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ABSTRACT

GRADES OR AGES: Grades 4-6. SUBJECT MATTER: Physical health and nutrition. ORGANIZATION AND PHYSICAL APPEARANCE: The guide is divided into five sections: factors determining what people eat, the role of food in growth and development, the uses of nutrients in food, selection of foods to meet bodily needs, and food in the history of man. The publication format of four columns gives the outline of content, the major understanding and fundamental concepts, suggested teaching aids and learning activities, and supplementary information for teachers. The pupil objectives are presented in the introduction. The guide is soft-covered. OBJECTIVES AND ACTIVITIES: Each subsection contains questions and topics for discussion. The supplementary information provides teachers with further discussion material. A list of vocabulary words follows each major section. INSTRUCTIONAL MATERIALS: A bibliography of books, leaflets, and filmstrips is presented along with a selected bibliography for teachers. STUDENT ASSESSMENT: No provision is made. OPTIONS: The guide suggests incorporation of subject matter into a social studies curriculum. (BRB)

HEALTH CURRICULUM MATERIALS
Grades 4, 5, 6

STRAND I, PHYSICAL HEALTH
NUTRITION

The University of the State of New York/The State Education Department
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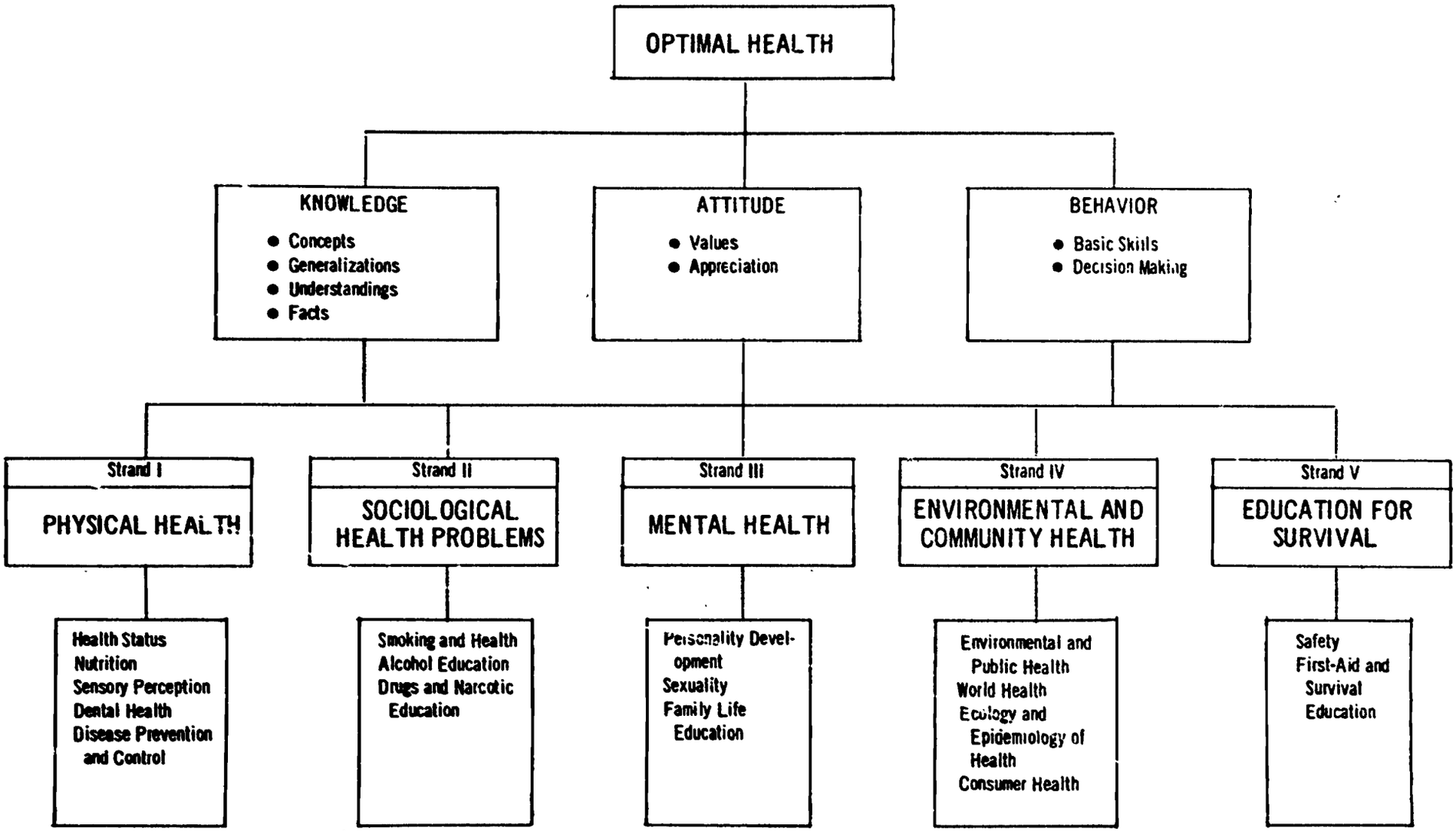
OPTIMAL HEALTH
KNOWLEDGE
Concepts
Generalizations
Understandings
Facts
ATTITUDE
Values
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BEHAVIOR
Basic Skills
Decision Making
Strand I
PHYSICAL HEALTH
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Sexuality
Family Life Education
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World Health
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Consumer Health
Safety
First-Aid and Survival Education

STRAND I
PHYSICAL HEALTH

Nutrition
Grades 4, 5, 6

OVERVIEW

The nutrition curriculum for the intermediate grades is directed toward helping the student to discover in some detail how food is related to health and growth, and to understand the role of criteria for selecting food. It also provides opportunity for the student to develop a concept of the food people eat as an integral part of physical and socio-cultural environment.

There is much opportunity for integration of the nutrition curriculum section with science and with social studies.

Grade levels are suggested for each teaching unit in order to form a logical progression and to take advantage of the interests and abilities of students at given grade levels. For example, Teaching Unit V (Food in the history of man) is suggested for grade 6, by which time students have sufficient social studies background to integrate the material meaningfully. However, it is realized that there will be instances in which the grade levels suggested are not appropriate for a particular situation.

At the end of each teaching unit a summary of key vocabulary is included. This may be used in many ways; as a device for a pretest to assess students' knowledge at the beginning of the unit, or as a summarizing device for review, or simply for teacher reference.

STRAND I
PHYSICAL HEALTH

Nutrition
Grades 4, 5, 6

OUTCOMES

Pupils in grades 4-6 should:

Realize the relationships between general well-being and principles of food selection

Base their food selection practices on acceptable nutritional criteria

Recognize the psycho-social factors that influence nutritional behavior

Be cognizant of the consequences of poor eating patterns and unwise food selection

Develop those nutritional practices that enable them to experience satisfactory patterns of growth and development

OUTLINE OF CONTENT	MAJOR UNDERSTANDINGS AND FUNDAMENTAL CONCEPTS	SUGGESTED TEACHING AIDS AND LEARNING ACTIVITIES	SUPPLEMENTARY INFORMATION FOR TEACHERS
I. MANY FACTORS DETERMINE WHAT FOODS PEOPLE EAT.	A. THE FOOD PATTERNS OF A COUNTRY OR REGION HAVE EVOLVED FROM A COMPLEX OF DEMOGRAPHIC, SOCIAL, ECONOMIC, AND CULTURAL FACTORS.		
	1. People usually do not think very much about what kind of food they eat. Eating is a <u>habit</u> -- we become used to eating certain foods. But other people in other parts of the world are used to eating other foods. These differences come about for many reasons:	Choose a country and find out all you can about what kinds of foods its people eat. (This can be part of a general social studies report on a country of the student's choice, in which case the role of food could be treated more broadly--i.e., the effect of the food supply on the political, economic, or social way of life of the country.)	
	<u>Availability of food.</u> For example a Chinese child eats rice because it is on the table at every meal, and everyone else eats it.	<u>Compare</u> (from the above reports) the foods eaten in two countries which are close together geographically, and in two countries which are far away from each other. In which case is there more similarity in the foods eaten? Why?	
	<u>Customs and beliefs about food.</u> Sometimes people think a food is only for certain people. For instance, we think of coffee as a food only for adults. In some parts of the world milk		

