them together to form a "wall". Students discuss how they formed the wall and the placement of the bricks. Students discuss the patterns they formed in placing the bricks to make the wall not fall over or separate. What do we know about a wall? What does it do? (Protect the inside; keeps people and animals out; keeps things like children and pets inside.)

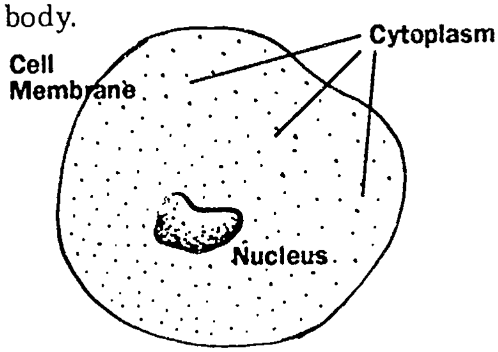


A "Cell" Wall

Exploring the Idea

Using a microscope with the highest magnifying power possible, examine slides of a variety of cell samples. Students look through the microscope and describe what they see. Are the cells close together? What are their shapes? Are they of different colors? Can you see them move? (No, because these cells have died; if they were alive, we could see them moving.) Do they have a "wall"? Can you see it? What is inside the wall? What does it look like? The cell wall is very thin. The nucleus is the heart, the center of the cell, and the cytoplasm is the substance that gives the cell its shape.

At the **Mathematics Center**, students explore the concept of a "billion". Place the picture of the night sky in the center. Show the bag of grains of sand. Tell the children to look at the picture and to imagine a number **so large** that it could tell you how many stars are in the sky or how many grains of sand are on the beach. The number "one billion" is a very large number that we need to count the number of tiny cells in the body.



Getting the Idea

All living things are composed of cells. The smallest living organisms — the bacteria — are composed of a single cell. The largest cells are chicken egg yolks. Show the diagram. The cells walls are called "membrane".

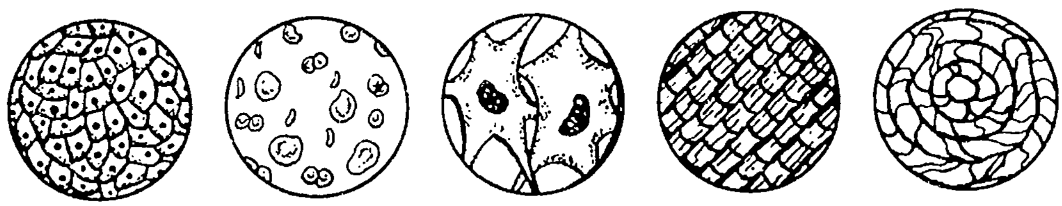
Cells are the smallest units in the human body and cannot be seen without a microscope. Cells that perform the same job gather themselves into shapes that make "tissue" like the skin, muscles, bones and organs such as the liver, lungs and kidneys.

Tissues are groups of like cells that perform the same function, for example, muscle tissue or bone tissue.

Organs are tissues that group to perform a specific function, like the heart or the liver.

The teacher tells students that the human body consists of many cells.

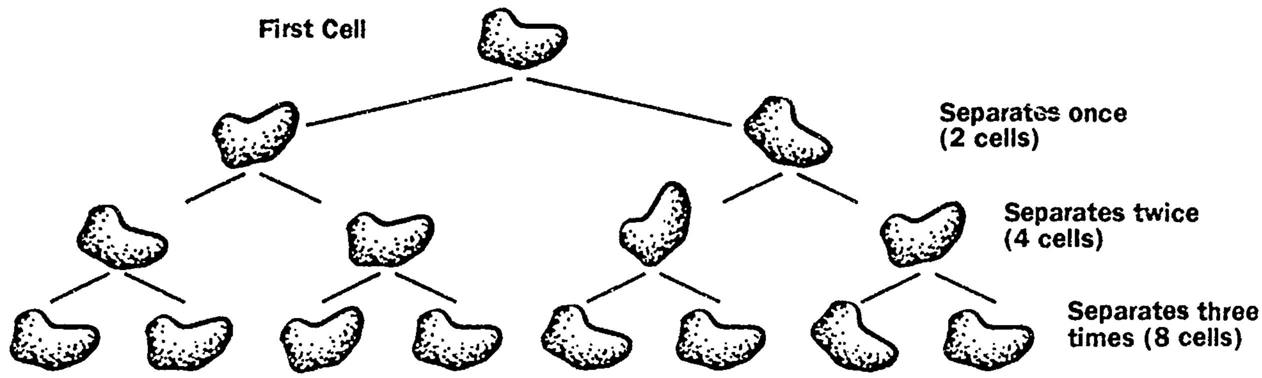
1. Cells are of different shapes and sizes.
2. The body makes over a billion new cells every minute.
3. Some cells are muscle cells, some are bone cells, and others blood cells, skin cells or nerve cells.
4. Each cell can make new cells by separating itself into two new cells; we say that cells **divide.**
5. Cells help humans grow.
6. Cells help humans heal injured body parts by making new cells.
7. Blood cells take food and oxygen to all the other body cells to help the cells develop and reproduce or help make new cells.
8. There are special cells the body needs to reproduce itself.
9. Inside the cell membrane is a substance called "cytoplasm".
10. Inside the cell, along with the cytoplasm, is the nucleus, which is the central part that controls the actions of the cell. The nucleus grows and then separates into two parts to form two new cells.



Skin Blood Nerve Muscle Bone

Organizing the Idea

At the **Art Center,** students draw and color a variety of different cells. They can draw the cells they saw through the microscope and/or cells they have seen in the reference books.



Applying the Idea

1. A single cell grows and changes until it has to "divide" itself. It divides or separates itself into two cells. How many new cells will there be after it "separates" for the second time? The third time? (Hint: Draw a picture of the cells as they separate; then count them.)
2. How many times would a single cell have to separate for 32 new cells to exist?
3. What do cells need in order to reproduce or "divide". (Food and oxygen that is supplied by the blood, which is also composed of blood cells.)

Closure and Assessment

The student completes this sentence: The two most important things about cells are ____________________ and ____________________ .

LESSON 3

The Body— A Complex Form

BIG IDEAS Our bodies have parts that help us move, think and feel. Measurements help us describe our bodies.

Whole Group Work

Materials

Chart
Colored nail polish
Collection of students' pictures
Black markers, graph paper, poster boards, butcher paper
Model or pictures of the human body
Measuring tape in inches, feet, centimeters
Unifix cubes to use to measure length
Word tags: internal, external, organ, lungs, liver, torso, legs, arms, head, neck, hands, arms, toes, knees, legs and others as student name them

Encountering the Idea

We've learned that the body grows and changes; we've learned that it is made up of tiny cells that grow and separate for the body to grow, that repair when the body has become injured or ill and that perform all its required functions. Let's continue to learn more about our bodies. Let's describe our bodies. Students draw a body on a poster board (or trace their own body on butcher paper) and label the body parts as they discuss them. They will use this diagram later to write in their journals. What can we see? Students count, describe and list what they see in a mirror. Then they speculate about what they cannot see — blood, stomach, etc.

Exploring the Idea

When students have listed a number of the body parts and described what they can, ask them to describe their hearts, brains, livers and so on. We can't describe some of these organs because we can't see them. In the centers we will discover more about the body and describe the parts that we cannot see. Using either a model of the human body or pictures brought by students of themselves, the students describe a human body including important internal organs that they cannot readily see.

At the **Science Center,** the students

1. complete the following **Activity** — Let's Describe our Bodies.

   The teacher draws the outline of a head on the board, for example. At the **Science Center,** the students complete the activity. They copy the outline of the head into their journals and provide other details such as eyes, nose, ears, etc. They complete the rest of the body — neck, torso, arms, etc. — on subsequent days. Label and describe the parts according to the students' comments. The descriptions should include number and shape descriptions.

2. complete **Activity** —Body Diagram. After making their body diagrams, the students place them in a secure spot to make in subsequent lessons a **composite** body diagram that will show body organs.

At the **Mathematics Center,** the students complete Part 2 of **Activity** — Mathematics of the Body.

Getting the Idea

External organs are those that are on the outside and can be easily seen and described. **Internal organs** are those that are inside the body and cannot be seen. We have to use instruments and equipment like X-rays to see the internal organs inside the body.

Let's talk about the measurements you've taken to describe your bodies. Look at Juan's outline. Juan, on the side of your body diagram, you wrote that you measure 43 inches in height. You also wrote that you measure 109 centimeters and that you measure 3½ feet in height. Why do you get these different numbers? Why is it 43 inches? 109 centimeters? And 3½ feet? What is a standard unit? Are all standard units the same?

Organizing the Idea

1. After completing their work on the body outlines and diagrams, the students work in pairs to review the new terms by asking their partners to point to and name various parts of the body they have studied. If they do not know the terms, they ask other students or the teacher.
2. The students draw pictures of the body and complete the frame sentences and write them in their journals. Place the chart with the frame sentences where students can see it:

   On top of my body is my ______. The head rests on the ________. The _______ are used to hold onto things. The hands are at the end of the ________. I laugh if you tickle my feet and my piggies, which are really my _________. When I play marbles, I rest on my ________. For running, I use my strong __________.

After the students complete the activities in the **Science Center** and finish measuring each other, each group confers and gives an explanation of why the numbers they got when they measured each other's length, for example, in inches and in centimeters are different. As soon as one group can explain, the Reporter/Recorder of the group signals. Students discuss using different size units. (The smaller the unit (cm.), the more of them you need.)

During the discussion, encourage the students to use specific new words they have learned to refer to their bodies. They may also use the outlines and diagrams they have made to give explanations of their observations.

Applying the Idea

1. What is the most interesting thing you learned about your body today?
2. Tommy measured the length of his foot. He said it was 8½ inches. His mother measured it and said it was 21 centimeters. Who was right? How do you know?

Closure and Assessment

1. After reconvening, the students can sing "Them Bones."
2. The students summarize what they have learned about the human body and what they have learned about themselves.
3. The students make a list of questions about other things they would like to know about the human body.
4. The students discuss the following:
   - Do you feel different about your body today as compared to yesterday?
   - Have you changed in how you feel about yourself? How have you changed?
   - What made you change how you feel about yourself?

List of Activities for this Lesson

▲ Body Diagram

▲ Mathematics of the Body: Part 2

ACTIVITY
Body Diagram

Objective
The student places body organ cutouts in their appropriate places in a body diagram.

Materials
Butcher paper; markers; measuring tapes (inches and centimeters); scales (pounds and kilograms)

Procedures
Students work in teams of three. Each student obtains enough butcher paper to trace the outline of his/her body. Students lie on the butcher paper to outline their shapes. After they trace each other, they label the parts.

1. Students continue working in groups as they measure the length of their own outlines. This is done in inches, feet and/or centimeters. On the side of their body outline, they write: "I am (*inches. centimeters, feet*) tall."
2. Students use a tape measure to measure the circumference of each other's heads, in inches and centimeters. They ask each other about the different measurements they get. Ask them to give their reasons during the closing activities of the lesson.
3. The students measure the length and width of their hands. They measure the length and width of their feet. They measure the circumference of their waists and wrists, and discuss the more effective unit — the centimeter or inch — to measure their wrists. They measure the circumference of their thumbs.
4. Students weigh each other in pounds and kilograms. On the side of the body outline they write: "I weigh _________ pounds or _________ kilograms."
5. Each group confers and gives an explanation of why the measurements are different. (The smaller the unit (cm.), the more of them you need.) As soon as one group can explain the Reporter/Recorder signals. Students discuss reasons why different people might want to use different standard units such as the inch and centimeter.

ACTIVITY
Mathematics of the Body: Part 2

Objective
Students use addition and/or subtraction appropriately to answer questions about information obtained in class.

Materials
8½ x 11 pieces of laminated construction paper
Erasable marker
Cuisenaire rods or other models that demonstrate place value

Procedure
Students use erasable markers to write on individual story boards made of 8½ x 11 pieces of laminated construction paper. Students write and solve addition and subtraction problems, using classmates' data on height and weight.

After they have collected information on students' weights, the students write original problems involving weight comparisons, in the same manner as the problems in **Activity**—Mathematics of the Body: Part 1.

LESSON 4 The Heart— The Nonstop Pump

BIG IDEAS The heart pumps blood to all parts of the body. We describe the heart's rate in beats per minute.

Whole Group Work

Materials

Book: **Harry and the Terrible Whatzit** by D. Gackenback, added to **Library Center**
Diagram of a heart or a model showing veins and arteries
Prepared tape for th~ **Heart Center**
Books about the heart
For **Heart Center** see **Activity** — My Heart
Oral Thermometer; stethoscope; clock/watch
Sheet of paper; gauze or cotton balls; alcohol to clean thermometer
Word tags: arteries, veins, temperatu:e, degree, heart, pump, oxygen, carbon dioxide

Encountering the Idea

Begin by introducing **Harry and the Terrible Whatzit.** First, have the students predict what the story is about. Read the book aloud. Afterward, the class discusses how Harry must have felt when he was afraid of the Whatzit. Do you think his heart was beating the same as it always does? Was it beating faster? What do you think makes our hearts beat faster? We will explore these ideas at the learning centers.

Tell students that they will explore more about blood when they do **Activity** — Body Temperature.

Exploring the Idea

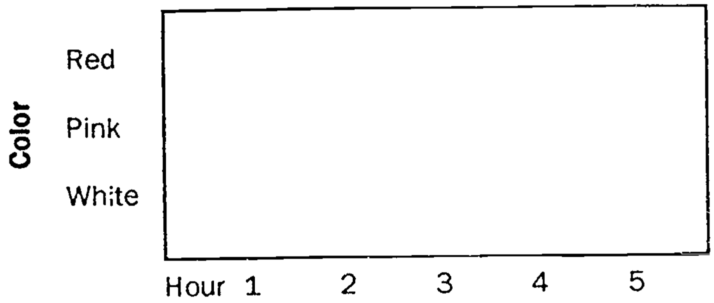
At the **Science Center,** the students

1. complete **Activity** — My Heart
2. complete **Activity** — Body Temperature
3. complete **Activity** — Veins and Arteries, as below.

PRIOR PREPARATION: Early in the day cut several pieces of celery stalks on a diagonal and place in a solution of red food coloring and water. Record the water level every hour for the entire school day.

Procedures

1. When placing the celery stalks in the water, the students observe the color of the stalks and the leaves, noting that they are green, light green and/or white, later becoming pink and then red.
2. At various intervals, the students make observations and record them. They observe that the color is traveling along a system of veins in the stalks and leaves.



Students discuss how the water and color travel from the glass into the stalks and leaves. They compare this system of veins with the body's system of veins and arteries that carries the blood to all parts of the body.

They draw the celery stalks in their journals and color the veins.

Getting the Idea

What did you learn when you completed your first activity — when you took your heart rate when you were resting and when you were exercising? What did that suggest to you? Did that activity have anything to do with the activity with the celery stalks that showed that the colored water could flow upwards into the leaves? What do those two activities have to do with the activity about your body temperature? (Pause for student responses. As they suggest ideas, write them down for further discussion.) Yes, your heart pumps your blood throughout your body. That, of course, is an extremely important function because the blood that gets to your cells does many things.

Show diagram of the heart. Discuss that the heart is one of the most important organs of the body. It pumps blood throughout the body, sending it through **arteries** and **veins**. **Arteries** are channels like flexible pipes that take the blood with oxygen from the lungs to the cells of the body. **Veins** are channels that take the blood filled with carbon dioxide back to the heart and lungs. Veins send blood through the lungs to get oxygen and leave the carbon dioxide, then through the liver and kidneys to leave other wastes. Besides taking oxygen to the body's cells, the blood also helps to take food in the form of sugar and proteins to the cells. As the blood flows throughout the body, it helps keep it warm.

Let's talk about your experiment with your body temperature.

1. Students compare temperatures and compare results with other groups.
2. State a hypothesis about the human body's temperature. Why does the body stay at 98.6° F?
3. Hypothesize about what it means if the thermometer reads 102°. What does it mean if it reads 92°? (This could mean that there is an illness such as flu, a cold, an infection.)
4. What do you think would happen to your body if you went outside on a cold day to play and your body did not stay at a temperature of about 98° F?

At the **Art Center**, the students cut out the heart diagram in **Activity** — The Heart, color it and locate it in its appropriate place on the body diagram. Explain to the students that the arteries are colored red because they carry the blood that is full of oxygen to the body cells, and that veins are colored blue because they are returning the body wastes to be removed. Using the two-color code, you can trace where the blood goes and what it does.

After students have had an opportunity to participate in all of the activities, they discuss: The **arteries** are channels, like flexible tubes, that take the blood with oxygen from the lungs to the cells of the body. **Veins** are channels, flexible tubes, that take the blood filled with carbon dioxide back to the heart and lungs.

At the **Mathematics Center,** the students

1. continue to work on **Activity** — Mathematics of the Body: Parts 1 and 2
2. complete **Activity** — Rates.

Organizing the Idea

At the **Music Center,** students engage in a **Sing and Dance** Activity. Students point to the parts of the body as they sing **"Dry Bones"** found in **We Sing** tapes and records. Students sing and dance **The Hokey Pokey**. They relate words to the body parts.

Students complete these frame sentences in their journals after completing **Activity** — Rates.

Students compare each other's heartbeats.

(*students*)'s heart beats (*faster/slower*) when (*running, sitting*) than when ________.

________'s heart beats ______ more beats when ______ than when ________. ________'s heart beats ______ more beats in one minute than ____________'s.

They show the subtraction sentences under the word sentence.

Applying the Idea

Problem solving

How many times does a heart beat in **one hour**? At the slow rate? At the fast rate?

The student constructs or builds a pump that can draw in a liquid as well as pump it out.

For one example, see **Activity** — A Rubber Pump.

Closure and Assessment

How fast does the heart beat when you are being quiet? After exercising?
What is the difference between the two?
What happens when we begin to rest after we exercise?
How does the graph show this?
What do you think the rate is at six minutes? At seven minutes?

List of Activities for this Lesson

▲ The Heart

▲ Body Temperature

▲ A Rubber Pump

▲ Rates

ACTIVITY
The Heart

Objective
The students say that a person's heart rate changes with a change in the person's activity.

Materials
Rubbing alcohol in a small jar with lid; stethoscope; cotton balls; pencil; tape recorder; cassette tape
Electric clock with a minute hand, or a tape recording counting 30 seconds or 60 seconds
Book: **Hear Your Heart** by P. Showers

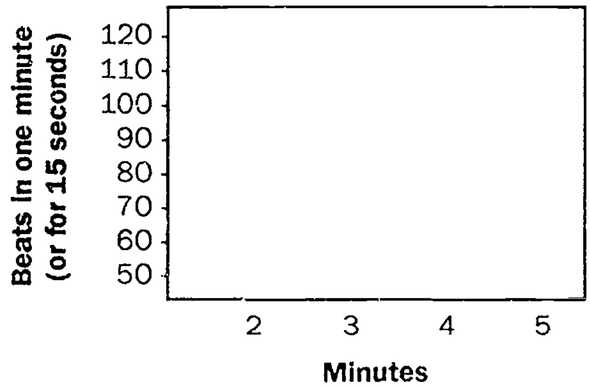
Part 1

Procedures
Students work in pairs, with one student acting as a timer for the other student.
1. The teacher prepares a cassette tape of the book (reads the book so that students can follow along in the center).
   a. The students clean the stethoscope's earplugs with cotton and alcohol.
   b. The students put on the stethoscope and listen to own heart and teammate's heart.
   c. The students look at the minute hand on the clock. Begin to count heartbeats when the minute hand is on 12. Stop when the hand reaches 12 again. The teacher may cue the 60-second timing rates on the cassette tape by using "Ready, listen, go .... stop."
   d. The students write down the number of beats for the resting rate.
2. Count and record heart rate after walking and running. The student follows the tape-recorded directions to measure his or her heartbeats. The student records his/her heartbeats on a chart.

Crystal's Heart		
________	________	Resting beats in one minute
________	________	Walking beats in one minute
________	________	Running beats in one minute

Part 2
Students take and record the heart rates of five classmates before and immediately after running, two minutes after vigorous exercise, and then every minute thereafter up to five minutes. Students prepare a graph and describe and discuss the results.
1. How fast does the heart beat when you are being quiet? After exercising?
2. What is the difference between the two?

3. What happens when we begin to rest after we exercise?
4. How does the graph show this?
5. What do you think the rate is at six minutes? At seven minutes?



Part 3

1. Make a tape recording of a person counting one to 60 seconds to use in the following activity.
2. Using a stethoscope the students count the number of heartbeats heard in one minute. Students record this number.
3. The students run in place for one minute, counting the number of heartbeats heard in one minute.
4. The students use the two heartbeat counts to write a number sentence on a human outline. Which is less?
5. Working in pairs, students write number sentences comparing fast and slow rates.

[1] A student's heart rate can be taken by locating and lightly placing a person's (teacher) middle finger on the student's forearm close to the hand (on the pulse) and counting beats for 15 seconds.
[2] As an alternative, the children may count for 30 seconds on the tape and double the number of heartbeats to get the rate per minute.

ACTIVITY
Body Temperature

Objective

The student says that a normal body temperature is about 98° F and takes her/his temperature with an oral thermometer.

Materials

Oral thermometer with Fahrenheit and Celsius scales (one with each scale shown on a side of the thermometer) for each student

Piece of paper; gauze and alcohol; a clock with a seconds timer

Procedures

Students work in small groups of three or four.

1. Each student group examines and describes a thermometer noting: the liquid in the cylinder; how the scale is marked; the number of subdivisions; and any other noticeable features. They find the largest number, the least number and any other special marking. They make these observations using the Fahrenheit scale and the Celsius scale.
2. The students read the thermometer the way they would read a number line, noting that the scale is in units of one degree, and the subdivisions are 2/10, 4/10, 6/10 or 8/10. They record the temperature as shown on the thermometer. If the students have not worked with fractions, they may estimate to the nearest one-half of one degree.
3. Each student cleans the thermometer with a piece of gauze wet with alcohol before taking her/his temperature. The student has the teacher shake the thermometer down to at least 94° F.
4. The student inserts the thermometer under his/her tongue, being careful to not bite on it, and closes the mouth and keeps it closed for at least 20 seconds by a clock.
5. Students read each other's temperatures to the nearest 1/2 degree, or fraction of a degree, and record them.
6. The students report on their body temperature.

