

Grade: K Domain: Life Science

Unit Title: Living and Non-Living Things

State Standard: K.2 - Many different kinds of living things inhabit the earth.

Structure and Function - How are organisms structured to ensure efficiency and survival?

◆ *Living things have certain characteristics that distinguish them for nonliving things, including growth, movement, reproduction and response to stimuli.*

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs *Required
<p>The world contains living and non-living things.</p> <p>Living things have specific characteristics. They grow and change, reproduce, and require food, water and air in order to live.</p> <p>Groupings of living and non-living things are constructed based on observable characteristics.</p> <p>An aquarium has both living and non-living things that help each other.</p>	<p>A 6. Describe the characteristics that distinguish living from non-living things.</p> <p>Expectations:</p> <ol style="list-style-type: none"> 1) Things in our environment can be classified based on whether they are alive, were once alive or whether they were never alive. 2) Growth is an observable characteristic common to living things. 3) Reproduction is an observable characteristic common to living things. Living things can be classified into groups based on the different ways they reproduce. For example, some living things lay eggs, while others produce seeds or give birth. Offspring generally resemble their parents but are not identical to them. 4) Many living things move in response to their environment, but movement alone is not evidence of life. For example, 	<p>Activity: Pupils survey the classroom and identify what they view as living and non-living things.</p> <p>Activity: Show pupils a toy and a real animal or an artificial plant and a real plant. Ask them to compare them, listing similarities and differences. Ask them why they consider one living and the other non-living.</p> <p>*Activity: Pupils take a walk around the school and collect rocks, shells, leaves, broken twigs from the ground. Add some living specimens such as fish, tadpoles, snails, mealworms and plants. Pupils divide them into two groups, living and non-living. Pupils use old magazines or newspapers and cut out examples of living and non-living things, which they make into a poster.</p>

The codes for the Student Content Outcomes and Skills are used to identify them for alignment with the State Standards. (Appendix A) 1

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs *Required
<p>Trees are living things and are members of the plant kingdom.</p>	<p>cars and the wind move, but they are not alive.</p> <p>A 5. Describe the similarities and differences in the appearance and behaviors of adults and their offspring.</p> <ol style="list-style-type: none"> 1) Members of the same group of animals can look and behave very differently from each other. For example, goldfish and sharks are both fish, but there are distinct differences in their size, color and lifestyle. In addition, all goldfish are not identical to each other and neither are all sharks. 2) Members of the same group of plants can look and behave very differently from each other. For example, although oaks and palms are both trees; their size, shape, leaves and bark are very different. In addition, all oak trees are not identical to each other and neither are all palms. <p>Vocabulary: classify, reproduction, offspring, characteristics, reptile, insect, mammal</p>	<p>Activity: Teacher plans and sets up an aquarium, uses water plants, small fish, snails, sand and ornamental objects such as shells, marbles and coral. (Optional)</p> <p>Activity: Pupils classify the contents of the aquarium into living and non-living categories. (Optional)</p> <p>*Activity: Take pupils for a walk around the school grounds. Look for living things; grass, trees, bushes, flowers, birds, dogs, ants etc. Pupils draw the living things they observed.</p> <p>Discuss the conclusion that people grow and change.</p> <p>Activity: Pupils may be asked to bring in their baby pictures and some recent photos and discuss how they have changed.</p> <p>Activity: Pupils observe changes in living things in the aquarium. Pupils draw pictures of their changing aquarium Pupils conclude from their observations that living things grow, need food, water and air and reproduce. Note: The snails, guppies and platys will reproduce. (Optional)</p>

The codes for the Student Content Outcomes and Skills are used to identify them for alignment with the State Standards. (Appendix A) 2

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs *Required
		*Activity: Have pupils collect pictures of living and non-living things and make a collage or a mobile flip booklet.

The codes for the Student Content Outcomes and Skills are used to identify them for alignment with the State Standards. (Appendix A) 3

State Standard: K.2 - Many different living things inhabit the earth.

Structure and Function - How are organisms structured to ensure efficiency and survival?

◆ *Living things have certain characteristics that distinguish them for nonliving things, including growth, movement, reproduction and response to stimuli.*

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs *Required
<p>All animals have general characteristics.</p> <p>They need food, water and air.</p> <p>They move about from place to place.</p> <p>Animals live in a variety of environments.</p> <p>Animals have different types of homes.</p> <p>They react to their surroundings.</p> <p>Animals reproduce.</p> <p>There are many similarities among animals.</p> <p>There are many differences among animals.</p>	<p>A 4. Describe the similarities and differences in the appearance and behaviors of plants, birds, fish, insects and mammals (including humans.)</p> <p>1) Plants and animals are living things. Animals have characteristics (such as body parts and body coverings) that plants do not have.</p> <p>2) Animals can be classified into groups based on generally similar characteristics such as number of legs, type of body covering, or way of moving. Some animal groups are reptiles, insects, birds, fish and mammals.</p>	<p>*Activity: Pupils examine through books, videos and pictures a variety of different animals such as fish, gerbils, rabbits, chicks, cats, dogs, squirrels etc. They describe the ways these animals are all the same and how they are different. The teacher records their findings</p> <p>*Activity: Pupils draw a variety of different environments that different animals inhabit.</p> <p>Activity: Pupils build bird houses and bird feeders which they hang outside the classroom window so that they may observe the birds. (Optional)</p> <p>*Activity: Pupils construct a bulletin board on Animals: How They Are Alike and How They Are Different.</p>

State Standard: K.2 - Many different kinds of living things inhabit the earth.

Structure and Function - How are organisms structured to ensure efficiency and survival?

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Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities/Labs * Required
<p>Plants differ from animals in two major ways: plants cannot move and plants make their own food.</p> <p>Plants have roots, stems and leaves. Each of these parts has a specific job.</p> <p>Roots, stems, and leaves may be different in different plants.</p> <p>Stems carry water and nutrients to all parts of the plant.</p> <p>Plants come in different sizes, shapes and colors.</p> <p>Many plants have flowers, fruit and seeds.</p> <p>Plants can be classified in many different ways such as those that :</p> <ul style="list-style-type: none"> ▪ have flowers and those that do not ▪ those that grow fruit and those that do not; those that like the shade and those that like the bright sunlight. ▪ Some plants have cones. ▪ The cones have seeds in them. <p>Most plants need air, water, soil and sunlight in order to live.</p>	<p>A 4. Describe the similarities and differences in the appearance and behaviors of plants, birds, fish, insects and mammals (including humans.)</p> <ol style="list-style-type: none"> 1) Plants and animals are living things. Plants have characteristics (such as roots, stems, leaves and flowers) that animals do not have. 2) Plants can be classified into groups based on similarities in the appearance of their leaves, stems, blossoms or fruits. 	<p>Activity: Pupils compare plants and animals in terms of movement and food production.</p> <p>Activity: Pupils observe a variety of plants.</p> <p>*Activity: Pupils examine all parts of a plant using a hand lens.</p> <p>Activity: Pupils cut out their illustrations of plant parts and make mobiles of different plant parts to hang on the ceiling. (Optional)</p> <p>*Activity: Pupils prepare to do the celery and vegetable dye experiment.</p> <p>They hypothesize what the celery might look like and give a reason for their answer.</p> <p>*Activity: Pupils construct a collage of different plants of different sizes, shapes and colors.</p> <p>*Activity: Observe and draw a variety of fruits.</p>

State Standard: K.1 - Objects have properties that can be observed and used to describe similarities and differences.

Properties of Matter - How does the structure of matter affect the properties and uses of materials?

◆ *Some properties can be observed with the senses, and others can be discovered using simple tools or tests.*

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities/Labs * Required
<p>Our eyes, ears, nose, tongue and skin constitute our five sense organs.</p> <p>We learn about our world by using our five senses: taste, smell, and touch, sight and hearing.</p> <p>Our eyes enable us to see. We can describe things around us by shape, color and size. Our eyes adjust to light and to darkness.</p>	<p>A 1. Use the senses and simple measuring tools, such as rules and equal-arm balances, to observe common objects and sort them into groups based on size, weight, shape or color.</p> <ol style="list-style-type: none"> 1) Humans have five senses that they use to observe their environment. A specific sense organ is associated with each sense. 2) Objects have properties that can be observed using the senses. Examples include size, weight, shape, color, texture, transparency, etc. An object's observable properties do not include the object's name or its uses. 3) Sorting objects into groups based on one (or more) of their properties makes it possible to observe and describe their similarities and differences. 4) Placing objects in order based on their 	<p>Activity: Draw a picture of our five sense organs and match them with our five senses</p> <p>Activity: Construct a poster or an experience chart describing how our five senses help us learn. (Optional)</p> <p>Activity: Have student shut their eyes and describe what they see. Turn off the lights in the classroom. Ask pupils to compare what they saw with their eyes shut and then without lights. Turn off the lights and use a flashlight to illuminate an object. What was needed order to see the object? (Optional)</p> <p>Activity: Discuss: What happens to you when you leave a dark movie and go out into the light?</p> <p>*Activity: Have pupils vibrate a piece of paper, slinky, a rubber band or bang on an aluminum pie plate. Vibrating objects produces focus on sound.</p> <p>Activity: Have pupils make sound instruments</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities/Labs * Required
<p>Our ears enable us to hear. We can hear people talking, walking, and we can hear music and noise, We can describe loud and soft and high and low sounds</p> <p>Our nose enables us to smell and recognize things by their odors.</p> <p>Our sense of smell helps us enjoy our world.</p> <p>Our sense of smell protects us.</p>	<p>size or weight makes it possible to observe patterns and describe relationships among the objects in a group.</p> <p>A2. Sort objects made of materials such as wood, paper and metal into groups based on properties such as flexibility, attraction to magnets, and whether they float or sink in water.</p> <p>Expectations:</p> <ol style="list-style-type: none"> 1) Objects can be described and sorted based on the materials from which they are made (for example, wood, paper, fabric, plastic, glass or metal). Objects can be made of a mixture of materials. 2) Objects can be described and sorted based on the results of simple tests. Simple tests include actions such as bending, squeezing, holding it near a magnet or putting it in water. Objects can be described as magnetic/nonmagnetic, flexible/not flexible, hard/soft, a floater/sinker, etc. 3) The heaviness of objects can be compared using the sense of touch. 	<p>by using coffee cans and rice.</p> <p>*Activity: Class Discussion: How is sound useful to us? Example fire drill and police siren.</p> <p>Activity: Use piano or a guitar and have pupils identify soft, loud, low, and high-pitched sound. (Optional)</p> <p>Activity: Have pupils make music and then make noise. Compare what they heard and describe the difference.</p> <p>*Activity: Provide pupils with mystery bags containing a variety of foods with distinct odors. Have pupils smell the bags and identify the contents.</p> <p>Activity: Construct a mobile illustrating the different kinds of odors. (Optional)</p> <p>*Activity: Discuss what people do if they smell smoke or gas.</p> <p>*Activity Pupils investigate and sense different smells such as mint, vinegar, lemon, and perfume.</p> <p>Activity: Class discussion: Discuss and list our favorite odors. How does our sense of smell make our lives enjoyable? Why do people tell</p>

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Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities/Labs * Required
<p>Our skin enables us to feel and touch and protects us.</p> <p>Our tongue helps us taste things that are sweet, sour, salty and bitter.</p> <p>Our skin helps us feel things that are hot and cold, soft, hard, rough, smooth, as well as pressure and pain.</p>	<p>Balances and scales are measurement tools that allow people to observe and compare the heaviness of objects more accurately. Objects can be sorted into groups that have the same heaviness, or into groups that are “more heavy than” or “less heavy than” a given object.</p> <p>4) The temperature of the air, water or bodies can be compared using the sense of touch. A thermometer is a measurement tool that allows people to compare temperatures more accurately.</p> <p>5) Objects can be sorted into groups based on measurements of their size. Nonstandard units for measuring size include hands, footsteps, pennies or paper clips.</p> <p>Vocabulary: senses, observe, observation, property, sort, classify, material, float, sink, heavy, magnetic, thermometer</p>	<p>us to smell the roses? How do we know that someone is making popcorn in the kitchen when we are in the living room?</p> <p>Activity: Blind fold pupils and have them taste foods that are sour, salty and bitter and attempt to identify the substances.</p> <p>Discussion: List the ways our skin protects us.</p> <p>Culminating Activity: Let us make a book about our five senses.</p> <p>*Activity: Provide students with a variety of different paper geometric forms of different colors and sizes. Have pupil identify the shapes and sort them in piles. Have students sort them according to color and</p> <p>.</p> <p>*Activity: Have pupils investigate a variety of fabrics, pieces of paper, aluminum foil, wax paper, plastic, wool, nuts, cereal, rocks, paper clips etc. Have them describe the softness, texture and hardness of the materials and objects. Have pupils classify the materials as soft or hard and as smooth or rough and whether they float or sink. Which materials are attracted to a magnet?</p>

State Standard: K.1 - Objects have properties that can be observed and used to describe similarities and differences.

Properties of Matter - How does the structure of matter affect the properties and uses of materials?

◆ *Some properties can be observed with the senses, and others can be discovered using simple tools or tests.*

State Standard: 1.4 - The properties of materials and organisms can be described more accurately through the use of standard measuring units.

Science and Technology in Society - How do science and technology affect the quality of our lives?

◆ *Various tools can be used to measure, describe and compare different objects and organisms.*

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs *Required
<p>The properties of objects such as their size, their weight and their temperature can be measured.</p> <p>Measuring these properties is done in different ways.</p> <p>When we measure, we compare things to each other.</p>	<p>A 3. Count objects in a group and use mathematical terms to describe quantitative relationships such as: same as, more than, less than, equal, etc.</p> <p>A 17. Estimate, measure and compare the size and weight of different objects and organisms using standards and nonstandard measuring tools.</p> <p>Expectations:</p> <ol style="list-style-type: none"> 1) Observations can be expressed in words, pictures, or numbers. Measurements add accuracy to observations. 2) Objects and organisms can be described using nonstandard measurement units, such as hand-lengths, pencil-lengths, handfuls, 	<p>Activity: Pupils discuss how they know how tall they are, how much they weigh and if they have a fever.</p> <p>Activity: Pupils describe the measuring tools with which they are familiar.</p> <p>Teacher introduces the concept of measurement as comparison.</p> <p>*Activity: Pupils discuss how measurement is used in our daily lives and construct a bulletin board: How We Measure! Why We Measure! What We Measure!</p> <p>*Activity: Teacher introduces the thermometer and pupils use it to measure the temperature of ice water, tap water and warm water.</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs *Required
<p>Units of measurement must be the same all over the world.</p> <p>Measurements of length, width and height are made with a metric ruler or a meter stick.</p> <p>Measurements of weight are made with a balance or scale.</p> <p>A measurement of how warm, hot or cold something is, its temperature, is made with a thermometer.</p>	<p>etc.</p> <p>3) Standard measurement units are more accurate than nonstandard units because they have consistent values agreed on by everyone. For example, “My caterpillar is one finger long” is much less accurate than “MY caterpillar is 4 centimeters long.”</p> <p>4) Scientists and nonscientists all over the world use the metric system of measurement. In the US, the customary measurement system is used in daily life. Equivalent values between the two systems can be estimated (for example, 1 inch is a little more than 2 centimeters).</p> <p>5) Specific tools are used to measure different quantities:</p> <p>a) Metric rulers are used to measure length, height or distance in centimeters and meters; customary rulers measure these in inches, feet or yards.</p> <p>b) Balances and scales are used to compare and measure the heaviness of objects. Grams and kilograms are units that express mass; ounces and pounds are units that express weight.</p> <p>c) Graduated cylinders, beakers and measuring cups are tools to</p>	<p>*Activity: Pupils make “paper shoes” outlining their feet on paper and cutting out their “feet”. They are asked to measure the length of the classroom using their own paper feet. The teacher records the responses on the board. Pupils review the data and are asked:” What is wrong? "Why can’t we use our paper feet?” Teacher introduces standardized units.</p> <p>*Activity: Pupils use meter sticks to measure the length of the room. Teacher records data. Pupils discuss the new results.</p> <p>*Activity: Pupils use old magazines and cut out pictures of scales. Teacher introduces the balance. Pupils weigh a variety of objects and teacher records data. Pupils draw a picture of the balance and how it is used to weigh an object. Pupils use their bodies to demonstrate balance and lack of balance.</p> <p>*Activity: Pupils discuss temperature and how it is measured.</p> <p>Teacher Demonstration: “Why can’t we just use our hands to find out how warm or cold the water is?” Pupils observe three bowls of water. One bowl has very cold water, one has very warm water and one is tepid. Pupils first place their hand in very cold water and then into</p>

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Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs *Required
	<p>measure the volume of liquids. Volume can be expressed in milliliters (mL), liters (L), cups or ounces.</p> <p>d) Thermometers are tools used to measure temperature; thermometers can indicate temperature in degrees Celsius or degrees Fahrenheit, or both.</p>	<p>tepid. Pupils then place hand in very warm water and then in tepid. They report on how the “tepid” water felt. It was obvious that when the cold hand was in the tepid water it felt hot in comparison. When the hot hand felt the tepid water, the water felt cold.</p>

State Standard: K.3 - Weather conditions vary daily and seasonal.

Energy in the Earth’s Systems - How do external and internal sources of energy affect the Earth’s systems?

♦ *Daily and seasonal weather conditions affect what we do, what we wear and how we feel.*

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities/Labs * Required
<p>The factors that affect weather are temperature, wind, precipitation and clouds.</p> <p>Weather conditions change day by day.</p> <p>Animals respond in a variety of ways to seasonal weather conditions.</p> <p>Temperature is a measure of how cold or Warm the air or any substance is. A thermometer is an instrument that is used to measure temperature of the air or of An organism or object or a substance.</p>	<p>A 7. Describe and record daily weather conditions. Expectations:</p> <ol style="list-style-type: none"> 1) The sun is the source of heat and light that warms the land, air and water. Variations in the amount of sunlight that reaches the earth cause the weather. 2) Weather conditions can be observed as sunny, cloudy, rainy, foggy, snowy, stormy, windy, hot or cold. Weather observations can be made based on how we feel, what we see or hear, or by using weather measurement instruments such as thermometers 3) Changes in weather conditions can be recorded during different times of day, from day to day, and over longer periods of time (seasonal cycle). Repeated observations can show patterns that can be used to predict general weather conditions. For example, temperatures 	<p>*Activity: Pupils describe and chart the weather for a week describing it as rainy, sunny, cold, warm, hot, cloudy or foggy. Pupils construct their own symbols for each of their descriptors</p> <p>*Activity: Pupils conclude that weather changes day by day.</p> <p>*Activity: Provide pupils with thermometers. Provide directions on how to read the instrument. Have pupils take the temperature in different parts of the classroom. Compare data.</p> <p>*Activity: Exploring the Sun’s Warmth: Use four plastic bags. Place a piece of chocolate in one plastic bag and a thermometer in another bag next to it in the sun. Do the same but place the chocolate and other thermometer in the shade. After 30 minutes, observe the bags of chocolate and the temperatures. Discuss findings.</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities/Labs * Required
<p>Sunlight warms the earth's surface, which in turn warms the air. The more sunlight there is the warmer will be the air.</p> <p>Some materials absorb more of the sun's heat than do other materials.</p> <p>Wind is moving air. It can be strong or weak and can blow fast or slow.</p> <p>Winds can be measured by a wind vane and by an anemometer.</p> <p>A wind vane tells us the direction from which the wind is coming.</p> <p>Water in the air can be a gas or vapor or a liquid as in the clouds, in fog in dew and in rain or as a solid as in snow crystals or in sleet or frost.</p>	<p>are generally cooler at night than during the day and colder in winter than in spring, summer or fall.</p> <p>4) Weather affects the land, animals and plants, and bodies of water.</p> <p>5) When the temperature is below "freezing," water outside freezes to ice and precipitation falls as snow or ice; when the temperature is above freezing, ice and snow melt and precipitation falls as rain.</p> <p>6) Clouds and fog are made of tiny drops of water. Clouds have different shapes, sizes and colors that can be observed and compared. Some cloud types are associated with precipitation and some with fair weather.</p> <p>7) Wind is moving air. Sometimes air moves fast and sometimes it hardly moves at all/ Wind speed can be estimated by observing the things that it moves, such as flags, tree branches or sailboats.</p>	<p>Activity: Use a variety of materials, some white and some black. Cover two glasses one with the black and the other with the white material. Place cold water in each glass plus a thermometer. Leave both in sun for 30 minutes. Record, discuss and illustrate your results.</p> <p>Activity: Use an electric fan. Place a variety of lightweight materials in front of fan. Describe what occurs.</p> <p>*Activity: Construct a wind vane. See Appendix C. (Class Activity)</p> <p>Activity: Pupils draw snowflake crystals and construct a collage or mobile</p> <p>Activity: Make a rain and snow gauge. See Appendix C.</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities/Labs * Required
<p>A rain gauge is used to measure the number of inches of rain. A snow gauge measures the number of inches of snow that falls.</p> <p>Meteorology is the science of weather. Meteorologists are weather scientists, weathermen or women.</p> <p>Meteorologists record and chart the weather. Weathermen can predict the weather.</p> <p>We do not expect a snowstorm in July or a heat wave in January. Weather can be predicted.</p> <p>There are four seasons: spring, summer, fall, winter, and the weather changes with each season. The weather conditions change with each season and people adjust their activities and their clothing to meet these changes.</p>	<p>A 8. Relate seasonal weather patterns to appropriate choices for clothing activities: Expectations:</p> <p>1) Weather influences how we dress, how we feel, and what we do outside.</p> <p>Vocabulary: weather, seasons-fall winter, spring, summer, thermometer, precipitation, freezing, melt</p>	<p>*Activity: Pupils draw pictures illustrating the four seasons focusing on the kind of weather we expect for each season and the kind of things we like to do during each season. Pupils share, compare and summarize their information.</p> <p>Activity: Pupils discuss how people adjust to different weather conditions.</p> <p>*Activity: Research: How do different animals adapt to seasonal changes? What do squirrels do? What do birds do?</p>

State Standard: 2.4 - Human beings, like all other living things, have special nutritional needs for survival.