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	is only consumed by children. (But in this country children and adults all drink milk.) Sometimes religious beliefs prohibit eating a certain food. What we are used to eating. For instance, most of us would not like to eat insects, even if they are available and we don't believe they will hurt us if we eat them. We just aren't used to eating them. But people in some parts of the world do eat them, and for them insects are food.		
	2. Food patterns in the United States are a complex mixture of foods which were here before the Europeans came, and foods which have been brought by many different groups of people to the United States.	List the foods eaten in the United States which the Indians ate prior to the coming of the Europeans. List some of the foods which are eaten in the United States which were brought from other countries. Discuss: Do all Americans eat the same foods? Why not? What differences	(Such a list would include corn, turkey, fish, squash, pumpkin, berries, venison, quail, pheasant.) See Chapter 3 in Food and Man. (Lowenberg et al)

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		exist among Americans in the foods they eat? Are there any foods you think all Americans eat? Find out about special kinds of American foods. (Examples: Boston vs. Manhattan clam chowders Soul food Mexican food Oriental food Italian food Spoon bread) Students in small groups can find out about a particular food, through library research and through resource persons. Simple foods may be prepared by the students themselves, in order to taste them. If more elaborate dishes are used, perhaps mothers will cooperate.	
B. MANY DIFFERENT FOOD PATTERNS SUPPLY THE SAME ESSENTIAL NUTRIENTS: WHEREVER MEN HAVE MANAGED TO SURVIVE, THEY HAVE FOUND FOOD WHICH WOULD SUPPLY AT LEAST THE MINIMUM NUTRIENTS NECESSARY FOR SURVIVAL.			

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	All people must have enough food for energy, and foods which supply protein, vitamins, and minerals. Many people in the world do not have all the foods they need for good health. But there are many different combinations of foods eaten which do supply all the nutrients people need.	Write on the blackboard four headings: 1) Meat, fish, poultry, eggs, beans 2) Cereal or bread 3) Fruits and vegetables 4) Dairy products See how many combinations of four foods the class can list. Try to list some combinations which make sense in terms of being eaten in some part of the world. Example: Hamburger, bread, spinach, ice cream, pork chops, grits, greens, buttermilk, beans, tortillas, tomatoes, cheese, fish, rice, bamboo shoots, milk, beef, spaghetti. Use the book Food and Nutrition from the Life Science Library. Pages 16-31 show, with color pictures, the sources of nutrients in different areas of the world. Write on the board the foods that two or three students ate yesterday. Identify the protein	

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		sources. Then think of other protein sources which could be used, and indicate the country or area in which they are used.	
	C. FAMILY AND INDIVIDUAL EATING PATTERNS ARE THE RESULTS OF A COMPLEX OF PERSONAL AND SOCIO-CULTURAL FACTORS.	Have student examine his own eating pattern and: a. compare with others in his family b. compare with his peers	
	1. People select foods which are available to them.	Identify foods that are more available and/or less expensive in the summer months than in the winter (fresh strawberries, watermelon, fresh peaches). Study foods in several parts of the world. Give a test in which the student must circle the food, of three or four, which "doesn't belong" in the diet of the specified country -- i.e., the food that is unavailable or not eaten there. Assign each student a foreign country or a different part of the United States. Pose the problem: If he were to open a food	

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		store in that area, what would he sell? Have each student research his own problem and report to the class. (A student might say that he would not open a store in a given area because the people all grow their own food.) Use Dairy Council booklet Animals that Give People Milk to find out one way in which availability affects the kind of food that people eat in different parts of the world.	
	2. People can select foods from those they can afford to buy.	Divide the class into several groups. Give each group several newspaper grocery ads and a specified amount of pretend money. Each group should have a different amount of money. Each group is to "shop" with their money for one day's food for a family of four, or some other specified number of people. Each group is to report to the class on what they "bought."	This activity uses a hypothetical shopping trip to avoid directly talking about families' differing economic resources, which might prove embarrassing to some students.
	3. People select foods that fit into the pattern of what they like and are used to -- their food habits.	Study a fictional family, devised by the teacher with the needs of the students and the nature of the community in mind.	

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	a. Food habits operate on several levels: individual, family, regional, cultural.	Talk about - what each member of the family eats - how what each family member eats is the same as or different from what the rest of the family eats, and why - how what the family eats is similar to or different from what other families in the community eat - how what the family eats is similar to or different from what people in another country eat. In a class where several ethnic backgrounds are represented, study several families to bring out similarities and differences. With the cooperation of the school lunch supervisor, the class can plan a "United Nations Lunch" for which members of the class can, in small groups, research what people eat in several countries and plan lunch menus appropriately.	

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	b. Our food habits change as we grow older and the relative influence of other forces on our behavior changes.	Discuss the influence of school lunch on students' food habits. Do students now eat any foods that they did not before meeting them in school lunch? Do they eat foods at school that they don't eat at home? Students can search for food advertisements on television, in magazines, and in newspapers. Keep track of how many advertised products the students actually eat. Do they think the ads influence them? Do the ads influence their mothers? What do the food ads really tell you? How do they try to influence you? Discuss the effect on a family's food habits of moving from one part of the country to another. Perhaps some members of the class will have first-hand experiences to relate.	
	4. Man has developed beliefs about food and its power to influence life.		

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	a. Many religions incorporate food or rules about eating into their rituals and doctrine.	Small groups or individual students choose a religion and report on how it uses food in its rituals or how its rules affect the food intake of its adherents. Almost all religions have a prayer or ritual for giving thanks for food. Collect such prayers from different religions, and make a bulletin board, a display, or a series of posters from them.	Examples: Hinduism - Cow is sacred; killing a cow a great sin; caste system in which highest caste is vegetarian. Islam - Eating pork is forbidden. Catholicism - Lenten customs; abstinence from meat on Friday (no longer required but many Catholics still observe.) Christianity - Role of bread and wine in the Mass and Communion services. Judaism - Prohibition of pork, shellfish; meat and milk together, Kosner concept; foods in the Seder service. See Chapter 5 in Food and Man. (Lowenberg et al).
	b. People in all parts of the world have beliefs or superstitions about foods.	Show the film Science and Superstition. This 10 minute film provides an introduction to distinguishing, by scientific methods, between	

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superstition and fact. The methods shown in the film can be used in testing beliefs and superstitions about food.

Students can find beliefs and superstitions about food in their own environment. Elderly relatives may be a good source. In class, evaluate the beliefs. Are they true? Do they have some remote basis in fact? Do they do any harm? How do you suppose they got started? Common examples:

- Fish is brain food.
- Orange juice and milk should not be eaten together.
- Garlic will make your blood pure.
- Tomatoes cause cancer.
- Honey will cure diseases.
- Wheat germ gives vigor and vitality.
- Grapefruit burns fat.

Vocabulary Summary:

Availability
Beliefs
Customs
Energy

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			Habits Minerals Vitamins Protein Cultural Superstition
II. OUR BODIES USE NUTRIENTS FROM FOOD FOR ENERGY, GROWTH, AND MAINTENANCE.	A. EACH CELL OF THE BODY HAS A NEED FOR SPECIFIC NUTRIENTS	Use an informal pretest to assess students' understanding of cells.	THIS UNIT SHOULD BE INTEGRATED WITH SCIENCE WHENEVER POSSIBLE.
	1. All living things are made up of cells.	Show film The Cell: Structural Unit of Life. A ten-minute overview of the nature of cells, including food getting, growth, and reproduction, and photomicrograph of several types of cells. Shows onion cells specifically, so is a good introduction to the next activity.	
	- Each cell has several parts, and each part has a function.	Look at cells through a microscope. Cut an onion in half. Peel off an inside layer. On the outside of this layer you will find a transparent skin as thin as tissue paper. Pull off a small piece of this skin and place it in a drop of water on a glass slide. Place on the slide one drop of iodine.	Materials needed: Onion, knife; compound microscope; toothpicks; glass slides; cover glasses; eye dropper; iodine. Methylene blue or ink may be used in place of iodine. Not all the nuclei will show up due to the thickness of the cell and the way the slide was prepared;

