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ABSTRACT

This guide is designed to aid the teacher in planning and teaching a ninth-grade science course. It should provide students with a functional system of knowledge which is applicable to new situations and will serve as the basis for future decisions. Five units outlined are entitled: Introduction to Service; The Earth's Storehouse; The Earth's Weather; Work (Easing Work); and Speeding Communication. Each unit is subdivided into a series of Main Ideas which were further subdivided into Concepts. When integrated, these concepts should explain the main idea. The functional level, however, is viewed as the Subconcept. Accompanying each set of subconcepts are suggested materials and methods, behavioral objectives, and suggested evaluation techniques. (JP)

# DESOTO PARISH CURRICULU

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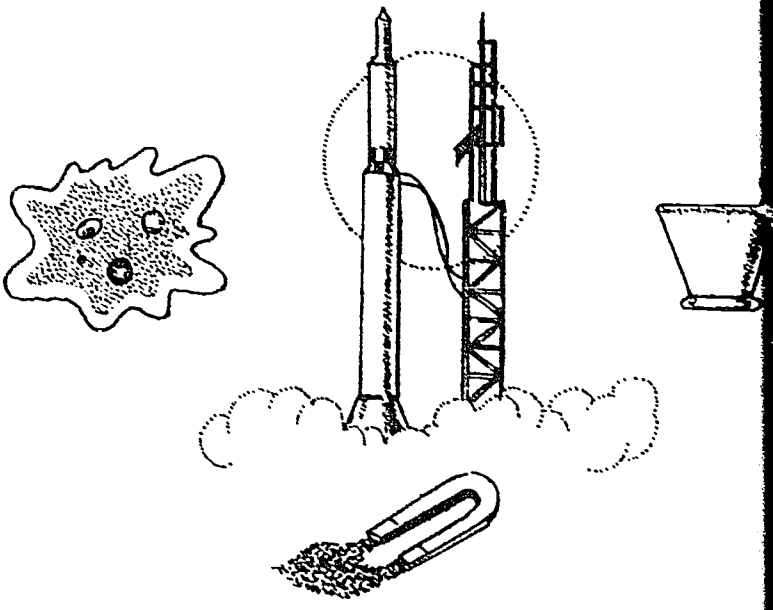

SCIENCE 9

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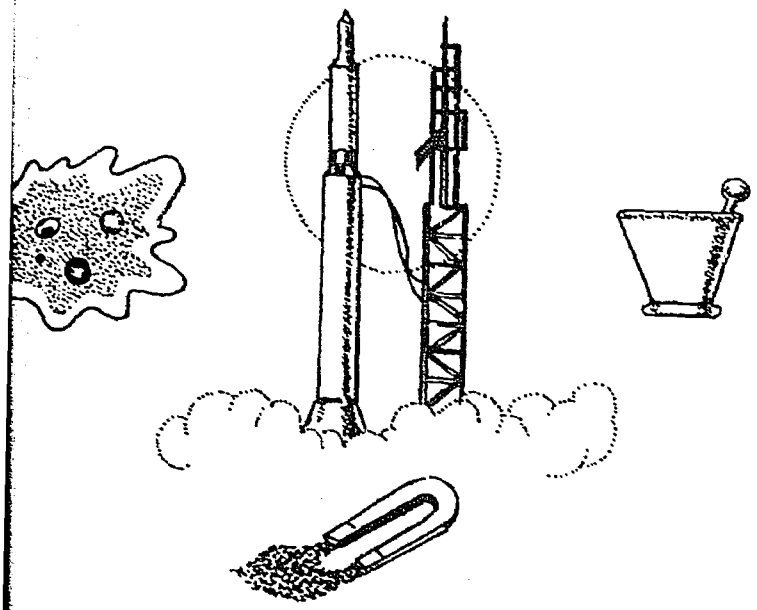
Title I, E.S.E.A.

Douglas McLaren, Superintendent

August 1971

# PARISH CURRICULUM GUIDE





SCIENCE 9

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UNIT FIVE Speeding Communication

A. Sound and Hearing
B. Light and Sight
C. Sending and Storing Signals

# INTRODUCTION

Population Explosion, Ecology, Energy Depletion, Pollution--These are the watchwords o for a comprehensive view of the partial cause and probable source of solution, Science. To knowledge of each of the major branches of science whether his vocational activities be pro the high school is to produce a broad educational background upon which intelligent decisio specialist. These thoughts guided the development of this curriculum guide. As one inspec the emphasis is placed on the development of comprehension and functionality, rather than o facts are required to form concepts; however, the goal of functional science instruction sh

The teaching process, if effective, must integrate both content and method in order to accomplish this is a decision to be made by each instructor, however, suggested methods are

This curriculum guide should not be viewed as perscriptive, but rather as suggestive o will need to supplement, modify, and select the materials to be taught on the basis of the needs.

In constructing this guide it was the opinion of those participating that at all times ing what is to be learned, how one might attempt to teach and the specific objectives shoul in the format presented herein.

Each unit was subdivided into a series of Main Ideas which were further subdivided int cepts explain the main idea. The functional level however was viewed as the Subconcept. O

# INTRODUCTION

ergy Depletion, Pollution--These are the watchwords of the day, all of which attest to a need
a cause and probable source of solution, Science. Today's citizenry is in need of a functional
s of science whether his vocational activities be professional or unskilled. The function of
educational background upon which intelligent decisions can be based; it is not to produce a
development of this curriculum guide. As one inspects this guide it will become obvious that
ent of comprehension and functionality, rather than on a knowledge of specifics. Admittedly,
owever, the goal of functional science instruction should be the latter.
e, must integrate both content and method in order to achieve the stated objectives. How to
de by each instructor, however, suggested methods are included.
be viewed as perscriptive, but rather as suggestive of a comprehensive course. Each teacher
elect the materials to be taught on the basis of the specific student population and current

the opinion of those participating that at all times an overview of the entire lesson includ-
ht attempt to teach and the specific objectives should best be apparent. This view resulted

eries of Main Ideas which were further subdivided into Concepts. When integrated these con-
tional level however was viewed as the Subconcept. Once the student accumulates the necessary

knowledge he should be able to relate these isolated bits of information into a functional
to new situations and will serve as the basis for future decisions. The committee is of th
portant, but what the student learns and carries away from the classroom is important.

Accompanying each set of subconcepts are Suggested Materials and Methods which the tea
subconcepts. Included in this section are lists of resources available at the Instructiona
cated. There is also included the approximate amount of time which is considered reasonabl

If one accepts the idea that learning will produce behavioral change, then the student
haviors after having learned. The Student Behaviors are stated as behavioral objectives wi
expression of the desired behavior. These when demonstrated can be accepted as prima facia

The committee has indicated several methods by which teacher and student evaluation mi
tive techniques to be used however will vary with the material, the class, and the teacher.

Slow learners generally function best when dealing with concrete situations and poores
gifted do well in both cases while those who are neither slow nor gifted exhibit all possibl
Certain materials in the text are best reserved for only the better student. These sections

olated bits of information into a functional system of knowledge which is applicable for future decisions. The committee is of the opinion that what is taught is not im-es away from the classroom is important.

Suggested Materials and Methods which the teacher might choose to use to teach the ts of resources available at the Instructional Materials Center or elsewhere as indi- amount of time which is considered reasonable to teach the lesson.

l produce behavioral change, then the student can be expected to exhibit specific be-aviors are stated as behavioral objectives with an action verb requiring an observable n demonstrated can be accepted as prima facia evidence of success.

ds by which teacher and student evaluation might be conducted. The specific evalua-ith the material, the class, and the teacher.

n dealing with concrete situations and poorest when dealing with abstractions. The re neither slow nor gifted exhibit all possible gradations between these extremes.

d for only the better student. These sections have been indicated by an asterisk (*).

| Main Idea | Concept | Subconcept |
|---|---|---|
| Methods of the Scientist | The scientist uses many methods of investigation to learn about matter, energy, and living things. | 1. Hypotheses are suggested a<br>2. Experiments are attempts t<br>3. Observations are directly<br>4. Conclusions are reasoned i tions.<br>5. Scientists build upon the<br>6. Facts determined through i events around us for meani<br>7. A scientist uses many diff<br>8. Knowing how to apply the s daily life. |

| | Subconcept | 1 |
|---|---|---|
| uses many<br>estigation<br>matter,<br>ving things. | 1. Hypotheses are suggested answers to problems.<br>2. Experiments are attempts to determine the correctness of hypotheses.<br>3. Observations are directly sensed.<br>4. Conclusions are reasoned interpretations made on the basis of one's observations.<br>5. Scientists build upon the carefully controlled investigation of others.<br>6. Facts determined through investigations provide a basis for organizing the events around us for meaning.<br>7. A scientist uses many different methods in planning his investigation.<br>8. Knowing how to apply the scientist's methods of inquiry, is useful in daily life. | |

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 5 periods<br>1. Discuss experiments of pioneer scientists.<br>2. Have the students identify the scientist's problem, probable hypothesis, and conclusions.<br>3. Present the students with another problem such as, "per unit volume," which is heavier, skimmed milk or whole milk?"<br>Have students:<br>a. develop a statement of the problem<br>b. develop all possible hypotheses<br>c. select a working hypothesis to test<br>d. design an experiment<br>e. make observation of experiment<br>f. record data<br>g. draw a conclusion.<br>Note: If the milk problem is used, the students will better understand the results if the whole milk is not homogenized.<br>4. Use film:"The Scientific Method."<br>Resources: Textbook<br>Film Library | 1. Given a problem situation, the<br>state hypothesis which would e<br>problem.<br>2. Given a list of hypotheses, th<br>select those which are most pl<br>3. Given experimental data, the s<br>interpret the data and state c<br>4. Student will conduct the resea<br>page 18.<br>5. The student will answer questi<br>pages 5, 9, 12, 15, and 18. |

s problem,

such as,

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1. Given a problem situation, the student will state hypothesis which would explain the problem.
2. Given a list of hypotheses, the student will select those which are most plausible.
3. Given experimental data, the student will interpret the data and state conclusions.
4. Student will conduct the research problem, page 18.
5. The student will answer questions, text pages 5, 9, 12, 15, and 18.

1. Present the students with the situations identified under Student Objectives and have them demonstrate the objective.
2. May use question number 2 on page 18 (Applying Your Knowledge).

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Ways of the Student | A. Modern Man and His Special Traits | 1. Capacity to learn is base<br>2. Students in science use t<br>3. One of man's most importa<br>4. Man thinks, imagines, and things. |

an and His

Traits

1. Capacity to learn is based on inherited and acquired aptitudes.
2. Students in science use the ways of the scientist to learn how the world works.
3. One of man's most important characteristics is his ability to learn.
4. Man thinks, imagines, and invents, which makes him superior to all other living things.

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 2 periods<br>1. Demonstrate and/or discuss<br>a. the kinds of motion permitted by the thumb<br>b. the responses to stimuli<br>c. that some parts of the skin are more sensitive than others<br>d. the function of the parts of the brain.<br>2. Using figure 2-2 and 2-4, trace the nerves to all parts of the body.<br>3. Perform and discuss the investigation, page 25.<br>4. Use films: "The Human Brain" NSU Film Library<br>"Gateways to the Mind" Bell Telephone Company.<br>Resources: Textbook, pages 20-25 | The student will<br>1. perform certain motions<br>2. list the chief kinds of organs that respond to t<br>3. draw a hand and mark the areas as they are found demonstration<br>4. using an outline drawing fill in the parts and inc function of each part (ma crayon)<br>5. bring to class pictures o things; then decide which brain are involved in dir activity represented. |

| | Student Objectives | Suggested Evaluation 4 |
|---|---|---|
| | The student will | The student might be evaluated by |
| he thumb | 1. perform certain motions of thumb | 1. answering questions on page 25 |
| re sensitive | 2. list the chief kinds of stimuli and the organs that respond to these stimuli | 2. his proficiency in the performance of student objectives. |
| rain. | 3. draw a hand and mark the more sensitive areas as they are found during a given demonstration | |
| ves to all | 4. using an outline drawing of the brain, fill in the parts and indicate the function of each part (may use colored crayon) | |
| page 25. | 5. bring to class pictures of people doing things; then decide which areas of the brain are involved in directing the activity represented. | |
| ibrary | | |
| ompany. | | |

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Ways of the Student | B. Your Inborn Ways | 1. Some of our actions, calle |
| | | 2. Reflex acts do not need th |
| | | 3. Inborn behavior is automat |
| | | 4. The results of modifying a |
| | | 5. Certain reflex acts protec |

rn Ways

Subconcept

1. Some of our actions, called reflexes, are inborn and automatic.
2. Reflex acts do not need thinking.
3. Inborn behavior is automatic.
4. The results of modifying a reflex is a conditioned reflex.
5. Certain reflex acts protect a person from harm.