Getting the Idea

1. Where do you think the heat that keeps your body warm at 98° F comes from?
2. We have learned that heat is one type of energy; where does this heat energy come from? (The cells burn the food with the oxygen that the blood brings to them to create heat energy and other kinds of energy that the body needs.)

ACTIVITY
A Rubber Pump

Objective
The student explores ways to show how the heart functions.

Materials
One transparent rubber glove
Two plastic drinking straws
Three small rubber bands to seal off the top of the glove and two fingers of the glove
Two transparent plastic tumblers; one with colored water, the other with clear water

Procedures
Students can work in pairs.

1. Snip the end of the thumb and one of the fingers of a rubber glove. The cut should be small, only large enough to insert one end of a plastic drinking straw.
2. Insert one of the plastic drinking straws into the cut on the thumb and seal it back up with one of the small rubber bands. Make sure no air can leak through the seal.
3. Do the same thing with the other finger of the glove.
4. Put enough water into the rubber glove to make it bulge. With a small rubber band, seal the top of the rubber glove so that no air or water can escape.
5. As the water begins to flow out of the fingers of the glove, one person puts a finger on each exposed end of the drinking straws to keep the water from flowing out.
6. Insert the thumb with the drinking straw attached to it into the tumbler with the clear water. Squeeze the rubber glove gently and release the end of the finger with the straw attached to it into the tumbler with the clear water. What happens? Clear water flows into the tumbler.
7. Now, remove the finger from the colored water, and the other person pulls on the r··bber glove to expand it. What happens? Colored water flows into the rubber glove.
8. Repeat the process back and forth. What happens? The clear water in the glove begins to turn red and the clear water in the thumb tumbler also begins to turn red.

Discussion
The student explains to the teacher how the pump works and why the water begins to turn red in the glove and in the other tumbler.

ACTIVITY
Rates

Objective
Student compares two rates and says which is faster or slower.

Materials
Stopwatch or watch with second hand or digital watch that shows seconds

Procedures
Students work in pairs.

1. Using a stopwatch, student times 10 seconds and notices how long that time "feels".
2. Now the student snaps his fingers or taps on a table with a pencil every second to get the sense of the rate of one second. Writes: One tap in one second.
3. Now the student taps her/his fingers **evenly** twice for every second. Practice tapping until it is even. Writes: two taps in one second.
4. The student taps **evenly** four times in two seconds. Writes: four taps in two seconds.
5. The student taps three times in one second. Writes: ___ taps in ____ second.
6. The students take turns tapping and guessing the number of taps in one second or two seconds.
7. The students say which rate is faster and which is slower.

Discussion
1. Which rate was the fastest? The slowest?
2. How can you tell? Can you hear it? Can you see it? (One response: We wrote it down and compared the number.)

LESSON 5 *The Lungs: A Gas Swap Meet*

BIG IDEAS The lungs take in air and take the oxygen out of the air to send it through the blood to all parts of the body. The lungs have capacity (volume) that we can be measure.

Whole Group Work

Materials

Book: **When Will I Whistle** by M.M. Green or **The Toy Trumpet** by A. Grifalconi
Lung model from **Activity** — How the Lungs Work
Pictures and diagrams of the lungs
Word tags: lungs, torso, carbon dioxide, oxygen, volume, capacity
Word strips
Stopwatch or digital clock

Encountering the Idea

The teacher reads the story of **When Will I Whistle,** or any other story that involves the use of the lungs such as **The Toy Trumpet.** The teacher asks students to name the parts of the body used to whistle or to play a horn. Write students' responses on word strips for future use in writing activities. The only way a person can play a trumpet is to be able to blow air through it. Where and how do we get air to play a trumpet? We'll be able to see by completing some of these activities at the learning centers.

Exploring the Idea

At the **Science Center,** the students:

1. complete **Activity** — How the Lungs Work
2. complete **Activity** — Lung Capacity.

Getting the Idea

1. Use the model constructed for **Activity** — How The Lungs Work to discuss the structure and function of the lungs. Use the diagram from **Activity** — The Lungs. Explain how the lungs work by showing students other pictures and diagrams as well as the model, focusing on:
   1) The **lungs** are two organs on each side of the **torso** that exchange oxygen and carbon dioxide for the body.
   2) Air comes into the lungs through the nose and the mouth. This air contains **oxygen.**
   3) Inside the lungs are some small sacs, called bronchioles. The oxygen is **exchanged or swapped for the carbon dioxide** brought in by the blood cells in the small sacs.
   4) Blood cells that are full of oxygen pass through the heart and go through the arteries to the body cells. The blood cells deliver the oxygen and pick up the carbon dioxide.

5) Blood cells filled with carbon dioxide go back to the lungs through the veins and start the cycle again.
6) There is a large, strong muscle called the **diaphragm** under the lungs. The diaphragm helps push air out of the lungs when they are full. It opens them up when they need fresh air.
7) The lungs have a capacity to fill with air when we **inhale.** Then when we let out air, we **exhale.** How much air can the lungs hold? We can discover this in one of our experiments.

2. Students now discuss the idea of lung capacity. What is another word for capacity? (Volume, size or amount.) At the learning centers, the students take turns describing how the lungs work. They compare the lung capacities of the members of their group. If a class member, including the teacher or a teacher from another class, plays a musical instrument — flute, horn, reed — he/she can demonstrate the way to play it to the class. The musician can discuss how she/he keeps the lungs strong in order to play well.
3. Discuss: Why do you breathe faster when you run?
4. The students place cutouts of the lungs in their appropriate places on the body diagrams begun during the first lesson. **Note: Leave the lungs unglued.** The students should be able to lift the lungs and see the organs that go underneath. Glue the trachea only.

At the **Mathematics Center,** students complete **Activity** — Don't Hold your Breath!

Organizing the Idea

At the **Writing Center,** the students
1. write a story that tells about how the lungs work
2. write a patterned paragraph: The two most important things about the lungs are __________ and _____________. (The student writes two or three sentences to elaborate and then concludes by paraphrasing the two reasons.)
3. draw a diagram of the lungs in their journals and show the carbon dioxide being replaced by the oxygen.

Applying the Idea

Problem Solving
1. Explain what you do when you need to take a big breath, for example if you want to swim underwater or you want to hold your breath. (Stand up straight, open the mouth to let the lungs expand completely.)
2. What happens when someone punches you in the stomach by accident? Yes, you lose all your air because the diaphragm squeezed hard, and it pushed the air out of your lungs.
3. How important are the lungs in playing basketball, soccer and in swimming?
4. Do you think a trumpet player's lungs have more capacity (can hold more air) than the lungs of people who do not play the trumpet? Why would that be true or not true?

Closure and Assessment

1. In the experiment on lung capacity, what does the amount of water you put with the measuring cup into the bottle show? (This is the amount of air you blew into the bottle.)
2. After each student repeats the activity, the students compare their lung capacities: Who had the largest capacity? Who had the smallest capacity? What is another word for capacity? (Volume.)
3. In what ways do our lungs help us? (Breathe, play an instrument, whistle, play sports and talk.)
4. In the story we read, how were the lungs used?

List of Activities for this Lesson

- ▲ Don't Hold Your Breath!
- ▲ How The Lungs Work
- ▲ Lung Capacity
- ▲ The Lungs

ACTIVITY

Don't Hold Your Breath!

Objective
Students discover their breathing rate when at rest and when exercising vigorously.

Materials
Stopwatch or digital clock

Procedures
Students work in pairs.

1. One student counts and records the number of times his/her partner breathes normally in one minute.
2. One students runs in place at an even pace for one minute.
3. At the end of the minute, the student continues running in place while his/her partner counts and records the number of breaths taken during the second minute of running.
4. Summarize the information on a chart for comparison.

Breaths in One Minute

Student	*Number breaths resting*	*Number breaths running*	*Difference*
J			
K			

5. Compare the breaths taken resting and running and then compare breath rates of the two students.
6. Are the breathing rates the same? What is the difference between the two students?
7. Pantomine: You are asleep. You hear a burglar come in. You go to investigate. What happens to your heart? What happens to your breathing?
8. Who had the largest difference between resting and running breathing rates in the class?
9. Who had the least difference?
10. Compare breathing rates and heartbeat rates (from **Lesson Four**) during resting and exercising.

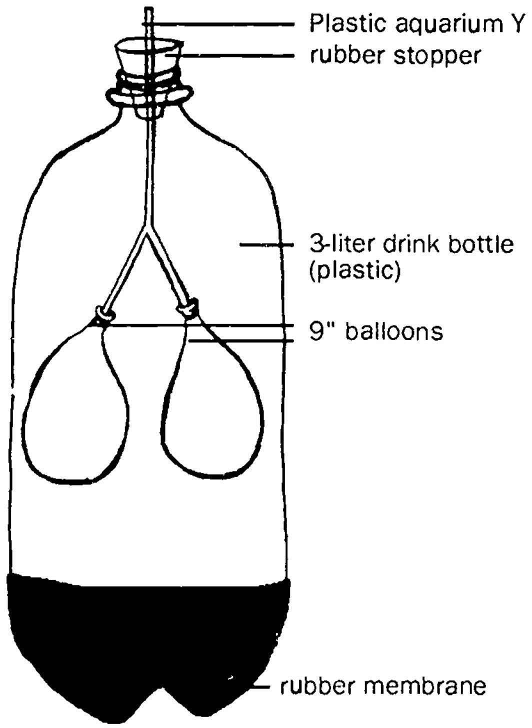
Discuss
Is there a connection between the heart beating faster and the person breathing faster when exercising?

ACTIVITY
How the Lungs Work

Objective
The student constructs a lung model.

Materials
For whole group:
Empty quart bottle of soda pop with the base cut off
Y tube for an aquarium
Piece of rubber sheet or large balloon cut with a diameter larger than the base of the bottle
Rubber stopper that fits the opening of the bottle and has a single hole that fits the Y tube
Two balloons attached to the dual ends of the Y tube

Procedures
1. Cut off the base of the plastic bottle.
2. Connect the Y tube to the rubber stopper and attach the balloons with tape to make the attachment airtight.
3. Secure the rubber tube to the top of the bottle.
4. Cover the base of the plastic bottle with the rubber sheet and secure on the sides with tape to make it airtight.
5. Pull the rubber sheet away from the base to show the two small balloons inflating; when the rubber sheet is released the balloons empty.



Lung Model

TEACHER DEMONSTRATION
Lung Capacity

Teacher Demonstration

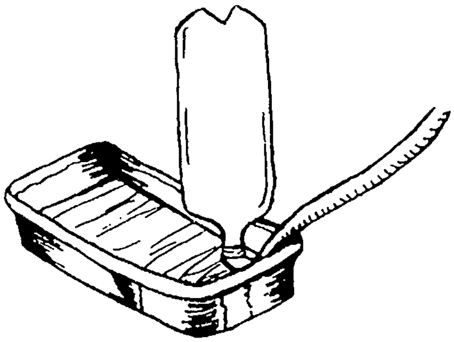
Materials

Three-liter soda pop bottle or one gallon vinegar bottle
Large pan
Two feet of tubing
Measuring cup marked in ounces and milliliters
Masking tape
Paper towels

Procedures

Students work in pairs or groups of three.

1. Fill the large pan with water to a two-inch depth.
2. Fill the three-liter bottle with water.
3. Cover the opening of the bottle and, holding it upside down, lower the bottle into the pan. Let the bottle stand upside down inside the water.
4. Tip the bottle to the side and insert one end of the tubing into the bottle.
5. As one student holds the bottle to keep it from tipping over, another student blows air into the bottle.
6. Each student takes a turn taking a deep breath and blowing it out through the tube into the bottle until the lungs are empty. Students should do this only once.
7. Mark the water level with a piece of tape.
8. Empty the water, and turn the bottle right side up.
9. Using a measuring cup, refill the bottle with water to the level marked with the tape. Record the number of milliliters it took to fill the bottle to the mark.



Discussion

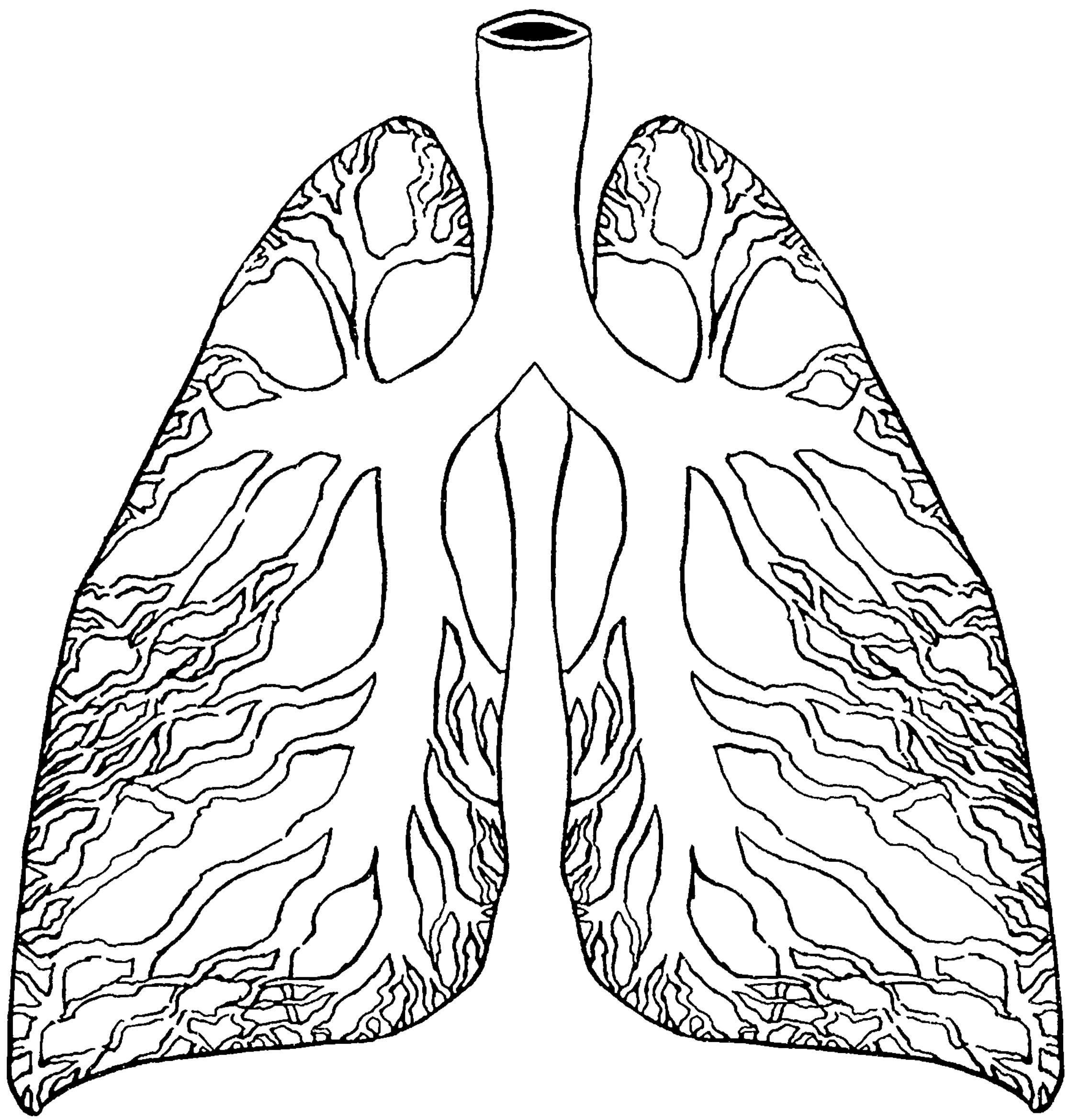
1. What does the amount of water you put into the bottle with the measuring cup show? (This is the amount of air you blow into the bottle.)
2. After each student repeats the activity, compare the lung capacities:
   Who had the largest capacity?
   Who had the smallest capacity?
   What is another word for capacity? (Volume.)

ACTIVITY
The Lungs

Note: Leave lungs unpasted. Students should be able to lift up the diagram to see the organs underneath.

Each student receives a copy of the lung diagram to color and cut out.

Remember: Each person has a pair of lungs, one on each side of the ribs.



LESSON 6 *The Muscles and Bones— A Magnificent Machine*

BIG IDEAS Muscles and bones work together to help the body move; bones also protect important body organs. Over 200 bones are in the human body.

Whole Group Work

Materials

Model: How Bones and Muscles Work
Book: **Now One Foot, Now the Other** by T. de Paola
Films and pictures depicting how the bones and muscles work together
Rubber band and matches
Word tags: elastic, flexible

Encountering the Idea

Read aloud **Now One Foot, Now the Other** to the class. The teacher asks the class to predict what the story is about. After reading the story, the students answer questions: Why could the grandfather not walk? What does it take to be able to walk and move around? The teacher shows a rubber band as it expands and contracts. A rubber band is flexible and elastic. The teacher shows a match that is hard and not flexible. It can break. In this unit, however, we are going to learn that two things — one that is flexible and one that is not—can work together to do many wonderful things.

Exploring the Idea

At the **Science Center,** using pictures and film or filmstrips, tell students that muscles and bones work together to help the body stand up straight, walk, run and move in many different ways. Show students the rubber band model of how bones and muscles work.

1. Complete **Activity** — How Muscles and Bones Work Together.
   Using a diagram of the body, help students locate muscles in their arms, legs, hands, fingers, on the face, neck, etc. Help them feel the muscles as they flex and as they relax. Place models in the **Human Body Center** for more study.
   At the **Mathematics Center,** ask: How much weight can you lift? How many bones are in the hand?
2. Complete **Activity** — Bones Protect the Body, as shown below,

Materials

Football helmet; several pieces of colored pipe cleaners of various sizes

Procedures

1. After the class has had an opportunity to examine the helmet and feel it, a student wears the helmet.

2. Arrange the pipe cleaners to simulate ribs. Shape one piece into a circle to simulate the head. One long piece serves as the spinal column, and the ribs and head are "attached" to it.
3. The students discuss how the bone that is the skull protects not only the brain but also the eyes and ears.
4. The students construct a "rib cage" of their own using pipe cleaners.

Getting the Idea

Using the model of the muscles and bones the students have made, review the contraction and relaxation of the muscles, working in pairs to help an arm move. During Physical Education, the teacher can help the students move an arm or leg and feel the muscles to identify the one that relaxes while the other contracts to make the limb move. Then, move the limb in the opposite direction to see how the muscles feel.

Tell students that bones not only help the body move, they also protect it. The skull is a good example of how a bone protects the brain. The ribs are another good example of how bones protects the important organs of the body like the heart and lungs.

Ask a physician to visit the classroom to talk to the students about their bones and muscles.

Organizing the Idea

1. After completing the activity on counting bones, the students draw a skeleton using the number of bones they have found, reaching a consensus of the difference in the numbers each has obtained. Using a reference book, the students find out how many bones are in the human body and use the information to complete their illustration.
2. Students write and illustrate how bones protect the important organs of the body.
3. Students learn and sing the song "The Head Is Connected to the ... Bone."

Applying the Idea

1. Students design and construct their own model of bones and muscles working to make a body move. (Can use Legos, if they have any.) They can experiment in different ways. They report on what they have constructed to the members of the class.
2. Using sports equipment a student (or a group) demonstrates how protective gear protects the body in sports. Show a football helmet, knee pads and gloves and show the bones and organs this gear protects.

Closure and Assessment

1. How many bones were we able to count? Who counted the most? The least?
2. What is the function of bones? (Movement and protection.)
3. What is a function of the muscles? (Movement.)
4. Why can't we see and count all our bones? Muscles?
5. Each student writes and reads to the class one question he/she has written about bones and muscles. The other students answer the questions; correct

them if they are wrong. The student responsible for writing the question is also responsible for providing an answer to the question.

List of Activities for this Lesson

- ▲ How Muscles and Bones Work Together
- ▲ Counting Bones

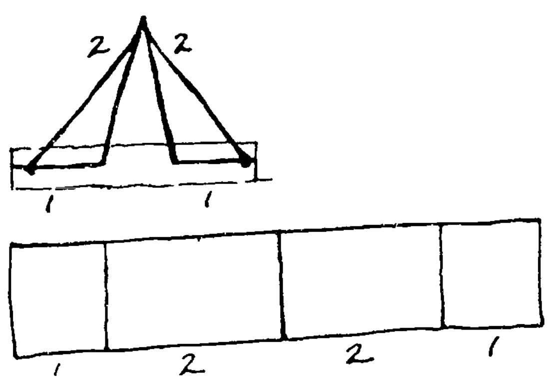
ACTIVITY
How Muscles and Bones Work Together

Objective
The student constructs a model showing how muscles, in pairs, work to move a bone.

Materials
One one-inch wide piece of cardboard, six inches long
Two rubber bands
Glue or stapler
Large (4' × 5') cardboard to serve as a base

Procedures
1. Fold the cardboard at three places, evenly spaced.
2. Fold the cardboard at the center and one inch away from each end.
3. Open the cardboard and mark as shown in the figure below.
4. Leave the two-inch segments back-to-back and fold the one-inch segments perpendicular to the longer segments. Glue the one-inch segments to the cardboard base.
5. Attach the rubber bands about ¼-inch from the top of the two-inch segment — one on each side, and at the base about ¼-inch from the end.

How does this model help us understand how the muscles and bones work together? What happens when you pull the rubber band? (The bone (cardboard) moves.) In this model what do the rubber bands represent? (Muscles that contract and relax.) What represents the bones? (The two-inch cardboard segments.)



ACTIVITY
Counting Bones

Objective
The student locates various bones in the body and says there are over 200 bones in a human body.