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		Flatten the tissue out and cover with a cover glass. Look at the cells through the low-power lens. The cells will be seen fitting together like bricks in a wall. Each brick is one cell.	some should show up however.
	- The nucleus directs the activities of the cell. When a cell divides, or uses food, the nucleus controls what happens.	Now look through the high-power lens. You will see that each cell contains a dark spot inside it. This is the <u>nucleus</u>.	
		What do you think would happen if the nucleus were removed? (The cell would die.)	Unless enough microscopes are available for each student to use one, it may be more effective to use a micro-projector so that all can see at the same time. Micro-projectors may be available through school audio visual sources.
	- The cell membrane lets in food substances and keeps out harmful substances.	Each cell also has two thin lines around the outside. The inner line is the <u>cell membrane</u>. All cells have cell membranes. The outer line is the <u>cell wall</u>.	
	- The cell wall protects the cell and gives it shape.		
		What do you think the iodine did to the cells?	
	2. There are many different kinds of cells.	Now gently scrape the inside of your cheek or lip with a toothpick. Then with a knife, scrape some of the white material on	
	- Animal and plant		

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	cells are different from one another.	the toothpick into a drop of water on a glass slide. Spread the material out in the water, add a drop of iodine, and lay a cover glass over it.	
	- All cells have a nucleus and a cell membrane. Only plant cells have a cell wall. Animal cells have no cell wall.	Examine the material under the low power and the high power lenses of the microscope. What do you see? Are the cells of your cheek different from the cells of the onion? Do you see a nucleus? A cell membrane? A cell wall?	
	- Cells in different parts of the body are different. They look different, they do different jobs, and they need different food substances to do their jobs.	Draw pictures of the two kinds of cells you looked at, and label the parts of each. Do you think cells from your bones would look different from the cells from your cheek? How would you determine whether hair is made of cells?	
	3. Each cell in the body needs nutrients from foods.	Discuss: How is energy measured? (Food energy is measured in calories.) What is food energy used for? What kinds of people	Need for calories depends on size, growth rate, metabolic rate, and physical activity. There is a great deal of individual

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	- All cells need energy. Energy comes from all foods.	need more or less food energy than others?	variation in caloric requirement.
	- All cells need protein. Cells are made up of protein. Good sources of protein are meat, fish, poultry, beans, nuts (including peanut butter) and dairy products.	List the foods that two or three students ate yesterday. Identify the good protein sources in the foods they ate.	
	- Some cells need particular minerals.	Discover what calcium does in bones. Take a clean chicken bone and cover it with vinegar. Leave it for several days, examine it at intervals. After a few days, the bone will become pliable and will bend easily. Ask the question:	MATERIALS NEEDED:
	Bones and teeth need calcium and phosphorous. Milk and food made from milk (cheese, ice cream) are good sources of these minerals.	- What did the vinegar (acid) remove from the bone? (calcium) - What does the calcium do for the bone? (makes it hard, keeps it from bending). - Why didn't the entire bone dissolve? (It must contain other things besides calcium.) The bone contains protein, which did not dissolve. - Do you think there is more than one kind of cell in bone? When possible, students can	Clean chicken bone, vinegar or dilute hydrochloric acid, jar. Note: It may be wise to explain that vinegar we eat, as in salad dressing, etc., does not have this same effect on the bones in our body. Our bones do not soak in what we eat.

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		do this project individually at home, each bringing in his chicken bone when he thinks it has changed. Discuss: Calcium is accumulated in bones as we grow older. Who do you think needs the most calcium? Who needs the least?	
	Blood cells need iron. We get iron from enriched and whole grain breads and cereals, from meats, greens, dry beans, dried fruits - like raisins, and eggs.	Discuss: What is meant by "enriched breads and cereals?" (Students might be assigned to find out on their own.) Collect labels from bread and cereal products the students find at home. Make a list of the kinds of bread and cereal products that state "enriched" and those that don't.	Enrichment refers to the addition of iron and the B vitamins thiamine, niacin, and riboflavin to bread and cereal products. Enrichment restores nutrients lost in the milling process. In New York State, white flour and all white bread and rolls except sweet rolls must be enriched. Products which may or may not be enriched (the label will state if they are) are spaghetti, macaroni, grits, rice. Sweet rolls, crackers, doughnuts, cakes, and cookies are almost always not enriched.
	The cells of the thyroid gland (a gland in your neck) need iodine. We get iodine from using iodized salt.	Have each student check the box of salt he has at home. Does it say "iodized" on it? Make a tally of how many students	

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		are using iodized salt at home and how many are not.	Goiter (enlarged thyroid from iodine deficiency) is far from being extinct in the United States. It could be eliminated if every family used iodized salt.
	The cells of bones and teeth need fluoride. We get fluoride from the water in cities which add it to their water or which have fluoride naturally in the water. In other places, the dentist may apply it to childrens' teeth.	Invite a dentist to come and speak about nutrition and dental health. Ask him to include an explanation of how fluoride helps in prevention of dental cavities.	
	Some cells need certain vitamins from foods. Skin and eyes need vitamin A. We get vitamin A from yellow and green leafy vegetables--carrots, pumpkin, squash, spinach, greens, brocolli. We also get some vitamin A from milk, butter and margarine.	Use booklet "The Great Vitamin Mystery" (Dairy Council). Tells the story of the discovery of each of the major vitamins. The stories also explain the deficiency diseases which result from the lack of each vitamin.	
	All cells need the B vitamins, which help the cells to use energy from foods. The B vitamins include thiamine, riboflavin, and niacin. We get riboflavin from milk; thiamine from pork; and all three from enriched	Students can bring in boxes or wrappers from bread and cereal products, and, from the labels, find out the names of the B vitamins.	

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	and whole grain breads and cereals.		
	All cells need vitamin C. Good sources of vitamin C are citrus fruits and juices, tomatoes and tomato juice, strawberries, melons, raw cabbage, white potatoes.	Discuss: If there were no citrus fruits available what would you eat for vitamin C?	While citrus is an excellent source of vitamin C, other sources are sometimes overlooked. The contribution of tomatoes and cabbage is substantial for many people. A baked potato contains about half the recommended daily allowance.
	Bone cells need vitamin D. Without vitamin D they cannot use calcium. Our skin can make vitamin D in the sunshine. We also get it from vitamin D fortified milk.	Discuss: Do you think children in New York State need vitamin D in their milk more than children in a tropical country? Why or why not? Who might need vitamin D more than children in New York State? Do you think living habits or clothing could make a difference in need for vitamin D?	Vitamin D fortified milk is labeled as such. Skim milk may or may not be fortified. A recent Food and Drug Administration has legalized the selling of dry skim milk with vitamins A and D, but at this writing the product is not commonly on the market.
	All cells need water. We get water by drinking milk, fruit juice, water, and other beverages. We also get water from the foods we eat.	Ask students to guess the answer to this question: "How much of the human body is water?" Write down the guesses. Assign one student to look up the correct answer and report back to the class.	

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		Discuss evidences that foods contain water. Students have seen some foods being squeezed for juice; they may relate the water seen in the pan after spinach is cooked, or the drying out of uncovered bread and cake to the presence of water. Ask whether students can think of a way to prove that foods contain water. This can be done by weighing a food -- a spinach or lettuce leaf works well - and then placing the food in a warm place for a few days (or an oven for a shorter time). Then weigh the food again. The difference in weight is due to water lost. Compare the amounts of water in several foods by repeating the experiment using equal weights of several moist foods (fruits, vegetables) and some dry foods (rice, macaroni).	
B. NUTRIENTS ARE DELIVERED TO THE CELLS OF THE BODY BY THE CIRCULATION, AFTER BEING DERIVED FROM FOOD BY THE			

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	PROCESS OF DIGESTION AND ENTERING THE CIRCULATION BY THE PROCESS OF ABSORPTION.		
	1. After food is swallowed it travels down the esophagus into the stomach. Digestion starts in the mouth and continues in the stomach. The food goes from the stomach into the small intestine and then into the large intestine. In the small intestine, nutrients are absorbed through the walls of the intestine into the bloodstream. Waste material (the part of the food the body does not use) is excreted as feces.	On a large picture or flannelboard representation of the human gastrointestinal system, <u>demonstrate</u> the path that food takes in the body. On a picture of the GI system, have students label each major part, learning how to spell the correct names. Distribute a dittoed sheet containing simplified drawings of a mouth, esophagus, stomach, small intestine, and large intestine, randomly arranged and unconnected. Have students <u>cut out and put together</u> the pieces of the GI system in proper order. Or do the same exercise with flannelboard pieces.	
	The food is moved along the gastrointestinal system by <u>peristalsis</u> -- muscle contractions which	<u>Discuss</u>: The following statement: "The gastrointestinal system is just a hollow pipe going through the body."	