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 1 period<br>1. Discuss and/or demonstrate<br>a. the advantages of reflexes<br>b. review parts of the brain and indicate which part controls certain reflexes<br>c. figure 2-6, page 26<br>d. the nature of reflexes.<br>2. Using figure 2-7, page 27 summarize Pavlov's experiment.<br>3. Film: "The Nervous System."<br>Resources: Textbook, pages 26-29<br>Film Library, NSU | The student will<br>1. perform activities page illustrate some reflexes<br>2. list reflexes that are a conditioned<br>3. demonstrate how a new st substituted for an old o<br>4. answer questions page 29<br>5. discuss,"Can conditioned changed?" (Teacher's 19)<br>6. evaluate the film. |

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The student will

1. perform activities page 26 and 27, to illustrate some reflexes
2. list reflexes that are automatic and conditioned
3. demonstrate how a new stimulus may be substituted for an old one
4. answer questions page 29, numbers 1-5
5. discuss, "Can conditioned reflex be changed?" (Teacher's Manual, page 19)
6. evaluate the film.

The student might be evaluated by the performance of the student objectives.

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Ways of the Student | C. Forming Habits | 1. Habits differ from reflexes |
| | | 2. Good habits improve your be |
| | | 3. Good habits save time; bad |
| | | 4. At first, everyone needs he |
| | | 5. Emotions play an important |

1. Habits differ from reflexes in that they are learned automatic responses.
2. Good habits improve your behavior and make for success.
3. Good habits save time; bad habits waste time.
4. At first, everyone needs help in forming habits.
5. Emotions play an important role in habit formation.

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 1 period<br>1. Discuss and/or demonstrate<br>a. actions performed without thinking so well that it is performed automatically<br>b. differences between reflexes and habits<br>c. advantages of being albe to learn something<br>d. how strongly habits affect our behavior<br>e. why is a habit good or bad.<br>2. Perform investigation, page 30.<br>3. Summarize the main ideas in the section "New Habits," page 29.<br>Resources: Textbook, pages 29-31 | The student will<br>1. list examples of reflexe<br>2. demonstrate how strongly our behavior<br>3. list examples of good an<br>4. tell how one bad habit l changed<br>5. answer questions, page 3<br>6. compose a list of good a habits. |

| | Student Objectives | Suggested Evaluation 8 |
|---|---|---|
| well<br><br>ts<br>ething<br>or<br><br><br>w Habits," | The student will<br>1. list examples of reflexes and habits<br>2. demonstrate how strongly habits affect our behavior<br>3. list examples of good and bad habits<br>4. tell how one bad habit listed can be changed<br>5. answer questions, page 31, number 1-4<br>6. compose a list of good and poor safety habits. | The student might be evaluated by the following:<br>1. classify as a reflex or habit a list of given acts<br>2. display a collection of newspaper and magazine clippings which describe accidents in which poor habits were involved<br>3. preparing posters to show good and poor school and home habits<br>4. take an objective test. |

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Ways of the Student | D. Some Useful Ways of Learning | 1. Ability to learn is based habits.<br>2. Past experiences are likel<br>3. The best learning usually<br>4. Man's ability to change hi trait. |

| | Subconcept |
|---|---|
| ful Ways of | 1. Ability to learn is based on the formation and practice of highly complex habits.<br>2. Past experiences are likely to help with present problems.<br>3. The best learning usually grows out of the best planning.<br>4. Man's ability to change his own behavior through learning is his most important trait. |

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 1 period<br><br>1. Discuss and/or demonstrate<br>a. the chimpanzee's efforts to attain a goal, page 31<br>b. display box, page 32<br>c. figure 2-9, page 33<br>d. some common excuses for not doing homework<br>e. the results of a trial-and-error investigation.<br>2. Have a student read aloud "Learning to Study," page 32. Discuss each step and compare with steps Redi used in investigating his problem.<br>3. Summarize the key ideas in section "Reading Well," page 33.<br><br>Resources: Textbook, pages 31-36 | The student will<br><br>1. give an example of a pro<br>three steps, page 32, to<br>(example:what to wear to<br>2. list proper study habits<br>2-9<br>3. give the advantages of r<br>4. answer questions page 34<br>5. list examples of learnin<br>and error. |

| Student Objectives | Suggested Evaluation |
| --- | --- |
| The student will<br>1. give an example of a problem and use the three steps, page 32, to clarify it (example:what to wear to a school party)<br>2. list proper study habits, using figure 2-9<br>3. give the advantages of reading well<br>4. answer questions page 34, numbers 1-3<br>5. list examples of learning by trial and error. | The student might be evaluated by<br>1. answering questions page 34, numbers 1-3 (Applying Your Know-ledge)<br>2. rating his study habits and write a paragraph on how he intends to improve his rating<br>3. objective chapter test. |

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| The Habit of Precision | A. Words and Units of Measurements | 1. Precision in science requi purpose.<br>2. Accuracy depends upon the c<br>3. Scientists can repeat inves of the methods used.<br>4. Man uses words and other me |

ts of

1. Precision in science requires selecting the tools most accurate for the purpose.
2. Accuracy depends upon the correct use of words and numbers.
3. Scientists can repeat investigations only if they have precise descriptions of the methods used.
4. Man uses words and other means to communicate with accuracy and precision.

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 3 periods<br><br>1. Discuss and/or demonstrate<br>a. common measuring tools used in the home, school, and laboratory (why and how each is used)<br>b. how accurate measurements contribute to the success of a project (making a dress, cake etc.)<br>c. that units must be descriptive (what size)<br>d. the importance of choosing words with a specific meaning (a ton of candy, go right ahead, etc.)<br>e. why a scientist repeats his investigations<br>f. necessity for standards of measurement.<br>2. Have student find pictures of more complex measuring devices used in the laboratory and industry.<br>3. After discussing the root words of some units and need for standardization, have student add others. (Research period needed in library)<br><br>Resources: Textbook, pages 37-41 | The student will<br><br>1. name and give use of ten ing tools found at home<br>2. list some accurate measu found in the laboratory<br>3. using a given list of wo choosing the word varies<br>4. use library to find the c English units<br>5. answer questions, pages 4<br>6. demonstrate figure 3-1 an page 39<br>7. solve problem on page 40. |

| | | |
|---|---|---|
| home, each is e to the s, cake t size) th a o right a- gations ent. ex measur- ndustry. units and dd others. | The student will<br>1. name and give use of ten common measuring tools found at home<br>2. list some accurate measuring devices found in the laboratory<br>3. using a given list of words, show how choosing the word varies the meaning<br>4. use library to find the origin of English units<br>5. answer questions, pages 40-41<br>6. demonstrate figure 3-1 and exercise, page 39<br>7. solve problem on page 40. | The student might be evaluated by<br>1. showing proficiency in the student objectives<br>2. an objective test<br>3. writing a paper stating the necessity for standards of measurement. |

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| The Habit of Precision | B. The Metric System | 1. Scientists use common meas<br>2. All lengths in the metric<br>meter.<br>3. The true mass of an object<br>4. The standard unit of liqui<br>5. For some scientific activi<br>6. Many units are measured in |

| System | Subconcept |
| --- | --- |
| | 1. Scientists use common measuring systems. |
| | 2. All lengths in the metric system are based upon the same basic unit, the meter. |
| | 3. The true mass of an object is always equal to the mass it balances. |
| | 4. The standard unit of liquid volume is the liter. |
| | 5. For some scientific activities time must be measured more precisely. |
| | 6. Many units are measured in relation to other units. |

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 3 periods<br>1. Discuss and/or demonstrate the<br>a. uses of the metric system in the United States now<br>b. three basic units of the metric system<br>c. table, page 625<br>d. ease of conversion in the metric system.<br>2. Have student to examine a meter and a yardstick and compare.<br>3. Perform experiments using figures 3-2, 3-3, 3-4, and 3-5.<br>4. Film: "Precisely So" Bell Telephone<br>"About Time" General Motors.<br>Resources: Textbook, pages 41-46 | The student will<br>1. give familiar examples o used in the United State<br>2. compare a given list of English system with the lent in names (quart-lit<br>3. given a list of measurem unit you would use in th (length of football fiel of needle-millimeter)<br>4. find the length, weight volume of given objects<br>5. answer questions, page 45 1-9 and 1-3. |

| | Student Objectives | Suggested Evaluation |
|---|---|---|
| ited States<br><br>tem<br><br>stem.<br>rdstick<br><br>-3, 3-4, | The student will<br>1. give familiar examples of metric system used in the United States<br>2. compare a given list of units in the English system with the metric equivalent in names (quart-liter; yard-meter)<br>3. given a list of measurements, tell what unit you would use in the metric system (length of football field - meter; eye of needle-millimeter)<br>4. find the length, weight and mass, and volume of given objects<br>5. answer questions, page 45-56, numbers 1-9 and 1-3. | The student might be evaluated by<br>1. performance of student objectives<br>2. a collection of items showing uses of the metric system (some cars, cameras)<br>3. making a chart comparing the English and metric system<br>4. objective test. |

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| The Habit of Precision | C. Numbers and Precision | 1. The purpose of an investig |
| | | 2. The lack of precision in m and failure of an investig |
| | | * 3. Scientists use a special w |
| | | 4. Scientists are constantly use of the tools they use |

| Subconcept | |
|---|---|
| Precision | 1. The purpose of an investigation determines the degree of precision needed.<br>2. The lack of precision in measurement may mean the difference between success and failure of an investigation.<br>* 3. Scientists use a special way of writing very small and very large numbers.<br>4. Scientists are constantly checking their results to increase precision in the use of the tools they use in this age of nuclear energy and space exploration. |

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 1 period<br><br>1. Discuss and/or demonstrate<br>a. when to use approximate and accurate measurements<br>b. significant figures<br>*c. expressing large and small measurements.<br>2. Using meter sticks, one marked in centimeters and one marked in millimeters, have student give<br>a. precise measurement as possible<br>b. significant number<br>c. more accurate measurement.<br><br>Resources: Textbook, pages 46-51 | The student will<br><br>1. give examples of using a<br>accurate measurements<br>2. answer questions, pages<br>1-6<br>3. answer, page 49, numbers<br>Interesting Questions"<br>4. answer number 2, "Resear<br>page 50. |

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The student will

1. give examples of using approximate and accurate measurements
2. answer questions, pages 48-49, numbers 1-6
3. answer, page 49, numbers 1-3, "Some Interesting Questions"
4. answer number 2, "Research Topics," page 50.

The student might be evaluated by

1. answer questions, text page 49 (Applying Your Knowledge)
2. objective chapter test
3. unit I test.

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Our Earth Planet | A. The Earth and its Air Envelope | 1. The earth is surrounded by<br>2. The earth and its air envel<br>3. The earth is made up of thr<br>4. No other planet around our ing the earth. |

| Subconcept | |
|---|---|
| and its Air | 1. The earth is surrounded by a layer of gases.<br>2. The earth and its air envelope are constantly changing.<br>3. The earth is made up of three forms of matter.<br>4. No other planet around our sun has an atmosphere just like the air surrounding the earth. |

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 1 period<br>1. Using a globe discuss the general features of the earth<br>2. Have students read pages 55-56; then draw a circle indicating the deepest and highest points on the earth's surface.<br>3. Using the diagram in number 2, indicate the atmosphere with a dotted line and label it 250 miles high.<br>4. Discuss the composition of the air.<br>5. Demonstrate and discuss the gas used to support combustion.<br>6. After reading page 58, discuss what causes movements of the air.<br>Resources: Textbook, pages 52-59 | The student will<br>1. draw a circle and indic Mount Everest and depth Deep<br>2. answer questions 1 and 3<br>3. make a chart showing a o our atmosphere to a heig<br>4. give examples showing th supports combustion. |

| Student Objectives | Suggested Evaluation |
| --- | --- |
| The student will<br>1. draw a circle and indicate height of Mount Everest and depth of Challenger Deep<br>2. answer questions 1 and 3-6, page 59<br>3. make a chart showing a cross section of our atmosphere to a height of 250 miles<br>4. give examples showing that oxygen supports combustion. | The student might be evaluated by<br>1. his proficiency in performance of student objectives<br>2. question number 2, page 59<br>3. project, page 57. |

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Our Earth Planet | B. The Restless Earth | 1. The earth undergoes constan<br>2. The earth consists of layer<br>3. Knowledge of the earth's in minerals and power.<br>4. In some ways earthquakes ar |

| | Subconcept |
|---|---|
| Earth | 1. The earth undergoes constant changes.<br>2. The earth consists of layers of different kinds of matter.<br>3. Knowledge of the earth's interior may lead us to incredible new sources of minerals and power.<br>4. In some ways earthquakes and volcanoes are valuable to man. |

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 2 periods<br>1. After reading page 59 and using figure 4-3, have the student compare the relative size of each layer. Ask then, "what lies below the surface of the earth?"<br>2. Discuss how scientists learned about the earth's interior.<br>3. Demonstrate a shock wave (Teacher's Manual, page 36).<br>4. Discuss Project Mohole.<br>5. Discuss earthquakes and volcanoes.<br>6. Demonstrate figure 4-8.<br>7. Use films: "Structure of the Earth"<br>"Changes in the Earth's Surface"<br>Resources: Textbook, pages 59-64<br>Film Library, NSU | The student will<br>1. make a cross sectional di<br>earth showing the relati<br>layer<br>2. construct a model showin<br>fold and earthquakes occu<br>3. trace on a globe the eart<br>(figure 4-5)<br>4. answer questions and disc<br>numbers 1-6<br>5. evaluate the two films. |

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The student will

1. make a cross sectional drawing of the earth showing the relative size of each layer
2. construct a model showing how strata fold and earthquakes occur (use clay)
3. trace on a globe the earthquake belt (figure 4-5)
4. answer questions and discuss page 64, numbers 1-6
5. evaluate the two films.