Materials
Paper and pencil
Model of a human skeleton or encyclopedia or other appropriate reference books

Procedures
1. Feel the bones in the finger of one hand with the other hand. Count them.
2. How many bones did you count in your hand? Write that number down.
3. See how many bones you can count from your finger to your shoulder. Write that number down.
4. Now begin with your toes and work up counting all the bones you can find. As you count the bones in your foot, leg, back and so on, complete a chart.
5. Using this procedure, count as many bones in your body as you can. Write the number for each part.
6. Draw a picture of the human skeleton, including the bones you found.
7. Compare your notes and drawings with other groups. If your numbers are different for some part of the body, count again and try to determine where the difference occurred.
8. When you have counted and drawn all the bones in your body that you can find, go to the model of the skeleton (or encyclopedia) to see how many bones are in the human body.
9. How close was your count?

Discussion
Why can't we count all the bones? (Some are too small or well-hidden to be felt by hand.)

Counting Bones

Students' names	*2 hands*	*2 feet*	*2 legs*	*Torso*
Sara				
Betty				
Jorge				
Joe				

LESSON 7 *The Stomach and Intestines— The Food Processors*

BIG IDEAS The stomach, intestines, teeth and saliva prepare the food we eat so the body can use it for energy.

Whole Group Work

Materials

Book: **What Happens to a Hamburger** by P. Showers
Pineapple, banana and orange
Picture or drawing of a large dead tree
Plastic bag containing all the pieces of a small puzzle, mixed in with small pebbles and marbles
Food blender, preferably with glass sides
Various types of vegetables such as carrots, etc.
Water in a tumbler
Words tags: prepare, digest, separate, chemicals, saliva, intestines, kidneys, blender, food processor

Encountering the Idea

Tell students that you are going on a picnic. You want to make a fire to cook your picnic lunch, but you need firewood to cook your meal. Show students a picture or drawing of a large dead tree. There is a dead tree nearby that you can use for fuel. Can you use it to make your fire? What do you have to do to make it into firewood? Let the students describe cutting down the tree, making it into smaller pieces and then into very small pieces for kindling. Ask: Can you use the tree as it stands or do you have to do something with it? You have to **prepare** the wood for it to burn. You cannot use it as it is.

Next, show students a pineapple, a banana and an orange. Can we eat this pineapple, banana or orange as they are? You want to peel them first? Why?

Next, show the students a plastic bag containing all the pieces of a small puzzle, mixed in with small pebbles and marbles. Can you complete the puzzle? No, you have to sort out the pieces you want. Two or three students sort out the puzzle pieces, separating them from the other material. Other students help to construct the puzzle. Ask the students: What do all these demonstrations have in common? We'll try to find out as we complete some of these activities.

Exploring the Idea

In a whole group activity, the teacher uses a blender, preferably with glass sides, and various vegetables such as carrots, etc. to suggest to the students how the body digests food.

Ask the students: What is a blender? Is it a food processor? Then the teacher demonstrates how the blender cuts and mixes the various substances. Add water to show how much more easily then the blender mixes the food and how quickly it takes a liquid form.

Getting the Idea

Tell the students that the stomach performs an activity similar to that of the food processor and review the examples of the firewood, the puzzle and the fruit. The body cannot use the food we put in our mouths the way it is. The body needs to prepare the food; the body needs to process it. The processing begins at the mouth. The mouth begins the digestion by cutting the food into small pieces and mixing them with saliva. The process continues in the stomach.

The teacher distributes cookies or a snack to students and asks the children to guess what the ingredients could be. The teacher writes responses on a large chart tablet. The children eat the cookies or snack and hypothesize what will happen to the cookies as they eat them. Again write responses on a large chart tablet. Then, the teacher reads the story, **What Happens to a Hamburger.**

The teacher shows either a model of a human body that shows the stomach and intestines or a picture and/or diagram of the digestive system. Tell the students that another very important function of the body is that it is able to use food in order to get energy. The body cannot use the food for energy in its original form. It has to change it into a liquid so the blood can carry the food to the cells of the body for energy. Use the diagrams included in the activities on the stomach and intestines to point to the different parts of the body that digest the food.

As soon as the food enters the mouth, the saliva begins to mix with the food while we chew. That means we begin to digest the food. If the food is a liquid, like milk, we don't chew it, but it goes directly to the stomach where it is also digested. Digestion is the process in which chemicals in the mouth, stomach and intestines change food into a liquid form. The blood cells then pick up food from the lining of the intestines to take to the body cells. The process of digestion continues in the intestines, which are long tubes that contain the digested food from the stomach. The intestines then eliminate it, getting rid of what is left as "waste".

Water is not food. Therefore we do not digest it. We use water in the process of digestion. That is one important reason why we must drink the necessary amount of water every day for the body to work well.

Using a model/diagram of the stomach and intestines, the teacher discusses the functions of the stomach and intestines. Write sentence strips as the students discuss the process. Use these strips in the **Writing Center.**

The Stomach

1. The stomach is like a stretched plastic bag that holds food while it digests it. It takes about 10 minutes for the food that is swallowed to reach the stomach.
2. Food reaches the stomach through a tube called the **esophagus.**
3. Little glands in the stomach make acids that digest the food.
4. Once the food enters the stomach, the muscles begin to move the walls of the stomach.
5. The stomach muscles mash the food to mix it.
6. The acids and the mashing help to break the food into smaller pieces, to "digest" it.
7. The stomach has a valve like a door in it that closes to keep the food inside.
8. The stomach of an adult can stretch to hold almost two quarts of food.
9. When the stomach has digested the food as much as it can, the valve opens and the food travels into the small intestine.
10. When the stomach is empty, it shrinks like a balloon without air!

Next the teacher focuses on:

The Small and Large Intestines

1. The small intestine is a muscle about 20 feet long.
2. The muscle wall of the small intestine contracts, pushing the food into the large intestine.
3. The body digests food as it pushes it through the small intestine.
4. Digestive enzymes break food into very small parts.
5. Digestion takes from four to eight hours.
6. After we digest food, it passes into the blood to provide energy for the body.
7. Tiny, hairy, finger-like things called villi line the small intestine.
8. The villi absorb or suck in food and pass it into the blood.
9. The villi also help push the waste down into the large intestine.
10. The large intestine receives the waste products from the small intestine.
11. It takes the waste in the large intestine from 10 to 12 hours to complete its route.
12. The muscle wall pushes waste through five feet of large intestine.
13. Water is taken out of the waste to be recycled in the body.
14. The rectum pushes the solid waste out of the body.
15. It takes about 24 hours for food to travel from the mouth to the rectum.

The students use the cutouts of each of the organs — the stomach, the large and small intestines — and locate them in their appropriate place on the body diagram. The students color the organs using colors suggested by pictures they have seen in the reference books.

Organizing the Idea

At the **Writing Center**, the students working in groups of three, write down all they can remember about the stomach and intestines, explaining the digestive process in sequential order.

Closure and Assessment

The teacher can do much of the assessment for this lesson while the students work on the various activities of the lesson. The objective here is to have the students understand where the stomach and intestines are located and understand that the body prepares food for use in a long digestive process.

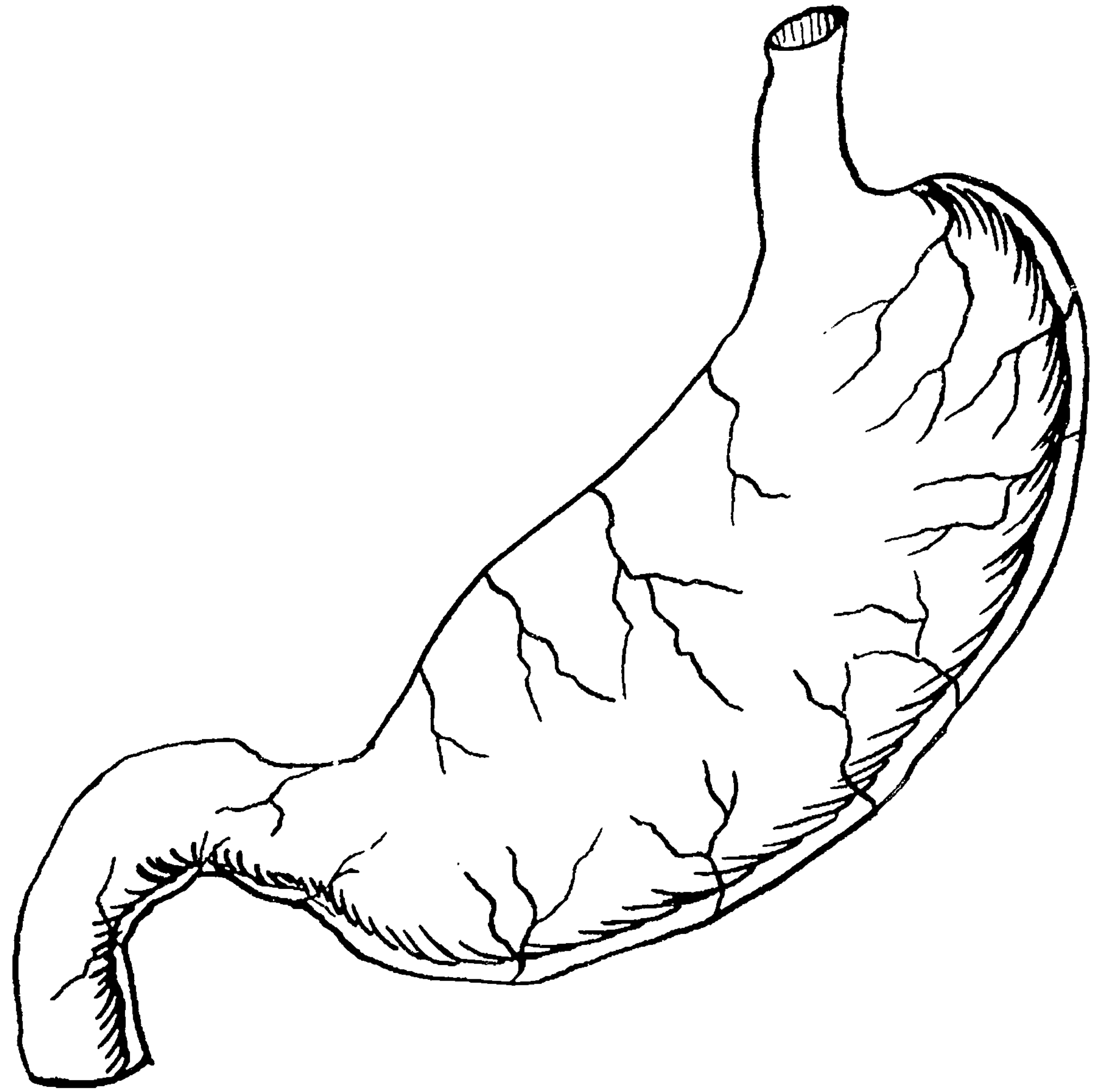
List of Activities for this Lesson

▲ The Stomach

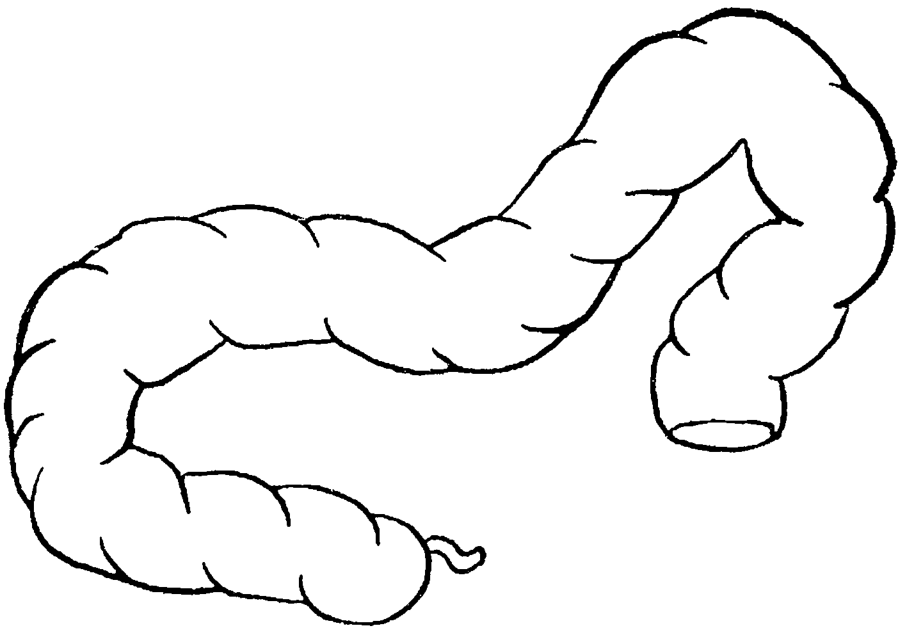
▲ The Large Intestine

▲ The Small Intestine

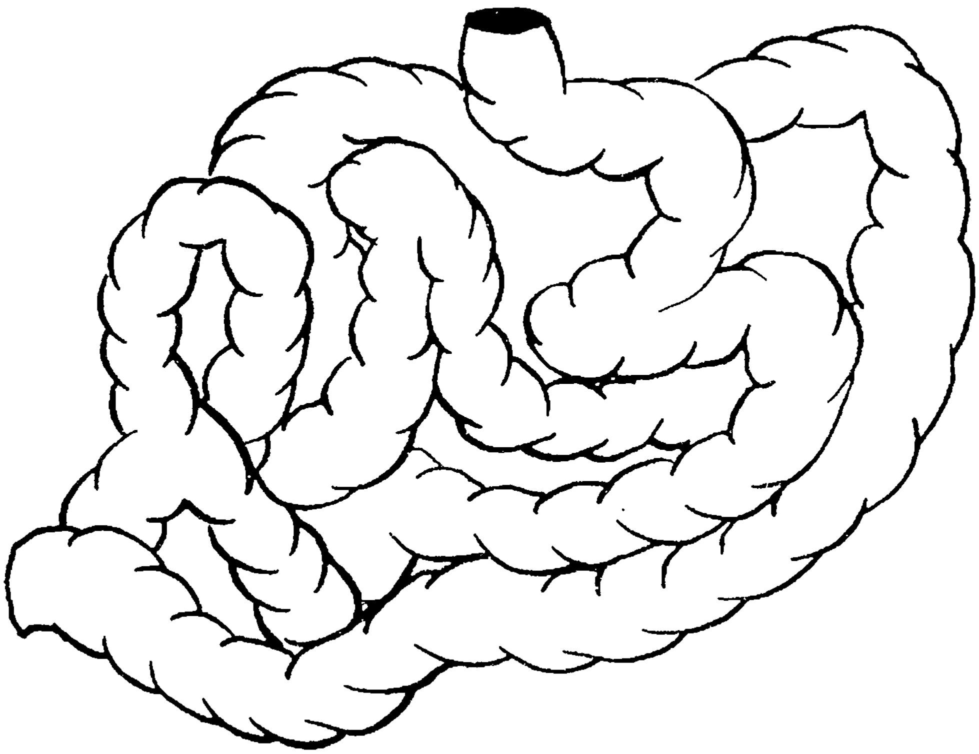
ACTIVITY
The Stomach



ACTIVITY
The Large Intestine



ACTIVITY
The Small Intestine



LESSON 8 Liver, Kidneys, Skin— The Great Eliminators

BIG IDEAS Because the body is a living organism, it produces waste that it must eliminate as it uses up energy.

Whole Group Work

Materials

Book: **The Magic School Bus: Inside the Human Body** by J. Cole
Microscope; glass/plastic slides; two-inch, square pieces of gauze
Human Body charts/models; reference books on the human body
Strainer with small gauge; mixture of black pepper in water
Empty jar for water; kidney beans
Word tags: liver, kidney, skin, eliminate, waste

Encountering the Idea

After a period of strenuous activity (probably after a physical activity during recess), the teacher has three or four students wipe perspiration from their faces, neck and forehead onto a glass or plastic slide. Place all slides except one or two at the **Science Center** to examine later for residue after the perspiration dries.

The teacher asks the children to hypothesize what they will see on the slides. The teacher demonstrates that we can separate wastes, using a mixture of black pepper in water and a strainer (a piece of gauze). Strain the mixture through the strainer while allowing the liquid to empty out into the jar. Students discuss what happened to the "waste". What did the process require?

Exploring the Idea

Using models/diagrams or the book **The Magic School Bus: Inside the Human Body,** the teacher shows the location of the liver, the kidneys and the layers of skin and discusses as follows.

The Liver

1. The liver is the largest organ in the body. It helps keep the blood clean.
2. The liver takes out sugar and vitamins the body cannot use immediately from the blood and stores them for use when they are needed.
3. The liver stores fats and starches for future use.
4. The liver manufactures a substance that makes blood clot in wounds inside and outside the body.
5. The liver manufactures bile needed to digest food.
6. The liver makes special cells called antibodies. Antibodies fight disease.

The Kidneys

1. The kidneys look like two large beans (kidney beans).
2. The kidneys produce urine, which is a liquid containing wastes, which goes into the bladder.

3. The kidneys clear the blood of waste through the urine.
4. A person may live life with one kidney and, at times, with one-half.

The Bladder

1. The bladder holds urine until it is full.
2. When the bladder is full, we feel uncomfortable and need to empty it. Then we go to the toilet to empty it.

The Skin

1. The skin covers our entire body and protects it.
2. The skin helps get rid of waste through perspiration.
3. The skin on the fingers has a unique pattern for each person.

The Pancreas

1. The pancreas is a gland that helps digest food and helps the body use the food's sugar.
2. The pancreas makes a liquid called pancreatic acid. This acid travels to the small intestine to digest food.
3. The pancreas makes another very important substance called insulin. Insulin helps the body burn extra sugars the body cannot use. If the extra sugar is not burned up it is stored, sometimes causing the body to gain weight.

The Spleen

1. The spleen helps destroy worn-out red blood cells, sending any leftover usable cell parts back for reuse in the making of new red blood cells.
2. The spleen stores red blood cells to use when necessary.
3. The spleen makes white blood cells that fight to help destroy infections in the body.

The Gall Bladder

1. The gall bladder is a storehouse for the body.
2. The gall bladder stores a greenish-yellow liquid called "bile" to help digest fats.
3. The gall bladder is under the liver and is shaped like a very small pear.

Getting the Idea

Since the skin covers the entire external parts of the body, we can easily see it and observe it. Because we cannot see them, the liver and kidneys are internal organs that are difficult for us to think about beyond having heard the words "liver" and "kidneys." It is important to show a variety of pictures and, if possible, models of the human torso showing the two organs. Point to the liver and have students use their fingers and palms of their hand to point in the general area of their own livers. The kidneys are in pairs, one on either side of the spinal column. The liver, kidneys and skin share a very important function — they take out body wastes.

The teacher tells the students that the body functions very much like a machine that needs energy to work. As it produces energy from the food it digests, the body makes byproducts called "waste". Then the body has to rid itself of this waste; it does, in part, through the liver, the kidneys and the skin.

The blood collects wastes from all the parts of the body and takes it to the liver, kidneys and skin. Then the wastes separate from the blood and expel in different ways. If the body cannot get rid of these wastes, it becomes ill.

Students discuss the concept of "waste", using examples such as vegetable peels, peanut husks and others.

Students complete **Activity** — Fingerprints.

Students locate and glue (in their appropriate place) the kidneys, bladder, liver, spleen, gall bladder and pancreas.

Organizing the Idea

List examples of waste; in their journals, the students draw the liver, kidneys and skin and show how they work.

Students complete **Activity** — Body-building Cookies.

Applying the Idea

At the **Mathematics Center**, each student collects fingerprints from five **different** students. Working in groups of four, the students examine the prints and describe them in terms of lines, ovals, whorls, ellipses and other geometric forms.

Closure and Assessment

1. Why are fingerprints or footprints used for identification in important documents such as birth and police records?
2. Why does the body create waste?
3. What organs help the body to get rid of waste?
4. What happens if the human body does not get rid of waste?

List of Activities for this Lesson

▲ Fingerprints

▲ Body-building Cookies

▲ Liver, Kidneys

▲ Pancreas, Spleen, Gall Bladder

ACTIVITY
Fingerprints

Objective
The student says that each individual has a unique set of fingerprints; our skin leaves small amounts of body oil on things we touch, and the oil remains as a pattern called a fingerprint.

Materials
Ink stamp-pad; small amount of talcum powder; clean sheet of white absorbent paper per student; several glass tumblers recently washed and thoroughly dried; small sponge

Procedures
Part 1
1. Ask several students to run their fingers over their forehead, nose and neck, and then to pick up a clean glass and hold it in their hands.
2. Lightly sprinkle talcum powder over the areas where the students touched the glass. Blow away the excess powder.
3. The students describe what they see. What are these called? Fingerprints.

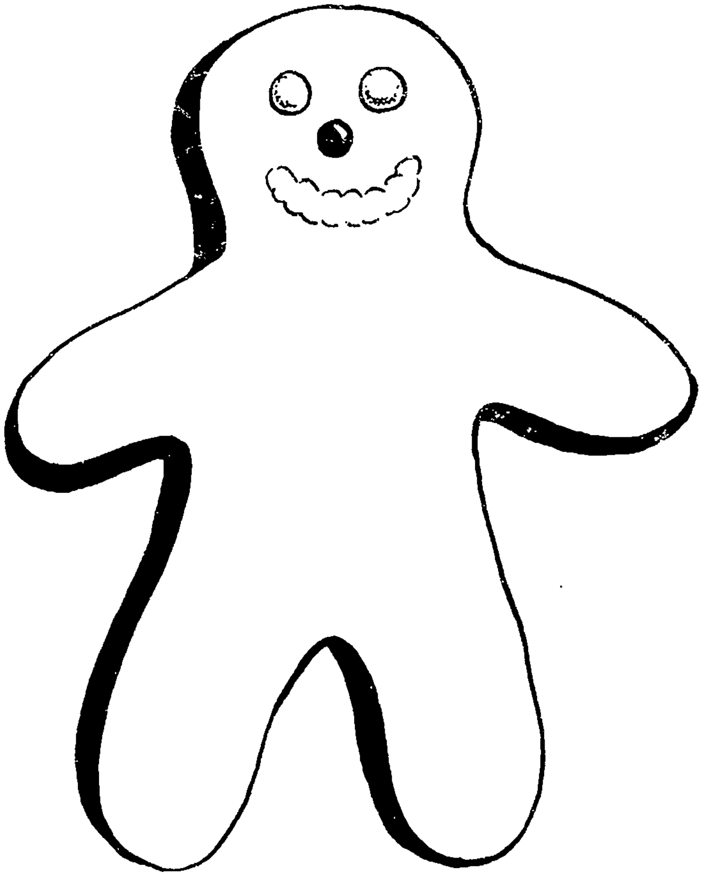
Part 2
1. Using an ink stamp-pad, apply ink to a small sponge.
2. A student **lightly** rolls the right forefinger with a slight right-to-left rolling motion on the sponge. Make sure the student doesn't press the sponge.
3. Immediately after applying the ink to the finger, the student places that finger on a sheet of absorbent paper, using the same rolling motion.
4. The students study the fingerprints made by different individuals.
5. The students describe the fingerprints in terms of ovals, curves, lines that appear to be parallel, whorls and other geometric shapes.
6. The students look for patterns among an individual's fingerprints of his/her different fingers.
7. The students compare fingerprints of different students, using terms related to geometric figures.