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	force the food to move on -- rather than by just falling through.	Illustrate that peristaltic action forces food along regardless of gravity by showing that you can swallow uphill. A student can stand on his head, feet against a wall to steady himself, and drink water or milk from a straw. He can swallow without much difficulty, and the liquid goes uphill. Discuss the significance that this has for space travel (the ability to swallow does not depend on gravity.)	
	2. Digestion is the process of breaking food down into small particles so that it can be used by the body. - Large food particles cannot be used by the body without being broken down or changed into smaller particles.	Demonstrate that starch will not dissolve. Hold up a cracker. Ask: What will happen to the cracker after it is eaten? - Is the cracker ready to be used by the cells as it is? - What must happen to it before the cells can use it? Grind the cracker into a powder, and put a teaspoon of powder into a glass of water. Put a teaspoonful of sugar in another glass of water. Stir each with a spoon.	MATERIALS NEEDED: cracker, sugar, iodine, spoon, two clear glasses or jars. NOTE: TINCTURE OF IODINE IS POISONOUS IF TAKEN INTERNALLY. It also stains clothing, and if it is old will burn if spilled on the skin.

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		Ask: Why is the starch water cloudy? Why is the sugar water clear? (The starch particles are big enough to see. The sugar molecules dissolved in the water; they are too small to see.) Add a few drops of iodine to the starch water. It will turn blue-black. This is a test for the presence of starch. Add iodine to the sugar water. It will remain tan colored, indicating that there is no starch present. Conclude: that starch must be changed into something else in order to dissolve.	
	- Substances called enzymes are present in our mouth, stomach, and intestines. These enzymes change large food particles into smaller ones so they can be absorbed into the bloodstream and used by the cells.	Ask: What is starch changed into so that our bodies can use it? What changes it? Discover that starch is changed to sugar in the mouth. Have students chew up part of a cracker, but do not swallow it.	MATERIALS NEEDED: A cracker or piece of bread for each student.

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		Hold it in the mouth for several minutes. Ask: What do you notice about the taste? (it will become sweet.) What do you think the starch changed to?	
		Demonstrate that starch is broken down by saliva. Make a starch solution by adding a teaspoon of flour or cornstarch to about half a cup of water. Collect some saliva in another glass or cup. To one test tube, add about 2 tablespoons starch solution. To test tube #2, add 2 tablespoons starch solution and 2 tablespoons saliva. To test tube #3, add only about 2 tablespoons saliva. To all three tubes, add two or three drops of iodine. The two tubes containing starch will turn blue-purple. Ask: Why did the tube with only saliva not turn blue? Let the tubes stand for several hours until the blue color in the saliva-starch-iodine mixture	MATERIALS NEEDED: 3 test tubes, holder or other receptacle for test tubes, iodine, cornstarch or flour, two small glasses or cups.

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		disappears. Ask: Why did the solution change color? Do you think that there is any starch present in the tube now? Why not? What has the starch been changed into?	
	- Starch is converted to sugar in fruits as they ripen. This is also the result of enzymes at work, similar to the conversion of starch to sugar in the mouth by the enzymes of saliva.	If microscopes or a microprojector are available, discover that starch is digested or changed to sugar in plants. Make slides from a thin smear of ripe and unripe banana, and stain with iodine. The unripe banana will show much more starch. Relate this to the development of a sweet flavor in the ripening of fruits, by tasting ripe and unripe pieces of several fruits. Discuss how the starch is changed into sugar.	MATERIALS NEEDED: Microscopes or microprojector, slides, cover glasses, iodine, knife, ripe banana, unripe banana.
	3. Nutrients travel to the cell through the bloodstream after being absorbed from the stomach and small intestine.		
	4. Nutrients enter the	Demonstrate that large	

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	cell by penetrating the cell membrane.	molecules cannot cross the cell membrane, while small ones can.	
	Large particles cannot enter the cell membrane; small particles can.	Make cell models as follows: Mix a teaspoonful of starch with a packet of gelatin. Add 1/2 cup cold water; let set a few minutes. Then slowly add 1 cup boiling water, stirring to dissolve. Cool slightly. Pour some of this mixture into a plastic bag (an amount about the size of a ping-pong ball will do). Add a piece of clay to represent the nucleus. Tie the bag tightly with string so it has the shape of a ball. There should be as little air as possible in the bag. Cut away the unused part of the bag with scissors. Let the gelatin cool and harden overnight in the bag. The plastic bag represents the cell membrane.	MATERIALS NEEDED: Unflavored gelatin, some cornstarch, two or three small plastic bags (sandwich size), string, scissors, a little modeling clay.
		Fill the jar about 3/4 full with warm water. Add enough iodine to turn a light tan. Place the gelatin cell model in the jar. Let sit for a few	MATERIALS NEEDED: A gelatin cell model, iodine solution, a clear bowl or jar, water.

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		hours or overnight. The gelatin solution inside the "membrane" will slowly turn blue. Interpretation: The iodine must have reached the inside of the bag. So it must have passed through the membrane. But the water outside the membrane did not turn blue. Therefore, starch could not have traveled through the membrane.	
	C. THE CELLS OF THE BODY CHANGE NUTRIENTS INTO ENERGY AND INTO BUILDING MATERIALS.		
	1. Food substances combine with oxygen in the cells to give energy. The energy is used to keep our bodies warm; to keep our hearts beating, lungs breathing, and other vital body functions going; to give us energy to move, work, play, and do the work involved in building more cells.	Show that food burns and gives off heat energy by holding a piece of food in a candle or bunsen burner flame (with tongs). Try several kinds of foods; note that high fat content foods (a peanut, a piece of bacon) burn longer than other foods (candy, bread).	

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	2. Protein, minerals, and other nutrients are used by the cells to build materials necessary for making more cells. More cells need to be made for growth and to repair and replace damaged or old and worn out cells.	Discuss: How is food energy measured? (calories) Does everybody need calories? Does everybody need the same amount of calories? Do you think a person who is growing needs more calories or the same as a person who is not growing? Use filmstrip How Food Becomes You. (Dairy Council). Shows how food is used by the body. Use booklet How Your Body Uses Food. (Dairy Council). Describes the processes of digestion and metabolism for the upper intermediate grades. Discuss: Do some kinds of cells keep reproducing at the rate necessary for growth, even when growth in in height has stopped? (hair, fingernails)	A calorie is a unit of heat. It is defined as the amount of heat required to raise the temperature of one gram of water one degree centigrade.
	D. THE BODY'S NEED IS FOR NUTRIENTS, NOT FOR SPECIFIC FOODS. 1. Many different combinations of food can supply the nutrients the body needs.	Discuss: Why does a person who is growing need more protein than a person who is not? Have the class make a list of all the foods they think contain	

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	- We need certain kinds of foods to supply nutrients to our bodies. But there are many different nutrients that make up the different kinds of food.	1) protein, 2) fat, 3) starch. Then conduct tests for these three substances on a variety of foods which the children bring from home. As tests are made, make a revised list. Gradually the concept will emerge that many foods contain these three substances.	
		To conduct a test for protein: Using a candle or a bunsen burner, burn a small feather. The resulting odor is characteristic of protein. Use this test to determine the presence of protein in foods -- if the odor of burning feathers results, protein is present. Test cheese, meat, dry skim milk powder, beans, egg white, peanuts, lunch meat, butter, mayonaise, sugar, other foods. To conduct a test for fat: Chop or mash the food sample; rub a small sample of the food on a piece of brown paper bag. Heat the paper with the food on it over a light bulb. If a grease stain is left on the bag, fat	MATERIALS NEEDED: Candle or bunsen burner, matches, feather, foods to be tested. MATERIALS NEEDED: Lighted light bulb, brown paper bag, foods to be tested, knife and fork for cutting and mashing.