The student might be evaluated by

1. his performance of the student objectives
2. an objective test
3. using the subconcepts as a test.

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Our Earth Planet | C. The Restless Seas | 1. The gravitational pull of t noticeable effects on large<br>2. The rise and fall of tides universe.<br>3. Tides move with the moon. |

1. The gravitational pull of the sun and moon upon the earth has particularly noticeable effects on large bodies of water.
2. The rise and fall of tides is the result of one of the great forces in the universe.
3. Tides move with the moon.

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 1 period<br>1. Have student summarize Newton's findings about the attraction between objects.<br>2. Draw a small, medium, and large circle to represent the moon, earth, and Jupiter. If you weigh 100 lb on the earth, figure your weight on the moon and Jupiter.<br>3. Discuss figure 4-10.<br>4. Using Table I page 67, have student suggest the position of the moon, sun, and earth for each tide.<br>5. Film: "Tides"<br>6. Transparency, 551.4T<br>Resources: Textbook, pages 64-68<br>Film Library, NSU | The student will<br>1. give the Law of Universal<br>2. compute your own weight o and Jupiter<br>3. explain Table I page 67<br>4. answer questions, pages 6 1-6<br>5. list ways showing what ef have along the shore and itself. |

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The student will

1. give the Law of Universal Gravitation
2. compute your own weight on the moon and Jupiter
3. explain Table I page 67
4. answer questions, pages 67-68, numbers 1-6
5. list ways showing what effect tides have along the shore and on the ocean itself.

The student might be evaluated by

1. computing the weight of an object on the moon and Jupiter when given the earth weight
2. obtaining tide tables from various sources (newspapers, sporting goods stores); explain them to the class
3. a report on how do high tides affect animals.

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Our Earth Planet | D. Changes on the Earth | 1. Wind, water, and temperatu on earth.<br>2. Weathering is the action o it away.<br>3. Erosion is the wearing away<br>4. Earthquakes and the restles some forces that change the<br>5. While land is being worn aw<br>6. Every soil particle, every |

| | |
|---|---|
| Earth | 1. Wind, water, and temperature are among the forces that cause slow changes on earth.<br>2. Weathering is the action of the sun, wind, and water upon the earth, wearing it away.<br>3. Erosion is the wearing away of soil by wind and water.<br>4. Earthquakes and the restless breaking of ocean tides against the shores are some forces that change the earth.<br>5. While land is being worn away in one place, it must be built up elsewhere.<br>6. Every soil particle, every rock is chained by gravity to this earth. |

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 1 period<br>1. Have student read pages 67-70; then discuss what agents cause slow changes in the earth.<br>2. Demonstrate activity, page 69,using modeling clay.<br>3. Perform investigation page 68.<br>4. Demonstrate the formation of a delta.<br>5. Discuss erosion and weathering, (Use opaque projector, show pictures).<br>6. Have student give ways to prevent or slow erosion and weathering.<br>7. Use films: "Erosion"<br>"Changes in the Earth's Surface"<br>Resources: Textbook, pages 68-71<br>Film Library, NSU | The student will<br>1. name three common agents slow change in the earth amples of how they change<br>2. make a survey (field) tr school building and campu examples of weathering a<br>3. answer questions, text p 1-6 and 1-3<br>4. evaluate the films<br>* 5. perform investigation an numbers 1 and 2, page 71. |

| Student Objectives | Suggested Evaluation |
| --- | --- |
| The student will<br>1. name three common agents that cause a slow change in the earth and give examples of how they change the earth<br>2. make a survey (field) trip of the school building and campus, listing examples of weathering and erosion<br>3. answer questions, text page 70, numbers 1-6 and 1-3<br>4. evaluate the films<br>* 5. perform investigation and projects numbers 1 and 2, page 71. | The student might be evaluated by<br>1. test (Applying Your Knowledge) pages 70-71<br>2. proficiency of student objectives<br>3. a test on subconcepts<br>4. an objective chapter test. |

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Earth's Building Blocks | A. Matter | 1. Man, as scientist, has lea<br>and a source of energy.<br>2. Atoms, the basic units of<br>elements and compounds.<br>3. Matter, which has weight a<br>4. Every bit of matter has sp |

1. Man, as scientist, has learned how atoms are the building blocks of matter and a source of energy.
2. Atoms, the basic units of matter, make up the molecules of the earth's elements and compounds.
3. Matter, which has weight and occupies space, can undergo change.
4. Every bit of matter has special characteristics.

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 1 period<br>1. Discuss and show how air has properties of matter.<br>2. Compare the properties of the three forms of matter.<br>3. By using experiments, page 73, show how matter may change forms.<br>4. Discuss the classification of matter into elements and compounds.<br>5. How can elements be classified?<br>6. Discuss Table 2 and Table 3, pages 75-76.<br>7. Film: "Physical and Chemical Changes in Everyday Living."<br>Resources: Textbook,pages 72-77<br>Film Library, NSU | The student will<br>1. identify the properties of matter<br>2. list elements that are c land, air,and water<br>3. given a list of names of (water, sugar, iron),cla elements or compounds<br>4. name the classes of elem examples of each<br>5. answer questions, pages 1-7. |

| | Student Objectives | Suggested Evaluation 26 |
|---|---|---|
| matter.<br>f<br>ter may<br>lements<br>ryday | The student will<br>1. identify the properties of the forms of matter<br>2. list elements that are common to the land, air,and water<br>3. given a list of names of substances (water, sugar, iron),classify them as elements or compounds<br>4. name the classes of elements and give examples of each<br>5. answer questions, pages 76-77, numbers 1-7. | The student might be evaluated by<br>1. his proficiency in the student objectives<br>2. a collection of solids, liquids,and gases and then sort them into elements, compounds, metals,and nonmetals. |

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Earth's Building Blocks | B. Mixtures and Compounds | 1. Substances retain their pro<br>2. In a compound substances co properties.<br>3. Many substances are combina<br>4. Most compounds are found mi<br>5. Pure substances are never m<br>6. Common changes in matter ar<br>7. Certain chemical and physic<br>8. Chemists use equations to d |

| | Subconcept |
|---|---|
| nd Compounds | 1. Substances retain their properties in a mixture.<br>2. In a compound substances combine chemically to form new substances with new properties.<br>3. Many substances are combinations of matter in more than one state.<br>4. Most compounds are found mixed with other compounds in the earth's crust.<br>5. Pure substances are never mixtures.<br>6. Common changes in matter are either physical or chemical.<br>7. Certain chemical and physical changes are basic to most industry.<br>8. Chemists use equations to describe chemical changes. |

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 3 periods<br>1. Define a mixture and compound and give examples of each.<br>2. Use figure 5-1, page 77,to tell how a mixture differs from a compound.<br>3. Perform investigation, pages 78-79.<br>4. Demonstrate physical and chemical changes.<br>5. Discuss formulas.<br>6. Demonstrate problem,page 79.<br>7. Use word equations to explain synthesis and decomposition equations.<br>Resources: Textbook, pages 77-82 | The student will<br>1. classify a group of subs mixtures or compounds<br>2. give ways of decomposing<br>3. list examples of physica changes<br>4. give the number of each given formula<br>5. answer questions, page 8<br>6. discuss safe laboratory |

| | Student Objectives | Suggested Evaluation |
|---|---|---|
| amples<br><br>ture<br><br><br><br><br>nd de- | The student will<br>1. classify a group of substances as mixtures or compounds<br>2. give ways of decomposing a compound<br>3. list examples of physical and chemical changes<br>4. give the number of each atom in a given formula<br>5. answer questions, page 82,numbers 1-6<br>6. discuss safe laboratory procedures. | The student might be evaluated by<br>1. his performance of student objectives<br>2. classify a given list of changes, whether physical or chemical<br>3. finding the total number of atoms in a given formula<br>* 4. research on Brownian movement<br>* 5. investigating that molecules are in motion<br>6. preparing a check list of safety rules for conducting chemistry experiments. |

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Earth's Building Blocks | C. Solutions and Suspensions | 1. Solutions and suspensions<br>2. One of the most important<br>3. Water dissolves some subst<br>4. Many solids that do not di<br>spot to another on the ear<br>5. Water can be freed of its |

and Sus-

1. Solutions and suspensions are special kinds of mixtures.
2. One of the most important chemicals is common ordinary water.
3. Water dissolves some substances better than it does others.
4. Many solids that do not dissolve in water, may be carried by water from one spot to another on the earth's surface.
5. Water can be freed of its impurities.

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 2 periods<br>1. Discuss what happens to substances put into water (Teacher's Manual, page 45, number 1).<br>2. Give the importance of water.<br>3. Perform investigation, page 83, then discuss solutions and saturated solutions.<br>4. Demonstrate suspensions.<br>5. Review physical and chemical changes.<br>6. Discuss Figure 5-5, how caves are formed.<br>7. Perform investigations, pages 84 and 86.<br>8. Films: "Properties of Water"<br>"Solutions"<br>Resources: Textbook, pages 82-86<br>Film Library, NSU | The student will<br>1. compare solutions and su<br>2. list important uses of w<br>3. name examples of solutio pensions<br>4. verify the fact that the above are physical chang<br>5. identify the parts of a (solute, solvent)<br>6. perform the investigatio laboratory and summarize<br>7. answer questions, pages<br>8. evaluate the films. |

| | Student Objectives | Suggested Evaluation |
|---|---|---|
| water<br><br>s | The student will<br>1. compare solutions and suspensions<br>2. list important uses of water<br>3. name examples of solutions and suspensions<br>4. verify the fact that the examples named above are physical changes<br>5. identify the parts of a solution (solute, solvent)<br>6. perform the investigations in the laboratory and summarize results<br>7. answer questions, pages 85-86<br>8. evaluate the films. | The student might be evaluated by<br>1. checking his proficiency in student objectives<br>2. using a laboratory check list for work and safety<br>* 3. research on "what kinds of suspensions"<br>* 4. verifying: 100 ml $H_2O$ + 100 ml alcohol $\longrightarrow 196 \pm$ ml. |

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Earth's Building Blocks | D. Inside the Atom | 1. Matter is a source of energ<br>2. A number of exciting discov up.<br>3. Protons are much heavier pa<br>4. The mass of the atom is con<br>5. The atomic number is the nu<br>6. The vibrating electrons tak |

1. Matter is a source of energy.
2. A number of exciting discoveries showed scientists that atoms could be broken up.
3. Protons are much heavier particles than electrons.
4. The mass of the atom is concentrated in the nucleus.
5. The atomic number is the number of protons in an atom.
6. The vibrating electrons take different positions about the nucleus.

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 2 periods<br>1. Use figures 5-12 and 5-13 to summarize the structure of the atom.<br>2. Discuss Dalton's atomic theory.<br>3. Define and locate the electron, proton and neutron (diagram).<br>4. Explain Table A-4, page 625.<br>5. Discuss radioactivity.<br>6. Films: "Atomic Energy"<br>"Inside the Atom"<br>Resources: Textbook, pages 86-91<br>Film Library, NSU | The student will<br>1. name and define the parts<br>2. given the name of element atomic number and atomic<br>3. when given the atomic num number of neutrons<br>4. diagram the structure of<br>5. evaluate the films. |

| | Student Objectives | Suggested Evaluation |
|---|---|---|
| struc- | The student will<br>1. name and define the parts of an atom<br>2. given the name of elements, find the atomic number and atomic weight<br>3. when given the atomic number, find the number of neutrons<br>4. diagram the structure of given atoms<br>5. evaluate the films. | The student might be evaluated by<br>1. his performance of the student objectives<br>2. answering questions, pages 90-91. |
| neutron | | |

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Earth's Building Blocks | E. The Chemist Works with Atoms | 1. New compounds may be formed<br>2. The alchemists failed to re<br>portant part in the history<br>3. In the 1800's chemists bega<br>behave.<br>4. The outermost shell electro<br>5. Atoms are bonded by sharing<br>6. Some elements are made up o<br>molecules.<br>7. There are many ways to grou<br>8. Acids and bases can neutral |

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1. New compounds may be formed by bonding of elements.
2. The alchemists failed to reach many of their goals, but they played an important part in the history of chemistry.
3. In the 1800's chemists began to learn about atoms and molecules and how they behave.
4. The outermost shell electrons are involved during chemical changes.
5. Atoms are bonded by sharing electrons or lending electrons.
6. Some elements are made up of atoms that are bonded together in groups to form molecules.
7. There are many ways to group compounds.
8. Acids and bases can neutralize one another.