Discussion
1. In the first part of the activity, what was on your fingers that left the prints on the glasses? (Oil.)
2. How did the oil get on your fingers? (We touched our face, etc.)
3. Did you have to touch your face or other parts of your body to leave prints? (No, but we did this to make sure we could see the prints.)
4. What do we know about the skin and fingerprints? (Our skin helps our bodies eliminate waste in the form of oil or perspiration; when we touch things our fingers leave an oil pattern that is unique to each individual.)

ACTIVITY
Body-building Cookies

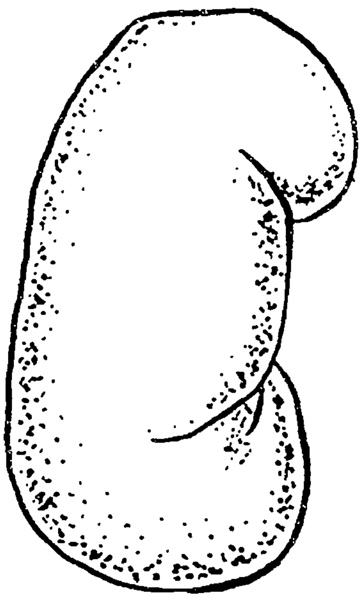
Mix
1/2 C. margarine
1/3 C. sugar
one egg
1/2 tsp. vanilla
1/4 C. all-purpose flour
1/4 tsp. salt
favorite food coloring
sprinkles or other decorations

Shape and bake at 350° for eight to 10 minutes

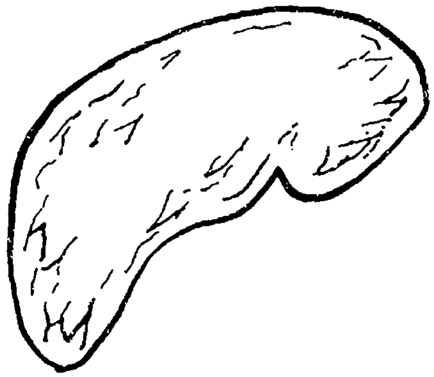


ACTIVITY
Liver, Kidneys

Kidney

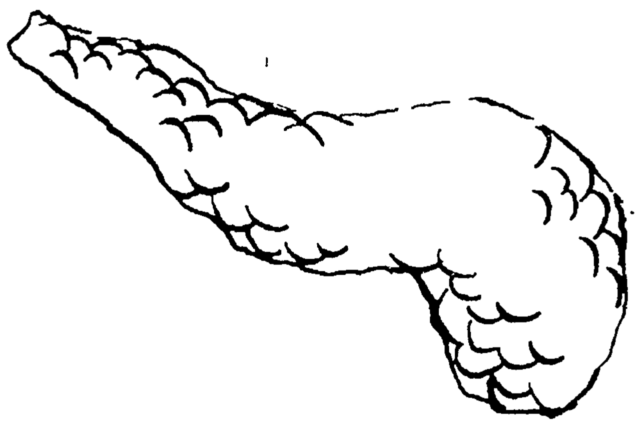


Liver

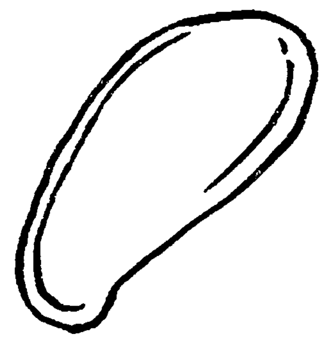


ACTIVITY
Pancreas, Spleen, Gall Bladder

Pancreas



Spleen



Gall Bladder

LESSON 9 The Brain— The Master Computer

BIG IDEAS The brain is like a computer that controls all the body functions; the nerves are the electrical system that helps it work.

Materials

Models/illustrations of the brain and the nervous system
Books: **Harry and the Terrible Whatzit** by D. Gackenback and/or **One Foot, Now the Other** by T. de Paola
Tray or transparency with about 10 items

Encountering the Idea

The teacher asks the students to recall the story of **Harry and the Terrible Whatzit.** Ask one of the students to review briefly the story for the class. What made Harry afraid? (His imagination.) What do we use for our imagination? (Our minds, our brains.) The teacher asks the students to recall the story **One Foot, Now the Other.** What happened to the grandfather? (He had a stroke, which means that some of the cells in his brain were damaged or hurt; he was not able to move and had to be taught how to walk again.) Today, we're going to discover many new things about the brain and all the wonders it can perform. Not even the most advanced computers in the world today can do some of the things our brains can do.

Exploring the Idea

At the **Science Center,** the students complete **Activity** — The Nerves Form a Circuit.

Voluntary Movement

Tell the students that they are now going to play **Simon Says.**

Simon says: Touch your nose.
Simon says: Jump up.
Simon says: Touch your toe.
Simon says: Say hello.

After several turns, the teacher says: You did very well. Only a few of you forgot to say "May I?" before following the instructions. That's very good. Now let's talk about what we did. After Simon says for you to do something, what makes your body obey Simon? After I said, "Yes, you may," what happened that made you do what Simon said? Your brain told you to do it? Why did some of you forget to ask: May I? Oh, that's right, your brain forgot to remind you! Let's play this game, now that many of you are familiar with.

Memory

Now, we're going to change the game. The teacher puts a variety of small objects on a tray or uses a transparency with several items drawn on it such as a pencil, marble, paper clip, etc. and lets students look at the items for 30 seconds. The teacher says: This game is sometimes called **Concentration.** Then without the students looking, the teacher removes a few of the items from the tray. Then she asks students to look at the tray again to see what is missing. The students try to recall all the items on the tray. The teacher replaces the items, and they play the game again to see who can remember the most items. After the students have done this several times, add more items to increase the challenge to remember. (Then place the tray in the **Science Center** for students to improve their ability to recall the items.)

Now, let's talk about the game and what you had to do to play the game. Why is it called "Concentration"? What does concentration mean? Is it the same as thinking? What are some other words you can use to describe what you do to win in this game? Pay attention? See the items in your imagination? Did any one count the items and try to remember them in numerical order? Did some of you group them as writing materials or something else? What was helping you remember, concentrate, think and so on? Yes, your brain. We are now going to play a different game.

Feeling

Working in pairs, the students determine which parts of the body are more sensitive to touch than other parts. Asking a partner to close his or her eyes the student places **the tips** of a finger **lightly** on the partner's back, the shoulder, the forearm, the neck and the forehead. Sometimes they will use one, two, or three fingers, asking their partners to say how many fingers they feel. They will trade places and have their partners test their sense of touch the same way. The students record their sensations for comparison with the other groups.

The students compare and summarize the results of which body parts they judge to be more sensitive than others. They hypothesize about why some parts of the body are more sensitive than others.

Involuntary Motion

Ask the students to sit quietly and tell their hearts to stop beating. Can they do it? Can we make ourselves stop breathing? Tell the students to tell their stomachs and intestines not to digest their food. Can we do that? Let's tell our kidneys to stop cleansing our blood. Can we do that? No, we cannot **deliberately, on purpose,** tell our bodies to do certain things. Who knows what makes our body organs such as the heart, lungs, stomachs, intestines and kidneys continue working and doing the job at the time they need to do it? **That's right — the Brain.** The brain keeps track of all the things these body organs need to do and keeps them on schedule — just like a super computer. There are some motions that are **voluntary,** that we can do by thinking that we want to do them, just like we did when we played the games. But there are some **involuntary motions** the body does through the action of the brain. We don't have to take care of those actions by thinking about them. Now, we are going to discover how the message from the brain gets to our arms when we are playing "Simon Says."

Getting the Idea

The teacher tells students to put one hand on their forehead and the other on the back of their head, just above the neck. They are holding their skull which holds their **brain.** If they run their fingers down the back of their neck they can feel the neck bones that support the **spinal cord.** The brain connects with the spinal cord.

The brain controls all of our actions, both voluntary and involuntary, because it acts like a computer, but it works in a way that is like an electric circuit. (At this point, review the questions at the end of **Activity** — The Nerves Form a Circuit to make the analogy clearer to the students.)

The brain sends the messages through the spinal cord from your brain to the arms and legs. The **nerves** act like wires that carry the message.

Using diagrams and/or drawings, the students discuss the following ideas.

The Nervous System — the Brain, the Spinal Cord, and the Nerves

1. The brain looks gray, wrinkled and coiled, and it is about the size of your two fists together.
2. It will weigh between two and three pounds when it is an adult brain.
3. It is very fragile and soft.
4. The skull protects the brain.
5. The brain connects to the spinal cord.
6. The spinal cord has many nerves bundled together, and the bones of the spinal column protect the spinal cord.
7. Nerves are like little telephone wires that send messages from the brain to all over the body.
8. Some of the messages go to the different parts of the body through the spinal cord.
9. The spinal cord not only sends out and receives messages from the brain, but it also controls some involuntary actions (i.e. blinking the eyes when something is coming in).
10. The brain keeps the heart beating, the lungs breathing and it tells the muscles when to move. The brain thinks and remembers things.
11. The brain is where we see, hear, taste, smell and feel.

Organizing the Idea

Students make the cut-out diagrams of the brain, the spinal cord and nerves to include in the larger body diagram. They write about the brain, spinal cord and nerves in their journals.

Students write a patterned "Most Important Thing" paragraph about the brain, spinal cord and nerves.

Closure and Assessment

1. What is the part of our body we use to think? What other things does the brain helps us do?
2. What are some of the amazing things our brains can do?
3. How does the brain receive messages?
4. How does the brain send out orders?
5. What can we do to help our brain to think better?

List of Activities for this Lesson

▲ The Nerves Form a Circuit

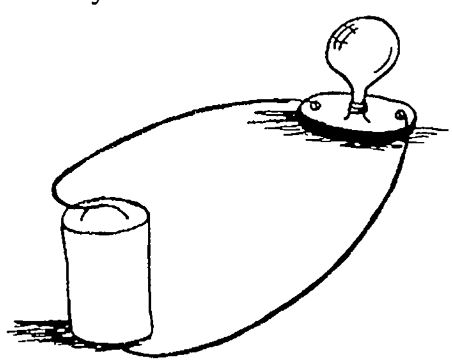
▲ The Brain

ACTIVITY
The Nerves Form a Circuit

Objective
Students say an electric circuit can transfer energy from a source through wires and a socket to light a small bulb.

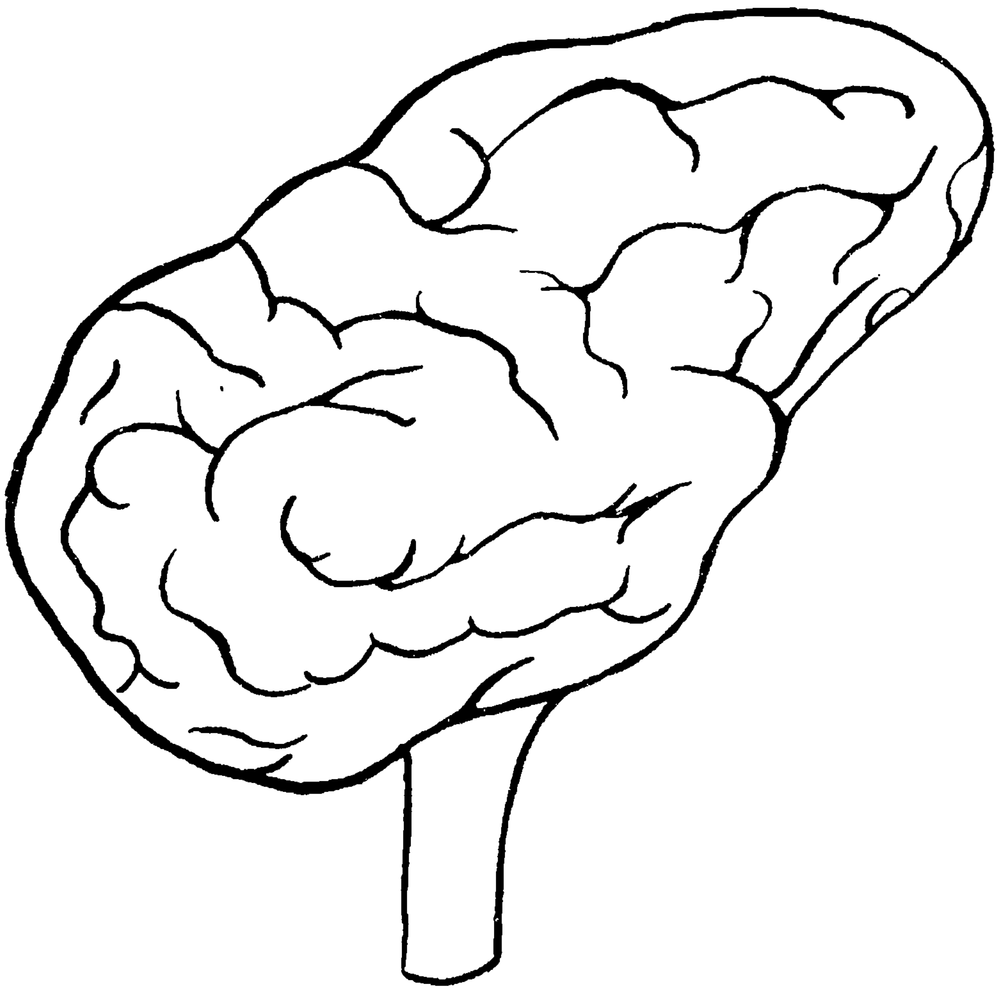
Materials
1½-volt flashlight battery (safe for classroom use)
Two 25-cm. (10 in.) lengths of single-strand insulated copper wire of 20 or 22 gauge, also referred to as bell wire
Small light socket with flashlight bulb; small screwdriver; wire cutter and stripper; duct tape

Procedures
1. Using the wire cutter and stripper, strip about 1/2-inch (about one cm.) off the ends of the two pieces of copper wire.
2. Connect the wires to the battery with duct tape, then to the socket with the bulb. Electricity will flow from the battery (power source) to the light bulb only if there is a closed path from one battery terminal (end) to the other.
3. Electric current will go through the copper wire but not through the plastic or rubber insulation (covering). Thus, students can work with the parts of the circuit without getting shocked only if they hold the wires on the insulated parts.
4. The bulb must make connection with the current, thus screw the bulb tightly in the socket. If the path to the battery is broken, the bulb won't light. The wires must be tightly connected with the screws on the socket.
5. Give the circuit kit (wires attached to the socket) to the students and let them discover how to make the circuit work by screwing the bulb in and touching the bare ends to the battery. They will discover that both bare ends of the wires must touch the battery terminals.



Getting the Idea
1. What type of energy is flowing from the battery to the light bulb? (Electricity, electrical.)
2. How does the electricity have to travel? (In a closed path.)
3. What does the word "circuit" sound like? (Circle; a circle is a closed path the electricity must have in order to get from the battery to the light bulb.)

ACTIVITY
The Brain



LESSON 10 Reproduction— A New Human Begins

BIG IDEAS Humans reproduce when an egg cell from the mother and a sperm cell from the father unite. The united cells begin to separate many times to form a new human being.

Materials

Book: **We Are Having a New Baby**, by V. Holland, **El Libro del Cuerpo** by C. Rayner

Slides of different types of cells, from a previous lesson; microscope

Word tags: egg cell, sperm cell, reproduction, mammal

Encountering the Idea

The teacher reads the story **We Are Having a New Baby** aloud for the whole group. After reading and discussing the book, ask the students how new humans begin. We know that all living things reproduce. Plants reproduce in their way and animals reproduce in a different way. For example: How do chickens reproduce — how does a new chicken begin? (The mother chicken lays an egg, the egg cracks open and a new chick hatches.)

Is this the same process for new puppies? (No, puppies are made inside the mother dog and are born from the mother as soon as they are able to live outside the mother.) Is this is the same for kittens? Yes, kittens are born the same way that dogs are born. What about horses? Name other animals that are born from inside the mother. The students give examples. These animals are called "mammals".

Do you know how a new baby begins life? Students offer their opinions. Yes, a human baby is also born from inside the mother after it develops enough so that it can live outside the mother's body. But this is not where life begins. In this lesson, we are going to discover how a new human being begins.

Exploring the Idea

All cells in living organisms come from two special cells: an egg cell and a sperm cell. In this next activity we are going to examine a cell — a very large one — a chicken egg.

The students complete the **Activity** — An Egg Cell.

Of course, we know that humans do not hatch from eggs, like chickens. Humans, do, however, develop from the union of two special cells — an egg and a sperm.

The teacher asks students to use the magnifying glasses to examine their skin. The teacher asks if someone has recently cut himself/herself. If a student has an injury that can be shown, ask the student to show how the injury has healed or is healing. Students examine the injury with the magnifying glasses, also. If no one has an injury to examine, ask the students to describe some injuries they have had and how they healed. Ask the students: What makes it possible for the body to heal an injury? (Cells die and new ones are made.) When you get a scrape on your arm, what happens to the scrape? (It heals because new cells form.) The body makes new skin cells that take the place of the injured ones. Sometimes when the injury has not completely healed, you can see that the new skin is red and a little tender. But, in a few days, the scrape is gone, and you can no longer see where your skin broke. How does the body do this? The body creates new cells. This is what we will study to find out how a new human being begins.

Working in small groups, the students look at cell slides with a microscope. First we have to understand that the body is made of different types of cells. We have talked about cells in another lesson. We know that each human body is composed of millions and millions of cells. But every cell in our bodies has come from two very special cells. When these two special cells unite, a new human being begins. The new human begins when the two cells unite and begin to make new cells. The mother's body gets ready to have the baby grow, and the cells continue to multiply until the baby is born.

Getting the Idea

There are many events that have to take place before a human being is born.

1. A young girl and a young boy need to grow to become adults in order for them to have children. Becoming an adult means the different parts of the body grow and change; for example, the arms and legs become longer and stronger.
2. When children are almost adults, special organs in their bodies begin to develop. These organs are important for making babies.
3. A girl develops two egg sacs that contain many egg cells that can become babies. These two sacs attach to the **uterus.** The uterus is below the stomach deep inside the girl's body. The uterus is an organ that is like a pouch where the baby can grow. The girl's breasts begin to grow to make milk to feed the baby after it is born.
4. At the same time a girl begins to change into an adult, a boy that is almost an adult begins to change. Boys have sacs where the **sperm cells** begin to develop. These two sacs and the **penis** are located between the legs.
5. A girl cannot make a baby herself. A boy is needed to make a baby. When the boy and girl become adults and want to have a baby, the man uses his penis to deposit the sperm cells into the woman's body. The sperm cells travel to the uterus to join the egg cell in the mother's body.
6. A new human begins with the meeting of the two cells — the egg cell from a woman and the sperm cell from the man.
7. As soon as the two cells unite, they become one cell. This new cell divides to create many new cells. These cells divide very fast. In about nine months, the new baby that is growing inside the mother is ready to come out to live on its own. At this time, there is a **new human being.**

Organizing the Idea

At the **Art Center,** the students

1. draw and color the different cells they saw under the microscope
2. draw, label and color the different parts of the chicken egg cells they studied.
3. write a paragraph listing the steps in sequential order in the development of a new human being.
4. cut out the diagrams of the reproductive organs and place them in the appropriate place on the body diagrams.

Applying the Idea

How do new chickens and new human beings begin their lives in ways that are alike and ways that are different? The new chick begins **when an egg cell units with a sperm cell,** and a baby also starts when an egg cell from the mother unites with a sperm cell from the father. The chicken lays the egg, and **the chick develops outside the mother hen** until it hatches. In a human being, **the baby stays in the mother** until it can live by itself outside the mother.

List of Activities for this Lesson

- ▲ An Egg Cell
- ▲ The Reproductive Organs

ACTIVITY
An Egg Cell

Objective
The student says that a chicken egg is a cell that when united with a sperm cell develops into a baby chick.