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		is present. Foods to try: cheese, bacon, mayonnaise, egg yolk, egg white, lunch meat, peanut butter.	
	- Foods which have mainly starch, sugar, and fat, give us energy. They are the "Go Foods." - Foods which give us protein are body-building foods, and they are the "Grow Foods."	To conduct a test for starch: Place a drop or two of iodine on the food. If starch is present, a blue-purple-black color will result. Foods to try: potato, apple, bread, spaghetti, corn (cut or mashed), beans, squash.	MATERIALS NEEDED: Food samples, iodine solution, eye dropper. Remind the children that iodine is poisonous and is not to be tested under any circumstances.
	- Foods which give us minerals and vitamins keeps us healthy. They are the "Glow Foods."	Using food models or pictures pasted on cards, students can sort foods into categories of Go Foods, Grow Foods, and Glow Foods. Ask: Where did you put milk in your sorting? Is milk a Go food, a Grow food, or a Glow food? (Milk is all three. It gives energy because of the fat and suger content; it has much protein; and it has calcium, vitamin D, and other minerals and vitamins.) Make a separate pile of cards for milk and milk foods made from milk.	This concept of functions of foods will be later related to the Four Food Groups, which coincide roughly with Go Foods, Grow Foods, and Glow Foods, plus milk. The Four Food Groups will have more meaning if preceded with this simplified version which emphasizes functions of food in the body.

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	- Different people use different foods to give them the nutrients they need.	Discuss: Do you think that a boy or girl in Mexico eats the same foods that you do? What might he eat? Can he eat all the kinds of foods he needs without having any of the foods you ate today?	A typical menu might be: Chicken and/or beans Tortillas (bread) Tomatoes Peppers Potatoes Cheese Coffee with lots of milk
	2. Some nutrients can be taken in a pill. But it is usually better to get nutrients from food. - Eating is fun. Taking a pill does not replace eating. - No pill contains all the nutrients we need. (Neither does any one food.) - There may yet be nutrients undiscovered which we get from food, which aren't in a pill. - It is possible to take too many vitamins; most of the time extras do no harm, but they are a waste of money.	Bring in the label from a bottle of vitamin pills. List on the blackboard the contents of the pills. Ask the following questions: - Can you think of nutrients we need which are not in the pills? (energy, protein, calcium. Some vitamin pills contain iron, some do not.) - Is there anything in the pills which we can't get from food? (no). - If we get enough vitamins from food, do we need more? (no, extra vitamins do no good.) - What happens to the extra vitamins if we already get enough from food and we take a pill? (most of them are excreted in the urine.)	For the teacher: Leaflet "Vitamin Supplements and Their Correct Use." (American Medical Association)

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	Some vitamins (A and D) can be dangerous if taken in excess.	- Is is possible to take too many vitamin pills? Yes, a person can become ill from taking too many vitamins -- such as a whole bottle at once, or several times the recommended amount over a long period of time . This applies to vitamins A and D. Because these compounds are not soluble in water, an excess cannot be excreted in the urine. - When should we take vitamin pills? (only when your doctor prescribes them). Hold a debate on the two sides of this issue: If we could get all the nutrients we needed from a pill (which we cannot) do you think people would stop eating food and start taking pills instead?	VOCABULARY SUMMARY: Cell Nucleus Cell wall Cell membrane Calories Energy Calcium Phosphorous Iron Minerals Acid Vitamins Enriched bread and cereal B vitamins Iodine Thyroid Goiter Vitamin A Vitamin C Vitamin D Rickets Digestion Circulation Absorption Enzyme Saliva Esophagus Stomach Small intestine Large intestine Peristalsis Gastro-intestinal system Starch Sugar Fat Oxygen

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III. FOOD PLAYS A ROLE IN GROWTH AND DEVELOPMENT	A. EACH INDIVIDUAL HAS HIS OWN PATTERN OF GROWTH, DETERMINED BY HEREDITY.		
	1. Heredity and nutrition are both important in growth. Food supplies the building materials, but heredity draws the plans for building.	Ask: What makes us grow? (One of the first answers will probably be "food.") Food is the right answer, but not the whole answer. Does anything else make us grow? If we continued to eat good food all our lives would we keep growing indefinitely? Do people ever stop growing in height and weight? Why? Conclude: There is a "plan" which tells our bodies when to grow and how much to grow and when to stop growing. We must have food in order to follow the plan. Discuss: What is inherited? Can inherited traits be changed? (examples: color of eyes, hair) Is size inherited? What makes a dandelion grow small, while an oak tree grows large? Find out: Are your	People are getting taller,

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		parents taller than your grandparents? Do you think you will be taller than your parents?	on the average in each succeeding generation. This is due at least in part to improved nutrition.
	2. Individual differences in amount and timing of growth are normal. - Some people are taller or shorter, heavier or lighter than others. Some of us are faster or slower in growth and development than others.	Show that we are all different in size and proportion. Have each student measure four or five fellow students for - height - sitting height - length of arms - length of hands Ask: Are all the students the same size? Are those who are the same height the same in other respects?	
		Demonstrate that individual differences exist from the very beginning of life. Ask each student to obtain from his mother the following information (she may have it written in a baby book or other record): - His birth weight - The age at which he got his first tooth - The age at which he walked - The age at which he said his first words. In class, list all the different birth weights	In a class in which this information is not likely to be available, perhaps the activity could be carried out using only birth weights, since most mothers will remember this.

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		and the differences in timing of development signs. Point out that these differences are normal. Compare to flowers; tulips bloom in the spring, chrysanthemums not until fall, but all are beautiful.	
		Find the average height or weight of all the children in the class. Then ask: Was anyone exactly average? How many children in the class are exactly average in height or weight? If we were all average, would we all be the same? Do you think you would like it if we were all the same size exactly?	Children of this age may confuse the words "average" and "normal." It is important that they realize that they can be normal and healthy and still be far from average. In case of a class which contains children known to be sensitive due to over or underweight, use data from another class or hypothetical data.
	- We all grow in "spurts" -- times of fast growth -- interspersed with periods of slower growth.	If possible, have each child obtain height and weight data for himself since birth (or at least since first grade; this should be available from the school nurse.) Each child can plot his height and weight growth on a chart (or use leaflet "My Growth Record" from Dairy Council). Ask: Are there some years	Caution: The teacher must take into account her own food practices may unduly influence her teaching (or not teaching) of certain sections unless she is aware of her own food "hang-ups."

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		in which you grew more than others? Were there any years in which you grew hardly at all? Do you think there will be more years when you will grow fast or slow?	
	3. Boys and girls have different growth patterns.	Total and average the heights of the girls in the class separately from the boys in the class. Both the total and the average will probably be greater for the girls. Compare with typical heights for men and women. Conclude that girls are only temporarily taller than boys. Boys will grow more when they are teenage, and be taller as adults.	Some of the girls may have already begun the adolescent growth spurt. They will need reassurance that others (including boys) will catch up.
	B. ADEQUATE NUTRITION IS ESSENTIAL FOR AN INDIVIDUAL TO ACHIEVE HIS GROWTH POTENTIAL.	Conduct an animal feeding experiment using weanling (3-week-old) white rats. Students should be responsible for caring for the animals, feeding them, weighing them and recording weights, cleaning cages, etc. Use two or three rats for each group. Feed as follows,	Information on obtaining and caring for animals, cages etc. may be found in the Dairy Council publication Animal Feeding Demonstration for the Classroom.