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 3 periods<br>1. Review the structure of the atom by using figure 5-14, page 92<br>2. Explain electron dot symbol, figure 5-14, page 92.<br>3. Refer to figures 5-16 and 5-17 to discuss bonding.<br>4. Demonstrate, by using zinc and iron, to show that a compound is formed.<br>5. Discuss why equations must balance.<br>6. Demonstrate neutralization.<br>7. Perform investigation, pages 97-98.<br>8. Use films: "Explaining Matter"<br>"Atoms and Molecules"<br>Resources: Textbook, pages 91-99<br>Film Library, NSU | The student will<br>1. draw and label the struc atoms<br>2. give examples of the typ<br>3. write the electron dot s simple elements<br>4. diagram how iron and sul gether<br>5. draw six hydrogen atoms combine to form as many water as possible<br>6. list examples of common salts<br>7. answer questions, page 9<br>8. summarize the films. |

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The student will

1. draw and label the structure of given atoms
2. give examples of the types of bonding
3. write the electron dot symbol of given simple elements
4. diagram how iron and sulfur bond together
5. draw six hydrogen atoms and two oxygens; combine to form as many moleucles of water as possible
6. list examples of common acids, bases, and salts
7. answer questions, page 98, numbers 1-6
8. summarize the films.

The student might be evaluated by

1. proficiency of the student objectives
2. questions, numbers 1-20 (Applying Your Knowledge)page 98
3. selected investigations, projects, and research questions, pages 98-99.

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Wealth in the Land | A. Metals from the Earth | 1. Man removes solids, liquid<br>them into usuable substanc<br>2. Most metals occur mixed or<br>moved from their ores.<br>3. One of the most important<br>4. Electricity is used to sep<br>5. When a metal is alloyed wi<br>6. Metallurgical processes ar<br>waste ore during its proce |

e Earth

1. Man removes solids, liquids, and gases from the earth's crust and converts them into usuable substances.
2. Most metals occur mixed or combined with other substances and must be removed from their ores.
3. One of the most important and useful metals in the world is iron.
4. Electricity is used to separate some metals from other substances.
5. When a metal is alloyed with another substance, a mixture results.
6. Metallurgical processes are being improved, and care is being taken not to waste ore during its processing.

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 1 period<br>1. Discuss substances that come from the earth.<br>2. Using figure 6-1, summarize the process of obtaining iron from its ore.<br>3. Discuss<br>a. the importance of iron<br>b. alloys and their uses (Table 4)<br>c. how aluminum is obtained<br>d. metallurgy.<br>4. Demonstrate the making of an alloy.<br>5. Film: "Changing Ores Into Metals"<br>Resources: Textbook, pages 100-107<br>Film Library, NSU | The student will<br>1. list metallic objects fou<br>and school and name the<br>in each<br>2. summarize the operations<br>furnace<br>3. name some common alloys a<br>4. define common terms used<br>(electrolysis, leaching, g<br>plating, etc.)<br>5. answer questions, pages<br>numbers 1-12<br>6. evaluate film. |

| | Student Objectives | Suggested Evaluation |
|---|---|---|
| n.<br>obtaining | The student will<br>1. list metallic objects found at home and school and name the metal contained in each<br>2. summarize the operations in the blast furnace<br>3. name some common alloys and give uses<br>4. define common terms used in metallurgy (electrolysis, leaching, galvanizing, plating, etc.)<br>5. answer questions, pages 106-107, numbers 1-12<br>6. evaluate film. | The student might be evaluated by<br>1. proficiency in student objectives<br>* 2. a collection of ore samples (sample may be obtained by writing to various industries) and the metal obtained from the ore<br>3. make a chart comparing the properties of several alloys with those of their components. |

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Wealth in the Land | B. Fuels from the Earth | 1. Coal, oil, and natural gas<br>that lived millions of year<br>2. Coal is the foundation of a<br>3. Heat energy from coal has m<br>4. Oil geologists study earth<br>tions which are likely to t<br>5. In may ways oil is trying t<br>6. Much of today's gasoline is |

e Earth

1. Coal, oil, and natural gas are derived from the remains of plants and animals that lived millions of years ago.
2. Coal is the foundation of a great chemical industry.
3. Heat energy from coal has many uses.
4. Oil geologists study earth structure, searching for the kind of rock formations which are likely to trap oil.
5. In may ways oil is trying to be conserved now.
6. Much of today's gasoline is made from a process known as cracking.

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 2 periods<br>1. Discuss and/or demonstrate<br>a. sources of fuel in your home and school<br>b. how coal and oil are obtained<br>c. use of coal and oil in industry<br>d. the by-products of coal and oil<br>e. conserving of coal and oil<br>2. Perform experiment figure 6-4, pages 107-108.<br>3. Explain figures 6-5 and 6-6, pages 110-111.<br>4. Film: "Our Common Fuels"<br>5. Pamphlets: American Petroleum Company (free).<br>Resources: Textbook, pages 107-111<br>Film Library, NSU | The student will<br>1. tell how coal is mined<br>2. demonstrate the making o<br>3. given samples of coal, n<br>uses of each kind<br>4. give ways of locating oi<br>5. discuss the drilling for<br>6. list ways of conserving<br>7. evaluate film<br>8. answer questions, page 1 |

| Student Objectives | Suggested Evaluation |
| --- | --- |
| The student will<br>1. tell how coal is mined<br>2. demonstrate the making of coke<br>3. given samples of coal, name and give uses of each kind<br>4. give ways of locating oil<br>5. discuss the drilling for oil<br>6. list ways of conserving oil and coal<br>7. evaluate film<br>8. answer questions, page 111. | The student might be evaluated by<br>1. his proficiency of student objectives<br>2. locating the major coal producing areas on a map of the United States<br>* 3. project, page 111. |

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Wealth in the Land | C. Other Important Minerals | 1. Man has modified his enviro<br>2. Sometimes the search for o<br>stances.<br>3. The uses of sulfur are many<br>4. For centuries men have used<br>5. Glass is one of the most us<br>6. Cement is a mixture of seve<br>7. All our precious stones com<br>8. The United States is a weal<br>minerals.<br>9. Man is using his brain to c<br>world. |

| rtant | Subconcept |
| --- | --- |
| | 1. Man has modified his environment by using and modifying the matter in it. |
| | 2. Sometimes the search for oil has led to the discovery of other important substances. |
| | 3. The uses of sulfur are many and important. |
| | 4. For centuries men have used clay to make many articles. |
| | 5. Glass is one of the most useful substances in the world. |
| | 6. Cement is a mixture of several complex compounds. |
| | 7. All our precious stones come from rocks and minerals in the earth. |
| | 8. The United States is a wealthy nation partly because it has many important minerals. |
| | 9. Man is using his brain to conserve the storehouse of minerals for all the world. |

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 2 or 3 periods<br>1. Discuss a collection of colored pictures of different minerals.<br>2. Summarize Frasch's process, using Figure 6-7.<br>3. Demonstrate the reinforcement of concrete, page 113.<br>4. Discuss the<br>a. importance, properties, and uses of sulfur<br>b. properties and uses of clay<br>c. kinds and uses of glass<br>d. composition of concrete<br>e. other valuable minerals found in the earth.<br>5. Films: "Sulfur at Sea" Freeport Sulfur Company<br>"Mining of Sulfur"<br>"Glass and You"<br>Resources: Textbook, pages 111-114<br>Film Library, NSU | The student will<br>1. identify the type of min<br>picture collection<br>2. explain how sulfur is mi<br>3. make concrete, using dir<br>113<br>4. give an oral report on a<br>minerals listed in text<br>5. evaluate the films<br>6. answer questions, page 1 |

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The student will

1. identify the type of mineral found in picture collection
2. explain how sulfur is mined
3. make concrete, using directions on page 113
4. give an oral report on any one of the minerals listed in text
5. evaluate the films
6. answer questions, page 114.

The student might be evaluated by

1. his proficiency in the student objectives
* 2. a collection of types of safety glass
* 3. the making of a silicate garden (Teacher's Manual, page 55).

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Wealth in the Lnad | D. New Substances from the Laboratory | 1. Chemists have invented many<br>ways.<br>2. The chemist does not create<br>3. A plastic can be made with<br>4. Most plastics are made of v<br>together many similar, smal |

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| Subconcept |
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| 1. Chemists have invented many new substances by forcing atoms to join in new ways. |
| 2. The chemist does not create matter; he merely uses the matter of the earth. |
| 3. A plastic can be made with nearly any desired set of properties. |
| 4. Most plastics are made of very large molecules which are built up by bonding together many similar, smaller molecules. |

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 1 or 2 periods<br>1. Discuss<br>a. synthetic products used today<br>b. kinds of plastics<br>c. compare the properties of plastics<br>d. medicines made in the laboratory.<br>2. Compare synthetic and natural fibers, as to use, properties, and cost.<br>3. Perform test to identify kinds of thermoplastics (Teacher's Manual, page 56).<br>4. Film: "Plastics"<br>Resources: Textbook, pages 114-119<br>Film Library, NSU | The student will<br>1. list synthetic products outstanding property of<br>2. name synthetic products are better than the natu<br>3. make a display of synthe<br>4. answer questions, page 1<br>5. evaluate the film<br>6. discuss (Some Interestin numbers 1-5, page 118. |

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The student will

1. list synthetic products and give an outstanding property of each
2. name synthetic products which you think are better than the natural product
3. make a display of synthetic products
4. answer questions, page 117, numbers 1-5
5. evaluate the film
6. discuss (Some Interesting Questions) numbers 1-5, page 118.

The student might be evaluated by

1. answering questions numbers 1-12, page 117-118
2. selecting one investigation or project, page 118, numbers 1-5
3. his perforance in the student objectives.

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Wealth in the Sea | A. Mining the Sea for Minerals | 1. The oceans are an important<br>2. The ocean is a store of many<br>3. Some salt is obtained by eva<br>4. Almost all of the magnesium water.<br>5. Most of the elements found compounds.<br>6. Scientists are studying ways |

ea for

1. The oceans are an important source of minerals, food, and fresh water.
2. The ocean is a store of many valuable chemical compounds in solution.
3. Some salt is obtained by evaporating sea water.
4. Almost all of the magnesium and bromine used in this country comes from sea water.
5. Most of the elements found in sea water are bonded with other elements in compounds.
6. Scientists are studying ways to extract the wealth of minerals in the sea.

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 1 or 2 periods<br>1. Discuss<br>a. substances dissolved or suspended in the ocean<br>b. why is water one of the most important compounds<br>c. uses of salt<br>d. why the Dead Sea is a chemical treasure house.<br>2. Perform investigations, pages 120 and 123.<br>3. Illustrate<br>a. the properties of fresh and salt water (Teacher's Manual, page 58)<br>b. how minerals in the land are carried to the sea (Teacher's Manual, pages 58-59).<br>4. Film: "Treasure From the Sea"<br>Resources: Textbook, pages 120-123<br>Film Library, NSU | The student will<br>1. name substances found in<br>2. compare the properties o and fresh water<br>3. list uses of salt (house dustrial)<br>4. give methods of obtainin magnesium from sea water<br>5. answer questions, page 1 1-5<br>* 6. prepare a bulletin board minerals found in the se extracting, and their us |

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The student will

1. name substances found in the ocean
2. compare the properties of salt water and fresh water
3. list uses of salt (household and industrial)
4. give methods of obtaining bromine and magnesium from sea water
5. answer questions, page 123, numbers 1-5

* 6. prepare a bulletin board display of minerals found in the sea, methods of extracting, and their uses.

The student might be evaluated by

1. his proficiency in the student objectives
2. an objective test.

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Wealth in the Sea | B. Harvesting the Ocean's Food Crop | 1. Sea animals used by man for<br>2. The circulation of waters p the surface need.<br>3. Many fertilizers came from<br>4. The ocean fish crop can be<br>5. Oyster farming is important |

Ocean's

1. Sea animals used by man for food depend on other organisms for their existence.
2. The circulation of waters provides the food that sea plants and animals near the surface need.
3. Many fertilizers came from the ocean.
4. The ocean fish crop can be ruined by overfishing.
5. Oyster farming is important in the United States, Japan, and France.