Materials
Plastic cup and chicken egg for each student group; all the eggs should be fertilized, if possible

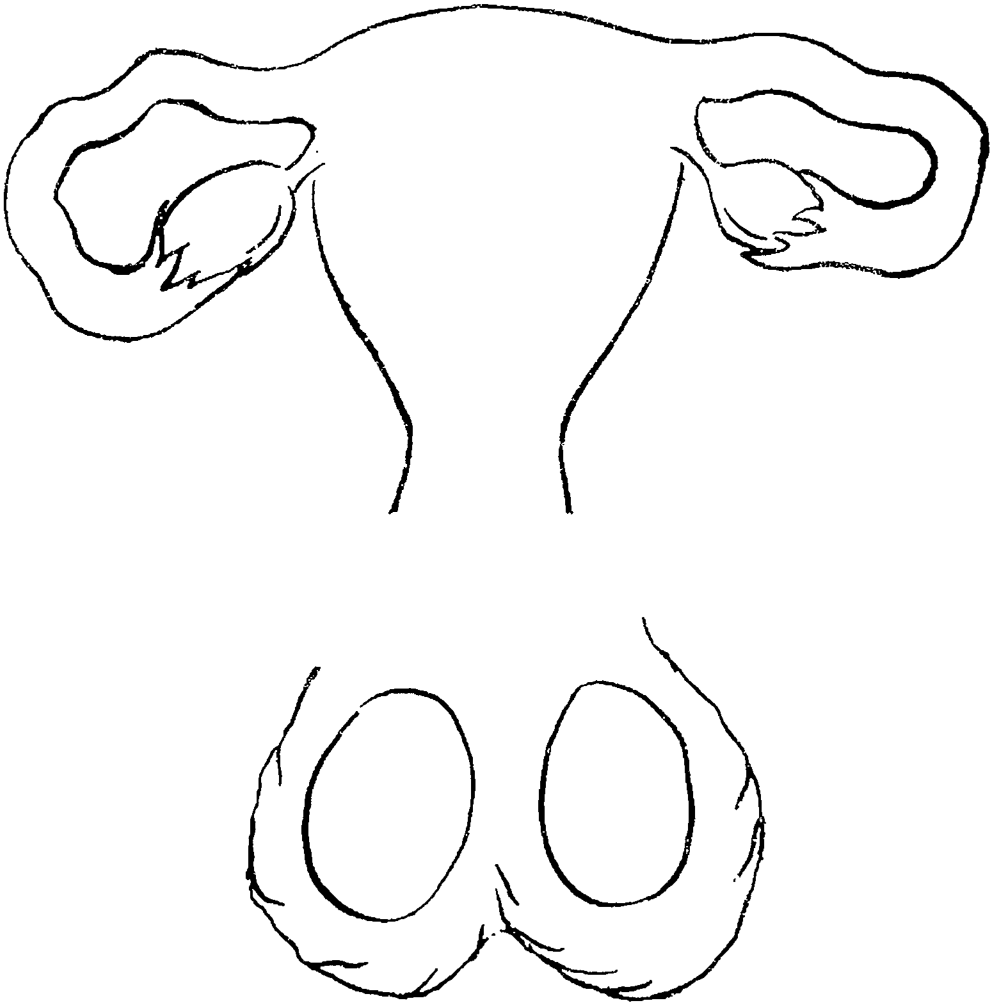
Measuring tape marked in inches and centimeters; a balance; metal washers to use to find the mass of the eggs

Procedures
1. Each student group is given a chicken egg and a plastic cup.
2. The students describe the egg. They record their observations: outside cover, shape, color, texture, mass it with the metal washers, measure it in length, measure its circumference with a tape.
3. The students carefully crack open the shell and place the egg white and yolk in the cup. They do not discard the shell.
4. The students describe the contents in the cup: color; shape, texture, odor.
5. The students look for a small crystalline object attached to the yolk. The teams that find the object show it to those teams that cannot find it.
6. The students describe the object. Is it small or large in comparison to the yolk? What is its shape?

Discussion
Tell the students that a chicken egg is a cell. The shell is the outside membrane that holds the contents of the egg. The egg white is the cytoplasm, and the egg yolk is the nucleus.

1. Let's describe the egg we had before we cracked the shell. (Students report their observations.)
2. After we cracked the shell, how many parts did we see? (The shell, the egg white, the yolk and, in some of the eggs, a small object attached to the yolk.)
3. The eggs that have a small clear object attached to the yolk have been **fertilized;** that means that another cell, a **sperm,** has attached itself to the nucleus of that egg cell; the two cells — the egg cell (the yellow part) and the sperm (the clear small object) have united.
4. If the fertilized eggs had been kept in a warm place, they would have developed into baby chicks. The eggs that were not fertilized would not have produced a baby chick.

ACTIVITY
The Reproductive Organs



UNIT ASSESSMENT

Oral Interview

1. How does our brain control our actions?
2. How do we grow?
3. How do we protect ourselves?
4. Do we need all of our body parts? Why?
5. Which book of the ones we used in this unit was your favorite? Who was the author?

Product/Performance

Using cutouts of the different organs such as the stomach, small intestine, large intestine, liver, pancreas, kidneys, spleen, have students place them on a large sheet, labeling each part.

Written/Oral

1. Fill in the blanks with one of these words.

heart	air	carbon dioxide
lungs	changes	food
liver	nerves	organs
kidneys	minute	sperm cell
skin	hour	egg cell
cells	day	
stomach	energy	
brain	bones	
muscles	blood	

My body is made up of many, many ________. My body grows and ________. My _____controls all my actions. My brain receives messages from the ________. My heart pumps _____ to all the parts of the body. The heart's beat is described in beats per _____. The lungs take in _____ and separate the oxygen from it. My lungs expel ________. When I walk, I use my _____ and my _____. My stomach and intestines prepare the ________ I eat so my body can use it for _____. My body is made up of many _____. A new human begins when a ________ from a boy unites with an ________ from a girl.

2. Choose one of these. Draw it and tell what it does.

Lungs	Stomach
Bones	Brain
Heart	

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The author explains how our bodies make use of the good things we eat.

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Explains the basic properties of skin, how it protects the body, and how it can vary in color.

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Describes how many teeth we have at various stages of life, why they fall out, and what they do.

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unit

1 Good Health

Prior Knowledge

The student has

1. constructed sets of objects lesser than or equal to 100
2. added and subtracted with single-digit addends
3. estimated and measured length.

Mathematics, Science and Language Objectives

Mathematics

The student will

1. measure length, temperature and/or time
2. give examples of ordinal numbers and, given a set, find a given ordinal position
3. show equivalent volumes in several ways, using given containers
4. compare single- and double-digit numbers
5. give examples of other names for a number, to show what "equals" means
6. collect data by counting
7. write and solve original addition and subtraction problems with single- and double-digit addends
8. make and read graphs and charts summarizing collected data
9. examine repeated addition in preparation for multiplication
10. group by a given number in preparation for division
11. make inferences from observations
12. use rates to describe events
13. name geometric shapes.

Science

The student will

1. say that good health means that a person feels well, has energy and is free of illness
2. list at least four things that help us have good health
3. list at least one consequence of lack of good nutrition
4. name the five food groups and give examples of each
5. describe health care practices that promote good health by
   a. describing practices that promote cleanliness
   b. listing exercise and rest as important to good health
   c. listing at least three ways to prevent disease
6. practice safety by
   a. describing the danger of substance misuse
   b. practicing school and household safety
7. mass objects in a pan balance
8. name at least three health care professionals.

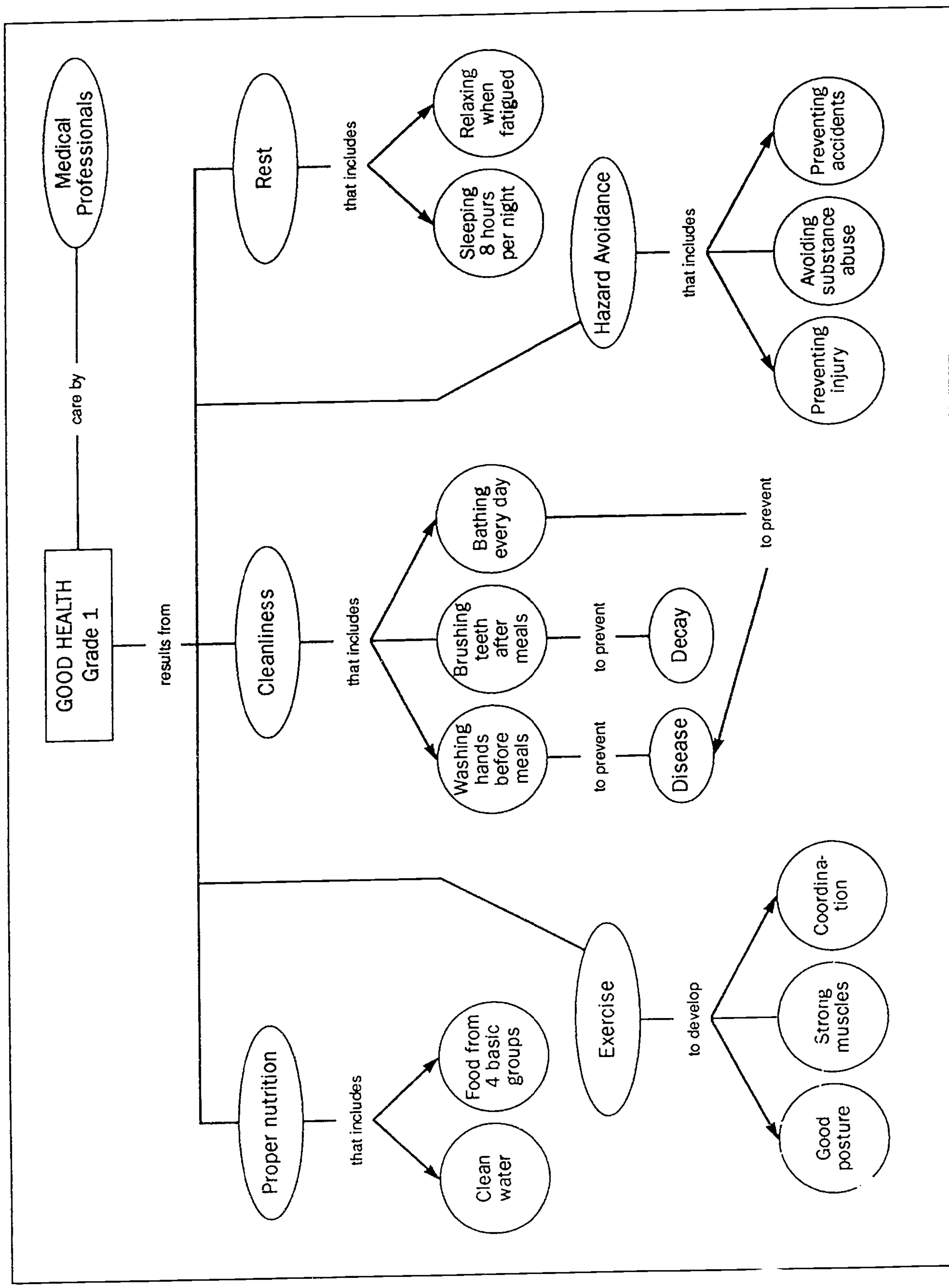
Language

The student will

1. discuss a story or book used in this unit
2. retell a favorite story or personal event that relates to good health and safety
3. write or ask a question regarding good health and safety
4. use formal and informal pronouns
5. write a paragraph, a poem, skit, story, etc., about good health and safety
6. use reasons to persuade (verbally) a peer or an adult.

VOCABULARY

drugs drogas	medicine medicina	prescription receta	poison veneno
hazardous peligroso	health salud	regular regular	safety seguridad, protección
energy energía	balance balance	growth desarrollo	balanced meals comidas balanceadas
breakfast desayuno	lunch comida	dinner cena	food groups grupos de nutrición
bread pan	cereal cereal	milk leche	snacks bocadillo, merienda
fruit fruta	vegetables legumbres	bacteria bacteria	chemicals substancias químicas
habit hábitos	exercise ejercicio	preventive preventivo(a)	disease enfermedad(es)
milk group grupo lacteo	rest descanso	windmill molino	bread/cereal group grupo de cereales
mold moho	comb peine	brush cepillo	fruit/vegetable group grupo de frutas y legumbres
towel toalla	rinse enjuagar	washcloth trapo de lavar	lather espuma, jabonadura
scrub fregar	shampoo champú	hygiene higiene	toothpaste pasta dentrífica
soap jabón	mold spores esporas de moho	toothbrush cepillo de dientes	suds espuma


GOOD HEALTH
Grade 1
care by
Medical Professionals
results from
Proper nutrition
that includes
Clean water
Food from 4 basic groups
Exercise
to develop
Good posture
Strong muscles
Coordination
Cleanliness
that includes
Washing hands before meals
Brushing teeth after meals
Bathing every day
to prevent
Disease
to prevent
Decay
to prevent
Rest
that includes
Sleeping 8 hours per night
Relaxing when fatigued
Hazard Avoidance
that includes
Preventing injury
Avoiding substance abuse
Preventing accidents

CONCEPT WEB

Teacher Background Information

Children need to develop habits early in life that lead to good health and safety. As they learn about the body's systems and related functions, the students associate these functions with the need for maintaining their good health through appropriate nutrition, cleanliness and hygiene habits, and through proper exercise and rest. Children can also develop an awareness of the great dangers of using inappropriate substances such as cigarettes, inhalants and other drugs.

Since students' understanding of appropriate health habits can be enhanced when they are aware of the body's capabilities, functions and limitations (e.g., it cannot utilize cigarette smoke as a nutrient) it is recommended that this unit on health and safety follow the unit on the human body. The latter unit will provide the information needed for students to understand the necessity of developing and maintaining good health habits.

LESSON FOCUS

■ **LESSON 1** — ***Good Heath Equals Good Living***

BIG IDEAS Good health helps us enjoy life. What does "equals" mean?

■ **LESSON 2** — ***You Are What You Eat***

BIG IDEAS Proper nutrition is the first principle of good heath. "First" is an ordinal number.

■ **LESSON 3** — ***Popeye Is Right!***

BIG IDEAS Water and minerals (like spinach) are necessary for growth and strength. Counting can help us have good health.

■ **LESSON 4** — ***R - S - R for Good Health***

BIG IDEAS During periods of rest, sleep and relaxation, body functions slow down for the body to regain energy and remove body wastes; we can measure these changes.

■ **LESSON 5** — ***Our Friends — the Suds***

BIG IDEAS Frequent washing and bathing remove bacteria that cause illness. Numbers, like bacteria, can grow very fast using multiplication.

■ **LESSON 6** — ***Exercise Is for Life***

BIG IDEAS Proper exercise helps the body maintain its good health and good looks. Keeping a chart helps us develop good exercise habits.

■ **LESSON 7** — ***Practicing Safety Helps Our Health***

BIG IDEAS Avoiding illness and preventing injury are important for our health. Charts summarize information so that we can use it.

■ **LESSON 8** — ***The Health Professions***

BIG IDEAS Some of the most important professionals in our community are the people who help us maintain our health. Each of these professions requires knowledge of science and mathematics.

OBJECTIVES GRID

Lessons	1	2	3	4	5	6	7	8
Mathematics Objectives								
1. measure length, temperature and/or time		•	•	•				•
2. give examples of ordinal numbers and, given a set, find a given ordinal position		•						
3. show equivalent volumes in several ways, using given containers			•					
4. compare single- and double-digit numbers	•	•	•					
5. give examples of other names for a number, to show what "equals" means	•				•			•
6. collect data by counting		•			•	•		•
7. write and solve original addition and subtraction problems with single- and double-digit addends			•		•			
8. make and read graphs and charts summarizing collected data		•	•			•		•
9. examine repeated addition in preparation for multiplication					•			
10. group by a given number in preparation for division	•							•
11. make inferences from observations	•	•	•	•	•	•	•	•
12. use rates to describe events				•				
13. name geometric shapes.					•			•
Science Objectives								
1. say that good health means that a person feels well, has energy and is free of illness	•	•	•	•			•	
2. list at least 4 things that help us have good health	•	•	•	•	•		•	
3. list at least one consequence of lack of good nutrition	•	•	•				•	
4. name the 5 food groups and give examples of each		•	•				•	

Lessons	1	2	3	4	5	6	7	8
5. describe health care practices that promote good health by								
a. describing practices that promote cleanliness.					•		•	
b. listing exercise and rest as important to good health	•			•		•	•	
c. listing at least 3 ways to prevent disease		•	•		•		•	
6. practice safety by								
a. describing the danger of substance misuse							•	
b. practicing school and household safety							•	
7. mass objects in a pan balance			•					
8. name at least three health care professionals.								•
Language Objectives								
1. discuss a story or book used in this unit			•	•	•	•	•	•
2. retell a favorite story or personal event that relates to good health and safety		•			•		•	•
3. write or ask a question regarding good health and safety	•	•	•	•	•	•	•	•
4. use formal and informal pronouns	•	•	•	•	•	•	•	•
5. write a paragraph, a poem, skit, story, etc., about good health and safety	•	•	•	•	•	•	•	•
6. use reasons to persuade (verbally) a peer or an adult.	•	•	•	•	•	•	•	•

LESSON 1 Good Health Equals Good Living

BIG IDEAS Good health helps us enjoy life. What does"equals" mean?

Whole Group Work

Materials

Book: **I Want to Be Big** by G. Ivenson
Frame sentence: I don't want to be big enough to ..., but I want to be big enough to ...
Magazine pictures of persons enjoying various activities
Pamphlets from a local health services center showing appropriate health practices
Word tags: nutrition, diet, water, exercise, balance

Encountering the Idea

Ask students what they think people mean when they say: **An apple a day keeps the doctor away.** At the end of the lesson you will ask them what they think it means now that they have studied about good health.

Ask children if they have ever wished they were bigger or older. Is it important to just be big? We also have to be in good health to enjoy life. As you read the story **I Want to Be Big,** tell students to think of what good health is and why it is important. As they discuss the book, point out the structure of the frame sentence they will be completing later.

Tell students that now that they know what the human body is and can do and what it looks like, they know also that the body needs energy to do its work. What gives the body the energy it needs and what keeps it healthy? What are the body's most important needs? Air, food, water, other. As the students respond, write their suggestions on a poster to use later.

The first body need we will discuss is that for food. Why does the body need food? (For energy, to stay warm, etc.) But you know that the body also needs many other things to be healthy.

We are going to investigate some of the answers to our questions in the learning centers. Are there other questions you have about food? If so, let's write them down to think about as we do our explorations.

Exploring the Idea

Ask students to jump up and down in place for a few minutes. After they have started to breathe heavily, ask them to stop. Ask: Where did you get the energy to do that? (Food.)

Why? How does food give you energy? Students discuss the various roles of the body organs and cells in producing energy to function. Have you grown out of your clothes this past year? Why? (Have grown bigger and gained weight, etc.) Where do you get the building materials to grow bigger and gain weight? What foods will help you get a lot of energy and keep you growing at the same time? Remember, your bones need calcium to grow; where does the calcium come from?

Who feels like drinking water now? Why? After you exercise or work hard, you want to drink water. How do you feel after a lot of exercise? Yes, you feel hot. How does your body cool you off? (You perspire and that means you lose water that you must replace.) Does your body need water? How much water does your body need?

At the **Science Center,** each student walks on the balance beam and describes to a partner what she/he has to do to keep balance and to walk all the way across the beam.

At the **Mathematics Center,** the students complete **Activity** — What Does "Equals" Mean? and **Activity** — Almond Cookie Factory.

At the **Writing Center,** the students illustrate and complete the frame sentence: "I don't want to be big enough to ..., but I want to be big enough to ...."

Getting the Idea

Show students the pictures of the people enjoying various activities. Describe how the people look. Where are they? Indoors or outdoors? Is it cold or hot? Does the weather matter to people who are healthy? Are they active? Smiling? Do they look energetic? Are their eyes shining? List other descriptors that indicate that healthy people have a good time and can enjoy life.

Discuss what the students had to do to stay in balance on the balance beam. What does the word "balance" mean? What do you think the idea of balance has to do with good health? (You can't just play, or just sleep, or just eat, or just work or just do one thing for good health. You have to have a balance.)

How does perspiration, which is moisture, or water, help your body to cool down after you exercise, play or work hard? (We know that for perspiration to evaporate, it needs to absorb heat; when perspiration evaporates, it takes heat from the body and cools it off.) This means that we have to drink water to replace the water we lose in perspiration.

What did we learn that "equals" means? "Equals" is another way of saying "is the same as," or "is another name for." We use "equals" to say numbers in different ways, as we learned in our mathematics activity, but we use "equals" in other ways, and it still means the same thing. When we say that "good health equals good living," how are we using the word "equals"? (Good health is another name for good living; good health is the same as good living.)

You also worked in the Almond Cookie Factory grouping the cookies by fives. Almond cookies are not only fun to eat, but they have many ingredients that give your body energy and materials to help you grow. What are some other names for five? (Pause for responses.) Yes, five has other names such as two plus three, and three plus two, and four plus one, and one plus four. We will study more about this in our next lesson.

Organizing the Idea

We have talked about needing food for energy for the body so that it can move, grow and do all the things it needs to do. We have also said that the body has other needs besides food for its health. Student groups write and illustrate five reasons why good health is important.

Applying the Idea

Students select, write and illustrate in their journals three things they **personally** do to be in good heath.

Students describe and/or illustrate in comic book style: An apple a day keeps the doctor away.

Closure and Assessment

Problem Solving

1. Roberto has been absent from school for three days because he has been sick. What could have made him sick? What can he do to get well?
2. At the beginning of the lesson, we said that Good Health Equals Good Living. What does that mean to you? What are some other words for "equals"? ("Is the same as" and "is another name for.") So, Good Health is another name for Good Living.
3. Suppose you are the owner of a cookie factory, but your factory wraps the cookies in a different way. Your factory wraps the cookies by sevens. Go through the activity with a partner or with your group and play the cookie game again, but this time group cookies by sevens.

List of Activities for this Lesson

▲ What Does "Equals" Mean?

▲ Almond Cookie Factory

ACTIVITY
What Does "Equals" Mean?

Objective
The student uses the phrases "is another name for" and "is the same as" interchangeably with the word "equals".

Materials
Unifix cubes, different colors; Cuisenaire rods, different colors

Procedures
Students work in pairs.

Tell students that they will work in pairs to learn other ways of saying "equals".

1. Students use cubes or rods to make chains of different lengths, such as five, six, seven, 10, etc.
2. One student makes a chain of length five using two or three colors, for example, two red and three brown or one red, two brown and two yellow.
3. Then the partner uses another color to make a chain of five of the same color and says any one of the following: two red plus three brown equals five; two red plus three brown is another name for five; two red plus three brown is the same as five.
4. After they have done this a few times, the students make chains but reverse the order of the statements of equality: five equals one red plus one white, plus three blue.
5. The students take turns making the chains and describing them using number words.

Tell students that this time they will roll dice and add the two numbers.

1. Students roll the dice and then make an addition number sentence using any one of the three phrases.
2. After the students have done this for several turns, they roll the dice and subtract the smaller number from the larger, again using "equals", is another name for" and "is the same as" to describe the operation.