Science and Technology in Society - How do science and technology affect the quality of our lives?

- ◆ *The essential components of balanced nutrition can be obtained from plant and animal sources.*
- ◆ *People eat different foods in order to satisfy nutritional needs for carbohydrates, proteins and fats.*

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities/Labs * Required
<p>A healthy meal should include fruit, vegetables, grains and dairy products.</p> <p>Junk foods are foods that contain too much fat and sugars.</p> <p>A healthy snack is food that does not have too much fat and too much sugar.</p> <p>A healthy snack is food that does not have too much fat and too much sugar.</p> <p>A healthy snack is food that does not have too much fat and too much sugar.</p>	<p>A 23. Identify the sources of common foods and classify them by their basic food groups.</p> <p>Expectations:</p> <ol style="list-style-type: none"> 1) People need to eat a variety of foods to get energy and nutrients they need to grow, move and stay healthy. Foods are classified as grains, fruits, vegetables, dairy, meats and beans, and oils. 2) The level of energy and nutrients individuals need depends on their age, gender and how active they are. 3) Most foods contain a combination of nutrients. Labels on food packages describe the nutrients contained in the food and how much energy the food provides (calories). 4) Breads, poultry, fish, beans, eggs and 	<p>*Activity: Pupils create and illustrate a healthy meal.</p> <p>*Activity: Cut out illustrations of junk foods from magazines or newspaper supplements.</p> <p>*Activity: Pupils discuss snacks and draw their favorite snacks.</p> <p>Activity: Search the Web. Investigate Fats. (Classroom Teacher)</p> <p>Activity: Pupils discuss the amount of fat in the snacks they illustrated.</p> <p>Activity: Oil and Fats in Junk Foods. See Appendix C.</p> <p>Activity: Pupils identify foods that make nutritious snacks. Pupils collect pictures of healthful snack foods in old magazines and</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities/Labs * Required
<p>A healthy body needs good food.</p> <p>A healthy body needs exercise, rest and sleep.</p>	<p>nuts are sources of protein, which keeps the body working properly.</p> <p>5) Fruits and vegetables are sources of vitamins and minerals, which keep the body healthy.</p> <p>6) Nuts, meats and fish are sources of fats and oils, which provide energy.</p>	<p>assemble them onto a Nutritious Snacks Poster.</p> <p>Activity: The class creates A Snack Book with recipes for healthy snacks.</p> <p>Activity: Pupils illustrate what they view as good food.</p> <p>Activity: Pupils create a classroom weekly plan for resting, exercising and eating.</p> <p>*Activity: Pupils list and illustrate how they exercise.</p> <p>Activity: Pupils describe the different ways they rest</p> <p>*Activity: Pupils model and practice rest time.</p> <p>*Activity: Pupils run laps at recess.</p> <p>Activity: Pupils graph exercise activities.</p>

State Standard: 1.2 - Living things have different structures and behaviors that allow them to meet their basic needs.

Structure and Function - How are organisms structured to ensure efficiency and survival?

- ◆ *Animals need air, water and food to survive.*
- ◆ *Plants need air, water and sunlight to survive.*

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities/ Labs *Required
<p>Many different kinds of animals inhabit the earth.</p> <p>Animals are classified as fish, reptiles, insects, amphibians, birds and mammals.</p> <p>Animals require water, air and food in order to survive.</p> <p>Animals must get their own food in order to live.</p> <p>Animals move in many different ways. They have special body parts to do so.</p> <p>Animals may be classified in many different ways.</p>	<p>A 12. Describe the different ways that animals including humans, obtain air, water and food.</p> <p>Expectations:</p> <p>1) All living things (organisms) need air, water and food to stay alive and grow; they meet these needs in different ways.</p> <p>2) Animals get air in different ways. For example, humans breathe with lungs, while fish breathe with gills.</p> <p>3) Animals get food in different ways. Some animals eat parts of plants and others catch and eat other animals.</p> <p>4) Animals get water in different ways. Some animals have special body parts, such as noses, tongues or beaks that help them get water.</p> <p>A 14. Describe the structures that animals, including humans, use to move around.</p> <p>Expectations:</p> <p>1) Most animals move from place to</p>	<p>Activity: Observe pictures of a variety of animals.</p> <p>*Activity: Pupils classify animals into five sub-groups: fish, reptiles, amphibians, birds, insects and mammals.</p> <p>*Activity: Pupils Construct a poster showing the three basic things animals need in order to survive.</p> <p>Activity: Pupils observe animals in their environment to discover the ways different animals get their food. (Field trip, video, books)</p> <p>Activity: Pupils choose an animal and describe how the animal meets its basic needs.</p> <p>Activity: Pupils collect and classify samples and pictures of animal products we use in our daily lives.</p>

State Standard: 1.2 - Living things have different structures and behaviors that allow them to meet their basic needs.

Structure and Function - How are organisms structured to ensure efficiency and survival?

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◆ *Plants need air, water and sunlight to survive.*

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities/ Labs *Required
<p>Many different kinds of plants inhabit the earth.</p> <p>Plants need air, water light and food in order to live and grow into new plants.</p> <p>Roots, stems and leaves are the parts of some plants.</p> <p>Roots hold the plant in the soil and take in the nutrients and water from the soil.</p> <p>Stems move the water and the nutrients to the leaves of the plant.</p> <p>Plants have leaves that make the food for the plant.</p> <p>Different plants have different shaped Leaves.</p>	<p>A 13. Describe the different structures plants have for obtaining water and sunlight.</p> <p>Expectations:</p> <p>.</p> <ol style="list-style-type: none"> 1) All living things (organisms) need air, water and food to stay alive and grow; they meet these needs in different ways. 2) Plants absorb sunlight and air through their leaves and water through their roots. 3) Plants use sunlight to make food from the air and water they absorb. 4) Plants have various leaf shapes and sizes that help them absorb sunlight and air. 5) Plant roots grow toward a source of water. 	<p>Activity: Pupils collect pictures of a variety of plants and sort them out using their own criteria. They share their classification systems with class.</p> <p>Pupils construct a bulletin board of different plants and list the different ways that they can classify the plants,</p> <p>*Discussion: Basic needs of plants.</p> <p>Activity: Pupils draw illustrations of the basic needs of plants.</p> <p>*Activity: Pupils examine all parts of a plant using a hand lens.</p> <p>*Activity: Pupils create a mobile showing the roots, stems and leaves of a plant and the function of each part.</p> <p>*Activity: Pupils prepare to do the celery and vegetable dye experiment. They hypothesizes hat the celery might look like and give a reason for their answer.</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities/ Labs *Required
<p>Some plants have flowers.</p> <p>Seeds are found in a plant flowers.</p> <p>Some plants have cones. The cones have seeds in them.</p> <p>Some plants need a lot of sun in order to grow and other like the shade.</p> <p>Plants and animals depend on each other.</p>	<p>6) Plant stems grow toward sunlight.</p>	<p>See Appendix C.</p> <p>Activity: Pupils create a mobile showing the roots, stems and leaves of a plant and the function of each part.</p> <p>Activity: Pupils make leaf prints of broad and needle shaped leaves.</p> <p>*Activity: Pupils use seed and plant catalogues and construct cards illustrating flowering plants and seed packets for these plants.</p> <p>*Activity; Pupils plant seeds, observe and record their germination. They describe the conditions required for germination. Isolate each variable, light, water, and soil to determine its role in the growth of a plant.</p> <p>Activity: Pupils collect pictures of shade loving and sun loving plants.</p> <p>*Activity: Pupils create a plant booklet such as My Favorite Plants, My Favorite Fruits or My Favorite Seeds.</p>

State Standard: 2.3 - Earth materials have varied physical properties which makes them useful in different ways.

The changing Earth - How do materials cycle through the Earth's systems?

◆ *Soils can be described by their color, texture and capacity to retain water.*

◆ *Soils support the growth of many kinds of plants, including those in our food supply.*

Key Concepts (For Teachers)	Student Outcomes and Skills	Hands-On Activities / Labs *Required
<p>Soil is made up of tiny pieces of rock and pieces of living things that have died.</p> <p>Soil can have many things in it such as air, water, plants and animals that are alive.</p> <p>Soil has many spaces in it. Dry soil has air in most of the spaces. Wet soil has water in most of the spaces.</p> <p>Soils vary in the amount of air and water they contain and in particle size.</p> <p>There are different types of soil such as sand, silt, clay and loam. The texture of soil, how it feels, depends on the size of the particles that make up the soil.</p>	<p>A 21. Sort different soils by properties such as particle size, color and composition.</p> <p>Expectations:</p> <ol style="list-style-type: none"> 1) Soil is a mixture of pieces of rock (particles), living and once living things (humus), water and air. The components of soil can be separated using sieves and settlement tests. 2) There are different types of soil that vary from place to place. Soil properties can be observed and compared. Soils can be classified by properties such as color, particle size or amount of organic material (humus). Digging a deep hole shows that soils are often found in layers that have different colors and textures. 3) The size of the particles in soils gives the soil its texture. Soils 	<p>*Activity: Experiment: Looking at Soil: Use garden soil in small trays hand lens, crayons and drawing paper. Have pupils spread soil around in the tray, feel it, and smell it. Use hand lens. Observe. Draw circles on paper and put a different part of soil in each circle.</p> <p>*Activity: Describe what you observed. Have pupils observe samples of wet and dry soil and describe their findings.</p> <p>*Activity Pupils use a hand lens to examine samples of soil, sand, and pebbles and discuss their findings. They will make a hypothesis as to which soil based on particle size would be most likely to hold the most water and which soil would be most suited for growing plants. (AINQ.1 - Make observations and ask questions about objects, organisms and the environment.)</p> <p>Activity: Pupils gather four soil samples from different areas of the school grounds or homes. They observe and label them as wet, dry, dark, light, soft</p>

Key Concepts (For Teachers)	Student Outcomes and Skills	Hands-On Activities / Labs *Required
<p>Most plants need soil in order to grow and grow better in loam than in sand or clay.</p> <p>Living things need soil.</p> <p>Plants grow in soil. We use plants that grow in soil for food, clothing, medicine and wood.</p> <p>We depend on the soil and must take care of the soil.</p>	<p>can be classified by how they feel: Sandy soils feel gritty, silty soils feel powdery, clay soils feel sticky, and soils with small rocks feel rough and scratchy.</p> <p>4) The broken rocks that make up soils can be tiny (silt and clay), medium (sandy), or large (pebbles). Soils can be classified by the size of their particles.</p> <p>A 22. Relate the properties of different soil types to their ability to retain water and support the growth of certain plants.</p> <p>Expectations:</p> <p>1) A soil’s texture affects how it packs together; soils that pack tightly hold less air and water than soils that stay loosely packed.</p> <p>2) There are different types of soil that vary from place to place. Some soil types are suited for supporting the weight of buildings and highways; other soil types are suited for planting crops or forest growth.</p> <p>3) Many plants need soil to grow. Soil holds water and nutrients</p>	<p>and hard. Teacher provides proper labels such as sand, clay, silt and loam.</p> <p>*Activity: Pupils use hand lens to compare particle size found in sand and in topsoil. Separate soils by using a sieves or screens.</p> <p>*Activity: Pupils will plant seeds in clay, in sand and in loam. Pupils will observe growth and select which soil was best suited for plant growth.</p> <p>*Construct a poster illustrating that living things need soil and the various products we obtain from the plants that grow in the soil and the ways we can conserve and take care of our soil.</p>

The codes for the Student Content Outcomes and Skills are used to identify them for alignment with the State Standards. (Appendix A) 22

Key Concepts (For Teachers)	Student Outcomes and Skills	Hands-On Activities / Labs *Required
	<p>that are taken in (absorbed) by plant roots.</p> <p>4) Soil is a habitat for many living things. Some organisms live in the soil and others live on the soil. Worms and other underground animals create spaces for air, water and plant roots to move through soil.</p> <p>5) Plants we eat (crops) grow in different soil types. Plant height, root length, number of leaves, and number of flowers can all be affected by how much water, air and organic material the soil holds.</p> <p>6) To support the growth of different plants, people can change the properties of soils by adding nutrients (fertilizing), water (irrigating) or air (tilling).</p> <p>Vocabulary: soil, property, classify, mixture, particle, humus, sand, silt, clay, texture, nutrients</p>	

The codes for the Student Content Outcomes and Skills are used to identify them for alignment with the State Standards. (Appendix A) 23

State Standard: 1.1 - The sun appears to move across the sky in the same way every day, but its path changes gradually over the seasons.

Forces and Motion - What makes objects move the way they do?

- ◆ *An object's position can be described by locating it relative to another object or the background.*
- ◆ *An object's motion can be described by tracing and measuring its position over time.*

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs *Required
<p>Although all the stars are always shining, the sun is the only star we see in the daytime.</p> <p>The sun is in different positions at different times of the day.</p> <p>The sun is in the same position at a specific time regardless of the day.</p>	<p>A 11. Describe the apparent movement of the sun across the sky and the changes in the length and direction of shadows during the day.</p> <p>Expectations:</p> <ol style="list-style-type: none"> 1) The sun's position in the daytime sky can be described relative to stationary objects on Earth. For example, the sun can be "just above the treetops," "high or low in the sky," or "on the other side of the school." 2) When an observer changes position, different words may be needed to describe an object's position. For example, when I am sitting on the bench the sun is "behind" me; when I move to the slide, the sun is "in front of" me. 3) The same object when viewed from close up appears larger than it does when viewed from far away (although the 	<p>Activity: Pupils use Work on Daytime Stars to find out whether the stars are always shining. Van Cleave's Astronomy For Every Kid, pp.140-141.</p> <p>Activity: Use light bulb in socket as sun and foam ball on stick or pencil as earth. Pupils observe that the light shines on different parts of the earth depending on the earth's position in its orbit around the sun.</p> <p>*Activity: Pupils safely observe the sun from the same location at the same time each day, collect, and analyze the data. Identify the sun as a star</p> <p>Activity: Pupils observe a variety of pictures of the sun.</p> <p>*Activity: Pupils illustrate the sun as a ball of burning gases.</p> <p>*Activity: Pupils investigate if sunlight heats</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs *Required
<p>The sun is a star.</p> <p>A star is made up of burning gases.</p> <p>The sun is the closest star to the earth.</p> <p>The sun is bright and hot and provides both light and heat.</p> <p>The apparent sizes of objects change with distance.</p> <p>The sun appears to move and this apparent movement can be predicted.</p> <p>Most living things on earth use solar energy, which is the light, and heat from the sun.</p> <p>We use solar energy to heat our homes, to produce electricity and to power calculators and other instruments.</p> <p>A telescope is used to see and study the stars.</p>	<p>actual size of the object does not change.) For example, a beach ball held in one's arms appears larger than it does when viewed from across the playground.</p> <p>4) An object's position can be described using the words ("near the door"), numbers (10 centimeters away from the door) or labeled diagrams.</p> <p>5) Changes in the sun's position throughout the day can be measured by observing changes in shadows outdoors. Shadows occur when light is blocked by an object. An object's shadow appears opposite the light source. Shadow lengths depend on the position of the light source.</p> <p>Vocabulary: motion, shadow, position</p>	<p>water. Use glasses of water in and out of sunlight. Pupils use thermometers to measure the temperature of both glasses of water and record their results in their science journal.</p> <p>Activity: Design an experiment to show that the sun gives us light.</p> <p>*Activity: Pupils use flashlights and turn off the lights They stand in the middle of the room and shine the flashlights on the wall. Then they slowly walk toward the wall still aiming the flashlight and observe the light pattern on the wall, What did they discover? What happened as they moved closer to the wall? What did they conclude?</p> <p>*Activity: Observe the sun at different times of the day and maintain a pictorial log of these observations. Show how shadows change during the day.</p> <p>Explain the apparent movement of the sun and the predictability of this movement.</p>

The codes for the Student Content Outcomes and Skills are used to identify them for alignment with the State Standards. (Appendix A) 25

State Standard: K.4 - Some objects are natural, while others have been designed and made by people to improve the quality of life.

Science and Technology in Society - How do science and technology affect the quality of our lives?

◆ *Humans select both natural and man-made materials to build shelters based on local climate conditions, properties of the materials*

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs *Required
<p>Some materials are better than others for making particular things, such as shelters.</p> <p>Animals require shelter in order to survive.</p>	<p>A .9 Describe the types of materials used by people to build houses, and the properties that make the materials useful.</p> <p>Expectations:</p> <ol style="list-style-type: none"> 1) People need shelters to keep warm or cool, dry and safe. Shelters are made of materials that have properties that make them useful for different purposes. 2) People in different regions of the world build different kinds of shelters, depending on the materials available to them, the local climate and their customs. 3) Traditionally, people have built shelters using materials that they find nearby. Today, people build houses from materials that may come from far away: <ol style="list-style-type: none"> a) People who live in forested regions have traditionally built shelters using wood and/or leaves from nearby trees. b) People who live in regions with clay soils have traditionally built shelters using bricks or adobe made from clay. c) People who live in snowy regions have traditionally built shelters using snow and ice. 	<p>Activity: Show students a small action figure or doll. Tell them that their job is to design a tiny model house for this “person”. Have students draw a picture of the house that they would build.</p> <p>Activity: Read a version of the Three Little Pigs and ask the students what materials did they pigs use to build their houses and why did they choose those materials?</p> <p>Refer to Science Netlinks Activities on materials and manufacturing and recycled materials.</p> <p>Activity: Have students create, design and evaluate different structures using Lego Blocks.</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs *Required
	<ul style="list-style-type: none"> d) People who live in regions with large animals have traditionally built shelters using animal skins. 4) Although they may look quite different, most shelters have walls, roofs and an entrance/exit; some shelters have doors, windows and floor. Walls, roofs and windows are made of materials that have specific properties. For example, walls require materials that are rigid, windows require materials that are transparent, and roofs require materials that are water-resistant. 5) Animals build shelters using materials that are easily available to them. The materials they use have properties that help the animals stay warm or cool, dry and safe. 	

The codes for the Student Content Outcomes and Skills are used to identify them for alignment with the State Standards. (Appendix A) 27

State Standard: 1.3 - Organisms change their form and behavior as part of their life cycles.

Heredity and Evolution - What are the processes responsible for life’s unity and diversity?