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 1 or 2 periods<br>1. Discuss<br>a. how do plants and animals obtain food<br>b. the food cycle<br>c. how do minerals get from the ocean bottom to the surface where they can be used by plants or animals<br>d. fertilizers from the ocean<br>e. conserving ocean food<br>f. planting oysters.<br>2. Demonstrate the circulation of hot and cold water (Teacher's Manual, page 69).<br>3. Assign investigation, page 127.<br>4. Film: "The Sea Around Us"<br>Resources: Textbook, pages 124-128<br>Film Library, NSU | The student will<br>1. diagram the food cycle<br>2. give the sources of the found in fertilizer<br>3. summarize ways of conser food<br>4. explain how oysters are<br>5. answer questions, pages<br>6. assemble a bulletin boar important food fishes<br>7. give the habitat, geogra and habits of the fish d |

The student will

1. diagram the food cycle
2. give the sources of the common elements found in fertilizer
3. summarize ways of conserving ocean food
4. explain how oysters are grown
5. answer questions, pages 1-8, page 127
6. assemble a bulletin board display of important food fishes
7. give the habitat, geographic location, and habits of the fish displayed.

1. The student might be evaluated by performance in the student objectives.
2. Reports may be given on
   a. radioactive waste on fish
   b. effect of industrial waste on fish
   c. growing of oysters
   d. other kinds of food fish.

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Wealth in the Sea | C. Fresh Water from the Sea | 1. Scientists have developed m<br>2. Ways to use our water resou<br>3. There is a need for finding<br>4. The present processes for p<br>pensive. |

from the

1. Scientists have developed methods for obtaining fresh water from the sea.
2. Ways to use our water resources with greater care will need to be found.
3. There is a need for finding more sources of water.
4. The present processes for getting fresh water from the ocean are still expensive.

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 1 or 2 periods<br>1. Discuss<br>a. local water problems<br>b. sources of water<br>c. need for water at home, industry and farming<br>d. why salt water cannot be used<br>e. possible methods of obtaining fresh water from salt water<br>f. figures 7-5 and 7-6<br>g. cost of desalting sea water.<br>2. Demonstrate the distillation of water.<br>3. Film: "Soft as a Cloud"<br>Resources: Textbook, pages 128-130<br>Film Library, NSU | The student will<br>1. give the sources of the<br>2. tell how some cities ob supply<br>3. explain the effects of s living plants, animals,<br>4. summarize three possible obtaining fresh water fr<br>5. give the source of energ each method<br>6. answer questions, page 1 1-5. |

| | Student Objectives | Suggested Evaluation |
|---|---|---|
| arming<br><br>ter from | The student will<br>1. give the sources of their water supply<br>2. tell how some cities obtain their water supply<br>3. explain the effects of salt water on living plants, animals, and metals<br>4. summarize three possible methods of obtaining fresh water from sea water<br>5. give the source of energy used in each method<br>6. answer questions, page 130, numbers 1-5. | 1. The student might be evaluated by his proficiency in the student objectives.<br>2. Research on methods of desalting. |

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Wealth in the Sea | D. The Sea - Our Food Supply and Other Needs | 1. The sea yields vitamins and<br>2. The ocean is a resource are<br>3. Sea winds carry sea spray c<br>4. Many fish in the sea contai<br>5. The world's food supply is<br>6. The world may have to get a<br>7. There are many possibilitie |

Our Food

Other Needs

1. The sea yields vitamins and minerals essential to human nutrition.
2. The ocean is a resource area, not only for minerals, but also for food.
3. Sea winds carry sea spray containing iodine salts.
4. Many fish in the sea contain rich supplies of both vitamins D and A.
5. The world's food supply is not increasing as fast as the population.
6. The world may have to get a much larger part of its protein from the ocean.
7. There are many possibilities for farming sea life.

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 1 or 2 periods<br>1. Discuss<br>a. source and use of iodine<br>b. where we obtain vitamin A and D<br>c. why agar is so important to bacteriologists<br>d. plankton<br>e. algae<br>2. Show iodized and plain salt to student.<br>3. Perform project, page 130.<br>4. Discuss "Some Interesting Questions," numbers 1-5, page 136.<br>Resources: Textbook, pages 130-137 | The student will<br>1. list the types of seafoo<br>2. give the minerals and vi from the sea food<br>3. give the importance of i<br>4. discuss algae used as a the future<br>5. answer questions, pages<br>* 6. select any one of the in or projects, pages 135-1<br>7. give an oral report on a topics listed under "Res 136. |

gists

rs 1-5,

The student will

1. list the types of seafood they eat
2. give the minerals and vitamins obtained from the sea food
3. give the importance of iodine in food
4. discuss algae used as a food now and in the future
5. answer questions, pages 131-134
* 6. select any one of the investigations or projects, pages 135-136 and perform
7. give an oral report on any one of the topics listed under "Research," page 136.

The student might be evaluated by

1. proficiency in student objectives
2. questions, pages 134-135, numbers 1-14 (Applying Your Knowledge)
3. unit two test.

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Daily Weather Changes | A. Air in Motion | 1. Organisms depend on the ear<br>2. Air is always in motion due<br>3. The atmosphere provides the<br>4. Daily weather changes are c<br>and the water cycle.<br>5. Unequal heating starts wind<br>the winds. |

Subconcept 51

1. Organisms depend on the earth and its atmosphere for their water.
2. Air is always in motion due to the effects of heating and cooling.
3. The atmosphere provides the oxygen needed for life.
4. Daily weather changes are caused by the effects of temperature, air pressure, and the water cycle.
5. Unequal heating starts winds blowing, but the spinning of the earth steers the winds.

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 1 period<br>1. Discuss<br>a. kind of weather you have experienced during the past week<br>b. listening to weather reports<br>c. convection currents<br>d. effect of the earth's rotation on wind direction<br>e. figures 8-3 and 8-4, pages 142-143<br>f. "Think it over," page 144.<br>2. Perform investigations, pages 141 and 144.<br>3. Demonstrate<br>a. Teacher's Manual, numbers 1 and 4, page 69<br>b. "investigate," page 145.<br>4. Films: "The Unchained Goddess"<br>"Weather"<br>Resources: Textbook, pages 138-145<br>Film Library, NSU | The student will<br>1. make two lists of terms reports (understand - co<br>2. summarize demonstration<br>a. convection currents<br>b. earth's rotation<br>c. air pressure.<br>3. answer questions, page 1<br>4. evaluate the films. |

| Student Objectives | Suggested Evaluation |
| --- | --- |
| The student will<br>1. make two lists of terms used in weather reports (understand - confuse list)<br>2. summarize demonstration on<br>a. convection currents<br>b. earth's rotation<br>c. air pressure.<br>3. answer questions, page 144, numbers 1-8<br>4. evaluate the films. | The student might be evaluated by<br>1. his proficiency in student objectives<br>2. an objective test. |

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| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Daily Weather Changes | B. Invisible Water in the Air | 1. Water vapor is one of the g<br>2. The amount of water vapor t<br>under different conditions.<br>3. The sun's energy evaporates<br>4. As air becomes colder, it h<br>5. Warm air can hold more wate |

er in the

| Subconcept |
| --- |
| 1. Water vapor is one of the gases in air. |
| 2. The amount of water vapor that a certain amount of air can hold is different under different conditions. |
| 3. The sun's energy evaporates water. |
| 4. As air becomes colder, it holds less water vapor. |
| 5. Warm air can hold more water vapor. |

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 1 or 2 periods<br>1. Discuss<br>a. evaporation<br>b. condensation<br>c. how a cloud is formed<br>d. water vapor in air<br>e. conversion of temperature<br>f. structure of a cloud.<br>2. Demonstrate<br>a. experiment, page 145<br>b. figure 8-6, page 147<br>c. investigation, page 149.<br>3. Solve problem, page 145.<br>Resources: Textbook, pages 145-149 | The student will<br>1. give examples of evaporat<br>densation<br>2. explain how a cloud is fo<br>3. using figure 8-8,draw and<br>"thunderhead" cloud<br>4. given Fahrenheit temperat<br>Celsius<br>5. devise a demonstration to<br>water vapor is present in<br>6. demonstrate projects, num<br>page 152<br>7. answer questions, pages 1 |

| Student Objectives | Suggested Evaluation |
| --- | --- |
| The student will<br>1. give examples of evaporation and condensation<br>2. explain how a cloud is formed<br>3. using figure 8-8,draw and label a "thunderhead" cloud<br>4. given Fahrenheit temperatures,change to Celsius<br>5. devise a demonstration to show that water vapor is present in the air<br>6. demonstrate projects, numbers 1 and 2, page 152<br>7. answer questions, pages 148-149. | The student might be evaluated by<br>1. his performance in student objectives<br>2. drawing the water cycle<br>3. an objective test. |

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Daily Weather Changes | C. Water Out of the Air | 1. The atmosphere has in it pa<br>2. The invisible specks of mat weather.<br>3. The sun is the most importa<br>4. Water is constantly evapora<br>5. Scientists early realized t influence the weather. |

the Air

1. The atmosphere has in it particles and specks of all kinds.
2. The invisible specks of matter in the air play a great part in making the weather.
3. The sun is the most important of all the weathermakers.
4. Water is constantly evaporating, condensing, and falling as precipitation.
5. Scientists early realized that they had no source of energy great enough to influence the weather.

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 1 or 2 periods<br><br>1. Discuss<br>a. what causes the formation of raindrops<br>b. kinds of freezing nuclei<br>c. seeding clouds<br>d. how the sun's energy influences the water cycle<br>e. statement that "the fog will be burned away."<br>2. Demonstrate<br>a. figure 8-9, page 150<br>b. investigation, pages 151-152<br>c. seeding of a cloud (Teacher's Manual, page 71)<br>d. sun's energy (Teacher's Manual, page 71).<br>3. Film: "Water Cycle"<br><br>Resources: Textbook, pages 149-153<br>Film Library, NSU | The student will<br><br>1. name kinds of freezing n<br>be present in the air<br>2. discuss how clouds may b<br>3. diagram the water cycle<br>4. give the influence of th<br>on the water cycle<br>5. answer questions, page 1<br>6. research questions, numb<br>153. |

| | |
|---|---|
| The student will<br>1. name kinds of freezing nuclei that may be present in the air<br>2. discuss how clouds may be seeded<br>3. diagram the water cycle<br>4. give the influence of the sun's energy on the water cycle<br>5. answer questions, page 151<br>6. research questions, numbers 1-4, page 153. | The student might be evaluated by<br>1. his performance in the student objectives<br>2. questions, numbers 1-7, page 152 (Applying Your Knowledge). |

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page 71)

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| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Predicting and Controlling the Weather | A. Temperature and Air Pressure | 1. Weather plays an important<br>2. Scientists investigate fact<br>modify weather.<br>3. Man has learned to predict<br>4. Temperature and pressure af<br>5. Common weather instruments |

nd Air

Subconcept

1. Weather plays an important role in all our lives.
2. Scientists investigate factors in the atmosphere in order to forecast and modify weather.
3. Man has learned to predict weather with a great deal of accuracy.
4. Temperature and pressure affect the water cycle.
5. Common weather instruments are the thermometer and barometer.

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 2 or 3 periods<br>1. Discuss<br>a. the important role of weather in our lives<br>b. how weather information is obtained<br>c. thermometers<br>d. kind of thermometers used by weathermen<br>e. barometers<br>f. equivalents of normal air pressure<br>g. weather maps<br>h. causes for variations in air pressure.<br>2. Perform project, page 156.<br>3. Investigation, pages 158-159.<br>4. Explain project, page 158.<br>Resources: Textbook, pages 154-159 | The student will<br>1. give the importance of we<br>lives<br>2. tell how weather informat<br>3. name the kinds of thermom<br>and school<br>4. define a thermograph and<br>minimum thermometer<br>5. name instruments used to<br>pressure<br>6. keep a record of barometri<br>using barometer made in cl<br>7. give the advantages and di<br>the aneroid barometer<br>8. answer questions, page 158 |

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The student will

1. give the importance of weather in our lives
2. tell how weather information is obtained
3. name the kinds of thermometers at home and school
4. define a thermograph and maximum-minimum thermometer
5. name instruments used to measure air pressure
6. keep a record of barometric readings, using barometer made in class
7. give the advantages and disadvantages of the aneroid barometer
8. answer questions, page 158.

The student might be evaluated by

1. competency in student objectives
2. an objective test
3. a collection of daily weather maps for a given period to show the trend of weather conditions
* 4. constructing models and setting up a weather station for your school.