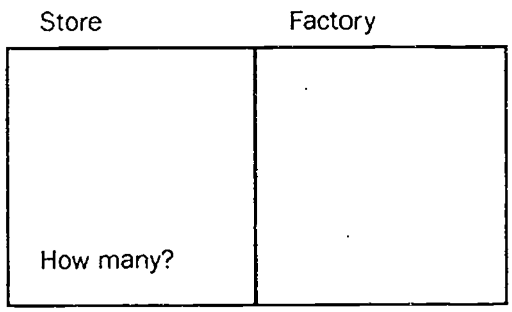
ACTIVITY
Almond Cookie Factory

Objective
Students group numbers by fives.

Materials
For each team of four children: Place Value Board (PVB)*; 25 Unifix cubes

Introduction to Activity

1. In this activity you will make almond cookies like this in a cookie factory. (Puts five cubes together to make a stack.)
2. You will work in teams of two. Two members of the team manufacture the cookies and the other two are the customers.
3. After we make five cookies we put them in a stack, and then we put them in the store.



Place Value Board

4. As soon we have five almond cookie stacks in the store, we can open it for business.
5. The customers say how many cookies they want. You can break the stacks to give customers the number of cookies they have asked for.

Clarification before students play the game:
What is the most number of cookies a customer can buy? (25.) What is the least number a customer can buy? (One.)

Procedures

1. Each team of four takes a PVB and the Unifix cubes separated into ones.
2. Two of the children "manufacture" the stacks that are five cubes long.
3. Once students make a stack, they move it to the store.
4. As soon as the store is full with five cookie stacks, the store opens.
5. The other two children on the team come to the store to buy the cookies.

[1]A large square made of heavy laminated cardboard divided into halves. Each half has a different color and the labels **Store** and **Factory**.

LESSON 2

You Are What You Eat

BIG IDEAS Proper nutrition is the first principle of good health. "First" is an ordinal number.

Whole Group Work

Materials

Book: **Is This My Dinner?** by I.S. Black or **No Peas for Nellie** by C.L. Demarest
Laminated, assorted pictures of various foods familiar to students from the five food groups
Pitcher of water filled and marked with eight glasses of water
Picture of a person riding a bicycle
Balance beam
Word tags: diet, starch, calories, nutrition, guide, pyramid

Encountering the Idea

Show students the cover of **Is This My Dinner?** Let the students predict what the story is about. Tell them that the story is told in rhymes. (Review what a rhyme is, in case someone has forgotten.) Read the story, letting the students predict whose dinner it is.

At the end of the story ask the students what made these dinners better for each of the animals. Would any of these dinners be good for you? If not, then what kind of dinner would be good for you? Remember, **one of the most important body needs is food,** not only for the animals, but for us too.

How do we know what kinds of foods we need to eat? How will you, your parents or the cafeteria workers who prepare your food know what food is good for you? Is all the food you eat good for you? Are some foods better than others? How much food should you eat? Do we need water? Is water a food? Bones, flesh, skin and hair all have to be made by the body from food. What foods do we need to help the body do these things?

We are going to investigate some of the answers to these questions in the learning centers. Are there other questions you have about food? If so, let's write these down to think about as we do our explorations. Write the questions on a chart for later use.

Exploring the Idea

At the **Science Center,** the students practice on the balance beam, and then complete

1. **Activity** — Food Energy
2. **Activity** — Food Building Blocks
3. **Activity** — Let's Make a Meal.

At the **Mathematics Center,** the students complete **Activity** — "First" Is an Ordinal Number.

Getting the Idea

What does the body need in order to do its work? (Food.) We also say that the body needs **proper nutrition.** What does the food provide? (Energy.) What foods provide energy? (Fruits, vegetables and grains because they give us sugar and starch for energy.) We say that proper nutrition is the **first** principle of good health. What does that mean? (Pause for student comments.)

Now let's talk about what we did in the **Mathematics Center.** We worked with **ordinal numbers.** Ordinal numbers tell us the position of an object. Look at the word "order". Can you find part of that word in "ordinal"? Yes, "ord" is in "order" and in "ordinal". That's what ordinal numbers tell you — the order or the position of objects. The ordinal numbers relate to the **cardinal numbers.** The cardinal numbers are the numbers we are familiar with — they tell us how many things are in a set or a group.

Now, why do you think that we say that nutrition is the first principle of good health? Yes, proper nutrition is the first principle of good health because without nutrition the body cannot continue to live for a long time in good health. What happens when we are sick or do not have energy? Are we happy? Can we do the things we want to do? No, nutrition is important, and so we say that it is the first principle of good health.

When we studied about foods that give us energy, what experiments did you complete? What did we learn in our experiment using iodine? Yes, many foods that we eat contain starch, which is one food that gives us energy.

Nutritionists, people who study the kind and amount of food that people need to be in good health, measure the amount of food energy living organisms need by using the unit of heat called a **calorie.** We use this unit to tell us how much food we need each day. If we know how much food we need each day, we will be able to balance our meals and to avoid the weight we would gain if we ate too much fat and too much starch.

But starch in our diet is not enough. What else do we need? What do fish, chicken, turkey and beef provide? (Those foods give us proteins that we need to build muscles and renew all the cells.)

As we saw from the activities on proper nutrition, all foods give us energy and help us build our bodies, but all foods give us more of one thing and less of another than the body needs. Very few foods give us **everything the body needs** all at the same time. That is why we need to eat **balanced meals.** The students consider: Is **fat** necessary for the body? Is it an important food? How much fat should we have in our daily diet?

You worked on an activity that required you to balance your body in order to walk from one end of the beam to the other. What did you have to do to stay in balance? Yes, you couldn't lean over too much on either side — you had to stay in the middle. What do you have to do in riding a bicycle? You can ride a bicycle only if you balance on it. The same happens with your body and balanced meals. You get energy and "building blocks" when you eat "balanced meals." What do you suppose "balanced" meals are? (Pause for student responses.) Yes, balanced meals are meals that include foods from each of the five food groups. We don't want to have too much of one thing and very little of another. (Display pictures of food from the **Food Guide Pyramid.**)

The **Food Guide Pyramid** is a guide, a suggestion, of the types and amounts of food that a person needs to be healthy. The Guide tells us that the group we should select the most from is the **Bread** group, which includes oatmeal, Cream of Wheat, rice, spaghetti, for six to 11 servings **every day.** The next groups are the **Vegetable** group, which should include three to five servings every day, and the **Fruit** group, which should include two to four servings each day. The **Milk** group includes cheese and yogurt, and should include two to three servings every day. We should have the same number of servings per day from the **Meat** group, which includes beef, chicken, pinto beans, eggs and nuts. At the top of the pyramid and having the smallest triangle, are the fats, oils and sweets. This is not considered a food group because all foods contain fat and sugar. To be healthy, however, we should use fats, oils, and sugar barely, or with care. Fats and sugar are important, but they do not give energy and building blocks as do other foods in a balanced diet.

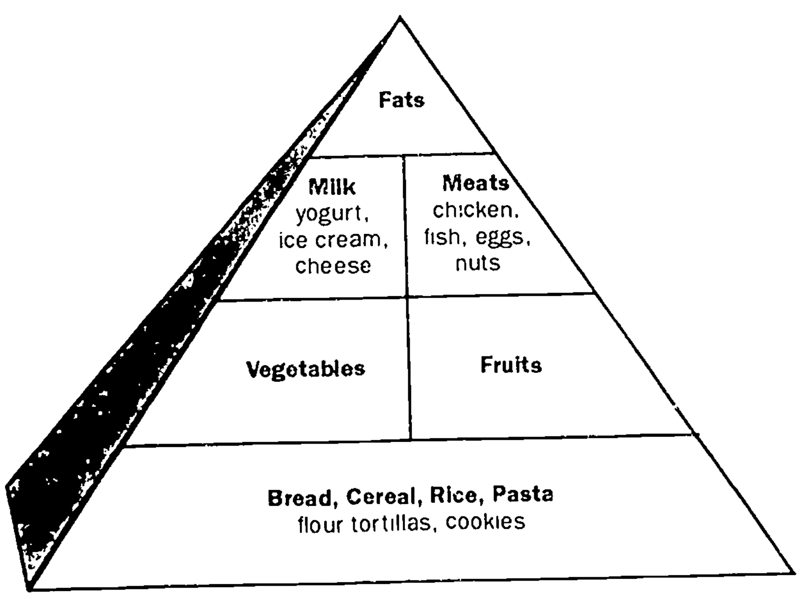
We also said that one of the body needs is water. Do all living things need water to live? We are going to look at the amount of water that living organisms need.

Teacher Demonstration

To demonstrate the amount of water contained in different plants and animals, fill various jars with different amounts of water. Ask students to pretend that each jar is a person, a plant or animal (a picture could be drawn on the glass). Fill the glasses to illustrate the approximate percent of the organism that is water. A person is 65% — others: mouse 65%, elephant 70%, potato 80%, tomato 95%. A balanced diet will always include plenty of water. The food alone is not enough to make a healthy body.

Organizing the Idea

We have talked about needing food for energy for the body so that we can move, grow and do all the things we need to do. These pictures of healthy foods are grouped into five groups so we can be sure to eat some from each group each day to have a balanced diet. We have to eat different kinds of food for the body to grow and change. (Display pictures of the five food groups.)



At the **Art Center**, students make a collage of good nutrition. Using magazine cutouts of healthy food, students write the names of the food on the pictures and glue them on an outline of a human body. The students also write ordinal numbers on the foods labeling them as first, second, and so on.

Applying the Idea

Each student chooses three or four pictures of different foods.

- Students place the pictures under the titles: breakfast, lunch, and dinner.
- Students respond to the following questions:
  a. Are there some foods you can eat at any of the meals and still have a balanced diet?
  b. Is it a good idea to eat a lot of the same type of good food in one meal until you are completely full? Why?

Breakfast	Lunch	Dinner
Chocolate	Hamburger	

Closure and Assessment

1. Reread the book **Is This My Dinner?** or read **No Peas for Nellie.** Discuss what students learned from these two books.
2. Children select a food from the each of the food groups that people eat for breakfast and paste a picture of it on the correct poster board. They repeat for lunch and dinner, if appropriate. Be sure you look at your selections. Do they make a balanced meal?
3. The students justify the way they made a balanced meal. They write about it and draw it in their journals.
4. What is the first, most important part of good health? Discuss your selection.
5. Is soda pop a good substitute for water during your meals? Why not?
6. When someone asks you the question, "How many people are at your desk?" and you answer, "Four", what kind of number is four? (It is a cardinal number because it answers the question: How Many?)
7. When you say "Every fourth person in the row gets to go to the Library Center tomorrow," how are you using the word "fourth"? (It is an ordinal number because it says which ones are selected.)

List of Activities for this Lesson

▲ Food Energy

▲ Food Building Blocks

▲ "First" Is an Ordinal Number

▲ Let's Make a Meal

ACTIVITY
Food Energy

Objective
The student says that the human body needs heat energy every day to do its work and to stay warm. We measure energy for the body in calories.

Materials
Burner to heat water; test tube with 10 ml. distilled water; pan with water for a water bath; several thermometers; alcohol and cotton swabs to clean the thermometers before every use

Procedures
1. Students, working in pairs, take turns taking each other's temperature every half hour for at least two hours. They record their temperature in degrees Celsius.
2. Heat a test tube containing 10 ml. of distilled water to 37° C in a hot water bath. Record its temperature.
3. Remove the water from the water bath and record its temperature every half hour for at least two hours.
4. As you are heating the water, ask the students what is making the temperature of the water rise. (The heat energy from the burner making the water hot and making the temperature on the thermometer rise.)
5. Ask the students what their body temperature has been for the last two hours. What keeps their body temperature at 37°C?
6. What is the temperature of the water in the pan? Why didn't it stay at 37° like their body temperature? (Energy is needed to keep the water hot.)
7. What keeps their temperature from going down? (The energy the cells are using to keep the body warm.)

Discussion
We measure energy from food in units of heat we call **calories.** Humans need to eat enough food every day to give the body energy to do all its work. Students find the weight that is closest to their own weight in kilograms and pounds and find the number of calories they need each day.

Recommended Daily Calorie Intake for Children

Weight		
Kilograms	Pounds	***Calories***
25	50	990
29	58	1080
33	66	1165
37	74	1245
41	82	1300

ACTIVITY
Food Building Blocks

Objective
The student says that fish, chicken, beef and other meats provide proteins we need to make new body cells.

Materials
Pieces of fruit such as apples, oranges; vegetables such as potatoes; crackers, bread, corn tortillas, beans, candy, other foods
Pieces of cooked meat like bacon, pork, beef, chicken
Tincture of iodine

Procedures
1. Students test each of the items to see if they contain starch by using a few drops of tincture of iodine, or Lugol's solution. (Please refer to **Unit 1: Plants and Seeds.**)
2. After they have completed testing the foods they separate them into two groups — those that have starch and those that do not.
3. The students make a chart showing the foods that mainly give the body fast energy, such as sugar and starch, and those that give us building blocks — proteins — to help us grow and renew our bodies.
4. The students show foods like beans, milk and other dairy products and grains like wheat and oats in the Proteins column since some vegetables also provide proteins.

Healthy Foods	
Give Us Fast Energy	Have Proteins to Build

[1]Warn students that tincture of iodine is a very harmful ingredient if it is eaten. Ask them not to taste any of the food that they test for starch.

ACTIVITY
"First" Is an Ordinal Number

Objective
The student gives the ordinal number of an object in a sequence and places a given object in a given ordinal position.

Materials
Set of objects (10 pieces of fruits, vegetables or food models, or as many as the students are able to work with) that students can distinguish by size or color
Word tags: First, Second, Third, Fourth, Fifth, Sixth, Seventh, Eighth, Ninth, Tenth, Last

Procedures
Students work in pairs.

1. Tell students that they are going to play a game of finding foods that have been placed in a sequence. To do this, each student tells a partner the position of the food, and the partner hands it to the student.
2. Place the number of foods that will be used, six for example, in a row. With the students, say the ordinal number of each food: Beginning on the left, this is first, second, third, fourth, fifth, sixth (and/or last).
3. The students take turns giving each other a position and finding the food in the given position.
4. Then the students take turns pointing to a food in the sequence and saying the position of the food. For example, one student points and the other students says: The red apple is fourth from the left.
5. The students practice putting the word tags in order according to their ordinal numbers.

   Tell students that sometimes we use ordinal numbers to find several objects in a sequence — that you may not want all of them, only some. But you may want to select them without choosing any in particular, only every other one, or every fourth one, every fifth one, and so on. Students, if I only want a few foods, but I don't want to have to select, I'm going to choose every fourth one. First, second, third, and I pick the fourth. Then I start over again. First, second, third, and I pick the fourth. Students practice finding every second, or every third, food in the sequence.
6. One student gives an ordinal number, and the partner finds those foods, if there are more than one.
7. Repeat the above procedures with other objects.

ACTIVITY

Let's Make a Meal!

Objective

The students prepare 3 menus that contain the recommended servings of the 5 food groups and the recommended number of calories required for a nutritious daily diet.

Materials

Calorie guide given below; calorie guide for different ages
List of the food groups recommended for daily consumption

Procedures

1. Using the calorie guide given below, the student prepares a menu for breakfast, lunch and dinner, each, appropriate for the student's age.
2. The student presents the menus to the class and discusses the calorie needs and the food groups represented in the menus.

Daily Calorie Requirement Guide

Calories are important for the body! How many do you need?

1200 to 2000 calories per adult each day
up to 2500 calcries per day for active children

The total number of calories consumed each day is the total number of calories of the 3 meals of the day
plus any snacks you may have along the way.

Remember—be calorie wise!!!

Food Guide Recommended Servings[1]

Breads, Cereals, Grains	6 to 11 servings
Fruits	2 to 4 servings
Vegetables	3 to 5 servings
Meat, Poultry, Fish	2 to 3 servings
Milk, Cheese, Yogurt	2 servings
Fats, sweets	only in moderation

[1] The U.S. government has revised the food groups and the number of daily recommended servings.

Calorie Counter

Food	Calories	Unit
Cinnamon rolls	130	roll
Mixed fruit	120	cup
Fresh orange	90	orange
Muffin	80	muffin
Flour tortilla	80	tortilla
Corn on cob (small)	90	ear
Angel food cake	110	serving
Corn and peas	220	cup
Roast beef	400	6 ounces
Pasta and lettuce	150	cup
Sugar cookie	120	cookie
Pepper chicken	320	6 ounces
Lamb chops	180	chop
Dinner roll	120	roll
Chicken nuggets	180	6 nuggets
Veggies	50	cup
Rice pudding/peaches	130	½ cup
Milk (low fat)	140	cup
Cereal (low sugar)	120	serving
Pizza (low fat)	230	5-inch square
Bean salad	130	½ cup
Corn tortilla	30	tortilla
Scrambled egg	150	egg
Jello squares	25	5-inch square

LESSON 3 Popeye Is Right!

BIG IDEAS Water and minerals (like spinach) are necessary for growth and strength. Counting can help us keep our good health.

Whole Group Work

Materials

Book: **Let's Go Swimming with Mr. Sillypants** by M.K. Brown

A picture of **Popeye;** matches; several cereal boxes that have the contents (minerals, vitamins) and their daily recommended amounts listed on the side package

Word tags: vitamin, mineral, iron, calcium, calorie

Encountering the Idea

Let's talk about our friend **Popeye,** the sailor, to see what ideas he has about good health. What do you know about Popyeye? He **knows** what he needs to make him strong. Why does Popeye need to be strong? To stop the bully Bluto! What does Popeye use to make him strong? Yes, spinach. What is spinach? Yes, it's a vegetable. But, what is so important about spinach; why can't some other vegetable do the job? Why **must he have spinach?** Let's think about that for a minute, and then let's ask some other questions about health.

What happens if we don't drink water for a few days? We get sick. When we studied the kidneys in the human body, we learned that the kidneys use a lot of water to get rid of wastes. We have to urinate several times a day. We need to replace that water. But, do we need to drink water **every day?** Who knows how much water people need to drink every day? Yes, we will review some of these ideas in this lesson, and in the following activities we will discover answers to why the body needs fruits, vegetables and water.

Exploring the Idea

At the **Science Center,** the students complete

1. **Activity** - - Let's Eat Our Spinach!
2. **Activity** — Water Is Important
3. **Activity** — Water for Health.

At the **Mathematics Center,** the students

1. begin **Activity** — Health Food Store
2. complete **Activity** — Chewing Gum Math.

Getting the Idea

Students discuss the importance of drinking the appropriate amount of water each day. After discussing the importance of drinking water, the students discuss ways to ensure they drink the appropriate amounts. The teacher asks: Will you drink eight glasses of water in one day if you drink from a small cup? What did our activity with the different-size glasses help us understand?

1. Why did it take more of these small glasses (point to the pictures of the glasses on the chart) than of these bigger glasses to meet the daily water intake requirement?
2. Show in at least three **different ways** how you can meet your daily water requirement for health.
3. If you exercise very hard every day, will you need more, less or the same amount of water for your daily water requirement? What makes you think that?

Students discuss the gum chewing experiment speculating about how and why the gum changed.

1. Why was there a difference in the two weights?
2. What did the gum lose that has weight?
3. What happened to the sugar, or the sweeteners?
4. What will the sugar do in your body?
5. How does sugar affect your body?
6. Is sugar necessary for your body to function properly? What happens if your body gets too much sugar?

Students discuss the notion of a balanced diet that includes taking a sufficient number of calories to give the body energy. It is also important that humans not eat more food than the body can use. If we overeat, the body stores the extra energy as fat in the body. Too much fat can cause health problems. Pediatricians have recommended that certain amounts of calories be consumed by children every day to give them the calories they need and to maintain a balanced diet.

Organizing the Idea

The teacher reads the book **Let's Go Swimming with Mr. Sillypants.** The class discusses the ideas in the book about the importance of water.

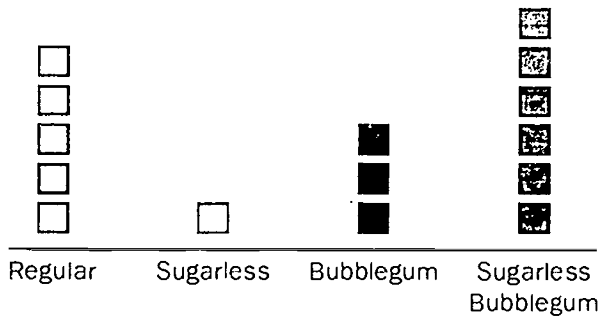
Students take a survey of all the class members about their favorite gum: sugarless, with sugar, bubble gum, etc. Working in groups, they graph the information and then report to the class what the graphs tells about the class's favorite chewing gum.

Students discuss the vitamins and minerals listed on the side panels of the cereal boxes, noting that the vitamins have letter names, such as **A, B, C,** etc. Students working in groups of three to four select a vitamin (Vitamin A, D or C, which are the more familiar ones) or a mineral (iron, the one **Popeye** gets from spinach, needed to make red blood cells, and calcium needed for teeth and bones) from the list on the cereal box and report to the class or write a class Big Book on vitamins and minerals.

At the **Language Center,** the students study the words **vitamin** and **mineral** to learn not only what the words mean, but how they are constructed, for example **vita** — means **vida,** or **life.** In other words, vitamins are necessary for life, for good health, for good living. What about **mineral?** Write a story about **Popeye** (or a favorite character) and the minerals and vitamins he eats.

Applying and Assessing the Idea

1. Students write at least three rules for healthy nutrition that tell about the appropriate daily use of water, about sugar, about fat, and about vitamins and minerals that we should include.
2. Show different kinds of fruit to the class. Brainstorm. Do fruits have vitamins? Do they give us energy? Keep us healthy? Etc. Which fruits give us Vitamin C? Which ones give us energy? (Most fruits have sugar and starch that give energy.)
3. Students either write and illustrate a cinquain or write and illustrate a story about the importance of water for the human body.
4. The students use the chart in **Activity** — Food Energy from **Lesson 2** to find the recommended number of calories they need to have energy for their bodies. They discuss why it is important to have a balanced diet that includes the required amount of calories.
5. This graph shows a first grade class's chewing gum preferences. Each student put a sticker above his/her choice of favorite gum. By looking at the graph, what can you tell about the class's preferences?



List of Activities for this Lesson

▲ Let's Eat Our Spinach!