- ◆ *Some organisms undergo metamorphosis during their life cycles; other organisms grow and change, but their basic form stays essentially the same.*

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs *Required
<p>Life cycles vary for different organisms. Some organisms undergo metamorphosis. In metamorphosis, the body of the organism changes in shape and appearance at each stage of the life cycle such as in the butterfly and in frogs and toads</p> <p>Animals have a life cycle that includes birth, growth, maturation, reproduction and death.</p> <p>The stages in the life of an animal as it grows, develops and matures to reproduce the next generation is known as its life cycle.</p>	<p>A 15. Describe the changes in organisms such as frogs and butterflies as they undergo metamorphosis. Expectations: 1) Plants and animals have life cycles that include a predictable sequence of stages: they begin life, develop into adults, reproduce and eventually die. Plants and animals produce offspring of their own kind. Offspring closely resemble their parents, but individuals vary in appearance and behavior. 2) Some animals change dramatically in structure and function during their life cycle in a process called metamorphosis. 3) Frogs are amphibians that undergo metamorphosis during their life cycle. As they grow, frogs develop different structures that help them meet their basic needs in water and then on land: a) Tadpoles hatch from eggs, live in water, breathe using gills, and swim using a tail. As they metamorphose into frogs, tadpoles lose their gills and their tails.</p>	<p>*Activity: Pupils make illustrations of the life cycle stages. Draw and label a concept map listing the stage, of metamorphosis (AINQ.6 Present information in words and drawings.)</p> <p>*Activity: Teacher uses a Life Cycle Kit of butterfly, mealworms or tadpoles. Observe the life cycle of an animal, record and illustrate observations in a science journal and share with class. (i.e., butterfly, frog)</p> <p>*Activity: Pupils may write short poems on their reactions to seeing the birth of a butterfly or tadpole. Pupils may construct a flipbook illustrating the life cycle of an animal and share the books with each other.</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs *Required
	<p>b) Adult frogs live on land and water. They breathe air using lungs and develop webbed feet and hinged legs for swimming in water and hopping on land. After a female frog mates, she lays her eggs, and the cycle begins again.</p> <p>4) Butterflies are insects that undergo metamorphosis during their life cycle. As they go through egg, larva, pupa and adult stages, butterflies develop different structures that help them meet their basic needs in very different ways:</p> <p>a) Caterpillars hatch from eggs, live on plants, get food by chewing leaves and move about using legs. As they metamorphose into butterflies inside a chrysalis, they develop wings, antennae and different mouth parts.</p> <p>b) Butterflies live on land and in the air. They get food by sucking nectar from flowers and move around primarily using wings to fly. After a female butterfly mates, she searches for the proper host plant to lay her eggs, and the cycle begins again.</p> <p>A 16. Describe the life cycles of organisms that grow but do not metamorphose. Expectations: 1) Animals are either born alive (for example, humans dogs and cows) or hatched from eggs (for example, chickens,</p>	<p>Activity: Pupils make daily observations and daily drawings of any changes they observe.</p> <p>*Activity: Teacher introduces concept of life cycle, through literature and pictures.</p> <p>Activity: Pupils research the Web to investigate a variety of print and online resources about animal life cycles.</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs *Required
	<p>sea turtles or crocodiles).</p> <p>2) Animals change throughout their lives. Many animals begin life as smaller, less capable forms of the adult. As they develop, they grow larger and become more independent (for example, humans or robins).</p> <p>3) Comparing the life cycle stages of different organisms shows how they are alike in some ways and unique in other ways.</p> <p>Vocabulary: life cycle, egg, metamorphosis, structures (body parts), amphibian, tadpole, gills, lungs, insect, caterpillar</p>	

State Standard: 2.2 - Plants change their form as part of their life cycles.

Structure and Function - How are organisms structured to ensure efficiency and survival?

◆ *The life cycles of flowering plants include seed germination, growth, flowering, pollination and seed dispersal.*

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs *Required
<p>The stages in the life of a plant as it grows, develops, and matures to reproduce the next generation, is known as its life cycle.</p> <p>The stages in the life cycle are birth, maturation, reproduction and death.</p> <p>Plants make their own food.</p> <p>Photosynthesis is the process by which plants make their own food.</p> <p>In order for plants to grow and mature, plants must meet their basic needs, soil, light, air and water.</p> <p>Plants reproduce in many ways. Some reproduce from seeds.</p>	<p>A 19. Describe the life cycles of flowering plants as they grow from seeds, proceed through maturation and produce new seeds.</p> <p>Expectations:</p> <p>1) Flowering plants progress through a sequenced life cycle. First, seeds sprout (germinate), then seedlings grow into adult plants with leaves and flowers. If the flowers are pollinated, seeds develop that will grow into new plants to continue the life cycle.</p> <p>2) Roots, stems, leaves, flowers and seeds are structures that develop during different stages of the plant’s life cycle.</p> <p>3) Seeds contain the beginnings of a new plant (embryo) and the food (energy source) the new plant needs to grow until it is mature enough to produce its own food. Different plant varieties produce seeds of different size, color and shape</p>	<p>*Activity: Teacher introduces the concept of life cycle and pupils discuss the stages.</p> <p>* Activity: Teacher introduces a concept map of a life cycle to be completed by the students.</p> <p>*Activity: Pupils discuss how plants make their own food and illustrate the conditions necessary for photosynthesis. Gather information on photosynthesis through research. Record and illustrate the process of photosynthesis</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs *Required
<p>Describe a variety of ways by which seeds are dispersed. Seeds are scattered in many ways.</p>	<p>A 20. Explore and describe the effects of light and water on seed germination and plant growth. Expectations:</p> <p>1) Environmental conditions, such as temperature, amount of light, amount of water and type of soil affect seed germination and plant development.</p> <p>2) A plant’s seed will grow into a new plant that resembles but is not identical to the parent plant or to other new plants. For example, marigold plants produce marigold seeds that grow into new marigold plants. Individual marigolds, however, vary in height, number of leaves, etc.</p> <p>3) Seedlings are young plants that produce the structures that will be needed to survive in its environment: Roots and leaves begin to grow and take in nutrients, water and air; and the stem starts to grow towards sunlight.</p> <p>4) Adult plants form more leaves that help the plant collect sunlight and air to make its food. They produce flowers that are structures responsible for reproduction.</p> <p>5) Flowers have structures that produce pollen, attract pollinators and produce seeds that can grow into new plants. Some flowers have structures that develop into fruits,</p>	<p>Activity: Teacher introduces the steps of the scientific method. Pupils are divided into four groups. Each group is assigned one of the factors such as soil, water, air, sunlight to investigate. . (AINQ.1 Make observations and ask questions about objects, organisms and the environment.)</p> <p>Activity: Pupils examine a variety of plants containing seeds as well as seedless plants.</p> <p>Activity: Pupils investigate plant reproduction by growing seeds placed in damp absorbent cotton in transparent plastic gloves.</p> <p>*Activity: Pupils examine a variety of fruit and draw the seeds and the fleshy part that projects the seeds.</p> <p>*Activity: Pupils illustrate plants that reproduce by seeds.</p> <p>* Go on an outdoor nature walk to observe and identify plants at different stages of the life cycle. Record observations in a journal.</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs *Required
	<p>berries or nuts that contain the seeds that can grow into new plants.</p> <p>6) Some seeds fall to the ground and germinate close to the parent plant; other seeds are carried (dispersed) by wind, animals, or water to places far away. The structure of the seed is related to the way it is dispersed.</p> <p>Vocabulary: seed, germinate, reproduce, flower, pollen, pollinator, seed dispersal</p>	

State Standard: 2.1 - Materials can be classified as solid, liquid or gas based on their observable properties.

Properties of Matter - How does the structure of matter affect the properties and uses of materials?

♦ *Solids tend to maintain their own shape, while liquids tend to assume the shape of the container and gases fill the entire container.*

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs *Required
<p>All materials, objects and organisms on the earth are made of matter.</p> <p>All matter takes up space and has mass.</p> <p>Mass is the amount of stuff something contains.</p> <p>Matter can be a solid, a liquid, or a gas.</p> <p>A solid has a definite shape or volume.</p> <p>A liquid does not have a definite shape and it takes the shape of the container it is in. A gas does not have a definite shape or volume. A gas expands or contracts to fill the shape of the container it is in.</p> <p>Properties are the characteristics of objects and materials such as size, shape, color, height, weight, odor, texture, softness,</p>	<p>A 18. Describe differences in the physical properties of solids and liquids. Expectations:</p> <ol style="list-style-type: none"> 1) All materials (matter) take up space. Matter can be classified by whether it is a solid, liquid or gas form. Each state of matter has unique properties. 2) Solids are the only state of matter that keep their own shape. A solid's shape can only be changed if a force is applied to it, such as hammering, slicing or twisting. Solids can be hard, soft, bouncy or stretchy. 3) Solids take up a certain amount of space (volume); the volume does not change if the solid is placed in different containers. 4) Liquids do not have their own shape; they go to the bottom of a container and take on the shape of the part of the container they occupy. Liquids pour and flow from a higher point to a lower point; some liquids 	<p>*Activity: Pupils identify all things in the room that are made of matter.</p> <p>Activity: Teacher assigns two students to stand in the same space. Pupils conclude that matter takes up space and that no two objects or people can occupy the same space at the same time.</p> <p>Activity: Not at the Same Time. See Van Cleave's Chemistry For Every Kid, pages 18-19.</p> <p>Activity: The Dry Napkin. See Appendix C. The napkin remained dry since a layer of trapped air protected it.</p> <p>*Activity: Pupils are provided with a group of solid materials such as a pencil, a clip, a piece of wood, a piece of plastic, some cloth, a book and identify the mass of these materials</p> <p>*Activity: Pupils are shown samples of liquids, solids and a container of air and identify each</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs *Required
<p>strength, temperature and ability to react with other substances.</p> <p>Materials and objects are described by their properties.</p> <p>Some properties can be identified by using our five senses.</p> <p>Physical properties are the properties that we can observe and measure such as size, color taste, odor. Chemical properties are the ways the materials interact with other materials.</p> <p>Some properties can be determined by the use of measuring instruments such as a metric ruler, a meter stick, a balance scale and a graduated cylinder or measuring cup.</p> <p>A balance scale is used to measure the weight of an object or substance.</p> <p>A graduated cylinder is used to measure the volume of a liquid.</p> <p>Objects can be described in terms of the materials they are made of such as paper, cloth, clay etc. and their physical properties.</p> <p>Objects can be sorted or grouped according to their similar properties.</p>	<p>flow faster than others.</p> <p>5) Liquids have a definite volume. When a liquid is poured into different containers, the shape of the liquid may change, but the volume does not.</p> <p>6) Gases do not have a definite shape; they take the shape of whatever container they occupy. For example, the air in an inflated balloon can be squeezed and reshaped.</p> <p>7) Gases do not have a definite volume; they spread out in all directions to fill any size container, or they keep spreading in all directions if there is no container. For example, blowing even a small amount of air into a balloon immediately fills the entire balloon; the smell of baking bread eventually fills the entire house and even outside.</p> <p>Vocabulary: property, classify, matter, state of matter, solid, liquid, gas, volume</p>	<p>as a solid, liquid and a gas.</p> <p>*Demonstration: Teacher pours a liquid into a variety of different shaped containers illustrating how the liquid takes on the shape of the container. Teacher places a solid in different containers and demonstrates that it maintains its shape.</p> <p>Activity: Pupils blow up a variety of different sized and shaped balloons. Pupils use different sized plastic bags to collect a mixture of gases such as air. Activity: An Empty Sack See Van Cleave`s Chemistry For Every Kid pages 14-15.</p> <p>*Activity: Pupils observe a variety of materials and objects such as crayons, chalk, paper, a rubber band, clips, a glass slide, a piece of aluminum foil, cotton, felt and describe the properties of each.</p> <p>*Activity: Pupils identify the properties of materials such as length and width of objects by making measurements using a metric ruler.</p> <p>*Activity: Pupils will weigh a variety of objects using a balance scale. They will record and compare their results.</p> <p>Activity: Pupils will measure water and other liquids such as juices and record the volume using a graduated cylinder.</p>

State Standard: K.3 - Weather conditions can be measured, described and predicted.

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs *Required
<p>The earth’s atmosphere is made up of an envelope of air, which surrounds us.</p> <p>Weather is the condition of the atmosphere for one day. Weather is constantly changing.</p> <p>The air around us may be cold, cool, warm or hot. The air around us may be dry or humid. The air around us may be rainy, foggy or filled with snow or sleet. The air around us may be moving slowly or rapidly producing breezes, winds, very strong wind like hurricanes.</p> <p>Temperature, humidity and precipitation are some of the factors used to describe weather.</p> <p>Weather changes day by day.</p> <p>Weather can be measured by using weather instruments.</p> <p>A thermometer is used to measure the temperature of things such as air.</p>	<p>A 7. Describe and record daily weather conditions. Expectations:</p> <p>1) The sun is the source of heat and light that warms the land, air and water. Variations in the amount of sunlight that reaches the earth cause the weather.</p> <p>2) Weather conditions can be observed as sunny, cloudy, rainy, foggy, snowy, stormy, windy, hot or cold. Weather observations can be made based on how we feel, what we see or hear, or by using weather measurement instruments such as thermometers</p> <p>3) Changes in weather conditions can be recorded during different times of day, from day to day, and over longer periods of time (seasonal cycle). Repeated observations can show patterns that can be used to predict general weather conditions. For example, temperatures are generally cooler at night than during the day and colder in winter than is spring, summer or fall.</p>	<p>*Activity: Pupils brainstorm the word “weather” and list a variety of words that come to mind when they think of the weather.</p> <p>Activity: Pupils create weather word cards to tack onto the bulletin board. Pupils sort the cards and place them in groups explaining why they did so.</p> <p>Activity: Teacher introduces new vocabulary such as temperature, humidity, and precipitation. Pupils use these headings to categorize their word cards.</p> <p>*Activity: Pupils observe changes in the weather for two weeks. They record their observations on a chart by writing or drawing. They compare the daily weather changes.</p> <p>*Activity: Pupils discuss temperature as a measure of how hot or cold something is. . (AINQ.2 Use senses and simple measuring tools to collect data.)</p> <p>*Activity: Pupils discuss their own experiences with temperature.</p> <p>*Activity: Pupils use a thermometer reading the</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs *Required
<p>A barometer is used to measure the pressure of the air around us.</p> <p>A rain gauge is used to measure the amount of rainfall.</p> <p>A snow gauge is used to measure the amount of snowfall.</p> <p>A weather dog may be used to measure the humidity of the air. It is a simple hygrometer and tells us when there is a lot of moisture in the air or when the air is dry.</p> <p>Wind is moving air. Tornados and hurricanes are very strong winds</p> <p>A tornado is a very strong wind that may cause a great deal of damage.</p> <p>An anemometer is used to measure the speed of winds.</p> <p>A weather vane is used to tell us the direction from which the wind is</p>	<p>4) Weather affects the land, animals and plants, and bodies of water.</p> <p>5) When the temperature is below “freezing,” water outside freezes to ice and precipitation falls as snow or ice; when the temperature is above freezing, ice and snow melt and precipitation falls as rain.</p> <p>6) Clouds and fog are made of tiny drops of water. Clouds have different shapes, sizes and colors that can be observed and compared. Some cloud types are associated with precipitation and some with fair weather.</p> <p>7) Wind is moving air. Sometimes air moves fast and sometimes it hardly moves at all/ Wind speed can be estimated by observing the things that it moves, such as flags, tree branches or sailboats.</p> <p>Vocabulary: weather, seasons, thermometer, precipitation, freezing melt</p>	<p>number next to the top of the red line.</p> <p>Activity: Using two thermometers pupils take the temperature of the air inside the room and outside in the outdoors. They compare the readings.</p> <p>Activity: Teacher shows pupils pictures of barometers or shows real barometer to pupils.</p> <p>Activity: Using empty cans and ruler pupils construct a rain and snow gauge. These cans are placed outside the classroom at the appropriate times. Pupils measure the number of inches of accumulated rain or snow and record the data in their science journals.</p> <p>Activity: To measure humidity pupils create weather dogs. Pupils cut out an outline of a dog’s head and paint it. They use blotter paper to make a tongue. The blotter paper has been soaked in cobalt chloride. The tongue will turn pink in humid weather and blue in dry weather.</p> <p>*Activity: Have pupils simulate wind by waving their hands to show how trees move in light wind and then accelerate their movements to show strong winds.</p> <p>Activity: Pupils do research on tornados and hurricanes. Share data with class. Pupils construct a tornado in a bottle and draw their observations. Use jar with tight cover and water</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs *Required
<p>coming. It tells us when the wind changes direction.</p> <p>Weather data are gathered, charted, graphed and placed on maps.</p> <p>Scientists who study weather are called meteorologists or weathermen or women. Meteorologists collect weather information that they place on weather maps.</p> <p>Weather can be predicted</p> <p>Most weather moves from west to east. Hurricanes move in different directions and Nor'easters move from south to north.</p> <p>Weather affects our daily lives.</p>		<p>plus drops of vegetable coloring.</p> <p>Activity: Use paper cups mounted on a wooden base. Demonstrate action by using an electric fan.</p> <p>Activity: Use a drinking straw, feather , pencil with eraser, a pin, heavy string and a stick, four or five feet in length. Place the weather vane outside the window. Pupils observe and draw changes.</p> <p>Activity: Collect pictures of weather maps. Have pupils use TV and go to channel 61.</p> <p>Build and illustrate how rain and snow gauges are used. (Optional) (AINQ.7 Use standard tools to measure and describe physical properties such as weight, length and temperature.)</p> <p>Activity: Teacher uses maps to track movements from west to east.</p> <p>State that weather data are placed in charts graphed, mapped and predicted. Collect and read weather maps. (AINQ.8 Use non-standard measures to estimate and compare the size of objects.)</p> <p>Activity: Pupils draw illustrations of how weather affects them.</p>

State Standard: 1.1 - The sun appears to move across the sky in the same way every day, but its path changes gradually over the seasons.

Forces and Motion - What makes objects move the way they do?

◆ *An object’s position can be described by locating it relative to another object or the background.*

◆ *An object’s motion can be described by tracing and measuring its position over time.*

State Standard: 5.3 - Most objects in the solar system are in a regular and predictable motion.

Earth in the Solar System - How does the position of Earth in the solar system affect the conditions on our planet?

◆ *The movement of the Earth and the moon relative to the sun explains the cycles of day and night, the monthly moon phases and the yearly seasons.*