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	1. No one food will provide all the nutrients needed for growth and health. 2. There are interactions among nutrients. [For example, the protein in cereal is "incomplete." Protein is made up of molecules called amino acids. If all the essential amino acids are present in the right amounts (as in animal proteins) the protein is efficiently utilized. If any amino acids are low or missing, the protein is less valuable -- it is not complete protein. But milk protein has plenty of the amino acid which is low in cereal protein. Thus when milk is fed with cereal, the cereal protein is better able to be utilized for growth.]	unrestricted amounts, keeping plenty of water available. Group I: A ground mixture of several ready-to-eat breakfast cereals. (Not protein and vitamin fortified). Group 2: Dried whole milk Group 3: Equal parts dried whole milk and breakfast-cereal mixture. The experiment will take six to eight weeks to complete. Keep growth records for the rats and record observations about changes in appearance, behavior, etc. The results should show: 1. Decided growth retardation in the rats fed only cereal 2. Possible growth retardation in the rats fed only milk. This is not likely to be marked. 3. Iron deficiency anemia in the rats fed only milk. This will show up in general lassitude and more	Dried whole milk, if not available in your local supermarket, may be ordered through your grocer or druggist. Land o-Lakes and Foremost both make a dried whole milk product. Borden's makes a dried whole milk for infant feeding trademarked "Klim" which could be ordered through a druggist. NOTE: Rats fed only milk have a marked tendency to develop diarrhea. This may be severe enough to cause death. To avoid this, start the milk-only rats on a diet of 9 parts whole milk to one part cellulose (order from the animal supplier). Cellulose is non-nutritive so won't interfere with the experiment. Gradually decrease the amount of cellulose to about one

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		specifically in the color of the animal's eyes. In albino rats the eyes will become pale. 4. General good health, growth and vigor in the rats fed the combination of cereals and milk. Explanations from which to draw questions, discussion, etc: a. The cereals-only diet does not contain adequate protein for growth. Calcium is also lacking. b. The milk-only diet provided plenty of protein, but no iron. Iron is necessary for making red blood cells. Without it fewer red blood cells are made. The albino rat's eyes reflect his blood, since there is no other color in them. The pale eyes indicate a lack of red blood cells.	part in 20 if the animals do not develop diarrhea.

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		c. No one food alone is sufficient for growth and health. d. The cereals-and-milk diet provided enough energy, protein, vitamins, and minerals. The rats were healthy and grew well. e. If the rats were humans, the cereal and milk wouldn't have been enough. Missing still is vitamin C, which we get from fruits and vegetables. Rats do not need dietary vitamin C, because they can synthesize their own.	
C. OVER OR UNDER-WEIGHT MAY RESULT FROM TOO MUCH OR TOO LITTLE FOOD IN RELATION TO NEEDS FOR GROWTH AND ENERGY.		Review the real or fictional food intake of normal weight, overweight, underweight persons in relation to their activity.	
1. Most people have periods of relative chubbiness or leanness while growing up.		Students can bring to class baby pictures of themselves, pictures at pre-school age if available, and pictures taken during the last year or two. A bulletin board	The idea here is to stress the normality and temporariness of "stages" of fatness or leanness while growing up. If there are children in the class who seem to be severely under or overweight, try to obtain a

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		display of the children's growth can then be made. Note that most of the babies look quite round and chubby. Ask: are they "fat"? Isn't it natural for babies to go through a chubby stage? Were you thinner as a preschooler? (Most children thin out during the preschool years. Some, however, stay plump. Hereditary growth patterns as well as food habits affect the growth progress and characteristics of the individual child.)	medical evaluation through the school physician or by having the school nurse refer the child to his own physician. If there are several really obese children in a school, perhaps cooperative planning can be initiated to provide a program of counseling, nutrition education, and exercise to help these children cope with their weight problem. Obesity which begins in childhood usually continues into adulthood, and is the hardest kind of obesity to overcome. A feeling of "differentness" and inferiority may develop which, later on as sensitive teenage egos complicate the picture, can really make a youngster miserable. If there is an obese child in the class, the other children should be encouraged to regard him as just another child, even if he has a special problem. He should not be made fun of or singled out as an example of a child who eats too much.

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	2. A person may be heavier or lighter than average without being too fat or too thin.	List all the parts of your body which contribute to your weight: Bones Muscles Skin Blood Fat Doesn't it make sense that some of us have bigger bones than others, or larger muscles? Weight doesn't depend only on fat. We can't change the kind of bones we have--which determines our basic body size.	Traditional weight control programs have emphasized weight out of proportion. The real issue is fatness. It is futile for a large-boned stocky girl to want to be a will-o-the-wisp; or for a delicately built boy to wish for the football player image. Food and exercise patterns can influence fatness and muscle development; they don't affect bone structure, which is inherited.
	3. Your physician's evaluation of your growth record is the best source of judgement for determining whether you are too fat or too thin.	Invite the school physician or a local pediatrician to come and talk to the class about growth. He may bring and demonstrate his instruments for measuring height and weight, and show the kind of growth chart on which he records children's heights and weights. Students can ask him questions and receive immediate feedback.	

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			VOCABULARY SUMMARY: Growth Heredity Individual Trait Proportion Development Average Normal Spurt Data Amino acids Utilization Anemia Red blood cells Overweight Underweight
IV. THERE ARE SOME CRITERIA WE CAN USE IN SELECTING FOOD TO MEET OUR NEEDS.	A. THE BASIC FOUR FOOD GROUPS OFFER A GENERAL GUIDE FOR WHAT KINDS OF FOODS WE NEED TO EAT. We need to eat foods from all four groups everyday. 1. The milk group contains milk and all the foods made from milk -- cheese, ice cream, buttermilk, chocolate milk. It is important for <u>calcium</u> and <u>protein</u>.	Use poster "Foods to Eat" (New York State Health Department) Use poster "A Guide to Good Eating" (Dairy Council) - pictures the four food groups. Leaflet "Foods to Eat... and Why!" (New York State Health Department) Using food models or flash cards, students can <u>sort</u> foods into the four <u>food</u> groups. Written exercises	

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	2. The bread and cereal group contains all the enriched and whole grain breads and cereals -- spaghetti, macaroni, grits, bread, breakfast cereal, cornbread, rice, rolls. The bread and cereal group is important for energy, iron, and the B vitamins.	can use matching techniques to sort foods into groups. Relate the four food groups to the earlier and simpler classification of Go foods, Grow foods, and Glow foods. (Meat group - Grow foods Fruits and vegetables - Glow foods. Milk - all three)	Dietary adequacy is much better judged on the basis of the whole day's intake then on the basis of one meal. Meals don't necessarily have to be "balanced" if the whole day's intake is adequate in all respects; i.e., not every category of Basic 4 food groups needs to be represented at each meal. It is desirable to have a complete protein food each meal.
	3. The fruit and vegetable group contains all the fruits and vegetables. It is important mainly for vitamins and minerals. Try to have a vitamin C food every day and a vitamin A food almost every day. (Vitamin A can be stored by the body, so is not needed every day. Vitamin C cannot be stored, so we need to supply it every day.)	Students can keep a record of their own food intake for two or three days. Calssify foods into food groups. Evaluate adequacy of day's diet on the basis of the food groups.	
	4. The meat group contains meat, fish, poultry, eggs, beans, and nuts. It is important mainly for protein.		

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	B. INDIVIDUAL NEEDS AND CONCERNS WILL AFFECT THE SPECIFIC FOODS WE CHOOSE TO EAT.	From student's records of their food intakes, identify differences in amount of food eaten (energy intake). Discuss reasons for differences in energy needs (body size, growth rate, physical activity). Students can plan diets, based on the Four Food Groups, for individuals with different energy needs. (football player vs. typist; teenage boy vs. elderly grandmother; astronaut vs. nurse) Evaluate the plans on the basis of whether they show understanding that-- All people need the same kinds of food. Amounts of food needed vary with size, physical activity, and growth. Students can plan a day's diet for individuals with special concerns: - Someone allergic to citrus fruit - Someone whose religion forbids eating beef - Someone who has no stove or refrigerator	Have student record food intake before getting into this study unit rather than after Basic 4 presented.