▲ Water Is Important

▲ Water for Health

▲ Health Food Store

▲ Chewing Gum Math

ACTIVITY

Let's Eat Our Spinach

Objective

Student gives examples of at least two vitamins and two minerals that the body needs for proper nutrition.

Materials

For each student pair or student group:

Glue one **Popeye, Bluto** or **Olive Oyl** picture on construction paper and cut into puzzle parts;

- place all the puzzle parts **except one** in an envelope to keep from getting lost;
- color the remaining piece green;
- place the missing part from the puzzle into some other group's envelope.

Each group has a complete puzzle, except for one part that does not belong to that envelope.

Empty cereal box listing the daily recommended mineral and vitamin requirements

Small portion of colored but **unsweetened jello** for each student

Procedures

1. Each student group solves the **Popeye** puzzle, except for the missing piece.
2. The students have to look for the missing piece among the other student groups' extra pieces.
3. When all the groups have completed their assigned puzzles, they signal that they are ready to continue.
4. The students describe their completed puzzle. What color is the missing part? Green.

Getting the Idea

Tell the students that each puzzle represents some food that the body needs to work, play or to stay healthy. The missing piece is what we might call a **mineral** or a **vitamin**. Minerals and vitamins are not food like meat, bread or fruit, but they are substances that the body needs to make the cells their best.

1. What do you suppose a body cell has to do if it needs a mineral or a vitamin to do its job? Yes, it has to look for it. But if it can't find it, then what do you suppose happens? It doesn't do it; it takes it from some other part of the body; or it **does without it.**
2. Let's take a rest, now, and eat our jello snack. What? You don't like it? Why? Yes, sometimes substitutes will not work. We really don't need the sugar in the jello, but it just didn't do the job as a snack.
3. That's what happens to food when it is missing vitamins and minerals. It can't do the job just right.
4. How will you know when you are getting all the vitamins and minerals you need? Yes, when you get a balanced diet.
5. Let's look at this list of vitamins and minerals written on this box of cereal.
6. One of the minerals we need is **IRON**. That is why **Popeye** likes spinach. That's how he gets his iron to fight against Bluto.

ACTIVITY
Water Is Important

Objective

The student says that water is important and that people need to drink at least eight glasses of water daily to maintain good health.

Materials

Chart; magazines; scissors; celery stalks or carnations; jar with lid that seals the jar; several jars of same size

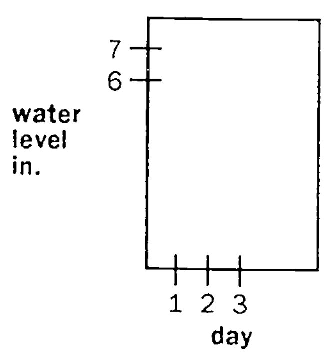
Water - Use Chart

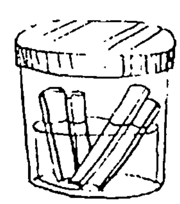
Procedures

1. Students find magazine pictures of water in daily use.
2. They divide the pictures into three groups: water used for work, for food and for play.
3. They glue the pictures on the chart.
4. The students make a list and count the number of different ways they used water on the previous day.
5. They graph their responses on a chart or in their journals. From the chart they determine the most frequent use of water.

Celery Stalks (or carnations) in Water

1. Place several stalks of celery in a jar of colored water and observe for a couple of days.
2. Place the celery stalks **completely** inside the jar and seal the jar with a lid; mark with tape the water level at the time the celery is placed in the jar.
3. The students measure and record how much water the celery absorbed on a daily basis.





Jar with lid

Teacher Demonstration

To demonstrate the amount of water contained in different plants and animals, fill various jars with different amounts of water. Ask students to pretend that each jar is a person, a plant or animal (a picture could be drawn on the glass.) Fill the glasses to illustrate the approximate percent of the organism that is water. A person is 65% — others: mouse 65%, elephant 70%, potato 80%, tomato 95%.

ACTIVITY
Water for Health

Objective

The student says that eight glasses of water are a daily health requirement and can give equivalent amounts in containers of different sizes.

Materials

A pitcher, for easy pouring, filled with eight glasses of water; mark the water level
Cups and glasses of various sizes and shapes
Poster board

Procedure

1. Fill a pitcher with the recommended daily intake of water, eight glasses, and place in the center.
2. Then fill different size glasses or cups from the original, large, marked container.
3. Students count how many of each size glass of water they would have to drink in order to meet the recommended daily intake of water.
4. Make a chart matching a particular glass with the number of glassfuls it takes to meet the daily requirement.

If you use:	How many?
	9
	2
	3
	5

ACTIVITY
Health Food Store

Objective
The students play store; they buy and sell priced items, give and count change; they sell liquids and measure them as cups, pints and quarts.

Materials
Washed and dried food containers of items: margarine, yogurt, milk; box containers of salt, oatmeal, fruit, vegetables; bread, tortillas, crackers; empty and clean containers of soap, toothpaste, toothbrushes; combs and other hygiene items

Large cardboard boxes to make the store; other smaller boxes to serve as a cash register

Procedures
The children, playing in pairs

1. construct a store with large cardboard boxes and place items (may be plastic models of fruit, bread, health products, liquids to represent milk or juice, etc.) to buy and sell in the store
2. price and label the items with numbers within their range of skills
3. make a cash box to keep the money in (paper or plastic models) that belongs to the store
4. take turns being the storekeeper or customer
5. buy several (two to four) items at a time
6. calculate the sum and give change
7. check the transaction
8. measure out requested amounts of liquid, such as pints, quarts, etc.

This center remains up for several days (weeks) until all students have an opportunity to play both roles several times.

▲ ACTIVITY
Chewing Gum Math

Objective

Student say that some foods have more sugar than is necessary for good health.

Materials

Piece of gum for each student
Sheet of paper to record observations
Poster board to graph results
Pan balance
Objects to balance the pan

Procedures

In each student group:

1. Students discuss the sight, smell and feel of the gum.
2. Students measure the length, width and thickness of the piece of gum.
3. Students place each piece of gum on the balance and mass it **while it is still in the wrapper.** Make the pan balance using various objects. The students record what they used to make the pan balance.
4. Each student chews his/her piece of gum for approximately 1½ minutes, and **saves the wrapper.**
5. Students discuss what is happening to the gum — it is getting soft; it is mixing with saliva; it's losing its sugar taste, etc.
6. Students put the gum back in its **original** wrapper and balance the pan again, recording what they used the second time.
7. Students discuss why they weighed the gum wrapper with the gum both times.
8. Students describe all the changes they see (using sight, smell and touch) and record them.
9. Students discuss reasons why the sum lost weight. (The sugar dissolved in their mouths and they swallowed it.)
10. Is all of the sugar we eat in candy, gum and other sweets necessary for the body to be healthy? Students discuss.

[1] **Weighing the chewing gum:** Use a pan balance that students can practice balancing before massing the gum They can use different materials to get the balance into balance for example, the unit cubes, counters or any other like materials available in the classroom

LESSON 4 *R - S - R for Good Health*

BIG IDEAS During periods of rest, sleep and relaxation, body functions slow down for the body to regain energy and remove body wastes; we can measure these changes.

Whole Group Work

Materials

Book: **Tony's Hard Work Day** by A. Arkin.
Charts to make web
Matches
Unit 1: The Human Body to relate to concepts of good health

Encountering the Idea

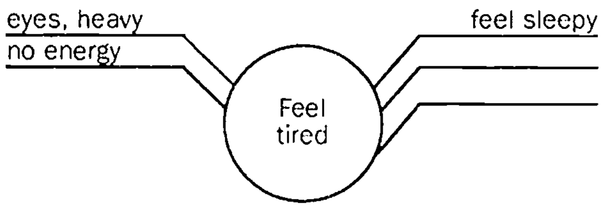
Read the book, **Tony's Hard Work Day.** Was Tony tired after all that hard work? What did he do? What happens after you exercise a lot? (You get tired, you need to rest, etc.) Why do we get tired at the end of the day, or after we exercise? After you exercise a lot, do your muscles ache? What happens to the body as we do our daily chores?

Remember what we learned about the cells in our body in the unit on the Human Body? Each cell uses energy, and as it uses energy to perform its function, its job, what does it produce? (Wastes.) What does the body do with these wastes? (Removes them.) Look, as I burn this match, it produces what? (Heat, light.) Yes and what else? Yes, ashes. These ashes must be removed. In like ways, the body must get rid of its wastes. In our **Writing Center,** we will list the different wastes the body creates and then list the ways the body removes them. In the following activities, we will discover why we need to rest.

Exploring the Idea

Do **The Body Needs Rest** Activity.

To introduce the activity, students describe how they feel when they are tired. Ask: How do your eyes feel when you are tired? Do you have a lot of energy? Let's make a web about how we feel when we are tired.



At the **Mathematics Center,** students complete **Activity** — Heart and Lungs.

Getting the Idea

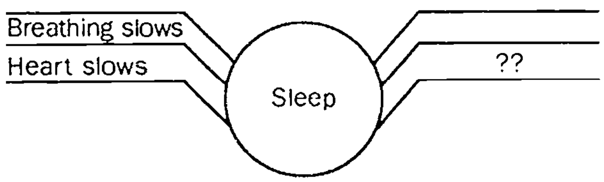
In the activities we completed, we learned that the body needs to rest in order to do some very important things. We learned that the body

1. makes new cells every day,
2. gets rid of body wastes, and
3. brings food to the cells.

That means that the body needs time to do all these things. It needs to slow down. Does the heart ever stop beating? Does your brain ever stop thinking? Does your blood ever stop flowing through your body? No, all of these things have to continue. Rest and sleep are very important for staying healthy. When the body sleeps, the heartbeat and breathing slow down.

Do **The Body Needs Sleep** Activity as shown below.

This slowing down of the body's activities allows the body to build up a new energy supply. Children need more energy than adults because children are growing. Everyone has different needs for sleep, but most children need about 11 hours of sleep each night. The body tells us if the amount of sleep is not enough by feeling tired. During a rest period, people slow down. They are awake but not active or moving. Rest helps the body gain new energy.

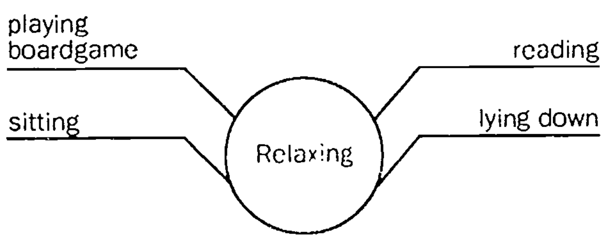


What Happens When We Sleep

Do **The Body Needs to Relax** Activity

Children pantomime relaxing, resting and sleeping and strenuous activities to notice the differences in how their bodies feel.

Students list relaxing activities.



Organizing the Idea

Students make a chart listing the differences in heartbeat and breathing rates when engaged in strenuous activity, during stages of rest and during sleep.

Discuss differences between rest, relaxation and sleep.

In the **Writing Center,** the students list the different ways the body removes waste. (This can be a review of **Unit 1: The Human Body.**)

1. Students list or make a chart of the different ways the body removes waste products: the lungs get rid of carbon dioxide; the skin gets rid of salts, acids

and oils; the intestines get rid of unused products of digestion; the kidneys get rid of waste in liquids, etc.

2. Students illustrate or dictate things related to: When I'm tired I .... but when I'm rested, I .... .

Applying the Idea

Students keep a diary for at least one week observing the time spent and types of activities done during the day when they rest, relax or sleep and the number of hours they sleep. How many hours of sleep do they get every night?

Closure and Assessment

Read **Tony's Hard Work Day** again. The students list all the things Tony did that used up his energy, and then all the things he did to regain his energy.

List of Activities for this Lesson

▲ Heart and Lungs

ACTIVITY
Heart and Lungs

Objective
The student describes the differences in heart and lung functions during periods of body activity and rest.

Materials
Watch with a second hand to count to one minute
Chart to record observations

Procedures
Students, working in pairs or small groups
1. run in place for one to two minutes
2. measure and record their heart rates and the number of breaths per minute
3. describe and record how they feel after running in place; for example, do their muscles ache? Do they run out of breath? Do they want to drink water? Are they hot?
4. after running in place, go to a quiet place to read or do some other quiet activity for at least five minutes
5. measure and record their heartbeat rates and their breathing rates again
6. compare the rates and describe and record how they feel after a period of rest
7. take a survey to see whose heartbeat was the fastest, and who breathed the fastest
8. survey the information to see which heart rate and which breathing rate were the most common.

Rest and Run Activity

Activity	Heartbeats per minute	Breaths per minute	How I Feel
Running			
Resting			

Organizing the Idea

The students use this table to write in their journals about the differences in body functions during rest and during heavy activity.

LESSON 5 Our Friends — the Suds

BIG IDEAS Frequent washing and bathing remove bacteria that cause illness. Numbers, like bacteria, can grow very fast using multiplication.

Whole Group Work

Materials

Book: **I Hate to Take a Bath** by J. Barrett
White clean towel
Different, colored pictures of bacteria
Frame sentence: I hate to take a bath because ...
Large Band-aid for each student
Word tags: bacteria, wash, dirt, disease, illness, clean

Encountering the Idea

Read the book **I Hate to Take a Bath.** Point out the pattern of writing in the book to the students: I hate to take a bath because ... , but if I have to take a bath ... Let's keep these ideas in mind while we have this demonstration.

The teacher holds up her hands and asks students whether her hands are clean. The students identify classroom items that appear to be clean. The teacher rubs and touches each of these items. Then she cleans her hands on a wet white towel to show that although things appear to be clean, they are not. Students try the same procedure. They discuss what makes things dirty.

Exploring the Idea

At the **Science Center,** students

1. begin **Activity** — But My Hands Are Clean!
2. investigate the reason for placing clean bandages on wounds. The students wash their hands and pretend to have a wound. They cover the area with a clean bandage and wear the bandage throughout the day.

At the **Mathematics Center,** students

1. participate in **Activity** — Achoo!
2. participate in **Activity** — Bacteria Fighter
3. complete **Activity** — Bacteria Grow Fast
4. complete **Activity** — Soap and Math.

Getting the Idea

Show pictures of bacteria and explain that they are very small and we can't see them except through a microscope. Bacteria need food in order to grow. They grow on many things, but they can also grow inside our bodies. They grow in our mouths, in our nose, between our teeth, under our fingernails, in our hair and in our ears. We need to keep all of our body clean to keep bacteria from growing on it. Bacteria are a cause of illness. Keeping clean and getting vaccinations (shots) help protect against illness.

In our activity in the **Mathematics Center**, we needed to use numbers to count the bacteria as they grow by separating. Each single organism can separate itself into two. We count the number of cells there are after each separation. We can also add them using the same number in repeated addition. These numbers become large very fast.

Ask students to observe a mark on the teacher's palm before and after washing hands in soap and water. Explain that people can see the mark and decide that the hands need to be washed. Bacteria are very small, and we cannot see them. Dirt and other marks are signs that there may be bacteria on the hands and that the hands should be washed.

Discuss the experiment with the peeled potato as the students make their daily observations of the two potatoes. Mold spores easily transfer from the hands to the potato. They will multiply quickly. After a few days, mold is likely to form on the potato that the teacher peeled with unwashed hands. Little or no growth will be noted on the potato that the teacher peeled after scrubbing the hands. Point out that the jars were clean before the experiments.

Daily observations, particularly after the mold begins rapid growth, help students realize the importance of washing their hands before handling food. Use a magnifying glass for students to observe what the mold looks like. Remind students that although the hands may have looked clean before the teacher peeled the first potato , they were not.

At the end of the day the students remove the bandage on the imaginary wound and compare the covered skin with the area around it. Students discuss how a bandage protects a wound from bacteria that cause infection and disease.

At the **Writing Center,** the students

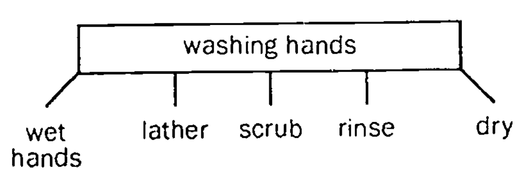
1. play hang-man using the unit's vocabulary
2. complete writing the frame sentence: I hate to take a bath because ... .

Organizing the Idea

1. **Washing Our Hands** Activity.

   Students brainstorm things they do when they wash their hands. Map their contributions on a chalkboard. Students list their actions of washing their hands in order.

   First, I wet my hands. Second (or next) I use soap to get a lather, etc.



   Review the concept map with the students and encourage them to give complete sentences that you will write on sentence strips. Using a pocket chart, the children put the sentence strips in order. After students are in agreement that the sentences are in correct sequential order, students read sentences aloud.

2. **Our Personal Hygiene** Activity.

   Brainstorm and list items needed for personal hygiene: soap, towel, washcloth, hairbrush, toothbrush, toothpaste, shampoo, and comb. The students keep a log for one week indicating the use of each of their personal hygiene items.

	Day 1	2	3
soap			
toothbrush			
brush			
toothpaste			
etc.			

Closure and Assessment

Students conclude the lesson by completing the following activity. Materials needed:

- teacher-made diagram
- 24 x 24 in. paper (butcher paper) for each student
- meter stick or yardstick
- marking pens, pencils, crayons
- box containing soap, towel, washcloth, toothbrush, comb, toothpaste, shampoo and hairbrush.

Materials preparation:

1. Trace a student's hands and bare feet with a black marking pen or pencil on a 24 x 24 in. piece of paper. Use a red marking pen and a meter stick or yardstick to draw a line to connect the hands, connecting a thumb to a thumb, or two other corresponding parts. Use a blue marking pen to draw a line to connect the feet, connecting heel to heel, etc. Use a green marking pen to draw a line across the width of one hand and one foot.
2. Additional lines may be drawn for students to measure, such as a line connecting the right hand and right foot or the left hand and right foot, or they can measure the length of a ring finger and the length of a little finger.
3. First the students estimate and then measure each of the items in the personal hygiene activity for length. Using one-inch square tiles they estimate and then measure the area of the towels and the washcloths.

List of Activities for this Lesson

- ▲ But My Hands Are Clean!
- ▲ Achoo!
- ▲ Bacteria Fighter
- ▲ Bacteria Grow Fast
- ▲ Soap and Math

ACTIVITY

But My Hands Are Clean!

Objective

The student says that although hands look clean, they may carry bacteria and other organisms that cause illness.

Materials

Two jars with tight lids; the jars should be thoroughly cleaned
Gummed labels
Potato peeler
Soap and towel

Procedures

1. Label one jar: **Not Washed;** label the other jar: **Washed.**
2. Without washing her hands, the teacher peels a potato and puts it in one of two jars, labeling the jar with the **Not Washed** label. She points out to the students that her hands look clean.
3. Scrub the hands well, using soap. Wash the second potato and the potato peeler also. The teacher points out to the students that not only did she wash the potato, but she also cleaned her hands and the peeler. Peel the second potato and put it in the other jar. Label it: **Washed.**
4. Seal both jars tightly with their lids; place the two jars in a warm place where students can observe them but not touch them for several days.
5. Without removing the lids on the jars, examine the two potatoes daily. Compare them.
6. Are there any changes in the potatoes? The students draw and date pictures of how the potatoes look.
7. The students write a description of the changes and draw a picture of what the growth on the potato looks like. They sequence the pictures as the growth becomes larger.

Discussion

In this activity, the students observe that even though hands may "look" clean, they may not be. They do this by peeling a potato to see if bacteria can grow on it. Someone whose hands appear to be clean but have not been washed for several hours should do the potato peeling. Mold spores can transfer from the hands to the potato during the peeling process. The spores multiply quickly, and students can see that the spores spread.

Students can describe the growth of the mold by comparing the area of the growth to different coins, such as dimes or pennies, or to small buttons, etc.

ACTIVITY
Achoo!

Objective
The students practice addition and subtraction.

Materials
Poster board marked in sequential squares
Laminated, printed 3x5 cards listing poor and good health practices
Numbered cubes

Procedures
1. Draw a path on a poster board and mark off spaces every inch.
2. On a few of the spaces write **Achoo!**
3. Students make game cards by laminating 3x5 cards that have written on them either a good health practice — brush teeth every day — or a poor health practice — forget to wash hands before eating.
4. Each student rolls a pair of numbered cubes and moves the total number of spaces shown on the cubes. If a person lands on "**Achoo!**" he/she must take a game card. If the card shows a good health practice, the player moves forward two spaces. If it lists a poor health practice, the player moves backward two spaces.
5. The game can vary by the students subtracting the smaller number from the greater number on the cubes and moving that number of spaces.

ACTIVITY
Bacteria Fighter

Objective

The student says that the body protects itself from harmful bacteria as the body's white cells eat the harmful bacteria.

Materials

Clothespins (one for each player)
Green paint or marker
Stick-on novelty eyes (optional)
Scissors
Cardboard from corrugated boxes or other heavy cardboard
Construction paper of different colors

Procedures

1. Paint clothespins green and allow them to dry before playing the game.
2. Paint eyes on the top of the clothes pins or attach stick-on novelty eyes.
3. Cut circles, triangles, squares and rectangles out of cardboard.
4. Put the shapes in a pile in the middle of a table.
5. Draw "bacteria" on these shapes.

Rules: The students play in pairs; the teacher may want to demonstrate the first round.

1. The bacteria fighters like to eat bacteria shapes (demonstrate pinching the clothespin so its "mouth" opens).
2. One students tells the other student's bacteria fighter which shape to eat, and then the second tells the first student's bacteria fighter which shape to eat. For example: There's a big circle that looks good to eat. Can your bacteria fighter eat a circle?
3. The child (the clothespin) "eats" a circle and gets a turn to tell the other student's bacteria fighter which shape to eat.
4. Place shapes that are eaten in a pile until the original pile is eaten up. If the child's bacteria fighter eats the wrong shape, the partner holds up the correct shape. If there is a difference of opinion, students ask the teacher to intervene.

ACTIVITY
Bacteria Grow Fast

Objective
The student says that, like bacteria, numbers become large very fast when we use multiplication.

Materials
Pound of beans; watch with a second hand

Procedures
In a whole group activity, the students place one bean for every bean they get, to demonstrate that bacteria grow very fast by dividing into two.