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Suggested Hands-On Activities
<p>All planets revolve around the sun.</p> <p>All planets rotate or spin on their axis as they revolve or move around the sun.</p> <p>A group of stars that form a picture is called a constellation.</p> <p>The sun is in different positions at different times of the day.</p> <p>The sun is in the same position at a specific time on a specific day.</p> <p>A planet is a large ball of rock or gas that follows a path around the sun.</p> <p>The earth is a planet.</p>	<p>A 10. Describe how the motion of objects can be changed by pushing or pulling.</p> <p>Expectations:</p> <ol style="list-style-type: none"> 1) An object’s position can be described by comparing it to the position of another stationary object. One object can be in front of, behind, next to, inside of, above or below another object. 2) The description of an object’s position from one observer’s point of view may be different from that reported from a different observer’s viewpoint. For example, a box of crayons between two students is near Susan’s left hand but near John’s right hand. 3) Things move in many ways, such as spinning, rolling, sliding, bouncing, flying or sailing. 	<p>Activity: Pupils demonstrate rotation as they revolve around another pupil designated as the sun.</p> <p>Activity: Pupils create a constellation visual or a star box using black paper and glue on yellow stars or make perforations to simulate stars and use a flashlight to illuminate the stars.</p> <p>Research constellations and the associated myths. (Optional) (AINQ.5 Seek information in books, magazines and pictures.)</p> <p>Activity: Star Pictures: Pupils construct star cups and use a flashlight to simulate constellations. See Appendix C.</p> <p>*Activity: Pupils use a Venn diagram to compare and contrast a planet and a star.</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Suggested Hands-On Activities
<p>The earth, the sun and the moon are spheres</p> <p>The solar system consists of the sun and nine planets and all other objects that are affected by the sun’s gravity and the planets.</p> <p>Because of Earth’s revolution, we see different constellations in the night sky at different times of the year.</p> <p>People have imagined these star pictures or constellations and named them for animals or mythological characters.</p> <p>Knowing the constellations was very important to travelers long ago. The star Polaris also known as the North Star is directly above the earth’s North Pole. By finding Polaris, travelers would know in which direction north lies. mythological characters.</p> <p>Stars are much bigger than the earth. They look small because they are far away.</p> <p>Some stars seem brighter than others</p>	<p>4) Motion is caused by a push or a pull. A push or pull is called a force.</p> <p>5) An object can be set in motion by forces that come from direct contact, moving air, magnets or by gravity pulling it down toward the earth.</p> <p>6) Pushes and pulls can start motion, stop motion, speed it up, slow it down or change its direction.</p> <p>B 22. Explain the cause of day and night based on the rotation of Earth on its axis.</p> <p>Expectations:</p> <p>1) The sun, Earth and its moon are spherical objects that move in two ways: they spin (rotate) and they change positions relative to each other (revolve).</p> <p>2) The sun is a star that produces light that travels in straight lines away from the sun in all directions. Light from the sun illuminates objects that reflect light, including Earth and its moon. The side of the earth that is facing the sun experiences daylight; the side of the earth facing away from the sun experiences night. All parts of the earth</p>	<p>*Activity: Pupils list reasons to classify the earth as a planet.</p> <p>*Activity: Pupils create a model of our solar system.</p> <p>*Activity: Demonstration: Teacher demonstrates a model of the solar system and the movement of the planets.</p> <p>Activity: Literature link: Read: The Magic School Bus Lost In the Solar System by Joanna Cole.</p> <p>Activity: The Apparent Movement of the Stars: Teacher and pupil demonstration using the constellations pupils illustrated. See Appendix C.</p> <p>Explain why we have daylight and night.</p> <p>Activity: Pupils discover how to locate Polaris. See Van Cleave’s Astronomy For Kids, pages 156-157 or See Appendix C.</p> <p>Activity: The effect of distance on the determination of size. See Appendix C.</p> <p>Activity: Pupils demonstrate rotation as they revolve around another pupil designated as the sun.</p> <p>Activity: Experiment: The Seasons. See Appendix C.</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Suggested Hands-On Activities
<p>do. Some stars are brighter but others may look brighter because they are closer to the earth.</p> <p>Stars are much bigger than the earth. They look small because they are far away.</p> <p>Stars are always shining.</p> <p>A telescope makes stars look closer and larger.</p> <p>The sun does not rise or set. The sun appears to rise and set because of the earth is rotating or spinning. It is the earth that is moving and not the sun.</p> <p>Most living things on earth use solar energy, which is the light, and heat from the sun.</p> <p>We use solar energy to heat our homes, to produce electricity and to power calculators and other instruments.</p> <p>The earth has different seasons since it rotates on its imaginary line or axis as it moves around the sun. Because of the tilt and its position, the earth receives different amounts of sunlight as it moves around the</p>	<p>experience a cycle that includes both day and night, providing evidence that the earth is rotating on its axis.</p> <p>3) The amount of time it takes for the earth to rotate once on its axis is regular and predictable (24 hours), and is called a “day.” Earth’s rotation makes it appear as if the sun is moving across the sky from east to west.</p> <p>B 23 Describe the monthly changes in the moon’s appearance related to its orbit around the Earth. Expectations:</p> <p>.1) The moon is a rocky object that revolves around the earth on its axis in a circular path called an orbit. The amount of time it takes for the moon to revolve once around the earth is about 29 days and is called a “lunar month.”</p> <p>2) Half of the moon is always illuminated by the sun. Phases of the moon occur because a different portion of the lit half of the moon is visible from the Earth each day as the moon revolves around the earth.</p> <p>3) At the beginning of a lunar month, no lit part of the moon is visible from the Earth (new moon). As the moon progresses through the first two quarters of its complete trip around</p>	<p>Activity: Use light bulb in socket as sun and foam ball on stick or pencil as earth. Pupils observe that the light shines on different parts of the earth depending on the earth’s position in its orbit around the sun.</p> <p>Activity: Pupils observe how light shining on a ball looks different as you move around the ball and relate this to the phases of the moon. See Appendix C.</p> <p>Activity: Pupils construct a chart illustrating the phases of the moon.</p> <p>Activity: Research the Web: Our Moon Landing. Who, when, how and what did we learn?</p> <p>Activity: Research the Web; What constitutes a year on each of the planets of our solar system. How is this determined?</p> <p>Activity: Teacher demonstration; Changing Seasons. See Appendix C.</p> <p>Activity: Shiner: Teacher demonstrates why the moon shines. See Appendix C.</p> <p>Activity: Face Forward: Pupils learn that the moon rotates on its axis. See Appendix C.</p> <p>Activity: Pupils make their own lunar landscapes. Use shoeboxes, sand, marbles and balls. See Appendix C. Wear safety glasses.</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Suggested Hands-On Activities
<p>sun.</p> <p>It takes the earth 365 days to make a complete trip around the sun.</p> <p>As the Earth orbits the sun, the seasons change.</p> <p>The reflection of the sun's light enables us to see the moon. The moon does not have its own light.</p> <p>The moon turns very slowly on its imaginary axis so we always see the same side of the moon.</p> <p>Because of the earth's rotation, the moon appears to rise in the east and set in the west.</p> <p>The moon's orbit makes the moon seem to change its shape. We call the parts of the moon that we see at different times the phases of the moon. The names include full moon, first quarter, last quarter, gibbous, crescent and new (no moon being visible.)</p> <p>We have visited the moon and have brought back samples of moon rock, photographs and a great deal of information.</p>	<p>the earth, larger portions of the right side of the moon are illuminated each day. When the moon has completed half of its trip around the earth, the full moon is illuminated. During the third and fourth quarters of the moon's trip around the earth, the illuminated portion gradually decreases so only the left side is illuminated and finally no lit portion of the moon is visible from the Earth again.</p> <p>4) Like the sun, the moon appears to rise at the eastern horizon and set at the western horizon due to the earth's rotation. From one day to the next, when observed at the same time from the same location, the moon's position in the sky varies in predictable ways.</p> <p>Vocabulary: position, force, push, pull, reflect, rotate, orbit, revolve, moon phase</p>	<p>Activity: Research moons of other planets. How did moons originate? Report to class.</p> <p>Reminder: Schedule your class for a visit to our own planetarium at Roton Middle School and invite our planetarium director to visit your class.</p>

State Standard: 2.4 - Human beings, like all other living things, have special nutritional needs for survival.

Science and Technology in Society - How do science and technology affect the quality of our lives?

- ◆ *The essential components of balanced nutrition can be obtained from plant and animal sources.*
- ◆ *Different people eat different foods in order to satisfy nutritional needs for carbohydrates, proteins and fats.*

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs *Required
<p>We require a variety of food in order to stay healthy.</p> <p>We require a balanced diet to be healthy. The ingredients of a balanced diet require foods from the following six groups: meats, dairy products, grains, fruits, vegetables, and fats.</p> <p>The food pyramid describes the six food groups and the amounts or servings of each required for a balanced, healthy diet.</p>	<p>A 23. Identify the sources of common foods and classify them by their basic food groups. Expectations:</p> <p>.</p> <p>1) People need to eat a variety of foods to get energy and nutrients they need to grow, move and stay healthy. Foods are classified as grains, fruits, vegetables, dairy, meats and beans, and oils.</p> <p>2) The level of energy and nutrients individuals need depends on their age, gender and how active they are.</p> <p>e) Most foods contain a combination of nutrients. Labels on food packages describe the nutrients contained in the food and how much energy the food provides (calories).</p>	<p>*Activity: Pupils list and discuss common foods and identify their sources.</p> <p>*Activity: Pupils list and discuss the kinds of food they think make up a healthy diet.</p> <p>Activity: Pupils use grocery store flyers and cut out pictures of their favorite foods. They share this with their class.</p> <p>Activity: Pupils construct a graph to illustrate how many of them have the same favorite foods.</p> <p>*Activity: Teacher introduces the food pyramid illustrating the six food groups required for a healthy diet</p> <p>*Activity: Pupils use their cutouts of foods and categorize them into the six food groups.</p> <p>Activity: Teacher introduces servings and serving size. How much of something should we eat? How much is too much or too little?</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs *Required
<p>Junk foods are foods that contain too much fat and sugars.</p> <p>A healthy snack is food that does not have too much fat and too much sugar.</p> <p>A balanced diet consists of eating foods from all of the six groups shown in the food pyramid in the proper amounts.</p>	<p>f) Breads, poultry, fish, beans, eggs and nuts are sources of protein, which keeps the body working properly.</p> <p>g) Fruits and vegetables are sources of vitamins and minerals, which keep the body healthy.</p> <p>h) Nuts, meats and fish are sources of fats and oils, which provide energy.</p> <p>A 24. Describe how people in different cultures use different food sources to meet their nutritional needs.</p> <p>Expectations:</p> <p>1) All people need the same basic nutrients to grow, move and stay healthy; different cultures satisfy these needs by consuming different foods.</p> <p>2) Some foods people eat come from plants that grow wild or are planted by farmers as crops. A fruit is the ripened ovary of a flower; vegetables are the roots, stems, leaves or flowers of plants.</p> <p>3) Some foods people eat come from animals that are wild or are raised on ranches. Meat, fish, dairy products and eggs all come from animals.</p> <p>4) The type of crops that can grow in an area depend on the climate and soil. Some foods are</p>	<p>Pupils use the pyramid to decide on serving size for each of the six groups.</p> <p>*Activity: Pupils create and illustrate A Balanced Menu for breakfast, lunch and dinner.</p> <p>Activity: Oil and Fats in Junk Foods. See Appendix C.</p> <p>Activity: Pupils identify foods that make nutritious snacks. Pupils collect pictures of healthful snack foods in old magazines and assemble them onto a Nutritious Snacks poster.</p> <p>Activity: The class creates A Snack Book with recipes for healthy snacks.</p> <p>Activity: Construct a poster of The Happy, Healthy Snacker showing a happy pupil surrounded by healthy snacks.</p> <p>Activity: Pupils are provided with six meals made of paper food. They are asked to decide if each meal is balanced or not.</p> <p>Activity: Pupils record what that had for dinner and report back to the class and assess whether the meal was balanced.</p> <p>Activity: Pupils are asked to name any ethnic foods. The class discusses what these foods are made of and into which group or groups they belong.</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs *Required
	<p>grown and sold by local farms, and some foods are grown far away and transported to local grocery stores.</p> <p>Vocabulary: nutrient, crop, grain, carbohydrate, protein, dairy, fats, oils, energy</p>	

State Standards: 3.2 - Organisms can survive and reproduce only in environments that meet their basic needs.

Matter and Energy in Ecosystems - How do matter and energy flow through ecosystems?

◆ *Plants and animals have features that help them live in different environments.*

State Standards: 4.2 - All organisms depend on the living and non-living features of the environment for survival.

Matter and Energy in Ecosystems - How do matter and energy flow through ecosystems?

◆ *When the environment changes, some organisms survive and reproduce; and others die or move to new locations.*

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs * Required
<p>Consumers can be grouped by the kinds of food they eat.</p> <p>All of these organisms have body parts that help them catch and eat their food.</p> <p>Herbivores are consumers that eat only plants.</p> <p>Carnivores are animals that hunt and eat other animals.</p> <p>Omnivores are animals that eat both plants and animals.</p> <p>Humans depend on both plants and animals to meet their basic needs.</p> <p>Living things depend on one another.</p>	<p>B 10. Describe how animals, directly or indirectly, depend on plants to provide the food and energy they need in order to grow and survive.</p> <p>Expectations:</p> <ol style="list-style-type: none"> 1) Living and nonliving things interact in land and water environments called ecosystems. Every ecosystem has certain conditions (abiotic factors) and a variety of living things (organisms) that are adapted for survival in those conditions. Abiotic factors include the quality and amount of air, sunlight, water and soil, as well as the terrain and climate. 2) Organisms depend on other organisms and on nonliving things in an ecosystem to meet their basic needs for food, water and 	<p>*Activity: Pupils develop a classification system grouping and a number of consumers and the variety of foods that they consume.</p> <p>*Activity: Pupils provide data that substantiate that all organisms have body parts that help them catch and eat their food.</p> <p>*Activity: Pupils collect pictures of herbivores and identify the specific adaptations these animals have to ensure their ability to obtain food.</p> <p>*Activity: Pupils collect pictures of, carnivores and omnivores and identify the specific adaptations these animals have to ensure their</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs * Required
<p>Plants and animals depend on one another to help them meet their basic needs.</p> <p>All living things obtain energy from the things they eat.</p> <p>Plants interact with sunlight, air, and water to make food.</p> <p>Animals interact with plants or other animals to get their food. Animals also interact with nonliving things in their environment such as water, sunlight, soil, and rocks.</p> <p>Plants are producers. A producer is a living thing that makes its own food.</p> <p>Producers use the food they make to live and grow.</p> <p>Plants make more food than they can use. This extra food is stored in roots, leaves, seeds, and fruit.</p> <p>Animals are consumers. A consumer is a living thing that eats other living things as food.</p> <p>A decomposer is a living thing that breaks down dead things for food and</p>	<p>protection.</p> <p>3) Plants use energy from the sun to produce their own food from air and water. The type of soil, amount of water and temperature range in an area determine the plants that grow there.</p> <p>4) Animals that live in an area get their energy and nutrients either directly or indirectly from plants that grow there: herbivores consume only plants, carnivores consume animals, and omnivores consume both animals and plants. Decomposers consume plant and animals waste and remains, returning nutrients to the soil where they are used again by plants.</p> <p>5) Some of the sun’s energy is transferred from one organism to another when a plant or animals is consumed by another animal. A food chain is a simple model that illustrates the passage of energy from one organism to another. Food webs are more realistic models that show the varied energy-passing relationships among plants and animals in an ecosystem.</p> <p>6) Environments are always changing. Some changes occur naturally (examples include</p>	<p>ability to obtain food.</p> <p>*Activity: Pupils construct a concept map illustrating how humans depend on both animals and plants to meet their basic needs and incorporate the many plant and animal products humans use.</p> <p>Design a mural showing the interactions of living and nonliving things in an environment. (BINQ.6 Analyze, critique and communicate investigations using words, graphs and drawings.)</p> <p>*Activity: Pupils create a concept map illustrating the interdependence of living things in meeting their basic needs.</p> <p>*Activity: Pupils do experiment: Growing Plants. See Appendix C.</p> <p>*Activity: Pupils do experiment: Photosynthesis. See Appendix C.</p> <p>*Activity: Pupils construct a mobile showing how plants and animals interact to obtain their food.</p> <p>*Activity: Pupils describe how animals use water and rocky environments as their safe haven and habitats.</p> <p>*Activity: Pupils create a chart of the numerous plants that are producers and provide us with resources to meet our basic needs.</p>

The codes for the Student Content Outcomes and Skills are used to identify them for alignment with the State Standards. (Appendix A) 47

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs * Required
<p>feeds on wastes of living things. A food chain is the path of food from one living thing to another.</p> <p>A food chain shows how energy moves through the environment. An energy pyramid shows that the amount of usable energy in an ecosystem is less for each higher animal in the food chain. The higher the animal is in the pyramid, the fewer of that animal there are.</p> <p>Since most organisms eat more than one kind of food, they can be part of more than one food chain.</p> <p>Food chains overlap in an ecosystem to form food webs. A food web shows how food chains overlap and link together. An animal that hunts another animal for food is a predator. The animal that is hunted is called a prey. Some animals can be both predator and prey. Organisms can survive and reproduce only in environments that meet their basic needs. We use animal and plants from both land and water environments for food, for building shelters, for clothing and for many other products.</p>	<p>disease outbreaks, violent storms, forest fires sparked by lightning). Other changes are caused by human activity (examples include establishing conservation laws, passing laws to control pollution, clearing forests for agriculture or construction, applying chemicals to lawns and crops, burning fossil fuels, etc.).</p> <p>Vocabulary: ecosystem, organism, abiotic factors, nutrient, producer, consumer, herbivore, carnivore, omnivore, decomposer, food chain, food web</p>	<p>*Activity: Pupils illustrate the concept of consumer and the various products consumers consume.</p> <p>Activity: Pupils research Web focusing on the role of fungi and bacteria as decomposers</p> <p>*Activity: Pupils grow bread mold. See Appendix C.</p> <p>Activity: Pupils do experiment: Decomposers. See Appendix C.</p> <p>Activity: Pupils construct a model of a food chain that would be found in a forest ecosystem.</p> <p>*Activity: Pupils complete the template of the energy pyramid labeling all parts and explain the specific distribution of animals at the higher level.</p> <p>Activity: Pupils construct a model of a series of food chains that show how organisms can be part of more than one food chain.</p> <p>*Activity: Pupils create a poster illustrating the many overlapping food chains that make up the food web in a marsh ecosystem. *Activity: Mystery Pellets, reading Barn Owl and Butter Nut Pond.</p>

The codes for the Student Content Outcomes and Skills are used to identify them for alignment with the State Standards. (Appendix A) 48

State Standards: 3.1 - Materials have properties that can be identified and described through the use of simple tests.

Properties of Matter - How does the structure of matter affect the properties and uses of materials?

◆ *Heating and cooling cause changes in some of the properties of materials.*

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs *Required
<p>Matter is everywhere.</p> <p>Matter is anything that occupies space and has mass.</p> <p>The amount of space something takes up is called volume.</p> <p>Mass is the amount of matter in an object</p> <p>All matter is made-up of tiny particles called atoms.</p> <p>Atoms make up elements. Elements are made up of one kind of atom. Gold is an element that is made up of atoms of gold.</p> <p>An atom is the smallest unit that keeps all the characteristics of an element and it is the smallest unit that can take part in a chemical change.</p>	<p>B 1. Sort and classify materials based on properties such as dissolving in water, sinking and floating, conducting heat and attraction to magnets.</p> <p>Expectations:</p> <ol style="list-style-type: none"> 1) Materials have properties that are directly observable; examples include its state of matter, or its size, shape, color or texture. Other properties can only be observed by doing something to the material (simple tests). Materials can be sorted and classified based on their testable properties. 2) Some materials dissolve (disappear) when mixed in water; other accumulate on the top or the bottom of the container. The temperature of water can affect whether, and at what rate, materials dissolve in it. 	<p>*Activity: Pupils list examples of matter observed in the classroom (BINQ.1 Make observations and ask questions about objects, organisms and the environment.) Construct a chart of solids, liquids, gases, and list common examples of each.</p> <p>Activity: Teacher directs two pupils to stand in the same space. Pupils explain that this cannot be done since no two things can occupy the same space at the same time. (BINQ.9 Use measurement tools and standards units (e.g., centimeters, meters, grams, kilograms) to describe objects and materials.)</p> <p>*Activity: Pupils use graduated cylinders or measuring cups to measure given containers of colored water or juice. Pupils use graduated beakers to measure popcorn or cereal or rice.</p> <p>*Do state embedded task Soggy Paper.</p> <p>*Activity: Pupils use the balance scale, weigh the</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs *Required
<p>Solids do not change shape or volume. Liquids can change shape and will take on the shape of the container in which they are placed. Liquids do not change in volume.</p> <p>Gases will spread out to fill the size and shape of the container</p> <p>The atoms and molecules in matter are in constant motion. The arrangement and speed of the atoms or molecules determine the state of matter.</p> <p>Atoms or molecules move most rapidly in gases, less rapidly in liquids and least rapidly in solids.</p> <p>When two or more atoms join, they make molecules. There are millions of combinations, so there are many types of matter.</p> <p>Three states of matter are solids, liquids and gases. Each state is a property of matter.</p> <p>A property is a characteristic of matter that is used to describe matter. Properties include size, shape, color, odor, taste, softness or hardness of a substance, strength, flexibility and state of which solid,</p>	<p>3) Some materials, such as sponges, papers and fabrics, absorb water better than others.</p> <p>4) Some materials float when placed in water (or other liquids such as cooking oil or maple syrup); others sink to the bottom of the container.</p> <p>5) Some materials conduct heat better than others. Materials that are poor heat conductors are useful for keeping things cold or hot.</p> <p>6) Some materials are attracted to magnets. Magnetic materials contain iron.</p> <p>B 2. Describe the effect of heating on the melting, evaporation, condensation and freezing water. Expectations:</p> <p>1) The physical properties of a material can be changed, but the materials remain the same. For example, a</p>	<p>mass of different objects in the room, record the data, and compare results. Pupils illustrate mass as the amount of stuff of which an object is made.</p> <p>Activity: Pupils diagram an atom as the smallest part of matter.</p> <p>Activity: Pupils list a variety of elements that they meet on a daily basis. Pupils describe the uses of gold, silver, chlorine, fluorine, sodium, iron, aluminum, uranium and others.</p> <p>Activity: Pupils will divide into three groups. Each group will have will have three minutes to list either all the solids or liquids or gases that come to mind.</p> <p>*Activity: Silent Demonstration: Pupils are asked to observe what the teacher does and then decide what specific information is being conveyed about the differences among a solid, a liquid and a gas. Pupils define each term. Teacher pours equal amounts of colored water into differently shaped containers. Teacher places a solid into differently shaped containers. Teacher blows air into differently shaped balloons.</p> <p>Activity: Pupils draw a solid with molecules packed very close together, a liquid with molecules spaced apart and a gas with molecule greatly spaced apart. All are in motion.</p> <p>*Activity: How The Addition and Subtraction of</p>

The codes for the Student Content Outcomes and Skills are used to identify them for alignment with the State Standards. (Appendix A) 50