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		- Someone in a hurry who has no time to cook.	
	C. KNOWLEDGE OF THE RELATIONSHIP BETWEEN NUTRITION AND HEALTH GIVES US THE BASIS TO SELECT FOODS THAT WILL PROVIDE THE NUTRIENTS WE NEED.	Apply knowledge of the Basic Four. Present students with a list of foods that a child might eat in a day. Make the list void in one group of foods. Ask students to suggest snacks that would make the day's menu adequate. This might be done with several groups of students, each with menus lacking a different food group.	
		Have the class as a group plan a menu for the school lunch for a day. (Secure the cooperation of the school lunch supervisor. Perhaps she could be present during the planning to explain to the students the requirements of a Type A lunch and to help them plan.) Then publicize to other classes on the day the lunch is served that the class planned it.	Using the technique of voting on disagreements, a group decision process can be used. This reinforces the learnings about accepting foods even if they are not favorites. SEE APPENDIX I FOR REQUIREMENTS OF TYPE A SCHOOL LUNCH. VOCABULARY SUMMARY: Basic Four Food Groups

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			Guide Activity Individual Differences Type A School Lunch Criteria
V. FOOD HAS ALWAYS BEEN AN IMPORTANT FACTOR IN THE HISTORY OF MAN.	A. THE SUCCESS WITH WHICH MAN HAS BEEN ABLE TO OBTAIN ADEQUATE FOOD HAS INFLUENCED HIS ABILITY TO DEVOTE ENERGY TO ACCOMPLISHING TASKS.		THIS UNIT SHOULD BE INTEGRATED WITH SOCIAL STUDIES WHENEVER POSSIBLE.
	1. Prehistoric man was a food gatherer. He ate what fruits, vegetables, and nuts he could find growing wild, and hunted for meat. Because he did not know how to store food or to produce food for himself, he had to devote nearly all his time to finding food. He was frequently hungry. 2. The beginnings of agriculture can be traced to the Near East at about 8000 B.C. This was after the Ice Age; dry weather forced people	Make a bulletin board, or have students make drawings, showing primitive man and his food supply, how he ate, how he found food. Discuss: What weapons and other methods did primitive man devise in order to trap and kill animals to eat? Discuss: What conditions had to exist before men could begin to develop agriculture and produce food for themselves?	

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	to move to the lakes, rivers, and the sea. They discovered that seeds dropped in the ground could yield a harvest several months later. At this point in history man became a food producer. The main crop was grain (mostly wheat). This was very important because grain could be stored. Thus people could store a harvest in order to have food during a dry or cold season. At first the grain was just roasted and eaten. Then people began to make bread. The first bread was flat (unleavened)--grain and water were mixed and pounded to a pasty dough and cooked over a fire. Later people learned to make raised bread. The Egyptians are said to have made the discovery first, by letting bread dough sour or ferment before cooking it.	Make a display showing grain the world over. Use a large world map for a background. Have students bring in as many different kinds of grain and bread as they can find. Identify each type of grain, the kind of food made from it, and the part of the world where it is grown and eaten. If possible, make tortillas or other unleavened bread. Discuss: In what ways besides bread do we eat grains? Discuss: What nutritional contributions do grains make to people's diets? Students can make short oral reports about the grains they brought for the display. Read the booklet Your Daily Bread and Its Dramatic History (American Institute of Baking).	Wheat is grown and eaten in the Middle East, Europe, North and South America. (Be sure to include both light and dark wheat bread. Use the opportunity to discuss the milling of wheat to make white flour). Rye is used mainly in Northern Europe; cassava (tapioca) in Africa, corn in Central and South America and the Southern U.S. Be sure to include samples of cornbread, and of unleavened types of bread (tortillas from Mexico, made from corn; matzoh from Isreal, made from wheat). Rice and breakfast cereals will be obvious examples. Point out other ones -- hominy grits, cooked cereals such as oatmeal, pasta such as spaghetti and macaroni. Cereals are often downgraded because of the high-calorie image they have acquired in our culture. Enriched and whole grain cereals and bread are important sources of iron, thiamine, niacin, and riboflavin.

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	People almost everywhere in the world depend on a grain for a large part of their food. In parts of the Middle East, bread is looked upon as sacred. It is considered improper to drop a crumb of bread. A meal is not considered a meal unless bread is eaten. Rice enjoys similar status in the Far East.		The protein in cereals is important in most of the world, although American diets include enough protein from other sources that cereal protein is less important. It should be emphasized that cereals contribute more than just calories to the diet.
	3. During the Middle Ages hunger was common. Agricultural practices were poor, insects took their toll, wars were frequent, and food was scarce. Many people starved.	Discuss: During the Middle Ages there was very little activity in science, music, art, or literature. Do you think the frequent famines during this period were connected in any way to this lack of scientific and cultural activity? Why or why not? Why were agricultural practices poor in the Middle Ages?	
	4. Today in the United States we use machines and scientific knowledge to produce food efficiently.		
	Invention of machines such as the tractor, the reaper, the milking machine have increased the productivity of the farmer. Knowledge of soils, fertilizers, genetics have also increased the amount of food a farmer can produce.	Discuss: If one man can produce enough food for twenty people instead of just for himself, what kinds of things can the other nineteen people do? Hold a debate or write a short report on the following	

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	Now instead of producing only enough food for himself and his family, the farmer can produce food for many other people. He can then sell the food he produces and use the money to buy other goods and services.	topic: "Civilization depends on man's ability to produce food efficiently." List the occupations of student's parents. How many are engaged in food-producing occupations? Contrast with a developing country, where 3/4 or more of the labor force may be engaged in the production of food.	
	B. THE NEED FOR FOOD HAS INFLUENCED WARS, REVOLUTIONS, PATTERNS OF SETTLEMENT AND EXPLORATION, AND OTHER IMPORTANT EVENTS IN HUMAN HISTORY.	Show film Miracles from Agriculture (U.S. Department of Agriculture). 13 1/2 min., color. Shows scientific advances in agriculture, processing, packaging, and marketing, with emphasis on the contributions of research.	The historical situations given as examples in this unit are meant only as examples of the basic role that food plays as a motivating factor and a political tool. Other instances can easily be found in the study of history and contemporary events. Examples should be selected to coincide with studies in Social Studies wherever possible.
	1. The availability of food has influenced the course of wars, revolutions, and political alliances.		
	For example:		
	- Lack of food was a factor in the frustrations which led to the French Revolution in 1789, Hungry people, faced with a scarcity of bread (their basic staple food) and rising prices, and distrustful of the King and	Discuss: the significance of the statement attributed to Marie Antoinette: "Let them eat cake!"	

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	Queen, believed that the royalty had the means to feed them but would not. They marched on Versailles and captured the King and Queen -- but no food. - The War Between the States demonstrated the effectiveness of interfering with an army's food supply in order to defeat it. The South depended on trade with England and France for grain. Long-continued blockading of Southern ports created a food shortage in the South.	Trace the role of food supply in the American Civil War. - Why was the Northern blockade of Southern ports effective in helping win the War? - Do you think the fact that the South produced cotton as its major agricultural crop contributed to its defeat? Why or why not? Individual students or small groups can check encyclopedia and history book accounts of such events as the Russian Revolution, French Revolution, World War I, World War II, Depression, Nigeria-Biafra War. Find out how frequently food is mentioned. What relation had these major events to food supply? Discuss: A nation which depends on foreign trade to supply its food is more vulnerable politically than one which can produce its own food	

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		supply. Do you agree or disagree? Why? Report on the role of food supply in the expansion of the Westward frontier in the U.S. Include effects both on the pioneers and on the Indians. Discuss the role of food supply in a current conflict taking place in the world. (The Nigeria-Biafra War, the Vietnam War, the Mid-East Conflict all provide ample material from which to draw.)	
	2. The search for needed or desired food items motivated much of the exploration of the world.		
	- Spices have always been prized--not only for their flavor, but for their value as preservatives. Before the days of refrigeration, pepper and other spices helped to preserve food and to improve the flavor of food	On a map of the world trace the routes of the early spice traders, of Vasco de Gama, and of Columbus. Provide the opportunity for students to see, taste, and smell a variety of spices. Find the place of origin	

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	which was partly spoiled. The European desire for spices was the basis for an active trade for centuries. Arabs bought the spices from India, Ceylon, and Burma, and sold them to Europeans. It wasn't until Marco Polo's stories of seeing spices in the Indies that Europeans realized where they came from. Then there arose great interest in finding a sea route to the Indies. This was the motivation for Vasco de Gama's voyage around the Cape of Good Hope, and his successful return to Portugal with a shipload of spices (1497).	of each; discuss foods in which it is used. Materials may be obtained from leading spice manufacturers.	
	Columbus thought he was going to the Indies when he landed in America. Instead of bringing precious spices back to Portugal, he brought Indian maize (corn) which, until then, didn't exist in Europe.	Discuss: Corn was eventually adopted as a food by some people of southern Europe . However, many Europeans never were willing to try it. Even during a time of real famine, Frenchmen would not eat corn. Why do you think this?	This is an example of the strength of food habits. A people for whom wheat bread had been the staple food for centuries were not interested in eating different food.