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Predicting and Controlling the Weather | B. Moisture and Air Movement | 1. Moisture and air currents a<br>2. The higher the temperature<br>3. The weatherman can use rela clouds will form.<br>4. The meteorolgist also want<br>5. Weathermen around the world |

| | Subconcept |
|---|---|
| Air | 1. Moisture and air currents affect the water cycle.<br>2. The higher the temperature of the air the more water vapor it can hold.<br>3. The weatherman can use relative humidity to compute how high in the air clouds will form.<br>4. The meteorolgist also wants accurate information about the winds.<br>5. Weathermen around the world observe and measure the weather. |

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 1 or 2 periods<br>1. Discuss<br>a. types of precipitation<br>b. how rainfall is measured<br>c. figure 9-4, page 159<br>d. humidity, relative humidity and T. H. I.<br>2. Explain Table 5, page 161.<br>3. Demonstrate the making of a psychrometer, page 160.<br>4. Discuss how the speed and direction of the wind are measured.<br>5. Have students make a rain gauge and anemometer.<br>Resources: Textbook, pages 159-162 | The student will<br>1. name the types of precip<br>2. tell how rain fall is me certain period of time<br>3. define humidity, T.H.I., humidity<br>4. given the temperatures o wet bulb thermometers, u find the relative humidi<br>5. use the psychrometer he relative humidity and T.<br>6. answer questions, page 1 |

| | Student Objectives | Suggested Evaluation |
|---|---|---|
| | The student will<br>1. name the types of precipitation<br>2. tell how rain fall is measured for a certain period of time<br>3. define humidity, T.H.I., and relative humidity<br>4. given the temperatures on the dry and wet bulb thermometers, use Table 5 to find the relative humidity<br>5. use the psychrometer he made to compute relative humidity and T.H.I.<br>6. answer questions, page 162. | The student might be evaluated by<br>1. a test on student objectives<br>2. naming six weather measurements that are important to the weatherman<br>3. adding a rain gauge, wind vane, psychrometer, and anemometer to his weather station. |

. I.

page

e wind

meter.

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Predicting and Controlling the Weather | C. The Weather Above Us | 1. High altitude research perm<br>2. Clouds indicate weather con<br>3. Radar can be used to examin<br>4. Air masses and fronts have<br>5. Weather changes along a col |

| bove Us | Subconcept |
| --- | --- |
| | 1. High altitude research permits more accurate long-range forecasts. |
| | 2. Clouds indicate weather conditions. |
| | 3. Radar can be used to examine the inside of clouds. |
| | 4. Air masses and fronts have much to do with weather. |
| | 5. Weather changes along a cold front. |

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 1 or 2 periods<br>1. Discuss special instruments used to study the upper air.<br>2. How do clouds indicate weather conditions?<br>3. Using figure 9-11, discuss cloud types.<br>4. Discuss<br>a. kinds of air masses<br>b. fronts<br>c. highs and lows.<br>5. Demonstrate a front (Teacher's Manual, page 76).<br>6. Review film: "Weather"<br>Resources: Textbook, pages 163-171<br>Film Library, NSU | The student will<br>1. give the uses of a pilot radiosonde<br>2. find pictures of clouds type of cloud<br>3. discuss weather changes front<br>4. summarize air masses<br>5. answer questions, page 1 |

| Student Objectives | Suggested Evaluation  |
| --- | --- |
| The student will<br>1. give the uses of a pilot balloon and radiosonde<br>2. find pictures of clouds and label as to type of cloud<br>3. discuss weather changes along a cold front<br>4. summarize air masses<br>5. answer questions, page 171. | The student might be evaluated by<br>1. his proficiency in the student objectives<br>2. make a list of all weather terms studied<br>3. make a record of cloud types observed over a period of one week and your daily weather predictions based upon these observations. |

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e 76).

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Predicting and Controlling the Weather | D. The Weather Map | 1. From a weather map, the we the weather.<br>2. Forecasting of weather dep cycle.<br>3. Weather forecasters have a with it.<br>4. As soon as weather maps ar |

Map

1. From a weather map, the weathermen are able to get a continent-wide view of the weather.
2. Forecasting of weather depends on a study of the factors affecting the water cycle.
3. Weather forecasters have a good idea of the weather that each air mass brings with it.
4. As soon as weather maps are made up, copies are sent to all weather stations.

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 1 or 2 periods<br>1. Discuss a collection of weather maps.<br>2. Compare and contrast Table 6, page 173, and figure 9-19, page 175.<br>3. Locate the highs and lows on map, figure 9-15, page 172 and figure 9-18, page 174.<br>4. Student will do investigation, page 176.<br>5. Using example, page 175, student will keep a weather chart for five days.<br>6. Discuss air masses and fronts.<br>7. Explain the types of storms.<br>Resources: Textbook, pages 171-176 | The student will<br>1. use a series of weather<br>plain the present and fu<br>conditions<br>2. list and define the term<br>weather map (isobars, hig<br>3. answer questions, page 1<br>1-7<br>4. discuss "think it over," |

| | Student Objectives | Suggested Evaluation |
|---|---|---|
| nd figure<br><br>9-15, page<br><br>p a | The student will<br>1. use a series of weather maps to explain the present and future weather conditions<br>2. list and define the terms used on a weather map (isobars, highs, lows, etc.)<br>3. answer questions, page 176, numbers 1-7<br>4. discuss "think it over," page 176. | The student might be evaluated by<br>1. his proficiency in the student objectives<br>2. a quiz on storms, page 176. |

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Predicting and Controlling the Weather | F. Modifying the Weather | 1. A knowledge of meteorologica phenomena.<br>2. Weather scientists are now<br>3. Many factors are involved be<br>4. For scientist interested in ing to be answered. |

Weather

1. A knowledge of meteorological phenomena is needed to predict and modify the phenomena.
2. Weather scientists are now determined to change weather.
3. Many factors are involved before a cloud can be seeded.
4. For scientist interested in weather, the future is filled with questions waiting to be answered.

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 1 period<br>1. Discuss the seeding of clouds.<br>2. Compare supercooled clouds with supersaturated solutions.<br>3. Give the advantages and disadvantages of cloud seeding from a ground generator and from an airplane.<br>4. Discuss the preparations that must be made in operating a silver iodide generator.<br>5. Explain: "Why is weather modification a better term than weather control?"<br>Resources: Textbook, pages 177-180 | The student will<br>1. explain the seeding of cl<br>2. list conditions of weathe necessary before seeding take place<br>3. discuss questions that th will have to over come in<br>4. answer questions, page 17<br>5. answer, "Some interesting numbers 1-4, pages 179-18 |

| Student Objectives | Suggested Evaluation |
| --- | --- |
| The student will<br>1. explain the seeding of clouds<br>2. list conditions of weather that are necessary before seeding of clouds can take place<br>3. discuss questions that the scientist will have to over come in seeding clouds<br>4. answer questions, page 178<br>5. answer, "Some interesting questions," numbers 1-4, pages 179-180. | The student might be evaluated by<br>1. competency in the student objectives<br>2. questions, page 179 (Applying Your Knowledge)<br>3. completion of all weather instruments for weather station. |

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Seasonal Changes in Weather | A. The Moving Earth - and Seasons | 1. The changing position of th changes.<br>2. Seasonal changes affect all<br>3. The North Star can be used<br>4. The calendar helps us keep<br>5. The position of the sun on |

rth - and

Subconcept

1. The changing position of the earth as it revolves around the sun causes seasonal changes.
2. Seasonal changes affect all living things.
3. The North Star can be used to find North.
4. The calendar helps us keep track of the seasons.
5. The position of the sun on the horizon changes from one season to another.

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 2 or 3 periods<br>1. Discuss<br>a. why do we have seasons<br>b. why do we have day and night<br>c. figures 10-2 and 10-3, pages 182-183<br>d. slant of the sun's rays at the beginning of each season.<br>2. Demonstrate<br>a. figure 10-1, page 182<br>b. the angle of sun's rays.<br>3. Perform investigation, page 184 (figure 10-6, page 185).<br>4. Film: "Earth in Motion"<br>Resources: Textbook, pages 181-187<br>Film Library, NSU | The student will<br>1. list two causes of seasor<br>2. compare and summarize the the earth at each season figures 10-1, 10-2, and 1<br>3. by using flashlights, demo sun's position at each se 10-6)<br>4. begin project, figure 10- for several months<br>5. measure dotted lines in f page 186<br>6. answer questions, pages 1 |

| Student Objectives | Suggested Evaluation |
| --- | --- |
| The student will<br>1. list two causes of seasons<br>2. compare and summarize the position of the earth at each season, refer to figures 10-1, 10-2, and 10-3<br>3. by using flashlights, demonstrate the sun's position at each season (figure 10-6)<br>4. begin project, figure 10-5, and continue for several months<br>5. measure dotted lines in figure 10-7, page 186<br>6. answer questions, pages 186-187. | The student might be evaluated by<br>1. short objective test<br>2. his performance of the demonstrations<br>* 3. making a sundial for class use<br>* 4. investigation, number 1 (Teacher's Manual, page 82). |

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Seasonal Changes in Weather | B. Seasons - and their Effects | 1. Each season has its own ef<br>2. Meteorological phenomena v<br>3. The atmosphere acts as a k sunlight.<br>4. Smog can be dangerous to h<br>5. Autumn weather can be dist |

| Subconcept | |
|---|---|
| their | 1. Each season has its own effects upon all living things.<br>2. Meteorological phenomena vary with the seasons.<br>3. The atmosphere acts as a kind of filter to screen out certain radiations in sunlight.<br>4. Smog can be dangerous to health.<br>5. Autumn weather can be distructive. |

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 1 period<br><br>1. Discuss<br>a. local seasonal characteristics<br>b. spring<br>c. summer<br>d. autumn<br>e. winter.<br>2. Explain how autumn differs from spring, although the day time temperatures are similar.<br>3. Demonstrate the formation of dew.<br>4. Discuss thunderstorms.<br>5. Film: "The Seasons"<br><br>Resources: Textbook, pages 187-191<br>Film Library, NSU | The student will<br><br>1. list the characteristics<br>seasons<br>2. summarize each season wi<br>facts (spring, March 21<br>night)<br>3. name three identifying f<br>autumn<br>4. tell why thunderstorms o<br>summer and hurricanes in<br>5. answer questions, page 1<br>* 6. give a class report on<br>a. lightning and thunde<br>b. weather<br>c. almanac's uses. |

| Student Objectives | Suggested Evaluation |
| --- | --- |
| The student will<br>1. list the characteristics of the four seasons<br>2. summarize each season with definite facts (spring, March 21 equal day and night)<br>3. name three identifying factors of autumn<br>4. tell why thunderstorms occur in the summer and hurricanes in the autumn<br>5. answer questions, page 191<br>* 6. give a class report on<br>a. lightning and thunder<br>b. weather<br>c. almanac's uses. | The student might be evaluated by his performance in the student objectives. |

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| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Seasonal Changes in Weather | C. Living Things and Seasonal Weather | 1. Climatic changes affect th<br>2. Not all animals can stand beings do.<br>3. Plants have temperature li<br>4. Dormant plants and animals |

s and

ther

1. Climatic changes affect the behavior of living things.
2. Not all animals can stand the seasonal changes in the weather the way human beings do.
3. Plants have temperature limits beyond which they cannot live.
4. Dormant plants and animals live mainly on stored food.

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 1 period<br>1. How does man adapt to variations in weather?<br>2. Demonstrate materials best used for windbreakers and porosity.<br>3. Why do we wear woolen clothes in winter?<br>4. Perform demonstration on page 193.<br>5. Explain how color affects the absorption of the sun's radiation (Teacher's Manual, number 3, page 84).<br>6. Discuss protecting yourself against the weather.<br>7. Assign project, page 191.<br>Resources: Textbook, pages 191-193 | The student will<br>1. discuss how plants and an themselves to cold weathe<br>2. tell how animals are prot the weather<br>3. give the reasons for wear clothing<br>4. answer questions, page 19<br>5. report on project, page 1 |

| | Student Objectives | Suggested Evaluation |
|---|---|---|
| r? | The student will | The student might be evaluated by |
| reakers | 1. discuss how plants and animals adapt themselves to cold weather | 1. proficiency in the student objectives |
| | 2. tell how animals are protected against the weather | 2. answering, "Think it Over," page 193. |
| f the | 3. give the reasons for wearing the right clothing | |
| 3, page | 4. answer questions, page 193 | |
| | 5. report on project, page 191. | |
| ather. | | |

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Seasonal Changes in Weather | D. Weather Made to Order | 1. Once man understands the co control these events.<br>2. Heat can be transmitted by<br>3. Man can control the heat in<br>4. Solar heating can be of hel |

to Order

1. Once man understands the concepts underlying certain events, he can begin to control these events.
2. Heat can be transmitted by conduction, convection, and radiation.
3. Man can control the heat in his home in the winter and summer.
4. Solar heating can be of help in the future.