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs *Required
<p>liquid and gas are three.</p> <p>The states of matter are different because of the way they change shape and volume.</p> <p>Heat changes the state of matter. When heat is added, a solid melts into a liquid.</p> <p>When heat is added to a liquid, it evaporates into a gas. When the heat is taken away from a gas, it turns back into a liquid.</p> <p>When heat is further taken away the liquid freezes into a solid.</p> <p>Matter can change in two ways. Matter can change physically. In a physical change, matter may change in size or shape but it is still the same substance.</p> <p>Matter can change chemically. In a chemical change, a new and different substance is</p>	<p>block of wood can be cut, sanded or painted, but it is still wood.</p> <p>2) Heating and cooling cause materials to change from one state of matter to another and back again. Adding heat can cause solids to melt into liquids (for example, chocolate, ice cream, butter or wax); removing heat (cooling) can cause liquids to harden into solids (for example, hot candle wax hardens as it cools).</p> <p>3) Adding heat can cause water to boil and evaporate into a gas in the air (for example, steam rises from heated water); removing heat (cooling) can cause water vapor to condense into liquid water (for example, warm steam hitting a cold mirror). Water outdoors or in an open container evaporates without boiling (for example, puddles, ponds, fish tanks, etc.).</p> <p>4) Water may exist as a solid, liquid or gas, depending on its temperature. If water is turned into ice and then the ice is allowed to melt, the amount of water is the same as it was before freezing.</p>	<p>Heat Affects the States of Matter: Pupils review the melting ice cube, boiling water and condensing water vapor and focus on the heat as the energy that drives the changes.</p> <p>Activity: Today I am a Molecule In a Gas then In a Liquid and finally in a Solid. Pupils act out the movements of molecules in each state.</p> <p>*Activity: Pupils observe and describe the melting of an ice cube in someone’s warm hand, the boiling of water and the condensation of the steam given off by the boiling water as it meets a cold aluminum pie plate. Pupils illustrate the changes of state and label them.</p> <p>*Activity: Pupils brainstorm the term property and list all words that describe a property. Pupils then classify the words into groups such as size, color, odor, taste, texture, hardness, flexibility, transparent etc</p> <p>*Activity: Pupils analyze their drawing of the changes of water. Did the ice cube have a definite shape? After the ice cube melted, did the liquid have a definite shape and hold that shape as you moved it? Did the water vapor have a definite shape or did it mix with the air in the room?</p> <p>*Activity: Pupil write out a word statement showing the addition or subtraction of heat in</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs *Required
<p>formed. This substance has new properties.</p> <p>Chemical changes are the results of chemical reactions in which the atoms a or the molecules of a substance break apart or combine to form a new substance.</p> <p>Changes of state are physical changes. In the case of water, water is normally a liquid.</p> <p>If we cool the water down and place it in the freezer, the liquid becomes a solid, ice.</p> <p>If we heat the ice, it changes back to a liquid.</p> <p>If we boil the liquid it becomes a gas, water gas called water vapor.</p> <p>We use our knowledge of physical properties to mix some kinds of matter or to separate some kinds of matter.</p> <p>Chemistry is the science that deals with the elements, mixtures and compound in our environment and how they interact with each other.</p>	<p>5) Liquid water becomes solid water (ice) when its temperature cools to 0 degrees Celsius (32 degrees Fahrenheit). Warming ice to a temperature above 0 degrees Celsius causes it to melt into liquid water.</p> <p>Vocabulary: physical property, state of matter, solid, liquid, gas, dissolve, absorb, conduct, attract, melt, freeze, boil, evaporate, condense</p>	<p>each state of matter change.</p> <p>*Discussion: What is a change?</p> <p>*Activity: Physical and Chemical Changes The following changes are made: A piece of paper is torn. A piece of paper is burned. A wooden splint is broken. A wooden splint is burned. Food coloring is added to water. Sand and marble are mixed together and then separated with a sieve, Iron filings are mixed with sugar and are then separated with a magnet. Oil, karo syrup and water colored with red food coloring are added to each other in a jar making liquid layer cake. Vinegar is added to sodium carbonate releasing carbon dioxide. Pupils record their observations and label each change as physical or chemical.</p> <p>*Activity: Pupils construct a concept map of the three states of water.</p> <p>Activity: Separating Colors. Let us Do Some Chromatography. See Appendix C.</p>

State Standard: 4.3 - Water has a major role in shaping the Earth’s surface.

Energy in the Earth’s Systems - How do external and internal sources of energy affect the Earth’s systems?

♦ *Water circulates through the Earth’s crust, oceans and atmosphere.*

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities/ Labs *Required
<p>The earth is often called the water planet since it is the only planet known to have liquid water.</p> <p>The earth appears to be blue from space because most of its surface is covered by water.</p> <p>Without water, there could be no life on earth. Plants and animals need water in order to live. Most animals and plants are made up of a great deal of water.</p> <p>Liquid water is a colorless, odorless, substance into which many other substances will dissolve.</p> <p>Most of the salt in salt water comes from the weathering of rocks. Rivers carry the salts from the rocks into the oceans.</p> <p>Living things on land need fresh water. Only a small part of the earth’s water is fresh water. All people need fresh water but most of the Earth’s water is not fresh.</p> <p>Most fresh water is frozen as ice in glaciers or</p>	<p>B 12. Describe how the sun’s energy drives the water cycle.</p> <p>Expectations:</p> <ol style="list-style-type: none"> 1) Water is continuously moving between the Earth’s surface and the atmosphere in a process called the water cycle. Water evaporates from the surface of the earth, rises into the air and cools, condenses, collects in clouds, and falls again to the surface as precipitation. The energy that causes the water cycle comes from the sun. 2) Most precipitation that falls to Earth goes directly into the oceans. Some precipitation falls on land and accumulates in lakes and ponds or moves across the land. Rain or snowmelt in high elevations flows downhill in many streams which collect in lower elevations to form a river that flows downhill to an ocean. 	<p>Activity: Have pupils estimate: How much of the earth’s surface is covered with water? Discuss and then research.</p> <p>*Activity: Obtain pictures of the Blue Planet. List as many uses of water that you can think of. Compare your list with those of your classmates.</p> <p>Small Group Activity: Construct a poster advertising Water as The Liquid for Life. (BINQ.6 Analyze, critique and communicate investigations using words, graphs and drawings.)</p> <p>Activity: Observe a sample of water and describe its properties.</p> <p>*Activity: Compare the fresh water with salt water.</p> <p>Describe ground water and how we obtain ground water.</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities/ Labs *Required
<p>in the icecaps near the poles.</p> <p>The rain and snow that falls to earth is fresh water. This water flows over the ground and into rivers and streams. Ponds and lakes also contain fresh water</p> <p>An estuary is a place where fresh water from a river mixes with salt water from the ocean. Many birds and animals find food and shelter in estuaries.</p> <p>There is also fresh water under the earth's surface. This is called ground water. Ground water starts out as rain entering the soil. The rainwater moves down until it reaches the solid rock of the earth. People tap the ground water by digging wells.</p> <p>Water's movement on the earth is a continuous cycle called the water cycle.</p> <p>In the water cycle, water is constantly changing form, from a liquid on land to a vapor or gas in the atmosphere, and again to a liquid that falls to the earth's surface.</p> <p>The flow of water on land and under the ground is part of the water cycle. As water moves in the water cycle the total amount of water does not change.</p> <p>The water cycle involves three major</p>	<p>Vocabulary: water cycle, evaporate, condense, precipitation, river, lakes, ground water</p>	<p>Diagram the water cycle</p> <p>*Activity: Draw a diagram or construct a model of the flow of water into ponds, streams and rivers</p> <p>Activity: Research: Estuaries: What are they? Where are they? Why are they important? . (BING.8 Search the web and locate relevant science information.)</p> <p>Activity: Investigate wells. How many people in Norwalk have their own wells? Why?</p> <p>Activity: Up and Down See Appendix C or Van Cleave's Ecology For Kids Pages 61-65.</p> <p>*Activity: Dripper: Demonstrates the water cycle. See Appendix C.</p> <p>*Activity: Illustration: Draw the changes in a drop of water as it moves through the water cycle.</p> <p>*Demonstration Observe the evaporation of water in an open and closed container. Use equal amounts of water. Observe record and explain your findings.</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities/ Labs *Required
<p>processes: evaporation, condensation, and precipitation.</p> <p>Evaporation is the process in which water changes from liquid to vapor or gas. Heat from the sun or from some other source is the energy that causes this change.</p> <p>Condensation is the process in which the water vapor or water gas becomes a liquid. The water droplets that come from condensation form clouds. Clouds tell us that water is in the air. Water that falls from clouds is precipitation. Inside a cloud, water droplets bump together and merge into larger droplets. They become very heavy and fall as rain, snow, or sleet depending upon the temperature of the air.</p> <p>All the water coming from precipitation is fresh water.</p> <p>Wet weather can fill our water storage areas called reservoirs</p> <p>People can obtain fresh water from salt water. The process is called desalinization in which salt is removed from the water.</p> <p>Since freshwater sources are usually muddy and dirty, filtering water is necessary. Water may contain microscopic living things such as bacteria or germs that cause sickness.</p>		<p>Demonstration: Observe evaporation of water, household ammonia and rubbing alcohol. Place a dab of each liquid of the same size on the surface of the blackboard. Have pupils observe the rate at which each liquid evaporates. Share your conclusions with class.</p> <p>*Activity: Explore Condensation. The Wet Glass! Fill the glass half full of water. Add an ice cube or two. Wipe the outside of glass dry. Let stand for five minutes. Have pupils explain why the outside of the glass became wet.</p> <p>Activity: Collect samples of rainwater and snow. Prepare a slide of each and have pupils view each under the microscope. Draw what was observed.</p> <p>*Activity: Investigate: Obtain a sample of pond water. Prepare a slide and view under microscope. Now prepare a slide of filtered water. Observe record and compare results.</p> <p>*Activity: Research: Water Pollution</p> <p>Activity: Research: Water treatment plants. Activity: Draw a map showing the location of your water supply.</p> <p>*Process Skills: Critical Thinking; You are hiking and you are very thirsty. Would you drink water from a stream? Why or why not?</p>

The codes for the Student Content Outcomes and Skills are used to identify them for alignment with the State Standards. (Appendix A) 55

State Standard 3.3 - Earth materials have different physical and chemical properties.

The Changing Earth - How do materials cycle through the Earth's systems?

◆ *Rocks and minerals have properties that may be identified through observation and testing; these properties help determine how the earth materials are used.*

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities/ Labs *Required
<p>Earth materials provide resources for living things.</p> <p>Rocks are made of minerals.</p> <p>Scientists can identify rocks and minerals by their properties and with a variety of tests.</p> <p>Igneous, sedimentary and metamorphic rocks are formed in different ways.</p> <p>Igneous rocks are formed from magma and lava, hot, molten masses of minerals. Magma works its way upward through the earth's hard crust and cools, forming igneous rock.</p> <p>Sedimentary rocks are formed from sediments, sand and clay. The sediments become compacted and cemented to form rock.</p>	<p>B 5. Describe the physical properties of rocks and relate them to their potential uses.</p> <p>Expectations:</p> <p>1) Earth is mainly made of rock. Rocks on the earth's surface are constantly being broken down into smaller and smaller pieces, from mountains to boulders, stones, pebbles and small particles that make up soil.</p> <p>2) Rocks can be sorted based on properties, such as shape, size, color, weight or texture.</p> <p>3) Properties of rocks can be used to identify the conditions under which they were formed.</p> <p>4) Rock properties make them useful for different purposes. Rocks that can be cut into regular shapes are useful for buildings and statues; rocks that crumble easily are useful for making mixtures such as concrete and sheetrock.</p> <p>5) All rocks are made of materials called</p>	<p>Activity: Pupils research the topic of earth resources and illustrate examples of earth resources.</p> <p>*Activity: Pupils conduct a variety of tests to identify minerals. These include tests for color, luster, streak, hardness and crystalline shape. Differentiate between rocks and minerals. Research the library or the Web on minerals and their uses.</p> <p>*Activity: Pupils compare and contrast rock formations.</p> <p>Activity: Pupils pictorially show how each kind of rock is formed.</p> <p>*Activity: Pupils draw a diagram of the rock cycle.</p> <p>*Activity: Pupil illustrates a variety of uses of rock.</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities/ Labs *Required
<p>Metamorphic rocks are formed when existing rocks are subjected to heat and pressure that can change in the rock cycle.</p> <p>The rock cycle is a process by which rocks, over geologic ages, can be changed into different kinds of rock.</p> <p>Rocks and soil can be changed by erosion.</p> <p>Rocks have real-world applications.</p> <p>Fossils are the remains of living organisms that have been preserved in rock form.</p> <p>Fossils provide us with valuable information about the past,</p>	<p>minerals that have properties that may be identified by testing. Mineral properties include color, odor, streak, luster, hardness and magnetism.</p> <p>6) Minerals are used in many ways, depending on their properties. For example, gold is a mineral that is easily shaped to make jewelry; talc is a mineral that breaks into tiny grains useful for making powders.</p> <p>B 6. Relate the properties of rocks to the possible environmental conditions during their formation. Expectations:</p> <p>1) Igneous rocks are formed when melted rock cools, hardens and forms crystals. Melted rock that cools slowly inside a volcano forms large crystals as it cools. Melted rock that cools rapidly on the earth’s surface forms small crystals (or none at all).</p> <p>2) Sedimentary rocks are formed underwater when small particles of sand, mud, silt or ancient shells/skeletons settle to the bottom in layers that are buried and cemented together over a long period of time. They often have visible layers or fossils.</p>	<p>Activity: Pupils go on a field trip to collect and classify rocks and minerals from your neighborhood.</p> <p>Activity: Pupils research how rocks are used in the construction of homes, walls, bridges, floors, monuments and in making jewelry.</p> <p>*Activity: Pupils make a fossil.</p> <p>*Activity: Pupils write a recipe and directions for creating a fossil.</p> <p>Activity: Pupils research fossils.</p> <p>Activity: Pupils illustrate how we use earth materials to improve the quality of our lives.</p> <p>Activity: Pupils research igneous, sedimentary and metamorphic rocks and write a story or poem about their formation.</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities/ Labs *Required
<p>Earth resources are limited and should be conserved.</p> <p>Earth materials are used to improve our lives.</p> <p>Rocks, minerals and fossils are found in the earth.</p>	<p>3) Metamorphic rocks are formed when igneous or sedimentary rocks are reheated and cooled or pressed into new forms. They often have bands, streaks or clumps of material.</p> <p>Vocabulary: property, classify, texture, igneous, sedimentary, metamorphic, fossil, crystal, mineral</p>	

State Standard: 3.4 - Earth materials provide resources for all living things, but these resources are not unlimited and should be conserved.

Science and Technology in Society - How do science and technology affect the quality of our lives?

◆ *Decisions made by individuals can impact the global supply of many resources.*

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities/ Labs *Required
<p>Soil is made up of layers that take many years to form. Topsoil is the top layer of soil and is a mixture of weathered rock and humus.</p> <p>Humus is decayed plant and animal matter. Humus provides nutrients that plants need to grow.</p> <p>Soil conservation efforts help to prevent the loss of soil from erosion or wearing away.</p> <p>Rocks are a natural resource found under the soil and are made up of a mixture of minerals. A mineral is a natural solid that has definite chemical makeup and is found in the earth’s crust.</p> <p>Minerals are formed by nature, not by living things and are used as a source of metals and other materials to manufacture products.</p> <p>A natural resource is any material from Earth</p>	<p>A 22. Relate the properties of different soil types to their ability to retain water and support the growth of certain plants. Expectations: 1) Soil is a habitat for many living things. Some organisms live in the soil and others live on the soil. Worms and other underground animals create spaces for air, water and plant roots to move through soil. NOTE: this is a review from 1st grade.</p> <p>B 7. Describe how earth materials can be conserved by reducing the quantities used, and by reusing and recycling materials rather than discarding them. Expectations: 1) Earth materials that occur in nature include rocks, minerals, soils, water and the gases of the atmosphere. Earth materials are natural resources that provide us with things we need to live, including food, clothing, water, air, shelter, land and energy. 2) Some natural resources are useful to</p>	<p>Activity: Illustrate the layers of soil and label the contents of each layer describing how it was formed. Activity:</p> <p>*Activity: Examine samples of topsoil and humus. Describe your observations.</p> <p>Activity: Research: Contour Plowing and Strip Cropping</p> <p>Define the term natural resources and give examples of some of our natural resources.</p> <p>Activity: List things you use that are made of metals.</p> <p>*Class Investigation: What are the natural resources of Norwalk and of Connecticut?</p> <p>*Activity: Saving Soil: Do plants help keep soil from being washed away? How? See Appendix C.</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities/ Labs *Required
<p>that can be used by man.</p> <p>Soil is a natural resource without which plants could not exist.</p> <p>Soil is a mixture of weathered rock particles and decayed plant and animal matter.</p> <p>Plants help keep soil from being eroded or washed away.</p> <p>Most minerals come from ores</p> <p>A resource that can be replaced is called renewable.</p> <p>A resource that cannot be replaced is nonrenewable.</p> <p>Fossil fuels are nonrenewable energy sources that supply most of the energy we use.</p> <p>People need fuels to get energy to meet their basic needs</p> <p>Most of the energy that people use comes from burning fossil fuels such as natural gas, coal, crude oil or petroleum</p> <p>We have other sources of energy such as wind, solar, sea water and energy from inside the earth</p> <p>There are many ways to reuse and recycle our natural resources.</p>	<p>people in their raw form (for example, fresh water, soil or air); other natural resources must be modified to meet human needs (for example, petroleum must be extracted from rocks and refined into gasoline, heating oil or plastics; wood from trees must be processed to make paper).</p> <p>3) The supply of many natural resources such as fossil fuels, metals, fresh water and fertile soil is limited; once they are used up or contaminated they are difficult or impossible to replace.</p> <p>4) Human actions can affect the survival of plants and animals. The products of the fuels people burn affect the quality of the air. Waste and chemicals from factories, farms, lawns and streets affect the quality of the water and soil.</p> <p>5) Humans can extend the use of some natural resources by reducing the amounts they use (for example, driving less to reduce the amount of gasoline used; turning off faucets when not in use).</p> <p>6) Humans can extend the use of some natural resources by recycling, or collecting used materials and processing them into new materials (for example, collecting waste paper or plastic bottles and making them into new products).</p> <p>7) Humans can extend the use of some natural resources by reusing products</p>	<p>Activity: Research: Iron, copper, gold, silver, diamonds, ores and extraction of metals from ores .</p> <p>*Activity: Process Skill: Critical Thinking: Pretend that you discovered a new mineral' Name the mineral and describe some of its properties.</p> <p>*Activity: Illustrate some renewable and nonrenewable resources. Show how we can conserve some of the unrenewable ones.</p> <p>*Activity: Investigate: Find out how many fossil fuels are used in your house and for what purposes. Share information with class.</p> <p>Activity: Illustrate alternative sources of energy.</p> <p>* Activity: Sun-Toasted Marshmallows. See Appendix C.</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities/ Labs *Required
	<p>instead of buying new ones (for example, washing containers that food is packaged in and using them again to store different foods or objects).</p> <p>8) Humans can extend the use of some natural resources by replacing what they use (for example, planting new trees to replace those that are cut for lumber or paper; purifying dirty water from storm drains and discharging clean water back into a river).</p> <p>Vocabulary: natural resources, recycle, reuse, replace, renewable</p>	<p>*Activity: Produce a poster that sends a clear message as to how we may conserve, reuse and recycle our natural resources as to how we may conserve, reuse and recycle our natural resources.</p>

Grade: 3 Domain: Physical Science Unit Title: Simple Machines (optional)

State Standard: 4.1 The position and motion of objects can be changed by pushing or pulling

Forces and Motion - What makes objects move the way they do? ♦The size of the change in objects’ motion is related to the strength of the push or pull. ♦ The more massive an object is, the less effect a given force will have on its motion.