1. The teacher keeps time and says GO every two or three seconds, but the number of seconds must be consistent.
2. One student begins with one bean, which represents a single bacteria. When the teacher says GO, the student places one bean under the first one to show that the first bean divided. The student now has two beans.
3. When the teacher says GO again, the student places one bean under each of the beans she/he has. Now there are four beans.
4. The teacher says GO. The student places one bean under each of the beans and now has eight.
5. After every two seconds the teacher says GO, and the student adds more beans. The student may ask other students for help to keep up with the two-second intervals.
6. After six trials, the teacher stops and asks the students to count the beans.
7. The students decide how to count them. They may want to group by fives or by 10s.
8. The students make a chart showing the sequence of the number of beans after each time the teacher said GO. They may want to repeat the exercise at a slower pace to count the beans every time before proceeding.

Sequence: **1, 2, 4, 8, 16, 32, 64, 128**

Discussion
1. Ask students if they have ever gotten up in the morning with "bad breath"? What caused the bad breath? Yes, bacteria that have grown in the mouth overnight. That means bacteria have been growing very quickly and separating.
2. This is one example of multiplication. Another way of thinking of multiplication is to think of repeated addition. For example:
   1 + 1 = 2, then **2 + 2 = 4,** then **4 + 4 = 8,** then
   8 + 8 = 16, and so on with **32,** then **64,** and then **128.**
3. What can we do to prevent bacteria from growing in our mouth at night? (Brush teeth.) Why? Show what would happen if you had started with 4 beans in this activity. How many would you have after the "bacteria" separated five times?
4. Do bacteria grow in your mouth during the day? What can we do about it? (Brush our teeth after we eat, whenever we can.)

ACTIVITY
Soap and Math

Objective

The students practice making subtraction sentences with numbers written on cards.

Materials

Two feet of string
Magnet powerful enough to pick up two paper clips and two index cards
10 paper clips
Shoe box or small container
13 3 x 5 index cards
Felt tip pen
Construction paper of different colors
Drawing of a hand on construction paper
Small, straight stick (or dowel rod) to serve as a fishing pole

Procedures

1. On 11 of the index cards, print numbers 0 through 10. (The cards can have numbers greater than 10 written on them, if appropriate, depending on the students' prior experiences.) Make a "minus" sign on another card and an "equals" sign on the last.
2. Spread all the cards out on the floor.
3. Tie one end of the string around the magnet and the other around the stick to make a fishing pole. Glue the handprint on the magnet.
4. Using construction paper, make a drawing of a bar of soap for each paper clip. The student counts the paper clips and puts one on each construction paper picture of a soap bar.
5. Put the soap bars in the shoe box.
6. Put the box on the seat of a chair and cover the chair back with a towel.
7. Position a student behind the chair and let him/her dangle the fishing pole so that the magnet is in the box.
8. Each student "catches" two bars of soap and constructs a subtraction statement using the "minus" and "equals" cards. Students take turns fishing and making subtraction sentences.

LESSON 6 Exercise Is for Life

BIG IDEAS Proper exercise helps the body maintain its good health and good looks. Keeping a chart helps us develop good exercise habits.

Whole Group Work

Materials

Book: **The Sand Lot** by M.B. Christian

A rusted hinge, pair of pliers, or some other unused object that will creak when moved; an old battery; other discarded objects, covered with dust, etc., that have not been kept in good repair

Machine oil

Word tags: exercise

Encountering the Idea

Look at this hinge. What do you hear when I move it? It squeaks. Why? (Rust, hasn't been used; can't be used, etc.) I'm going to put some oil on it and move it slowly back and forth. Now, do you still hear it? Can it work now? Look at these pliers. They're covered with dust and rusted. Do you think they are still useful? What would we have to do with them to get them into good shape?

In our last unit we said that many of the parts of our body work like machines. Our heart is like a pump; our lungs exchange air; our kidneys remove wastes. Do you think our body could become like the rusty hinge? Let's explore how this could be.

Exploring the Idea

Students run in place for 30 seconds. They return to their seats. Did this activity make your body work hard? Was it fun? How do you feel? In a few minutes, you are going to your Physical Education class. What do you do in that class?

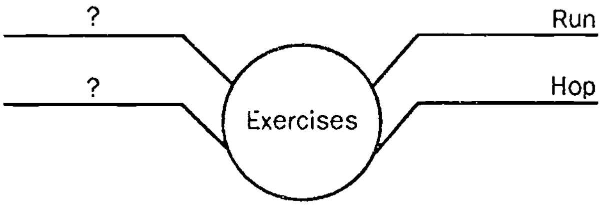
First, you exercise. Which exercises do you do? Jumping Jacks, Touch your Toes, Windmills, etc. Are those fun? No? They're boring? Okay, after you exercise, what do you do? You get to play. What have you been playing?

Softball, kickball, etc. Are those fun? Yes, you like games, but you don't like the exercises as much as the games. Well, today we'll discover that there are many ways to keep your body from becoming rusty and creaky like the hinge and the pliers, and you can **still have fun.**

Getting the Idea

Read the book **The Sand Lot.** Discuss the ideas of what "exercise" really is. Can it be fun? Does it have to be like work? Show the word tag **exercise.** Exercise is **any activity** that makes the body work hard. A person must exercise on a regular basis in order to become and stay physically healthy.

Many of our body parts are designed for movement, such as hands, feet, arms. What are some other part that have to move? (Fingers, heart, lungs.) Regular exercise is necessary to keep these parts in good health. Regular exercise makes the heartbeat strong and efficient. A strong heart pumps more blood with each beat than a weak heart. We also need strong lungs. Exercise makes the lungs bring in more oxygen than without exercise.



Recreation can be a fun way to exercise. When we play games that make us run, hop or move around in any way, we are exercising. Let's name some fun ways to exercise. As the students name some games, the teacher lists them on the chalkboard for use in the **Writing Center**. Students brainstorm about how we use water for recreation. Are we exercising when we swim? How do you know? Yes, you get tired and you breathe faster and your heart beats faster. Write down these ideas also.

We need to exercise on a regular basis. Suggest one way to know if we are getting enough exercise every day. We can write down the days we exercise and how long, how much time, we exercise. We will decide how we want to organize this information and use it at the **Mathematics Center.**

Organizing the Idea

1. Students draw types of recreation and compare their preferences using a pictograph. Divide students into groups that prefer different types of recreation.
2. At the **Mathematics Center,** the students design a chart to help them organize information on how often and how much they exercise each day.

Applying the Idea

Working in teams the students select a part of the body that they need to exercise and design an exercise or a game to keep that part of the body fit: hands, feet, arms, fingers, heart, lungs, neck, face, etc.

Closure and Assessment

1. Invite the school nurse to talk to the class about routine examinations conducted at school (hearing, sight, vision, etc.), treatment of school-related injuries and the instruments the nurse uses for these purposes. During the nurse's visit, the students make a list of what parts of the body the nurse examines in the routine examinations and/or a list of the treatment of school-related injuries.
2. Students use the chart to record when and how much they exercise for at least one week. The students discuss the need for proper exercise with the school nurse.

LESSON 7 Practicing Safety Helps Our Health

BIG IDEAS Avoiding illness and preventing injury are important for our health. Charts summarize information so that we can use it.

Whole Group Work

Materials

Book: **Here Comes Kate!** by J. Carlson.
Rinsed and sealed containers of safe and unsafe products
Word tags: drugs, medicines, prescription, prescribe, prevention, accident, pharmacist, allergy, vaccination, summarize

Encountering the Idea

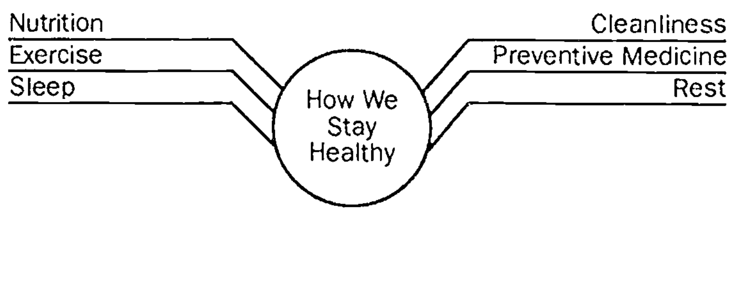
Read the book **Here Comes Kate!** Why did Kate have to be careful? Yes, she could have hurt someone badly. She could also have hurt herself. We know good health is very important. We have learned that there are many things that help us have good health. Let's name some. Students list: We need to eat the proper food; we need to take vitamins and drink plenty of water. We need to rest, and we need to be clean. But, there is something else. We have to **take care of our health** by trying not to get sick and by preventing accidents.

Exploring the Idea

Prevention of Illness

In a whole-group activity the students brainstorm ideas for ways to prevent illness and disease. As the children list effective health habits, they make a web that they can use later in the **Writing Center.**

Students name a good health habit and why they consider it a good habit.



One way of preventing illness, as we mentioned, is by enjoying good nutrition. Proper nutrition can include many good things to eat.

At the **Mathematics Center,** the students complete the **Activity** — Almond Cookie Factory, modified so that students group by some other number than five or 7. See **Activity** —Almond Cookie Factory in **Lesson 1.**

Practicing Safety at Home

Do **Poisonous Things at Home** Activity.

Students make a list of poisonous items they may find at home, i.e., Clorox, insect spray, etc. The students take the list home and take a survey of the poisonous items they found in their homes. If they find others at home that they have not listed, they add them to the list. Then the class accumulates the data brought in by all the members of the class. They summarize it in a pictograph charting the poisonous materials most frequently used at home.

Do **Unsafe Substances in Familiar Containers** — Activity.

1. Display rinsed and sealed containers of safe and unsafe products.
2. Name each product; students group each according to whether it is safe or unsafe.
3. Sometimes poisons are stored in familiar containers, such as milk cartons.
4. Emphasize that we should ask an adult about the safety of all unfamiliar substances.
5. Make labels for poisons with the word **poison** on each label.
6. Students take labels home and put them on containers that contain poison. They may have a family member help them at home.

Do **Safe Ways to Play at Home** Activity.

Students draw or write about safe ways to play when they are home. (They should clean up toys after playing to prevent accidents.) Students list things in their homes that they should not touch. (Guns, whether loaded or not, stove, medicines, tools, cleaners, iron, any plastic wrappers they can try to put over their heads, etc.)

Safety Test

Students take a Safety Pretest. Describe a situation to the students. They answer by saying whether it is hazardous or not hazardous. Students discuss each situation telling how to correct the dangerous situations, i.e., newspaper near the fireplace, heater or stove; children playing by the stove; slippery carpets; open staircases; open windows in upper stories of apartment houses; exposed electrical wires; unprotected electrical outlets; iron resting on top of the ironing table, etc. Discuss until all situations are covered.

Say NO! to Drugs

A drug is something other than food, water or air that can change the way the body works. Some drugs may be helpful such as those in medicines that make people feel better when they are ill. But, **even these medicines may be harmful if we don't use them correctly.**

Drugs also appear in products other than medicines. Household products such as paint thinner, airplane glue, rubber cement, insect sprays, and oven cleaners contain drugs that can be **very harmful if we use them on the body.** None of these products should be used inside our bodies.

At the **Art Center**, the students select one or two of the dangerous situations and depict how they would correct the situation.

Getting the Idea

Introduce vocabulary such as "drugs", "medicines" and "prescription" in a discussion. Students name some medicines that are for a specific illness. Discuss with the students the difference between a drug and a medicine. Discuss the idea that only doctors can prescribe some medicines, and why. Discuss the idea that even though a pharmacist has studied and knows about medicines, the pharmacist cannot **prescribe** certain drugs — only doctors.

Let's look at the pictograph we made that summarizes the information about the different harmful products we find at home. What do we mean when we say that the chart "summarizes" the information we collected? Look at the word "summarize". What word do you find in it that we use in mathematics? Yes, the word "sum". What is a sum? A total; it means putting all our information together. Instead of saying what each person found in their homes, we put all the information together so that we can look at it to see which of the poisonous products are the ones that we are most likely to find in our homes. This is information that tells us about all the homes represented in this classroom and not just about one home at a time.

Which products did we find to be the most used in our homes? Now that we have that information, what can we do with it? The students make suggestions that the teacher writes on the chalkboard for the students to use in their writing.

Organizing the Idea

Students make a list of products containing drugs, which includes products that contain caffeine, alcohol and nicotine. Students cut out pictures from magazines and categorize them into two groups.

Harmful-dañino	**Helpful—útil**
cigarette-cigarro	aspirin-aspirina

The students go to the school cafeteria. The cafeteria manager talks to the students about how the cafeteria workers keep bacteria from spreading to food.

At the **Writing Center,** the students

- select one or two of the health practices listed in the health web and write a paragraph on each stating why these are effective health practices
- write and draw in their journals at least three ways to prevent disease
- write and draw in their journals at least three ways they can use the information summarized on the pictograph showing the most-used poisonous products that they found in their homes
- make an illustrated booklet entitled **Protect Yourself From Illness.** Students include information about how we can prevent bacteria from spreading, how vaccinations (shots) can help people stay well and how people can take care of their bodies. They can make the booklet into a class Big Book.

Applying the Idea

1. ***Problem Solving:*** Your friend has been sick with a cough. He went to the doctor, and the doctor gave him a prescription for a medicine that made him well. The next day you begin to feel sick and have a cough. Should you or shouldn't

you take some of your friend's medicine to make you well? Explain the reasons for your answer. (You should **never** take someone else's prescribed medicine. Only the doctor knows what a person's illness is and what medicine will be effective for that person. Sometimes people are allergic to some kinds of medicines. The doctor would know what to prescribe for you knowing what you illness is.)

2. Students make a **PERSONAL HEALTH CHART** that they will keep for the duration of the school year. On a weekly basis they record their general health, whether they have been ill or had an accident, whether they have been to see the doctor, nurse, dentist, etc.

Closure and Assessment

Written Assessment

1. What is a drug?
2. What are some products that contain drugs?
3. What is a prescription?
4. Why are children not permitted to buy beer, wine, liquor and tobacco products?

Performance Assessment

Reread the story **Here Comes Kate!** Using the story to develop ideas, the students write about and illustrate at least three things they might do to be safe at home, at school and at play.

List of Activities for this Lesson

▲ Almond Cookie Factory (from Lesson 1)

LESSON 8 The Health Professions

BIG IDEAS Some of the most important professionals in our community are the people who help us maintain our health. Each of these professions requires knowledge of science and mathematics.

Whole Group Work

Materials

Books: **Farley Goes to the Doctor** by E.P. Kingsley and **Five Little Monkeys Jumping on the Bed** by E. Chislelow

Medical instruments (play, if real ones are not available) used by physicians, dentists, ophthalmologists

Various reference books on the medical and health care professions; pamphlets from a local health department describing these professions

Word tags: profession, nurse, dentist, medical, instruments, doctor, technician

Encountering the Idea

Read **Farley Goes to the Doctor** or **Five Little Monkeys Jumping on the Bed.** Ask students who has gone to the doctor. The students take turns describing their visits, the doctor or nurse, the medicines they have had to take, whether they like them or not and so on.

Ask students if they have gone to the doctor not because they are ill, but because they need a **checkup.** What is a checkup? Do babies get regular checkups? Why? Yes, the parent and the doctor need to know that as the baby grows there is nothing going wrong, there is no sign of illness. The parent needs to know if the baby is gaining weight and developing its body normally.

Has any one of you gone for a checkup? You went to the doctor? Good. Oh, you went to the dentist? Who has gone to see an eye doctor? It's always a good idea to find out if you need glasses. Many of us sometimes don't want to go to the doctor or the dentist, or to get glasses if we need them. In this lesson we are going to find out that the people, the professionals, who help us take care of our health are some of the most important people in our community.

All of us have seen and heard ambulances that take people to the hospital when they become very ill or when there has been an accident and the people need immediate help. The **emergency medical service** technicians give first aid to the people who are sick or hurt and take them to the hospital. These people are very important because they have to respond to many different kinds of illnesses and take care of the people until they get to the hospital.

Exploring the Idea

In the **Science Center,** place several boxes containing medical instruments. The students sort them out. They sort them by the way they think each instrument is used and who would use it — a doctor, a nurse, a dentist or an eye doctor. Sometimes the same tools are used for different things. The students examine the instruments. Later the students will summarize what they have learned about the instruments on a chart.

Getting the Idea

1. Students brainstorm and make a list of the different health professions they know about.
2. Using pamphlets from a local health services department to suggest ideas, students list other health professionals and describe the tasks they perform. They also try to identify what mathematics and science preparation these health professionals need.

Organizing the Idea

At the **Writing Center:**
1. The students list, describe and/or draw procedures used in examining a patient.
2. Each student selects a health profession. The students can organize into like-profession groups to share ideas to write, describe and illustrate why they picked that profession and whether they would like to study and prepare themselves to enter that profession. During the discussion the students look in books or pamphlets to identify the levels and courses in science and mathematics they need to complete to become professionals in the health care field.
3. Students complete a chart in the **Writing Center** to describe the medical instruments.

Instrument	**Description** (size, material, picture)	**Function** (what it does)	**What It Measures**

Applying the Idea

Invite at least two health professionals to visit the class and to describe their jobs. Select both a male nurse and a female doctor, if possible, to decrease the stereotypes of the gender of health professionals. Ask the health professional to describe the type and level of mathematics and science preparation required in various health care professions.

Closure and Assessment

1. The students write and illustrate their own version of **Five Little Monkeys Jumping on the Bed.**
2. A student group pantomimes being a health professional while the rest of the class tries to guess who it might be.
3. The student writes a paragraph using the pattern: "The most important thing about __(profession)__ is __(describe job)__, because __(list benefits)__."

References

Annotated Children's Books

Allard, H. (1979). *I will not go to the market today.* New York: The Dial Press.

Fenimore B. Buttercruch meets several obstacles before he finally gets to the market to get jam for his toast and tea.

Arkin, A., & Stevenson, J. (1972). *Tony's hard work day.* New York: Harper and Row.

Because he is little, Tony's family is reluctant to allow him to help with chores. Left with nothing to do, Tony builds a house in a day.

Barrett, J. (1975). *I hate to take a bath.* New York: Four Winds Press.

This reviews "reasons" why baths should be taken and why baths should not be taken.

Black, I. S. (1972). *Is this my dinner?* Chicago: Albert Whitman.

An easy reader, this story in rhyme tells of a boy looking for his dinner and discovering several kinds of food he cannot eat.

Blas, J. W. (1987). *Old Henry.* New York: William Morrow and Company.

This is the story of how a community tries to get Henry to improve his property and fix up his house.

Brown, M. K. (1986). *Let's go swimming with Mr. Sillypants.* New York: Crown Publishers.

This humorous tale tells of the concerns Mr. Sillypants has about learning to swim.

Brown, M. W. (1992). *Red light, green light.* New York: Scholastic.

All day and night the traffic signal blinks its messages of stop and go.

Burningham, J. (1978). *Time to get out of the bath. Shirley.* New York: Thomas Y. Crowell.

While her mother lectures and tidies up the bathroom, Shirley's imagination takes her off on a series of adventures.

Caines, J. (1988). *I need a lunch box.* New York: Harper and Row.

A young boy, not yet in school, thinks of all the reasons he needs a lunch box just like his older sister does.

Carlson, J. (1989). *Here comes Kate!* Milwaukee: Raintree Publishers.

A beginner reader, this story is about a girl in a wheelchair who eventually learns when to go fast and when to slow down.

Christelow, E. (1989). *Five little monkeys jumping on the bed.* New York: Clarion Books.

Five little monkeys jumping on the bed fall one by one, making the doctor come in each time.

Christian, M. B. (1978). *The sand lot.* New York: Harvey House.

This is a story of how adults tend to "over organize" children's creative nature and children's play.

Demarest, C. L. (1991). *No peas for Nellie.* New York: Macmillan Publishing Company,

Nellie tells her parents all the unusual things she would rather eat than her peas, and while doing so she ends up eating them all.

de Paola, T. (1975). *Strega Nona.* New York: Simon & Schuster.

An old tale, retold, and illustrated by de Paola. When Strega Nona leaves Big Anthony alone with her magic pasta pot, he gets into trouble in his determination to show the towns people how it works.

Fassler, J. (1975). *Howie helps himself.* Chicago: Albert Whitman & Company.

This is a story of a child who is physically handicapped and wants more than anything else to be able to do things for himself.

Hare, L. (1983). *Who needs her?* New York: Atheneum.

A Margaret K. McElderry book, this volume addresses cleanliness. Cynthia's clothes rebel against the rough treatment she gives them.

Hitte, K., & Hayes, W. D. (1970). *Mexicali soup.* New York: Parents' Magazine Press.

Mother makes the soup just like everyone in the family wants it and finds it easy to make: "you just leave everything out of it." This text may need to be read by the teacher.

Ivenson, C. (1979). *I want to be big.* New York: E. P. Dutton.

A young girl wants to be big but not too big.

Kingsley, E. P., & Swanson, M. (1980). *Farley goes to the doctor.* Racine, WI: Sesame Street Golden Press Books, Western Publishing.

Leaf, M. (1961). *Safety can be fun.* Philadelphia: Lippincott.

This takes a first look at safety and accident prevention.

Marshall, J. (1984). *The cut-ups.* New York: Puffin Books.

Practical jokers get away with every trick until they meet Mary Frances.

Melser, J., & Cowley, D. (1980, 1990). *The big toe.* San Diego: The Wright Group.

This folk tale about a lost big toe is adapted from one originally designed and edited by June Melser. Large illustrations and very low burden of print make this book predictable.

Morris, A. (1989). *Bread, bread, bread.* New York: Lothrop, Lee and Shepard Books.

This is a good photojournal of how bread is celebrated throughout the world. It also shows different kinds of bread.

Patent, D. H. (1990). *An apple a day.* New York: Cobblehill Books/Dutton.

This may have to be read by the teacher. It shows an overview of how apples are planted and harvested.

Zolotow, C., & di Grazia, T. (1972). *Hold my hand.* New York: Harper and Row.

Two children hold hands through bad weather.

Teacher Resources

Tolman, M. N., & Morton, J. O. (1986). *Life Science activities for grades 2-8.* West Nyack, NY: Parker Publishing Company.