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 1 period<br><br>1. Discuss<br>a. how you keep warm aside from clothing<br>b. how your home or classrooms are heated<br>c. primary source of heat<br>d. ways heat can be transferred<br>e. three heating systems<br>f. figures 10-12, 10-13, and 10-14.<br>2. Demonstrate<br>a. radiation causes heat (Teacher's Manual, page 85)<br>b. conduction (Teacher's Manual, page 85)<br>c. investigation, page 198-199.<br>3. Explain air conditioning.<br>4. Film: "Heat - Its Nature and Transfer"<br><br>Resources: Textbook, pages 193-199<br>Film Library, NSU | The student will<br><br>1. name the ways the classro<br>(sun, artifical heat, and<br>2. define and give examples<br>ways heat can be transfer<br>3. tell kinds of heat transf<br>each method of heat syste<br>4. list the advantage and di<br>the different heating sys<br>5. exhibit examples of good<br>tors and good heat insula<br>6. answer questions, page 19 |

| | Student Objectives | Suggested Evaluation 74 |
|---|---|---|
| , page | The student will<br>1. name the ways the classroom is heated (sun, artifical heat, and body heat)<br>2. define and give examples of the three ways heat can be transferred<br>3. tell kinds of heat transfer involved in each method of heat systems<br>4. list the advantage and disadvantages of the different heating systems<br>5. exhibit examples of good heat conductors and good heat insulators<br>6. answer questions, page 198. | The student might be evaluated by<br>1. his proficiency in the student objectives<br>* 2. a poster showing how a vacuum bottle keeps liquids hot or cold.<br>* 3. display thermostats and tell how it helps control heating. |

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Seasonal Changes in Weather | E. Safety From Fire | 1. Understanding of the phenom<br>2. The home should be a safe p<br>3. Carelessness in storing of<br>lives.<br>4. Wherever you are, always ch<br>5. One of the most dangerous h |

Subconcept

1. Understanding of the phenomenon of fire enables us to control it.
2. The home should be a safe place to live.
3. Carelessness in storing of certain materials can cause property damage and loss of lives.
4. Wherever you are, always check the exits of the building.
5. One of the most dangerous hazards at home is fire.

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 1 or 2 periods<br>1. How may fires accidentally start?<br>2. Why are there more home fires during the winter?<br>3. What must a fire have to start?<br>4. How may a fire be extinguished ? (3 ways)<br>5. Demonstrate ways of extinguishing a fire (Teacher's Manual, page 87).<br>6. Discuss figure 10-18, page 200.<br>7. Perform investigations, pages 201 and 203.<br>8. Discuss safety measures based on figure 10-19, page 201.<br>9. Discuss "Think it Over," page 201.<br>Resources: Textbook, pages 199-205 | The student will<br>1. given the headings, such cooking, electrical, pers ness, etc., list possible<br>2. name the three factors ne fire<br>3. discuss how to extinguish<br>4. make a list of things to of a fire (this could be bulletin board)<br>5. answer questions, page 20 |

| | Student Objectives | Suggested Evaluation 76 |
|---|---|---|
| nter? | The student will<br>1. given the headings, such as heating, cooking, electrical, personal carelessness, etc., list possible causes of fire<br>2. name the three factors necessary for a fire | The student might be evaluated by<br>1. answering questions, page 203, numbers 1-12 (Applying Your Knowledge) |
| Teacher's | 3. discuss how to extinguish a fire | 2. objective chapter test |
| | 4. make a list of things to do in case of a fire (this could be placed on the bulletin board) | 3. checking student objectives |
| 19, | 5. answer questions, page 201. | * 4. research, page 204, numbers 1 and 2<br>5. a unit test. |

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Easing Work | A. Simple Machines | 1. Simple machines multiply ma |
| | | 2. Simple machines can be vari |
| | | 3. The efficiency of a machine out by the amount of work p |
| | | 4. Energy may be changed from |
| | | 5. Work is done only when an o |
| | | 6. Friction and inertia oppose |
| | | 7. Force is a push or pull. |
| | | 8. When a lever is used there |

1. Simple machines multiply man's capacity to do work.
2. Simple machines can be varied to produce greater mechanical advantage.
3. The efficiency of a machine is determined by dividing the useful work put out by the amount of work put into it.
4. Energy may be changed from one form to another.
5. Work is done only when an object is moved by a force applied to the object.
6. Friction and inertia oppose motion.
7. Force is a push or pull.
8. When a lever is used there is always a force, a fulcrum, and a resistance.

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 5 periods<br><br>1. Use such examples as<br>a. study prints of simple machines<br>b. pictures of compound machines.<br><br>Resources: Textbook, chapter 15, pages 286-304<br>MPL 531 "Simple Machines"<br>MPL 531-S "Study Prints" | The student will<br><br>1. using his ruler, book, and eraser, demonstrate how wo made easy<br>2. by moving the eraser clos from the book, demonstrate may be varied to produce hanical advantage<br>3. using the formula F X D, put in and work got out a<br>4. given a flashlight, chang energy to light and heat<br>5. apply force to his desk a and determine which force<br>6. construct and display som machines. |

| Student Objectives | Suggested Evaluation |
| --- | --- |
| The student will<br>1. using his ruler, book, and a chalk board eraser, demonstrate how work can be made easy<br>2. by moving the eraser closer or farther from the book, demonstrate how a machine may be varied to produce greater mechanical advantage<br>3. using the formula F X D, show that work put in and work got out are equal<br>4. given a flashlight, change potential energy to light and heat energy<br>5. apply force to his desk and to the wall, and determine which force produced work<br>6. construct and display some simple machines. | Demonstration:<br>the student will demonstrate proficiency in each of the student objectives. |

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Easy Work | B. Engines | 1. As fuels burn they release h<br>2. Conversion of water to steam work.<br>3. Internal combustion engines<br>4. Savery, Newcomen, Watt, and<br>5. The four strokes of a gasoli exhaust. |

1. As fuels burn they release heat and light energy.
2. Conversion of water to steam by means of heat energy provides energy for doing work.
3. Internal combustion engines are more efficient than external combustion engines.
4. Savery, Newcomen, Watt, and Parson were among the first inventors of engines.
5. The four strokes of a gasoline engine are the intake, compression, power, and exhaust.

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 5 periods<br><br>1. Discuss<br>a. the kinds of energy and how they may be changed from one form to another<br>b. external and internal combustion engines<br>c. early inventors and engines.<br><br>2. Demonstrate:<br>how the internal combustion engine operates.<br><br>Resources: Textbook, chapter 16, pages 305-322<br>The Internal Combustion Engine | The student will<br><br>1. strike a match, feel the<br>serve the light given off<br>(wood of match) burns<br>2. given a ring stand, bunsen<br>and a spice can, perform<br>(Text, page 306)<br>3. shown a model of an exter<br>ternal combustion engine,<br>that the internal engine<br>efficient<br>4. make a written report on<br>early inventors of engine<br>5. shown a cut-away of a sma<br>engine, recognize the var |

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perates.

322

The student will

1. strike a match, feel the heat, and observe the light given off as the fuel (wood of match) burns
2. given a ring stand, bunsen burner, string, and a spice can, perform project 16-2 (Text, page 306)
3. shown a model of an external and internal combustion engine, determine that the internal engine is more efficient
4. make a written report on some of the early inventors of engines
5. shown a cut-away of a small gasoline engine, recognize the various strokes.

Demonstration:

have the student demonstrate proficiency in student objectives 2 and 5.

Report:

check student's written report on early inventors and engines.

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Easy Work | C. Harnessing the Electron | 1. Electricity is the movement<br>2. The relationship between el limited power.<br>3. Efficient use of electrical through the circuit.<br>4. Static electricity is still<br>5. Like charges of electricity each other. |

1. Electricity is the movement of electrons from one place to another.
2. The relationship between electricity and magnetism makes possible nearly unlimited power.
3. Efficient use of electrical force depends upon control of the flow of electrons through the circuit.
4. Static electricity is still or stationary.
5. Like charges of electricity repel each other, and unlike charges attract each other.

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 6 periods<br><br>1. Study and discuss<br>a. electrons and their flow<br>b. magnetism and electricity<br>c. using electricity<br>d. nuclear energy (Plate 1-5, pages 338-339).<br><br>2. Field trip:<br>take class to power plant (electric)<br><br>Resources: Textbook, chapter 17, pages 323-346<br>MPL 537 "Current Measurement"<br>MPL 538 "What is Magnetism" | The student will<br><br>1. perform investigation 17-<br>325)<br>2. perform experiment 17-5<br>3. state the definition for<br>4. state the rules for deali<br>electricity<br>5. construct an electromagne |

| Student Objectives | Suggested Evaluation |
| --- | --- |
| The student will<br>1. perform investigation 17-1 (Text, page 325)<br>2. perform experiment 17-5 (Text, page 331)<br>3. state the definition for magnetism<br>4. state the rules for dealing with electricity<br>5. construct an electromagnet. | Demonstration:<br>student objectives 1, 2, 4, and 5. |

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| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Easing Work | D. Energy from Inside the Atom | 1. When atoms are split, a sm of energy.<br>2. Tremendous energy is releas<br>3. Nucleonics has advanced to for industrial, agricultura<br>4. The nucleus of an atom can finding and destroying body and developing new plants a<br>5. Fallout is the radioactive plosion.<br>6. The Geiger counter is one o |

Inside

1. When atoms are split, a small amount of mass is converted into a huge amount of energy.
2. Tremendous energy is released when a nucleus splits or when nuclei fuse.
3. Nucleonics has advanced to the point where man makes use of nuclear energy for industrial, agricultural, and medical purposes.
4. The nucleus of an atom can be controlled and put to use in running engines, finding and destroying body tumors, tracing plant and animal life processes, and developing new plants and animals as products from them.
5. Fallout is the radioactive dust which falls back to earth from a nuclear explosion.
6. The Geiger counter is one of the instruments used to detect radioactivity.

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 5 periods<br>1. Discuss<br>a. splitting the atom<br>b. nuclear piles and nuclear explosions<br>c. nuclear energy for all<br>d. the different machines used to change atoms.<br>2. Assignment:<br>assign a research project on the different machines used to change atoms.<br>3. Laboratory work:<br>secure a Geiger counter and carry students on tour of campus playground areas and search for lost coins. Listen to the clicks of the Geiger counter.<br>Resources: Textbook, chapter 18, pages 347-369<br>MPL 537.5 "Radioactivity"<br>FS 541 "Molecular Models"<br>The Formation of Plutonuim, Figure 18-9 (Text, page 356) | The student will<br>1. state the definition for fission, critical mass, ray, isotope, and radioiso<br>2. name the different machi change atoms and state th between each<br>3. state some uses of radio measuring devices. |

| Student Objectives | Suggested Evaluation |
| --- | --- |
| The student will<br>1. state the definition for radioactivity, fission, critical mass, fusion, cosmic ray, isotope, and radioisotope<br>2. name the different machines used to change atoms and state the difference between each<br>3. state some uses of radioisotopes as measuring devices. | 1. Research project:<br>check research projects.<br>2. Written test:<br>student objectives. |

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ure 18-9

| Main Idea | Concept | Subconcept |
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| Easing Work | E. New Sources of Power | 1. The automobile provides pow bustion engines.<br>2. Any object placed in a flui of the fluid displaced by t<br>3. In order to fly, an airplan lift to overcome the forces<br>4. Applications of the concept the technology of flight.<br>5. Energy may be converted int mass and energy remains the |

| Subconcept | |
|---|---|
| Power | 1. The automobile provides power by a combination of machines and internal combustion engines.<br>2. Any object placed in a fluid is buoyed upward by a force equal to the weight of the fluid displaced by the object.<br>3. In order to fly, an airplane must be provided with sufficient thrust and lift to overcome the forces of drag and gravity.<br>4. Applications of the concepts of science have resulted in the development of the technology of flight.<br>5. Energy may be converted into other more useful forms, but the totality of mass and energy remains the same. |

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 4 periods<br>1. Discuss<br>a. new means by which man can travel:<br>(1) on land<br>(2) on and under the sea<br>(3) in the air.<br>2. Review<br>a. cut-away gasoline engine<br>b. MPL"Internal Combustion Engines".<br>Resources: Textbook, chapter 19, pages 370-391<br>MPL"The Internal Combustion Engine,"Film Library, NSU | The student will<br>1. construct two cardboard<br>19-1, page 371)<br>2. determine how gears enab<br>mobile to travel forward<br>speeds or reverse direct<br>19-2, page 372)<br>3. demonstrate Archimedes'<br>(Science cabinet, tray 1<br>4. construct and demonstrat<br>(figure 19-10, page 378)<br>5. list the several importa<br>airplane and the purpose<br>6. construct a cardboard ai<br>label the most important |

| | Student Objectives | Suggested Evaluation |
|---|---|---|
| | The student will<br>1. construct two cardboard gears (figure 19-1, page 371)<br>2. determine how gears enable an automobile to travel forward at different speeds or reverse direction (figure 19-2, page 372)<br>3. demonstrate Archimedes' Principle (Science cabinet, tray 15)<br>4. construct and demonstrate project (figure 19-10, page 378)<br>5. list the several important parts of an airplane and the purpose of each<br>6. construct a cardboard airplane and label the most important parts. | Demonstrate:<br>student objective, numbers 2. 5, and 7. |
| "Film | | |

| Main Idea | Concept | Subconcept |
|---|---|---|
| Sound and Hearing | A. Characteristics of Sound | 1. Vibrating objects produce s<br>2. The human ear consists of m<br>3. Hearing begins with vibrati<br>4. The ear is constructed so t<br>5. Humans are capable of heari<br>6. Ultrasonic sound waves have<br>7. Echoes are reflected sound<br>8. Sound waves must travel thr<br>9. Sound travels at a fairly c<br>10. Sounds provide us with one<br>11. Sounds can differ in freque |

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Subconcept



1. Vibrating objects produce sound waves by causing molecules to vibrate.
2. The human ear consists of many parts, only one of which can be easily seen.
3. Hearing begins with vibrations, which finally are interpreted by the brain.
4. The ear is constructed so that pressure changes do not normally damage it.
5. Humans are capable of hearing vibrations only within a limited range.
6. Ultrasonic sound waves have many practical uses.
7. Echoes are reflected sound waves.
8. Sound waves must travel through something (such as air or wood).
9. Sound travels at a fairly constant rate.
10. Sounds provide us with one of our most important forms of communication.
11. Sounds can differ in frequency, pitch, loudness, and quality.