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Suggested Hands-On Activities
<p>Work occurs when a force is used to make an object move through a distance.</p> <p>The metric unit of work is called the joule. One joule is the amount of work done when a force of 1 Newton acts on an object that moves a distance of 1 meter. Many forms of energy are measured in joules, including thermal, mechanical and electrical energy.</p> <p>Work is only done when an object moves through a distance.</p> <p>Simple machines are tools that help people do work. They do not change the amount of work. They just make the job easier to do.</p> <p>There are six simple machines. These machines are the lever, the pulley, the</p>	<p>B 8. Describe the effects of pushes and pulls on the motion of objects.</p> <p>3SM1 Experiment by pushing against a wall and a door, compare the results and decide which of these actions constitute work.</p> <p>SM2 Research the Web and report to class by defining the term joule and describing what it measures. (BINQ.8 Search the web and locate relevant science information.)</p> <p>3SM3 Describe the relationship between work and force. Differentiate between activities that constitute work and those that do not.</p> <p>3SM4 Explain how simple machines make work easier as opposed to doing all of the work.</p> <p>3SM5 Collect pictures or photographs of the</p>	<p>Activity: Pupils are asked to push against a wall and then push against a door, which then opens. They are asked to compare the results and determine in which case work has been done.</p> <p>Activity: Research the Web. What is a joule and where is it used?</p> <p>Activity: Critical thinking: Pupils are asked to describe an example in which someone is using force but not doing work</p> <p>Activity: Pupils perform experiment: Moving Up. See Appendix C. Pupils compare two ways of doing work.</p> <p>Activity: Research the Web. Pupils select two</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Suggested Hands-On Activities
<p>wheel and axle, the inclined plane, the wedge and the screw.</p> <p>Some simple machines reduce the amount of force you have to use. Some simple machines change the direction of the force you use. Some simple machines reduce the effort. Some simple machines do both.</p> <p>A lever is a simple machine. It is a rigid bar used to lift or move things. There are first, second and third class levers. An inclined plane makes lifting an object easier.</p> <p>A wedge is an inclined plane that moves.</p> <p>A screw is an inclined plane wrapped around a cylinder. The more threads there are on the screw, the longer the inclined plane, the easier it is to turn.</p> <p>A fixed pulley makes work easier by changing the direction of the effort force.</p>	<p>six simple machines and illustrate how they are used and the advantages they provide.</p> <p>3SM6 Perform experiments using a variety of levers. Compare first, second and third class levers and describe the advantages of each.</p> <p>3SM7 Perform an experiment using an inclined plane. Illustrate and explain the advantage of using an inclined plane.</p> <p>3SM8 Perform an experiment using a wedge. Describe the advantage of using a wedge and cite an example.</p> <p>3SM9 Perform an experiment using a screw. Illustrate and describe how a screw makes work easier. Optional</p> <p>3SM10 Work with three different types of pulleys. Compare the uses of a fixed pulley, a movable pulley and a block and tackle. Illustrate and label each type. (BINQ.3 Design and conduct simple investigations.)</p> <p>3SM11 Construct a model of a waterwheel</p>	<p>simple machines to investigate and report to class. They are asked to bring in illustrations or photographs of the machines they researched.</p> <p>Activity: Pupils perform experiment, Lifter using a first class lever and determine what the advantage of using one is. See Appendix C.</p> <p>Activity: Pupils perform experiment, Second Class Lever. See Appendix C. Pupils collect pictures or photographs of second class levers such as wheelbarrows, nutcrackers and bottle openers.</p> <p>Activity: How do levers reduce the force you apply to them? Pupils do experiment, Megapinchers. See Appendix C.</p> <p>Activity: Pupils perform experiment, Uphill. See Appendix C.</p> <p>Activity: Pupils perform experiment Opener. See Appendix C.</p> <p>Activity: Pupils perform experiment, Threads, How is a screw like an inclined plane? See Appendix C.</p> <p>Activity: Pupils perform experiment Flag Raiser. See Appendix C.</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Suggested Hands-On Activities
<p>A wheel and axle is a simple machine that consists of a shaft, called an axle inserted in the middle of a wheel. Any force that is applied to the wheel is transferred to the axle and vice versa.</p> <p>Gears are wheels with teeth around the outer rim and are used to change the direction of movement.</p> <p>Simple machines can be used by themselves or they can be part of more complicated machines.</p> <p>A compound machine is made up of several simple machines that are put together.</p> <p>People compute the mechanical advantage of a machine. This is a number that represents how many times a machine multiplies the effort force we have exerted.</p> <p>People have used simple machines through time. The Egyptians made large tombs called pyramids, using ramps and lever to move large stones.</p>	<p>and describe how it works.</p> <p>3SM12 Study the action of gears on a bicycle and describe how the gears work.</p> <p>3SM13 Construct a compound machine.</p> <p>3SM14 Explain the value of computing the mechanical advantage of a machine.</p> <p>3SM15 Describe how people in the past used simple machines.</p>	<p>Activity: Pupils perform experiment, Moveable and compare results with Flag Raiser explaining what the advantages and disadvantages were in each case. See Appendix C.</p> <p>Activity: Pupils perform experiment Windmill, A wheel and axle. See Appendix C.</p> <p>Activity: Pupils perform experiment Use an egg beater to demonstrate how gears can change the speed and direction of movement</p> <p>Activity: Pupils build a Bubble Machine to illustrate a compound machine. See Appendix C for directions.</p> <p>Activity: Pupils are asked to invent their own compound machine.</p> <p>Activity: Research the Web. How did people over time use simple machines? Share information with class or illustrate with class mural.</p>

State Standard: 4.2 - All organisms depend on the living and non-living features of the environment for survival.

Matter and Energy in Ecosystems - How do matter and energy flow through ecosystems?

◆ *When the environment changes, some organisms survive and reproduce, and other die or move to new locations.*

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs * Required
<p>A biome is a large region characterized as having a distinct climate and specific types of plant and animal life.</p> <p>Land biomes include the tundra, coniferous forests, deciduous forests, tropical rain forests, grasslands and deserts.</p> <p>Biomes exist both in the ocean and on land</p> <p>Water biomes include freshwater ecosystems such as lakes, ponds, swamps, streams and rivers as well as saltwater ecosystems such as the ocean, intertidal zones and the coral reef and the deep-sea vent communities.</p> <p>Land biomes include the tundra, coniferous forests, deciduous forests, tropical rain forests, grasslands and deserts.</p> <p>Organisms live almost everywhere on the earth.</p> <p>The biosphere is the part of the earth that supports life and extends several kilometers up</p>	<p>B 10. Describe how animals, directly or indirectly, depend on plants to provide the food and energy they need in order to grow and survive.</p> <p>B 11. Describe how natural phenomena and some human activities may cause changes to habitats and their inhabitants.</p> <p>Expectations:</p> <ol style="list-style-type: none"> 1) Living and nonliving things interact in land and water environments called ecosystems. Every ecosystem has a certain conditions (abiotic factors) and a variety of living things (organisms) that are adapted for survival in those conditions. Abiotic factors include the quality and amount of air, sunlight, water and soil as well as the terrain and climate. 2) Environments are always changing. Some changes occur naturally (examples include disease outbreaks, violent storms, forest fires sparked by lightning). Other changes 	<p>*Activity: Chart the land biomes of North and South America and their climates.</p> <p>Activity: Complete a chart of all land biomes depicting climate and specific types of plant and animal life.</p> <p>Activity: Set up an aquarium. Have pupils observe and record their observations on a daily basis. Have pupils identify the biotic and abiotic factors in this ecosystem. Strongly recommended. Reinforces all aspects of the food chain.</p> <p>Activity: Create a Water Biome” Visit a local pond and “borrow” some pond water and soil to set up your classroom pond. Have pupils make slides of the pond water and use microscopes to observe the organisms in the pond water.</p> <p>Activity: Research: What parts of the earth</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs * Required
<p>into the atmosphere and deep down to the ocean floor</p> <p>Climate determines what ecosystems exist in different parts of the biosphere. Climate is the general weather of an area over a long period, including its seasonal changes.</p> <p>An ecosystem consists of all the organisms, plant and animal that live in an area together with the nonliving factors of the environment such as soil, water, air, sunlight and temperature.</p> <p>The study of how organisms interact with each other and their physical environment is called ecology.</p> <p>The climate of an area is largely determined by its location on earth. Areas close to the equator receive more direct sunlight than areas near the poles, and so are warmer year-round. Areas nearer the poles experience warm summer but cold winters.</p> <p>The climate of an area determines what plants can grow in that area. The plants, in turn, determine what animals and other organisms the area can support.</p> <p>The living components such as plant and animal life are called biotic factors, the</p>	<p>are caused by human activity (examples include establishing conservation areas, passing laws to control pollution, clearing forest for agriculture or construction, applying chemicals to lawns and crops, burning fossil fuels, etc).</p> <p>3) Changes in an environment are sometimes beneficial to organisms and sometimes harmful. For example, a newly created beaver pond provides habitat that attracts frogs and raccoons to an area; but trees, earthworms and moles are no longer able to survive in the area.</p> <p>4) When environments change, some organisms can accommodate the change by eating different foods or finding different shelters (for example, hawks nest on city buildings and consume pigeons and rats). Those organisms that can no longer meet their basic needs die or move to new locations.</p>	<p>have the largest populations? What parts have the smallest populations? Are there parts that have no life? *Activity: Illustrate the biosphere. Provide evidence that there is a relationship between the kind of plant life and the kind of animal life in a region.</p> <p>Activity: Research Climates of the World. Have you seen a polar bear in Norwalk lately? Why not? Illustrate the three major climate zones. . (BINQ.2 Seek relevant information in books, magazines and electronic sources of information.) Activity: List and describe some of the ecosystems in Norwalk. Start with Calf Pasture Beach. Describe and list the biotic and abiotic factors in an ecosystem and delineate how these interact Show the relationship between climate and the kind of plant life in a region. Activity: List the factors that influence climate. Discuss: Why are the poles colder than the equator? *Activity: Pupils show the kinds of plants and animals, they would find in tropical climate and in temperate climate. Explore ecosystems in the schoolyard.</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs * Required
<p>nonliving components such as sunlight, air; water and soil are called abiotic factors. In ecosystems, the biotic and abiotic factors interact.</p> <p>Ecosystems can be found anywhere plants and animals interact with the world around them. Ecosystems are all around us. There are pond ecosystems, wetland ecosystems, pine forest ecosystems and schoolyard ecosystems.</p> <p>A system is made up of organisms or parts the work together as a whole. Each part affects the functioning of the whole. If something disrupts the system, the system tries to fix itself. The system tries to maintain its stability.</p> <p>Stability means that over time the changes in a system cancel each other out. If something is added, later it is taken out .The system stays in balance.</p> <p>When ecologists, scientists who study ecology, talk about a certain kind of organism, plant or animal, they use the word species. A species is a group of organisms that can mate and produce offspring that in turn can produce more offspring.</p>	<p>.</p> <p>Vocabulary: adaptation, ecosystem, migration, hibernating, camouflage</p>	<p>Draw a mural incorporating the observations of the class. (BINQ.6 Analyze, critique and communicate investigations using words, graphs and drawings.)</p> <p>*Activity: Investigate: Explore the Ecosystem in your Schoolyard. See Appendix C. Draw a mural depicting what you discovered.</p> <p>Activity: Brainstorm: What comes to mind when you think of the word system? Start with solar system, school system, lawn- watering system etc.</p> <p>Activity: Investigate Starlings. What happened to the stability of an ecosystem when starlings were brought into this country?</p> <p>*Activity: Research a coral reef and a rain forest. Construct a diorama of one of them. Compare and contrast coral reefs and rain forests and use a Venn diagram to show commonalities and differences.</p> <p>*Activity: Resources from Various Biomes Chart: Class Project. Pupils will work in small groups, chart each biome, and list the resources and products we obtain from each one.</p> <p>Activity: Visit Calf Pasture Beach or Silvermine River and the adjacent wetland. Have students explore the beach and marsh and collect plant and animal life in buckets of water. Pupils record their findings and use identification guides to name organisms and then return all organisms to their habitats.</p>

State Standard: 4.2 - All organisms depend on the living and non-living features of the environment for survival.

Matter and Energy in Ecosystems - How do matter and energy flow through ecosystems?

◆ *When the environment changes, some organisms survive and reproduce, and other die or move to new locations.*

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs * Required
<p>Animals grow and develop in different ways.</p> <p>Animals grow and develop in different ways.</p> <p>Animals have physical adaptations that help them meet their needs.</p> <p>Birds have physical adaptations such as beaks, claws, feathers and hollow bones, all serving to ensure survival.</p> <p>Every animal’s body covering is an adaptation that helps animals survive. Body coverings include fur, hair, sharp hairs, stiff hairs (whiskers), scales that protect fish from disease and from other animals.</p> <p>Some animals have deep layers of fat that protect them from the cold.</p> <p>Some animals use camouflage to survive by blending in with the environment.</p>	<p>B 3. Describe how different plants and animals are adapted to obtain air, water, food and protection in land habitats.</p> <p>B 4. Describe how different plants and animals are adapted to obtain air, water, food and protection in water habitats.</p> <p>Expectations:</p> <ol style="list-style-type: none"> 1) Animals have physical and behavioral adaptations that allow them to survive in certain environments. Adaptations are passed from parents to offspring. Individuals that happen to be bigger, stronger or faster can have an advantage over others of the same kind for finding food and mates. 2) Animals have behavioral and structural adaptations for getting food. Structural adaptations include things such as specialized teeth for tearing meat or grinding grasses; specialized beaks for cracking seeds, snatching insects, tearing meat or 	<p>Activity: Brainstorm: What comes to mind when you think of physical adaptations?</p> <p>Activity: Experiment: Bird Beaks and Food. See Appendix C.</p> <p>Activity: Research #1: Assign groups to investigate beaks, claws, feathers, bones, hair, fur, scales and protective body coverings. (BINQ.2 Seek relevant information in books, magazines and electronic sources of information.)</p> <p>*Activity: Research #2: Have pupils select animals that interest them and report on the physical adaptations the animal exhibits.</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs * Required
<p>An animal may survive by mimicking another animal that has a protective adaptation.</p> <p>All animals have five basic needs: food, water, oxygen, shelter and climate.</p> <p>An animal meets its basic needs in its environment by interacting with both living and nonliving things.</p> <p>Animals meet their needs in different ways.</p> <p>Animals that live in different environments may meet their basic needs in different ways.</p> <p>Animals must reproduce to continue their species.</p> <p>An instinct is a behavior an organism is born with</p> <p>Animals meet their needs and protect themselves by instinct.</p> <p>Some organisms such as birds and insects travel south for the winter.</p> <p>Some organisms protect themselves by playing dead.</p> <p>Some organisms migrate, moving from one region to another and then back again.</p>	<p>spearing fish; sharp claws for grasping; keen sense of smell, or long, sticky tongues for reaching food. Behavioral adaptations include actions such as following herds of prey animals, spinning webs or stalking.</p> <p>3) Animals have behavioral and structural adaptations for protection from predators. Some animals have camouflage that allows them to stay concealed by blending in with their surroundings; some animals look like other animals to avoid being eaten. Structural adaptations include things such as sharp quills, hard shells or antlers. Behavioral adaptations include things such as staying absolutely still, producing a bad odor, appearing or sounding scary, or fleeing.</p> <p>4) Animals have behavioral and structural adaptations for surviving harsh environmental conditions. Animals that live in cold climates have insulating body coverings such as blubber, down or thick undercoats that keep them warm. Animals that live in hot climates keep cool by releasing heat from big ears or by panting, or by living underground. Some animals survive seasonal</p>	<p>Whales, bears, foxes, African elephants and giraffes are good suggested choices. Activity: Engage pupils in the butterfly hunt. (Optional)</p> <p>Divide the class into two teams. Each team will cut out paper butterflies and camouflage them. Each team will take turns while the other is out of the room to place the butterflies around the room. Each team will collect as many butterflies as it can.</p> <p>Activity: Create an illustration of mimicry.</p> <p>Activity: Investigating Mealworms: What Are the Basic Needs of Mealworms and How Are They Met? (Obtain from local pet store) See Appendix C.</p> <p>Activity: Investigating Your Pet: What does your pet eat, drink, where does he or she sleep, play? How does your pet meet the basic needs? List the living and nonliving things in your pet's environment. (Optional)</p> <p>Activity: Plan a visit to the Maritime Aquarium. Have pupils report on animals in different environments meeting the basic needs in different ways. (Optional)</p> <p>Activity: Small Group Activity: Select one</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs * Required
<p>Some animals adapt to colder temperatures by hibernating.</p> <p>Some behaviors that help animals meet their needs are learned such as animals learning to hunt, learning to make their own tools and learning to communicate with motions and sound.</p> <p>Imprinting is a learned behavior in which animals learn to recognize the parents who feed and protect them.</p>	<p>changes by slowing down body functions (hibernating in dens, tunnels or mud) or moving to more favorable conditions (migrating).</p>	<p>group of organisms, fish, amphibians, birds, reptiles etc. Have pupils research how they reproduce. As a total class, chart the data.</p> <p>Activity: Illustrate and give examples of mimicry.</p> <p>Activity: Discuss butterfly, bird and salmon migrations. Research the travel route of one animal as it migrates as the season changes. Use a map to show the route. Research the migration path of the Atlantic Green Turtle and how instinct guides the turtle to the nesting grounds on Ascension Island. Write: You have become a migrating organism. Write about your adventure and map your route. (See Harcourt - Monarch Butterfly Map)</p> <p>Activity: Research The Hibernation of American Bats. Describe how animals prepare for hibernation. (Optional)</p> <p>Activity: Research learned behavior such as nest building, Investigate the different shapes of bird's nests. Make a model of a bird's nest. See Appendix C.</p> <p>Activity: Why is imprinting an important behavior that ensures survival?</p> <p>Activity: Pupils create a class mural or their own National Geographic magazine on Animal Adaptations.</p>

State Standard: 4.2 - All organisms depend on the living and non-living features of the environment for survival.

Matter and Energy in Ecosystems - How do matter and energy flow through ecosystems?

◆ *When the environment changes, some organisms survive and reproduce, and other die or move to new locations.*

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Lab *Required
<p>Seeds scattered by wind, burs, and animals help ensure the survival of the plant species by spreading the seeds far from the parent plants, where they have a better chance of growing.</p> <p>Flowers and fruit are reproductive adaptations. Flowers attract insects for pollination. Fruits protect seeds from dehydration and destruction and provide food for sprouting seeds.</p> <p>Some plants have adaptations that let them make new plants in other ways such as runners, bulbs tubers and stem pieces. Parts of plants such as stems and roots are used to grow new plants.</p> <p>Plants have behavioral adaptations including tropisms to light, to water, to gravity and</p>	<p>B 3. Describe how different plants and animals are adapted to obtain air, water, food and protection in land habitats.</p> <p>B 4. Describe how different plants and animals are adapted to obtain air, water, food and protection in water habitats.</p> <p>Expectations:</p> <ol style="list-style-type: none"> 1) Plants have physical and behavioral adaptations that allow them to survive in certain environments. 2) Plants have adaptations for getting the sunlight they need to survive. Examples include growing or facing toward sunlight and sending out chutes or tendrils to get taller than neighboring plants. 3) Plants have adaptations for protection from predators. Examples include spines, thorns and toxins (for example, poison ivy). 4) Plants have adaptations for surviving in 	<p>*Activity: Investigate: How Are Seeds Dispersed? Make a model of a seed with wings, such as a seed from a maple tree. Fold a strip of paper in half the long way and then unfold it. Cut a little less than halfway along the fold. Refold the uncut part and bend out the two cut strips so they look like wings. Put a paper clip on the bottom of the folded part. Drop the seed. How do the wings benefit the plant?</p> <p>Activity: Investigate Plant a bulb. Observe its growth. Plant a carrot top. Observe its growth. Plant the eyes of a potato. Observe and illustrate its growth.</p> <p>Activity: Explain why adaptations are essential for plant life.</p> <p>*Activity: Design experiments. How can you discover if plants turn toward the light? What materials would you use and what</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Lab *Required
<p>sensitivity to touch. All of these adaptations improve the plants chances to survive in different environments and climates.</p> <p>Plants have adaptations that help them live in different climates and under different conditions.</p> <p>Plants are a diverse group of organisms that live in many land environments. Most plants live on land. Some plants live in water.</p> <p>Plant structures such as leaves, stem, and roots are adaptations that help plants meet their basic needs.</p> <p>Plants undergo respiration as do animals.</p> <p>The leaves of plants may vary in shape and size being broad or needle shaped or rolled up.</p> <p>Plants have four basic needs: water, carbon dioxide from the air, light and nutrients.</p> <p>The leaves of plants make food by the process of photosynthesis.</p> <p>Plants need water, carbon dioxide, light and chlorophyll for photosynthesis.</p> <p>The stems of plants may be soft and flexible or stiff, they maybe thick and tough or they may</p>	<p>different environmental conditions. Examples include dropping leaves in winter when sunlight and water are limited, having needle-shaped leaves that shed snow, or surviving drought by storing water in their stems.</p>	<p>steps would you take?</p> <p>Use the microscope and identify the stomata on the underside of a leaf. (BINQ.1 Make observations and ask questions about</p> <p>*Activity: Discuss adaptations. List some adaptations we make to meet our basic needs.</p> <p>Activity: Research: Land and water plants. How do they differ?</p> <p>Activity: Investigate: How Light Affects Plants. See Appendix C. Have pupils compare the two test tubes. Have them repeat the experiment again and measure the amount of oxygen given off by the elodea.</p> <p>Activity: Research stems of the water lily, cacti and vines. How are these stems helpful to the plants?</p> <p>Activity: Research: Get To The Root of The Matter! Find out how taproots and fibrous roots serve their particular plants.</p> <p>Activity: Illustrate fibrous roots.</p> <p>Activity: Research: The Venus Flytrap: How does the adaptation for trapping insects help some plants meet their basic needs?</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Lab *Required
<p>be long and run under the ground</p> <p>The roots of plants are underground and hold the plants in the soil. They carry the nutrients from the soil to the leaves for food making or photosynthesis.</p> <p>Roots have adaptations to help plants meet their needs. Some plants have taproots, large thick roots other plants may have small roots called fibrous roots that are thin and shallow such as grass roots.</p> <p>Some plants have unusual adaptations such as trapping and digesting insects.</p> <p>Plants have reproductive adaptations. Seeds, pollen and spores are reproductive adaptations.</p>		<p>*Activity: Draw and label the parts of a flowering plant.</p> <p>Activity: Design an experiment to discover if plants search for water. How would you do this?</p> <p>Activity: Do plants respond to gravity? How would you find out? Share your designs with your class Now set up the experiments and record your findings.</p>

State Standard: 4.1- The position and motion of objects can be changed by pushing or pulling.