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	3. The problems of providing adequate food have limited man's ability to explore and conquer his environment.		
	- For centuries, it was common on long sea voyages for many sailors to become ill and to die. The disease they got was called "scurvy." On Vasco da Gama's voyage around the Cape of Good Hope in 1497, 100 out of 160 men died. Scurvy remained a plague until 1753, when a doctor in the British Navy discovered that citrus fruit would cure and prevent scurvy. It was the long months at sea with no fresh fruits and vegetables which produced the disease. It was not until many years later that we learned that Scurvy is caused by a deficiency of vitamin C--a vitamin that we get from fruits and vegetables.	Booklet "Hey Kids-Get Aboard the Good Ship Vitamin C" (Florida Citrus Commission). Tells the story of early problems with scurvy aboard ships, and the discovery of the cure. Discuss: None of Columbus' men died from scurvy. Can you figure out why? (Let students do some individual reading about Columbus' voyage to discover why. Columbus sailed from Lisbon on September 6, arrived in America on October 12.	Be careful to emphasize that there are other sources of vitamin C besides citrus fruits: cabbage, potatoes, tomatoes, strawberries, melons, green peppers.

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	After the discovery that citrus fruits would prevent scurvy, the British Navy took limes on long voyages. Thus British sailors became known as "limeys."	The voyage was not long enough for healthy men to become ill and die from the vitamin deficiency.)	
	- Exploration still requires that we provide adequate food for the explorers. Feeding astronauts in space has been a difficult problem and has prompted new ideas in food preparation and packaging.	Collect from news sources stories which mention the type of food used and the methods of eating employed by astronauts in space.	See Look magazine article "Eating in Space: It's No Picnic Up There." July 15, 1969. p. 58.
		Visit the school cafeteria and observe lunches being prepared.	VOCABULARY SUMMARY:
	- No matter where people are, provision must be made for them to eat. As our society advances technologically, providing new methods of education, entertainment, transportation, etc., new methods of feeding people must be devised also.	If possible, visit an airport kitchen to see how meals are prepared for airplane passengers.	Grain Staple food Agriculture Mechanization Leavened bread Unleavened bread Tortillas Cassava Matzoh Protein B vitamins Iron Productivity Food supply Blockade Spice Famine Scurvy Vitamin C Ascorbic Acid "Limey"
		If possible, visit a hospital or other institution to see how meals are prepared.	

TEACHING AIDS

BOOKS

Sebrell, W. H., Haggerty, J. J. & the Editors of LIFE. Food and nutrition. (From the LIFE Science Library) Time, Inc., New York, 1967.

BOOKLETS AND LEAFLETS

Animals that give people milk. National Dairy Council, Chicago, Illinois. (For Dairy Council materials, contact the Dairy Council office serving your area.)

Food for fitness: a daily food guide. U. S. Department of Agriculture, Washington, D. C., Leaflet #424.

The great vitamin mystery. National Dairy Council.

Hey kids! get aboard the good ship vitamin C! Florida Citrus Commission, Lakeland, Florida.

How your body uses food. National Dairy Council.

Your daily bread and its dramatic history. American Institute of Baking, 400 E. Ontario Street, Chicago, Illinois 60611.

FILMSTRIPS

How food becomes you. National Dairy Council.

The power of food. National Livestock and Meat Board, 36 S. Wabash Avenue. Chicago, Illinois 60603

FILMS

The cell: structural unit of life. Coronet Films. 10 minutes, black and white. (available from Cornell University

Film Library for $2.00 rental fee).

Miracles from agriculture. U. S. Department of Agriculture, Washington, D. C. 13 1/2 minutes, color. (available from Cornell University Film Library for $1.50 rental fee).

Science and superstition. Coronet Films. 10 minutes, black and white. (available from Cornell University Film Library, Roberts Hall, Ithaca, New York 14850, for $1.50 rental fee.)

You and your food. Walt Disney Productions (Available from Film Library, New York State Health Department.) Depicts basic four food groups.

MAGAZINE ARTICLE

"Eating in space: it's no picnic up there." LOOK, July 15, 1969. Page 58.

FOR THF TEACHER

BOOKS

Eppright, Pattison, & Barbour. Teaching nutrition. (2nd edition) Iowa State University Press, Ames, Iowa. 1963.

Leverton, R. M. Food becomes you. Dolphin Books, Doubleday and Company, Inc., Garden City, New York. 1961. Paperback.

Lowenberg, et al. Food and man. John Wiley and Sons, Inc., New York. 1968.

Martin, E. A. Nutrition education in action. Holt, Rinehart & Winston, New York. 1963.

McWilliams, Margaret. Nutrition for the growing years. John Wiley and Sons, Inc., New York. 1967.

Wilson, Fisher, & Fuqua. Principles of nutrition. (2nd edition) John Wiley and Sons, Inc., New York. 1963.

BOOKLETS AND LEAFLETS

American Medical Association, 535 North Dearborn Street, Chicago, Illinois 60610. Vitamin supplements and their correct use. 10¢.

American School Food Service Association, P. O. Box 10095, Denver, Colorado 80210. Nutrition education in school lunch.
Useful for work with parents.

National Dairy Council. Animal feeding demonstrations for the classroom. 30¢.

FILMS

Growth and development in children. Association Films, Inc., 600 Grand Avenue, Ridgefield, New Jersey 07657.
An excellent general overview of growth and development throughout childhood.

It happens every noon. U. S. Department of Agriculture, Consumer and Marketing Service, School Lunch Division, Washington, D. C. 13 1/2 minutes, color.

Shows how urban and rural schools can manage to have a school lunch program. Good for work with parents and community in stimulating the formation of a school lunch program.

Teaching techniques (from Elementary School Science Series) McGraw-Hill, Inc. Hightstown, N. J. Color, 19 minutes.

Contains very useful guidelines for teaching science-related subjects.

PERIODICAL ARTICLES

Sliepcevich, E. M., & Creswell, W. H. "A conceptual approach to health education: implications for nutrition education." American Journal of Public Health. 58: 684 (April 1968).

APPENDIX I

Summary of School Lunch Standards*

In order to qualify for federal school lunch funds by participation in the National School Lunch Program, a school must serve meals meeting established nutritional requirements. To qualify as a "Type A Lunch," a lunch must include:

1. 8 ounces of fluid whole milk
2. A protein-rich food: 2 oz. of cooked or canned lean meat, fish, or poultry; or 2 oz. of cheese, or 1 egg, or 1/2 cup cooked dried beans or peas; or 4 tablespoons of peanut butter; or an equivalent combination of these foods.
3. Vegetables and fruits: two or more to equal 3/4 cup total. Undiluted juice can be used as the equivalent of 1/4 cup of the total. The inclusion of an ascorbic acid source daily and vitamin A food on alternate days is recommended.
4. Bread or a bread substitute: either whole grain or enriched, one slice or its equivalent.
5. Butter or fortified margarine: 2 teaspoons used as a spread or in preparation of other foods.

If schools participate in the National School Lunch Program, they must provide lunches free or at reduced prices for needy children. U. S. Department of Agriculture regulations issued in October 1968 require that local school authorities develop and publicly announce their policy for determining which children are eligible to receive free or reduced price meals. The food service programs must be operated in such a way that children receiving free or reduced-price meals cannot be identified or singled out in any way.

*As of the fall of 1969, the requirements have been amended to specify only one teaspoon of butter or margarine rather than two teaspoons. In addition, special attention should be given to foods which supply iron, vitamin A, and calories. It is desirable that a food rich in vitamin A be served every day and that foods rich in iron be served daily.

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