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 3 to 5 periods<br>1. Have the students produce sounds from such objects as stretched rubber band, stringed musical instruments, and a drum. Discuss the source of the sound - a vibrating object.<br>2. Perform and discuss the tuning fork activity (Teacher's Manual, page 157).<br>3. Discuss and illustrate<br>a. text, pages 394-397<br>b. eustachian tube function (Teacher's Manual, page 158).<br>4. Demonstrate the differences between water and sound waves.(Teacher's Manual, page 158).<br>5. Discuss, pages 398-400.<br>6. (Optional) Have students who wish to do so conduct an investigation, pages 400-401, and demonstrate their results to the class.<br>7. Discuss and demonstrate how sounds can differ.<br>Resources: Text, pages 394-404<br>Teacher's Manual, pages 157-162<br>MPL 612 "The Ear - Perception of Sound"<br>"Ear: Its Structure and Function" | The student will<br>1. state that vibrating obj sound waves<br>2. name the major parts of state the function of ea<br>3. describe the effect of a eustachian tube<br>4. state several causes of<br>5. state how water waves ar sound waves<br>6. tell how dogs hear sound cannot hear<br>7. demonstrate how sounds c |

| Student Objectives | Suggested Evaluation  |
| --- | --- |
| The student will<br>1. state that vibrating objects produce sound waves<br>2. name the major parts of the ear and state the function of each<br>3. describe the effect of a plugged eustachian tube<br>4. state several causes of deafness<br>5. state how water waves are different to sound waves<br>6. tell how dogs hear sounds which humans cannot hear<br>7. demonstrate how sounds can differ. | The student might be asked to<br>1. demonstrate proficiency in each of the student objectives<br>2. identify the subconcepts as true statements<br>3. answer "Think It Over" questions, page 400, and Interesting Questions 1 and 2, page 405. |

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Light and Sight | B. Characteristics of Light | *1. Scientists think of light as<br>2. Parallax helps us to see in t<br>3. Parallax is a common source o<br>4. Light travels in straight lin<br>5. Light can be reflected or bou<br>6. White or clear light can be s<br>7. A lens can be used to bring<br>*8. Diffraction is the spreading<br>than the wave.<br>*9. Light waves can interfere wi<br>*10. Some substances produce an e |

s of

| Subconcept |
| --- |
| *1. Scientists think of light as both waves and particles. |
| 2. Parallax helps us to see in three dimensions. |
| 3. Parallax is a common source of error in measurement. |
| 4. Light travels in straight lines, but can be bent. |
| 5. Light can be reflected or bounced off of a surface. |
| 6. White or clear light can be separated into bands of colored lights. |
| 7. A lens can be used to bring light rays together or to spread them apart. |
| *8. Diffraction is the spreading of a light wave as it passes through a gap smaller than the wave. |
| *9. Light waves can interfere with one another. |
| *10. Some substances produce an electric current when struck by light. |

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 3 periods<br>* 1. Introduce the idea of two theories of light but withhold its study until the close of this lesson.<br>2. Discuss and demonstrate<br>a. parallax and its effects<br>b. how light travels<br>c. reflection of light<br>d. refraction of light<br>e. the visible spectrum<br>* f. diffraction<br>* g. interference<br>* h. photoelectric effect<br>Resources: Textbook, pages 407-415 | The student will<br>* 1. state evidence for both th light<br>2. demonstrate the effects o<br>3. describe how light travels<br>4. diagram the reflection of rays from a smooth and rou<br>5. diagram the effect of a pr of light. |

| | Student Objectives | Suggested Evaluation |
|---|---|---|
| t but<br>lesson. | The student will<br>* 1. state evidence for both theories of light<br>2. demonstrate the effects of parallax<br>3. describe how light travels<br>4. diagram the reflection of several light rays from a smooth and rough surface<br>5. diagram the effect of a prism on a ray of light. | The student might be asked to<br>1. demonstrate proficiency in the student objectives<br>2. identify the subconcepts as true statements. |

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Light and Sight | C. Seeing | 1. Sight results when the eye r |
| | | 2. Each part of the eye serves |
| | | 3. Seeing requires a properly f |
| | | 4. A defect in the eye, optic n |
| | | 5. Only the retina of the eye f |
| | | 6. Nearsightedness and farsight |
| | | 7. The eye lens changes shape t |
| | | 8. Eyeglasses are used to help |
| | | 9. Proper lighting is essential |
| | | 10. Observing involves more than |

1. Sight results when the eye receives light and the brain interprets it.
2. Each part of the eye serves a special purpose.
3. Seeing requires a properly functioning eye, optic nerve, and brain.
4. A defect in the eye, optic nerve, or brain can cause poor vision.
5. Only the retina of the eye is light sensitive.
6. Nearsightedness and farsightedness are common eye faults caused by eye shape.
7. The eye lens changes shape to allow for near and distant vision.
8. Eyeglasses are used to help the lens in the eye produce sharp vision.
9. Proper lighting is essential to proper eyesight.
10. Observing involves more than just seeing.

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 2 periods<br><br>1. Discuss and illustrate<br>a. the internal structure of an eye<br>b. the function of each eye structure<br>c. the relationship of the eye, optic nerve, and brain<br>d. nearsightedness and farsightedness<br>e. the influence of convex and concave lenses as corrective measures for near and far-sightedness.<br><br>2. Demonstrate conditions of poor and proper lighting.<br><br>3. Discuss questions and vocabulary, page 419.<br><br>Resources: Teacher's Manual, pages 162-167<br>Textbook, pages 416-419<br>MPL "Eye: Farsightedness"<br>MPL "Eye: Nearsightedness" | The student will<br><br>1. state how each eye part<br>sight process<br>2. describe the function of<br>and brain during sight<br>3. name some common eye defe<br>4. state how near and farsig<br>caused and corrected<br>5. state rules for proper li<br>reading. |

| | Student Objectives | Suggested Evaluation |
|---|---|---|
| erve, and<br><br>lenses<br>far-<br><br>lighting.<br>9. | The student will<br>1. state how each eye part functions in the sight process<br>2. describe the function of the optic nerve and brain during sight<br>3. name some common eye defects<br>4. state how near and farsightedness are caused and corrected<br>5. state rules for proper lighting when reading. | The student might be asked to<br>1. demonstrate proficiency in the student objectives<br>2. identify the subconcepts as true statements<br>3. match eye parts and function. |

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Sending and Storing Signals | D. The Telegraph and Telephone | 1. Both the telegraph and telep<br>2. The telegraph is based on si and the electromagnet.<br>3. Scientists and engineers hav same principles.<br>4. The telephone is based on th<br>5. The sounds produced in both objects. |

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1. Both the telegraph and telephone are recent developments.
2. The telegraph is based on simple principles of electricity, a complete circuit and the electromagnet.
3. Scientists and engineers have improved the telegraph, but it still operates on the same principles.
4. The telephone is based on the same principles as the telegraph.
5. The sounds produced in both the telephone and telegraph are made by vibrating objects.

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 4 or 5 periods<br>1. Demonstrate and discuss<br>a. principles of telegraphy<br>b. improvements in telegraphy, including teletype<br>c. the simple telephone<br>d. the improved telephone.<br>2. Arrange for a field trip to the local Western Union and telephone facilities.<br>3. Have students construct and demonstrate the operation of a simple telegraph.<br>4. Have interested students construct and demonstrate a simple or improved telephone.<br>Resources: Teacher's Manual, pages 167-170<br>Textbook, pages 422-426<br>Local telegraph and telephone company employees. | The student will<br>1. name the basic parts of<br>2. state how each part in a circuit works<br>3. construct a simple teleg demonstrate its operatio<br>4. name the parts of a simp and describe its operati<br>* 5. construct and demonstrat and improved telephone. |

| Student Objectives | Suggested Evaluation |
| --- | --- |
| The student will<br>1. name the basic parts of the telegraph<br>2. state how each part in a telegraph circuit works<br>3. construct a simple telegraph and demonstrate its operation<br>4. name the parts of a simple telephone and describe its operation<br>* 5. construct and demonstrate a simple and improved telephone. | The student will demonstrate proficiency in objectives 1-4. |

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| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Sending and Storing Signals | E. Storing Sound | 1. The phonograph record is a r<br>2. The phonograph speaker vibra recording.<br>3. Sound can be changed into el to magnetize wire or tape.<br>4. Sound tapes are magnetized a can then be converted into s |

ound

1. The phonograph record is a recording of needle vibrations caused by sound.
2. The phonograph speaker vibrates at the same rate as the sound which made the recording.
3. Sound can be changed into electricity of varying frequency which can be used to magnetize wire or tape.
4. Sound tapes are magnetized and can be used to produce an electric current which can then be converted into sound.

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 2 periods<br>1. Demonstrate and discuss<br>a. the Edison phonograph<br>b. the electrical phonograph<br>c. the tape recorder<br>d. "Check Your Understanding" questions, page 430<br>Resources: Teacher's Manual, pages 170-172<br>Textbook, pages 427-430<br>Old mechanical phonographs | The student will<br>1. demonstrate how vibratio<br>ed on foil<br>2. explain the operation of<br>phonograph<br>3. explain the operation of<br>corder. |

| | Student Objectives | Suggested Evaluation 96 |
|---|---|---|
| page 430 | The student will<br>1. demonstrate how vibration can be recorded on foil<br>2. explain the operation of a mechanical phonograph<br>3. explain the operation of a tape recorder. | The student might be asked to<br>1. demonstrate proficiency in the objectives<br>2. identify the subconcepts as true statements. |

| Main Idea | Concept | Subconcept |
| --- | --- | --- |
| Sending and Storing Signals | F. Storing Light | 1. Light causes some chemical s<br>2. Plates coated with light sen<br>3. Photographic prints are made the original photograph call<br>4. Developing is a process of c sensitive substance not alre<br>5. Motion pictures are really s<br>6. The brain blends pictures sh ment.<br>7. Stored sound energy is used<br>8. The lens regulates the amou film. |

1. Light causes some chemical substances, such as silver chloride, to change color.
2. Plates coated with light sensitive chemicals can be used to record light.
3. Photographic prints are made by exposing light sensitive paper to light through the original photograph called a negative.
4. Developing is a process of developing the light image and removing all the light sensitive substance not already exposed.
5. Motion pictures are really still pictures shown in rapid succession.
6. The brain blends pictures shown in rapid succession into smooth continuous movement.
7. Stored sound energy is used to make movies "talk".
8. The lens regulates the amount of light entering a camera and focuses ones image on film.

| Suggested Materials and Methods | Student Objectives |
| --- | --- |
| Time: 3 or 4 periods<br>1. Center the development of this topic around the pinhole camera.<br>a. a round oatmeal box with the bottom cut out of the "film end" makes a good demonstration camera. Cover the cut out section with thin tissue paper and focus on a candle flame in a darkened room.<br>b. have students build light tight pinhole cameras and take photographs of immobile objects.<br>2. Dissect an old lense type camera and demonstrate its operation.<br>3. The idea of light sensitive compounds can be demonstrated by mixing equal quantities of silver nitrate solution and sodium chloride solution. Spread the solid silver chloride on white paper then place in sunlight. In about ten minutes it will be darkened.<br>4. Discuss and demonstrate persistence of vision.<br>Resources: Textbook, pages 430-436 | The student will<br>1. construct and use a pinho<br>2. explain how a pinhole and camera operates<br>3. describe how light sensiti trap images<br>4. explain the idea of motio |

| | Student Objectives | Suggested Evaluation |
|---|---|---|
| | The student will<br>1. construct and use a pinhole camera<br>2. explain how a pinhole and lens type camera operates<br>3. describe how light sensitive papers trap images<br>4. explain the idea of motion pictures. | The student will demonstrate proficiency in the student objectives. |