Forces and Motion - What makes objects move the way they do?

◆ *The size of the change in objects' motion is related to the strength of the push or pull.*

◆ *The more massive an object is, the less effect a given force will have on its motion.*

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs * Required
<p>When we give directions to get to a specific place we are describing motion (movement) and position.</p> <p>Motion is any change of position.</p> <p>In order for an object to be in motion, the object must change position.</p> <p>To describe motion or change of position, we need a frame of reference.</p> <p>A frame of reference consists of all the things around us that we use to describe motion.</p> <p>Relative motion describes the movement of an object compared with a frame of reference.</p> <p>Motion or change in position is measured by speed.</p>	<p>B 8. Describe the effects of pushes and pulls on the motion of objects.</p> <p>Expectations:</p> <ol style="list-style-type: none"> 1) An object is in motion when its position is changing. Speed describes how far an object moves in a given amount of time (for example, miles per hour). 2) A force is a push or pull that can cause an object to move, stop, or change speed or direction. 3) The greater the force, the greater the change in motion. For example, two people can push a heavy box that could not be pushed by one person alone. 4) Given an object, changing the amount of force applied to it causes measurable effects. 5) When an object does not move in response to a push or pull, it is because another 	<p>*Minds-On Activity: Pupils will write specific directions on how to get to the lunchroom from their classroom. The teacher will be looking for some reference to movement and position.</p> <p>Activity: Pupils will analyze their written directions and identify how they used motion, position and frame of reference.</p> <p>Experiment with pushing and pulling a variety of objects. Differentiate between a pull and a push.</p> <p>*Activity: Sheep in a Jeep activity.</p> <p>Use a spring scale to measure a force such as a pull force</p> <p>Measure the speed of a classmate walking across the room and then when running. Provide a definition of speed. (BINQ.10 Use mathematics to analyze, interpret and present data.)</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs * Required
<p>Speed is a measure of an object's change in position during a unit of time.</p> <p>Speed is calculated by the distance traveled divided by the time it took to go that distance.</p> <p>In the USA we use miles per hour and in Europe and in the scientific community we use kilometers per hour as units of speed.</p> <p>A force is a pull or a push.</p> <p>Forces are added and subtracted. More than one force can, and usually does act on an object at the same time.</p> <p>Forces may be measured by using a spring balance.</p> <p>The net force on an object is the combination of all forces acting on it.</p> <p>When the net force on an object is zero, the forces are said to be balanced.</p> <p>Balanced forces produce no change in the motion of an object.</p> <p>Newton's First Law of Motion: An object at rest will stay at rest unless acted on by an Unbalanced force. An object in motion will</p>	<p>equal-sized force, such as gravity or friction, is countering the push or pull. Gravity (the earth's pulling force) and friction (the force between two surfaces) are common forces that work against motion.</p> <p>B 9. Describe the effect of the mass of an object on its motion. Expectations:</p> <ol style="list-style-type: none"> 1) The amount of force needed to move an object is related to the object's mass. 2) The greater the object's mass, the greater the force needed to move it, stop it or change its speed or direction. 3) An object with a small mass is easier to stop or cause a change in motion than an object with a large mass. 4) Given the same amount of force, changing the mass of an object has measurable effects. 	<p>Activity: Given a chart of data containing miles traveled to a variety of town and the total time for each trip, pupils will calculate the speed of the vehicle for each trip.</p> <p>*Activity: Pupils will push and pull a variety of objects and describe what they did and differentiate between a push and a pull.</p> <p>*Activity: Demonstration: Have one student attempt to move a desk. Now have two students do the same task. Compare the results. What happened to the forces when two students did the task?</p> <p>*Activity: Experiment: Pupils use spring scales to measure the pull on a variety of objects. They record their results and compare data.</p> <p>Design an experiment to demonstrate the relationship between the mass of an object and the amount of force required to move it..</p> <p>Activity: Experiment: Observing Balanced and Unbalanced Forces. Use equal arm balances and standard masses. Have pupils balance and unbalance the pans, Record observations. See Appendix C or details.</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs * Required
<p>stay in motion at the same speed and in the same direction unless acted on by an unbalanced force.</p> <p>When the net force on an object is greater than zero, the forces are said to be unbalanced.</p> <p>We use our knowledge of friction by increasing or decreasing this force to benefit our purposes.</p> <p>We apply our knowledge of forces and motion to our daily lives.</p> <p>Engineers develop high –tech vehicles using their knowledge of forces, acceleration and friction.</p> <p>Mass is the amount of matter an object contains.</p> <p>The greater the mass of an object, the greater will be the force needed to move it. A force affects an object with less mass more than an object with more mass.</p> <p>Acceleration is any change in the speed or direction of an object’s motion. It always takes a force to cause acceleration.</p>	<p>Vocabulary: motion, force, speed, gravity, friction, mass, inertia</p>	<p>Demonstration: Balance and Unbalance with Seesaw. Have pupils of different weights sit at each end. Observe and record the effects and explain the results.</p> <p>Activity: Use a Quick Lab: Magic? On table place paper table cloth with plastic cup or container. Give a rapid tug on tablecloth removing it while the cup remains in place. Have pupils explain re Law of Inertia.</p> <p>*Activity: Experiment. Ball in Shoebox (one end open). Place ball in shoebox. Slide box quickly along table. Bring box to a sudden stop. Observe what happens to ball. Explain.</p> <p>*Activity: Experiment: Have pupils use a light and a heavy book. Attach each to a spring scale. Pull each across the desk. Record the amount of force required to get each book moving. What did you discover?</p>

The codes for the Student Content Outcomes and Skills are used to identify them for alignment with the State Standards. (Appendix A) 76

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs * Required
<p>The unit of mass is the kilogram. The unit of force is the Newton.</p> <p>Spring scales measure forces in newtons.</p> <p>There are many different types of scales.</p> <p>Gravity is a force that pulls all objects toward each other.</p> <p>Weight is a measure of the force of gravity between you and the earth.</p> <p>Friction is a force that keeps objects that are touching from easily sliding past each other.</p> <p>Different amounts of force are required to move the same object over different surfaces.</p>		<p>Illustrate mass and weight.</p> <p>Activity: Design an experiment to demonstrate that the greater the mass of an object, the greater will be the force needed to move or lift it.</p> <p>*Activity: Demonstrate the proper use of a spring scale to measure lifting forces and forces needed to move an object over a horizontal surface. Be sure to zero the scale before using.</p> <p>*Activity: Experiment: Mass and Weight Have pupils weigh an empty box. Fill the box with sand Have pupil weigh again. Discuss. Which had more mass? Which had more weight? Have pupils weigh a variety of objects in the classroom and identify their weight and mass. Identify how weight and mass are different.</p> <p>*Activity: Experiment: Forces on a Sliding Box. Use a spring scale. Attach to box. Place some books in box and slide box over different surfaces. Record data. What did you conclude?</p>

The codes for the Student Content Outcomes and Skills are used to identify them for alignment with the State Standards. (Appendix A) 77

State Standard: 4.4 - Electrical and magnetic energy can be transferred and transformed.

Energy Transfers and Transformations:

◆ *Electricity in circuits can be transformed into light, heat, sound and magnetic effects.*

◆ *Magnets can make objects move without direct contact between the object and the magnet.*

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs * Required
<p>Magnetism is the attraction of a magnet for another object.</p> <p>Magnets attract certain materials such as iron and steel. Magnets can be used to push, pull or pick up objects containing iron.</p> <p>Magnets have north and south poles. Magnets attract and repel each other. Like poles repel and unlike poles attract.</p> <p>The poles of any magnetic object have a stronger magnetic pull than the rest of the</p>	<p>B 16. Describe the properties of magnets, and how they can be used to identify and separate mixtures of solid materials. Expectations:</p> <ol style="list-style-type: none"> 1) Magnets pull on (attract) objects made of iron or have iron in them. Materials can be identified by using magnets, and mixtures of materials can be separated using magnets. 2) Some areas of a magnet have stronger magnetic attraction than other areas. 3) Magnets can pull (attract) or push (repel) other magnets. 4) The ends of a magnet are called “poles.” A magnet’s poles are often referred to as “north” and “south.” When the north pole of one magnet is placed near the north pole of another magnet, they repel each other; when the 	<p>Activity: Observe magnet and dancing paper clip. Record and explain observations.</p> <p>*Activity: Conduct Experiment:” What kinds of materials will magnets attract?” Use aluminum foil, copper wire, marbles, iron nails, paper clips, steel BBs, paper, wooden splints screws etc. Have pupils create a poster illustrating the materials that magnets will attract.</p> <p>*Activity: Place the like poles of the bar magnets close together and observe what occurs. Now, place the opposite poles of the bar magnets together and observe what occurs. What do you conclude about like and unlike poles? What is the law of magnets?</p> <p>Activity: Design an experiment to find out</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs * Required
<p>object.</p> <p>Magnets exert forces creating magnetic fields. A magnetic field is a region around a magnet in which magnetic attraction or magnetic pull acts.</p> <p>Magnetic field lines map out the magnetic field around a magnet.</p> <p>Magnetism can pass through a variety of materials such as glass, wood, and plastics as well as the human body.</p> <p>The earth is a magnet. The earth's magnetic poles are not the same as its geographic poles.</p> <p>Substances can be magnetized. Magnets can be made. Magnets can be permanent magnets or Temporary magnets.</p> <p>A compass is an instrument used to determine directions by means of a magnetic needle that always points to the earth's magnetic north pole.</p>	<p>south pole of one magnet is placed near the south pole of another magnet, they repel each other; when the north pole of one magnet is placed near the south pole of another magnet, they attract each other.</p> <p>5) A magnet's push or pull can cause a magnetic object or another magnet to move without direct contact. The strength of a magnet's attractive force can be measured by recording the number or mass of the objects it attracts or the distance across which it attracts objects.</p> <p>6) When a magnet, or a magnetized object such as a compass needle, is allowed to swing freely, its ends will point toward the earth's magnetic north and south poles.</p> <p>7) Magnets and electromagnets have many uses in everyday life. Examples include paper clip containers, refrigerator door seals, shower curtain weights, or a compass.</p>	<p>which part of a bar and a horseshoe magnet has the greatest pull? You may use paper clips or iron filings. Draw what you discovered. Compare what you did with your classmates. Pool your results. What did you discover?</p> <p>Activity: Discover the magnetic fields of bar and horseshoe magnets. Use photographic paper and iron filings. Place paper over magnet and sprinkle iron filing on top of paper. Leave in sunlight for 20 minutes. Remove and develop paper by immersing in water. Hang to dry.</p> <p>*Activity: Use a variety of materials such as paper, cardboard, glass, aluminum pie plate water to see if magnetism acts or goes through these materials. Record your findings.</p> <p>Activity: Make a magnet: Use an iron nail and a strong magnet. Stroke the iron nail with one pole of the magnet repeatedly moving in one direction only. Test your nail with iron filings or small paper clips.</p> <p>Activity: Construct a compass. See Pointer in Van Cleave's Magnets pages20-23 and pages34-35.Process Skills:</p> <p>Activity: Critical Thinking: Two doughnut magnets are placed on a pencil. One floats</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs * Required
<p>Magnetism is a very useful force. The Maglev Train which travels at 500 km/h is drawn forward by magnetic force. Maglevs are lifted into the air by magnetic forces. There are powerful magnets on both the train and the rails. Natural magnets are found in nature such as lodestone, magnetite and hematite. We use magnets in a variety of machines and equipment.</p>	<p>Vocabulary: magnet, attraction, repel, iron, pole, force</p>	<p>above the other. What can you conclude? A rock sample from Mars is tested. It can be picked up by a magnet. What can you conclude?</p> <p>Research and report on how magnetism is used in our daily lives. (BINQ.2 Seek relevant information in books, magazines and electronic sources of information.)</p>

State Standard: 4.4 - Electrical and magnetic energy can be transferred and transformed.

Energy Transfers and Transformations:

- ◆ *Electricity in circuits can be transformed into light, heat, sound and magnetic effects.*
- ◆ *Magnets can make objects move without direct contact between the object and the magnet.*

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs *Required
<p>Particles of matter have a property called electric charge.</p> <p>90</p> <p>A particle can have a positive (+) charge, a negative (-) charge or no charge at all (neutral).</p> <p>Matter in an object normally has equal numbers of positive and negative particles.</p> <p>When an object has more positive than negative charges its overall charge is positive. If an object has more negative than positive charges its overall charge is negative.</p> <p>We separate negative and positive charges by rubbing. Rubbing or friction pulls negative charges off one object onto another. Rubbing two objects together can move negative particles from one object to another.</p> <p>Only negative charges move. A negative charge moves to make a static charge.</p>	<p>B 14. Describe how batteries, wires and bulbs can transfer energy to light a light bulb.</p> <p>Expectations:</p> <ol style="list-style-type: none"> 1) Electric current flows (is transferred) from an energy source (battery) through a continuous loop (circuit) and back to the source. A complete circuit (also called a closed circuit) forms a closed loop that allows electric current to flow; an incomplete circuit (also called an open circuit) has a break in the loop that prevents the flow of electric current. 2) Electrical energy is changed (transformed) into light and heat energy as it passes through a bulb in a circuit. Electrical energy can be transformed into sound energy as it 	<p>Activity: Minds-On Activity: Brainstorm: What comes to mind when you think of the following words: electric charge, positive charge, negative charge, static electricity and lightening? List the words and compare your responses with your classmates.</p> <p>Activity: Research the Web. Use URL www.scilinks.org Code: GSSM321</p> <p>Define and illustrate an electric current.</p> <p>Activity: Experiment: Balloons Rubbed with Different Materials. Use scraps of wool material, silk, paper towels and plastic wrap. Rub balloons and then place near wall. Observe and record findings. Process Skill: Critical Thinking: Why do you think most objects are neutrally charged? Teacher directed instruction.</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs *Required
<p>Charge is the measure of the extra positive or negative particles that an object has. A charge causes an electric field. Static electricity consists of an electric charge on the surface of an object.</p> <p>Static electricity is electricity that does not move unless given a path. The electric fields of charged objects interact to produce electric forces.</p> <p>Objects with like charges repel each other. Objects with unlike charges attract each other. The atom consists of positive and neutral charges in its nucleus and negative particles called electrons.</p> <p>An electric current is the flow of electrons. Current is measured in amperes.</p> <p>A battery is an electric cell which supplies energy to move charges through a circuit. The energy a battery provides is measured in volts.</p> <p>A resistor is a material that cuts down the amount of current or electrons that flow in the circuit.</p> <p>We depend on electricity it generates power, to heat, cool our homes to run our appliances to communicate.</p>	<p>passes through a bell or a radio in a circuit.</p> <p>3) Adding batteries or bulbs to a circuit can produce observable changes. Electricity flowing through an electrical circuit produces magnetic effects in the wires. The electromagnet can be turned on or off, and its strength can be varied and measured.</p> <p>B 15. Explain how simple electrical circuits can be used to determine what materials conduct electricity. Expectations:</p> <ol style="list-style-type: none"> 1) Complete circuits can be made by connecting wires, batteries and bulbs in certain sequences. Circuits are completed only when certain parts of a battery, a bulb or a wire are touching (making contact). Circuit diagrams show the relative positions of batteries, bulbs and wires in complete circuits. 2) Conductors are materials that allow electric current to flow through them in an electric circuit. An open circuit can be completed by inserting a conductive material. If a bulb stays lit when an object is added to an electric circuit, the material is a conductor. 	<p>Activity: Experiment Further: Bring the charged balloons close to some puffed cereal grains. Then bring another charged balloon near a wall. What can you conclude about the effect of a charged balloon on uncharged objects?</p> <p>Activity: Discuss Lightning.</p> <p>Activity: Use piece of carpet. Have student rub shoes on carpet and then touch a friend's hand. The charges will discharge.</p> <p>*Activity: Go with the Flow state embedded task.</p> <p>Activity: Experiment: Close Encounter, Van Cleave's Physics For Every Kid, pages 28-29. Have students build a complete circuit using battery, bulbs, insulated wire (#22) bulb holder and simple switch.</p> <p>Activity: Research: Ampere</p> <p>Activity: Diagram the contents of a battery and describe how it works.</p> <p>Activity: Experiment: Build A Dimmer. See Appendix C.</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs *Required
<p>A circuit is a path made for an electric current. A current can only flow if there is a complete circuit.</p> <p>A conductor is a material that allows current to pass through easily.</p> <p>An insulator is a material that will not allow current to pass through easily.</p> <p>A switch controls when a circuit is open or closed and thus controls the flow of electricity.</p> <p>Circuits may be in series or in parallel. A series circuit has only one path in which the current may flow.</p> <p>A parallel circuit has more than one path in which the current can flow.</p> <p>An electric current produces a magnetic field around a wire. Wrapping coils of wire around an iron rod and passing electric current through these coils magnetizes the rod producing a very powerful electromagnet.</p> <p>Increasing the number of coils or using a larger iron rod increases the strength of the electromagnet.</p> <p>Electromagnets are extremely useful. They are used in electric motors, in loudspeakers, in television sets in doorbells and automatic doors.</p>	<p>3) Insulators are materials that do not allow electric current to flow through them in an electric circuit. If a bulb does not stay lit when an object is added to an electric circuit, the material is an insulator.</p> <p>4) Conductors can be tested to compare how easily they allow electricity to flow through them.</p> <p>Vocabulary: electric current, energy source, battery, contact, complete/closed circuit, incomplete/open circuit, conductor, insulator, switch.</p>	<p>Activity: Compose a short account of what it would be like to live in a world without electricity, A World Without Electrical Power. (Optional)</p> <p>*Activity: Experiment: Find out which materials are conductors and which are non-conductors, which are insulators. Activity: Create an open circuit. Use variety of materials such as paper clips, pennies, toothpicks, rubber bands, etc. See Appendix C for full details. Have pupils wear goggles for this activity.</p> <p>Activity: Experiment: Build A Switch. See Appendix C.</p> <p>Activity: Experiment: Build a Series and a Parallel Circuit. See Appendix C.</p> <p>Activity: Experiment: Constructing an Electromagnet, Van Cleave’s Physics For Kids, pages 48-49.</p>

Standard: 4.3 - Water has a major role in shaping the Earth’s surface.

Energy in the Earth’s Systems - How do external and internal sources of energy affect the Earth’s systems?

◆ *Water circulates through the Earth’s crust, oceans and atmosphere.*

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs * Required
<p>Moving water is a powerful force for changing the earth’s surface.</p> <p>The surface of the earth is constantly changing.</p> <p>Over time, physical forces are continuously interacting to change the landforms of the earth.</p> <p>Landforms are rock cliffs, mountains, canyons and beaches.</p> <p>Forces from nature such as wind, rain, floods, moving water, and glaciers slowly change the earth’s surface.</p> <p>Sudden processes such as the eruption of volcanoes and the action of earthquakes rapidly change the earth’s surface.</p> <p>Water weathers the earth’s surface by wearing away the rock surface and breaking rocks into tiny pieces called sediment.</p>	<p>B 12. Describe how the sun’s energy drives the water cycle. (Review from Gr. 3) Expectations: 1) Water is continuously moving between Earth’s surface and the atmosphere in a process called the water cycle. Water evaporates from the surface of the earth, rises into the air and cools, condenses, collects in clouds, and falls again to the surface as precipitation. The energy that causes the water cycle comes from the sun.</p> <p>B 13. Describe the role of water in erosion and river formation. Expectations:</p> <p>1) Water moving across the earth in streams and rivers pushes along soil and breaks down pieces of rock in a process called erosion. The moving water carries away rock and soil from some areas and deposits them in other areas, creating new landforms or changing the course of a stream or river.</p>	<p>Activity: Investigate The Effects of Moving Water See Appendix C.</p> <p>*Activity: Brainstorm: What comes to mind when you think of the changes on the earth’s surface?</p> <p>Activity: Describe some of the landforms of Norwalk, of Connecticut.</p> <p>.</p> <p>*Activity: Investigate: How does wind and ice shape the land? See Appendix C. (Optional)</p> <p>Activity: Investigate Gigantic Frozen Sandpaper. See Appendix C.</p> <p>Activity: Describe processes that promote rapid change. Cite examples.</p> <p>*Activity: Illustrate the process of sedimentation.</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs * Required
<p>Water erodes the earth's surface by carrying away the sediment formed from one place to another.</p> <p>Sediments are formed by weathering are carried by erosion and the dropped in a new place by the process of deposition.</p> <p>Wind and ice in the form of glaciers can cause weathering of landforms and erosion. Wind can form sand dunes. Ice can carve U shaped valleys.</p> <p>The earth consists of three layers: the crust, the mantle and the center part, the core. The crust is made of solid rock. The mantle is made of solid rock and soft rock and the core is liquid iron and nickel and an inner part of solid iron.</p> <p>The earth's surface is made up of broken pieces called plates, which float on the soft part of the mantle.</p> <p>Mountains are the highest landforms and form as the earth's crust folds or bends due to the movement of its plates.</p> <p>A volcano is a mountain formed by lava and</p>	<p>2) The amount of erosion in an area, and the type of earth material that is moved, are affected by the amount of moving water, the speed of the moving water, and by how much vegetation covers the area.</p> <p>3) Rivers carve out valleys as they move between mountains or hills. The speed of the river's flow depends on the slope of the land. The speed of the river's flow affects the shape of the river's course (straight or meandering), the shape of the valleys it carves (u-shaped or v-shaped) and the amount of earth material that is pushed along or left behind in floodplains and deltas.</p> <p>4) Water moving inn ocean waves carries sand, shells and debris away from some coastal areas and deposits them in new areas, changing the shape of the coastline.</p> <p>5) Erosion is constantly reshaping the earth's land surface. Sometimes the effects of erosion are immediate (for example, a flash flood or a hurricane) and sometimes the effects of erosion take a long time (for example, the changing course of a river or carving</p>	<p>*Activity: Provide examples of erosion in daily life.</p> <p>Activity/Experiment: How water changes the Earth's surface. Use stream tables to investigate this.</p> <p>Activity: Investigate: At the Beach: Where does sand come from? Where does it go? Find out how moving water affects sand on the beach.</p> <p>Activity: Science Literature Connection: Read One Day in the Desert by Jean Craighead George.</p> <p>Activity: Research: Glaciers and their impact on the environment.</p> <p>Explain how earthquakes occur</p> <p>*Activity: Construct a model of the layers of the earth. Label each part.</p> <p>Activity: Explain what we mean by a theory. Illustrate the action of moving plates using any materials of your choice.</p> <p>Activity: Select a famous mountain range. Research this range and report what you have</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs * Required
<p>ash. Lava is magma and ash and consists of small pieces of hardened lava. Most volcanoes form at plate boundaries.</p> <p>An earthquake is the shaking of the ground caused by the sudden release of energy in the earth's crust when the plates move, collide or slide over each other.</p> <p>Magnitude is the measure of energy that the earthquake releases.</p> <p>Continental drift is the theory of how the earth's continents move over the surface of the earth.</p> <p>Fossils are the remains and traces of dead organisms that tell us what life was like in the past and how the earth's surface has changed.</p> <p>Geologists are scientists who study the changes of the earth.</p> <p>Technology such as the Geosat satellite is providing new ideas</p> <p>How the earth changes significantly affects our lives.</p>	<p>the Grand Canyon).</p> <p>Vocabulary: erosion, weathering, valley, flood plain, delta, mountains, earthquakes, volcanoes</p>	<p>learned to the class. (Optional)</p> <p>Activity: Research the Web: Kilauea. The largest active volcano found in Hawaii.</p> <p>Activity: Research: The different kinds of volcanoes: shield, cinder cone and composite. Obtain pictures or illustrations to share with class.</p> <p>Activity: Research: Seismic Waves</p> <p>Activity: Research: The Richter Scale</p> <p>*Activity: Research: Pangea and the Theory of Continental Drift.</p> <p>Activity: Describe what the science of geology is and what the role of a geologist is.</p> <p>Activity: Construct a booklet on the topic of Our Restless and Changing Earth. Highlight what you have learned in this unit of study and describe how these changes impact on our lives and what we can do to ensure our survival.</p>

State Standard: 4.2 - All organisms depend on the living and non-living features of the environment for survival.

Matter and Energy in Ecosystems - How do matter and energy flow through ecosystems?

◆ *When the environment changes, some organisms survive and reproduce*

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs * Required
<p>Human activities affect ecosystems. Changes in the ecosystem may lead to the decline or ext</p> <p>Human activities that contribute to the endangerment and extinction of plant and animal life are:</p> <ul style="list-style-type: none"> hunting building new roads building homes reducing the size of natural habitats, importing exotic disease-carrying organisms air and water pollution acid rain oil spills destruction of the ozone layer use of pesticides such as DDT global warming <p>Natural events such as floods, fires, droughts, erupting volcanoes, strong hurricanes may destroy habitats.</p> <p>Extinction is the death of a species and is</p>	<p>B 11. Describe how natural phenomena and some human activities may cause changes to habitats and their inhabitants.</p> <p>Expectations:</p> <p>1) Environments are always changing. Some changes occur naturally (examples include disease outbreaks, violent storms, forest fires sparked by lightning). Other changes are caused by human activity (examples include establishing conservation areas, passing laws to control pollution, clearing forest for agriculture or construction, applying chemicals to lawns and crops, burning fossil fuels, etc).</p> <p>2 Changes in an environment are sometimes beneficial to organisms and sometimes harmful. For example, a newly created beaver pond provides habitat that attracts frogs and raccoons to an area; but trees, earthworms and moles are no longer able to survive in the area.</p> <p>3) When environments change, some</p>	<p>*Activity: Minds-On Activity: Brainstorm: List the kinds of human activities that would affect ecosystems and result in a decline or extinction of populations</p> <p>Activity: Have students work in small groups. Each group will research a human activity which is a key factor endangering the health and survival of an animal or plant species. The resultant product will be a combined chart and a series of dioramas depicting their findings.</p> <p>Research and report on a species. (BINQ.2 Seek relevant information in books, magazines and electronic sources of information.)</p> <p>Activity: Have pupils report on a variety of animals that are extinct such as the Carolina parakeet and the Mexican grizzly bear and describes the conditions that caused these extinctions.</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs * Required
<p>forever.</p> <p>The biggest cause of extinction today is habitat destruction.</p> <p>Some extinct animals of the USA are the Caribbean monk seal, the Mexican grizzly bear, the Carolina parakeet and the Passenger pigeon.</p> <p>Endangered organisms are those that have a population so small that they are likely to become extinct if steps are not taken to save them. Some endangered animals of the USA are the Whooping crane, the California condor, the Florida manatee and the Mexican wolf.</p> <p>Threatened organisms may become endangered if not protected. . Some threatened animals of the USA are the Spotted owl, the American bison and the California sea otter.</p> <p>Human action can help restore the endangered species population. People must develop environmental awareness, pass and enforce laws to protect the survival of plants and animals.</p> <p>Environmental engineers and conservationists work to save and restore our living and earth resources.</p>	<p>organisms can accommodate the change by eating different foods or finding different shelters (for example, hawks nest on city buildings and consume pigeons and rats). Those organisms that can no longer meet their basic needs die or move to new locations.</p> <p>Vocabulary: extinction, pollution, habitat destruction</p>	<p>*Activity: Construct a collage depicting endangered animals or plants. Describe the efforts that are being made to save these organisms. Describe the consequences should they die.</p> <p>Activity: Have pupils research the currently threatened animals such as the Brown Pelican and the Bald eagle and report on what efforts are being made to save these birds.</p> <p>Activity: Have pupils research the successful steps taken to save the California condor. Discuss the work of the EPA.</p> <p>Activity: Invite a representative from the local or state office to visit the class and describe how we in the community can help to save habitats and conserve and take care of our natural resources</p> <p>*Activity: Acid Rain and Its Effects. For detailed descriptions of all of these experiments, see The Hands-On Appendix C.</p>

State Standard: 2.2 – Plants change their forms as part of their life cycles..

Structure and Function - How are organisms structured to ensure efficiency and survival?

◆ *The life cycles of flowering plants includes seed germination, growth, flowering, pollination, and seed dispersal.*

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs * Required
<p>Plants are a diverse group of organisms that live in many land environments.</p> <p>Plants are affected by both their genetic makeup and their interaction with their environment</p> <p>Plants have basic needs in order to survive. The basic needs of plants are air, water, light and soil.</p> <p>Plants have specific structures that improve their ability to survive in a specific environment.</p> <p>Mosses are nonvascular plants.</p> <p>Mosses reproduce with spores. A spore is a single reproductive cell that is protected by a hard watertight covering, which prevents the cell from drying out.</p> <p>Spores are small and can be transported through the air.</p>	<p>A19. Describe the life cycles of flowering plants as they grow from seeds, proceed through maturation and produce new seeds.</p> <p>Expectations:</p> <p>1) Flowering plants progress through a sequenced life cycle. First, seeds sprout (germinate), then seedlings grow into adult plants with leaves and flowers. If the flowers are pollinated, seeds develop that will grow into new plants to continue the life cycle.</p> <p>2) Roots, stems, leaves, flowers and seeds are structures that develop during different stages of the plant’s life cycle.</p> <p>3) Seeds contain the beginnings of a new plant (embryo) and the food (energy source) the new plant needs to grow until it is mature enough to produce its own food. Different plant varieties produce seeds of different size, color and shape.</p> <p>4) Environmental conditions, such as temperature, amount of light, amount of water and type of soil affect seed germination and</p>	<p>Activity: Pupils collect pictures of a diversity of plants.</p> <p>Research the Web and report on the basic structures plant need in order to survive in a dry environment. (BINQ.8 Search the web and locate relevant science information.)</p> <p>*Activity: Pupils design and set up an experiment selecting one factor or variable to illustrate one basic plant need. Pupils share their designs with class. (BINQ.3 Design and conduct simple investigations.)</p> <p>Describe the characteristics of spores and the advantage they provide for reproduction of the species.</p> <p>Activity: Pupils chart the advantages of spore reproduction.</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs * Required
<p>Offspring from spores can grow in places that are far from the parent organisms.</p> <p>Leaves produce food for the plant by the process of photosynthesis.</p> <p>Flowering plants reproduce by seeds.</p> <p>Seeds are an important plant adaptation. Seeds contain an embryo which is an immature form of an organism that will grow and develop when the condition are right for it to grow.</p> <p>A seed will grow when moisture, temperature and other conditions are right.</p> <p>Germination is the beginning of growth of a new plant from a spore or a seed.</p> <p>Trees, bushes, flowers and grasses are all seed plants.</p> <p>A seed differs from a spore. A seed contains an embryo while a spore is made up of one cell.</p> <p>Flowering plants reproduce from seeds. The flower of the flowering plant contains both the male and female parts necessary for reproduction.</p> <p>The pistil is the female part and the anthers</p>	<p>plant development.</p> <p>5) A plant's seed will grow into a new plant that resembles but is not identical to the parent plant or to other new plants. For example, marigold plants produce marigold seeds that grow into new marigold plants. Individual marigolds, however, vary in height, number of leaves, etc.</p> <p>6) Seedlings are young plants that produce the structures that will be needed to survive in its environment: Roots and leaves begin to grow and take in nutrients, water and air; and the stem starts to grow towards sunlight.</p> <p>7) Adult plants form more leaves that help the plant collect sunlight and air to make its food. They produce flowers that are structures responsible for reproduction.</p> <p>8) Flowers have structures that produce pollen, attract pollinators and produce seeds that can grow into new plants. Some flowers have structures that develop into fruits, berries or nuts that contain the seeds that can grow into new plants.</p> <p>9) Some seeds fall to the ground and germinate close to the parent plant; other seeds are carried (dispersed) by wind, animals, or water to places far away. The structure of the seed is related to the way it is dispersed.</p>	<p>Activity: Pupils prepare a concept map of photosynthesis functions of the structures of vascular plants.</p> <p>Explain why we view seeds as a very important plant adaptation.</p> <p>Explain the advantage seeds have over spores in the reproductive process. Use a Venn diagram to compare seeds and spores.</p> <p>Design and conduct an experiment on seed germination. Identify the conditions under which seeds will grow or germinate. (BINQ.10 Use mathematics to analyze, interpret and present data.)</p> <p>Activity: Pupils do Seed Germination See Appendix C.</p> <p>Activity: Pupils research the Web on the diversity of seeds available.</p> <p>*Activity: Pupil examine model of a flower and illustrate and label its parts.</p> <p>*Activity: Pupils will illustrate and label the process of pollination.</p>

The codes for the Student Content Outcomes and Skills are used to identify them for alignment with the State Standards. (Appendix A) 90

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs * Required
<p>are the male parts. The anthers produce pollen grains. The pistil contains the ovary.</p> <p>Fertilization occurs when the pollen is caught on the pistil and grows a pollen tube, which reaches the ovary and fertilizes the egg.</p> <p>The wind and many insects help in the process of moving the pollen from the stamens of the flower to the pistil.</p> <p>The fertilized egg grows into an embryo and develops a seed coat.</p> <p>The ovary develops into a fruit</p> <p>When the fruit is eaten and the seeds are dispersed, this is the start of a new cycle.</p> <p>Seeds have many adaptations to ensure their dispersal.</p> <p>The wind and many insects help in the process of moving the pollen from the stamens of the flower to the pistil.</p> <p>Plants capture the sun's energy to produce sugars and carbohydrates and produce oxygen, the oxygen humans and all animals need in order to live.</p> <p>Vascular plants are plants that have specialized tissues for moving food and</p>	<p>Vocabulary: seed, germinate, reproduce, flower, pollen, pollinator, seed dispersal, structural parts</p>	<p>Activity: Pupils will diagram the life cycle of a flowering plant.</p> <p>Activity: Pupils will dissect a fruit. See Appendix C.</p> <p>Activity: Pupils write article in their science journal on how plants play a critical role in our lives be it in terms of our food supply or medicine or shelter.</p> <p>*Activity: Pupils do experiment, The Parts of a Vascular Plant. See Appendix C.</p> <p>*Activity: Pupils illustrate and label the structures and functions of vascular and non-vascular plants.</p>

The codes for the Student Content Outcomes and Skills are used to identify them for alignment with the State Standards. (Appendix A) 91

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs * Required
<p>water throughout the plant. Vascular plants have roots, stems, and leaves.</p> <p>Non vascular plants do not have vascular tissue. Water and nutrients move through their nonvascular bodies cell by cell.</p> <p>Flowering plants are vascular plants. They have roots, stems, leaves, flowers and fruits</p> <p>Roots serve to anchor the plant and obtain nutrients from the soil.</p> <p>Stems serve to transport materials from roots and leaves to all parts of the plant.</p>		

The codes for the Student Content Outcomes and Skills are used to identify them for alignment with the State Standards. (Appendix A) 92

State Standard: 5.1 - Sound and light are forms of energy.

Energy Transfer and Transformations - What is the role of energy in our world?

- ◆ *Sounds is a form of energy that is produced by the vibration of objects and is transmitted by the vibration of air and objects.*
- ◆ *Light is a form of energy that travels in a straight line and can be reflected by a mirror, refracted by a lens, or absorbed by objects.*

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs * Required
<p>Energy is the ability to do work.</p> <p>Sound is a form of energy.</p> <p>Sound is a very useful form of energy that affects our lives.</p> <p>The vibration of objects produces sound.</p> <p>Sounds may differ in terms of frequency resulting in different pitches.</p> <p>Sounds may differ in terms of volume resulting in the loudness or softness of the sound.</p> <p>The pitch of a sound can be changed.</p> <p>The amplitude or loudness of a sound can be changed.</p> <p>Most sounds we hear are noises. Noise is</p>	<p>B 17. Describe the factors that affect the pitch and loudness of sound produced by vibrating objects.</p> <p>Expectations:</p> <ol style="list-style-type: none"> 1) There are a variety of sounds in our environment. Sounds have characteristics such as loudness, pitch and quality (timbre) that allow them to be identified. 2) For sound to occur, there must be a vibrating object, a material through which the vibrations are transferred (for example, air or water) and a receiver (for example, an ear) to perceive the sound. 3) Objects can be caused to vibrate by actions such as striking, strumming, bowing, plucking or blowing. 4) Sounds can vary in loudness (volume). Volume is affected by the 	<p>Activity: Discuss the term energy. Pupils brainstorm the words that come to mind when they think of “energy” and compile a list.</p> <p>Activity: Pupils brainstorm the word “sound” and compile a list. Pupils relate words from these lists and explain why they paired or grouped together. How many of these words can they relate to sound?</p> <p>Activity: Pupils describe what life would be like without sound. They then compile a list of the many ways sound that sound is useful to us in our daily lives.</p> <p>Use a variety of materials to create sound and conclude that sound is produced by vibration.</p> <p>Construct a kazoo and explain how it works.</p> <p>Activity: Pupils make sounds using a piece of paper, a rubber band, a pencil, their feet and hands.</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs * Required
<p>any sound, especially a nonmusical sound that is made up of random sounds with varying pitches.</p> <p>Different instruments produce different vibrations resulting in different sounds varying in pitch and amplitude.</p> <p>Scientists use sound waves to map the ocean floor. Sonar is sound navigation and ranging. Echolocation is the use of sound waves that reflect or bounce off objects to find objects. Sonar is a form of echolocation. Most sounds we hear are noises. Noise is any sound, especially a nonmusical sound that is made up of random sounds with varying pitches.</p> <p>Sound waves are longitudinal waves. They move by compressing the air in front of them. When they swing back, the air expands.</p>	<p>strength of the force causing the vibration. For example, striking a drum forcefully or gently produces sounds with different volumes.</p> <p>5) Sounds can have a high or low tone (pitch). The pitch of a sound depends on the speed of the vibration. Objects that vibrate quickly have a high pitch, while those that vibrate slowly have a low pitch.</p> <p>6) Pitch is affected by characteristics such as shape, length, tension or thickness of the vibrating material (for example, the vibrating material may be a string, a glass, a wire or a drum).</p> <p>B 18. Describe how sound is transmitted, reflected and/or absorbed by different materials. Expectations:</p> <p>1) Sound travel (is transmitted) through materials by causing them to vibrate. Sound is not transmitted if there are no materials to vibrate. Solids, liquids and gases (air) transmit sound differently.</p> <p>2) Sounds can be reflected or absorbed,</p>	<p>Construct a straw flute and vary the length of the straw. Describe sound of high frequency as high pitch and those of low frequency as low pitch</p> <p>*Activity: Pupils are given a diagram of a series of sound waves and label the amplitude, wavelength, crest and trough.</p> <p>Activity: Pupils construct The Spoon Bell. See Van Cleaves Physics For Kids, pp.230-231 or See Appendix C. Demonstrate how the pitch of a sound can be changed.</p> <p>Activity: Amplitude and Loudness Experiment. See Appendix C.</p> <p>Activity: Pupils construct a musical scale with water glasses or soda bottles. They describe how the pitch changes. See Van Cleaves` Physics For Kids”pp.216-217 and pp. 178-179 or use Appendix C.</p> <p>Activity: Pupils gather a variety of musical instruments, demonstrate, and identify different pitches.</p> <p>*Activity: Demonstration: Teacher uses a variety of tuning forks to demonstrate the different pitches of sounds.</p> <p>Activity: Pupils discuss and research: “When sound music is and when is sound noise?”</p> <p>Activity: Pupils research a variety of sound</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs * Required
<p>The ear has three parts: the outer ear, middle ear, and inner ear. Sound waves make the eardrum vibrate. Vibrations from the eardrum travel through the middle ear to the inner ear. The brain receives signals and changes them to sounds we hear. Most human s hears sounds when an object vibrates between 20 and 20000 times per second.</p> <p>The human ear and the telephone both have structures that respond to and transmit sound vibrations.</p>	<p>depending on the properties of the material it hits. Sounds tends to bounce off smooth, hard surfaces, producing an echo; sound tends to be absorbed by soft, porous surfaces, producing a muffled sound.</p> <p>B 21. Describe the structure and function of the human senses and the signals they perceive.</p> <p>Expectations:</p> <ol style="list-style-type: none"> 1) Animals have sense organs that are structured to gather information about their environment. Information perceived by the senses allows animals to find food, water, mates and protection. 2) Each sense organ perceives specific kinds of stimuli. Some human senses are more or less developed than the senses of other animals. 3) The human ear is structured to collect sound vibrations from the environment and pass them through the middle ear (eardrum and small bones) and inner ear (hair-lined tubes) to the auditory nerve where they are transformed into electrical signals that are sent to different parts of the brain. <p>Vocabulary: sound, pitch, vibration, volume, reflect, transfer, absorb, echo</p>	<p>instruments from different cultures and construct a bulletin board classifying the various instruments as string, percussion, and wind.</p> <p>Read, research and report on sonar and its uses. (BINQ.2 Seek relevant information in books, magazines and electronic sources of information.)</p> <p>*Activity: Pupils investigate vibrations using a tuning fork. They strike the fork gently and then place it rapidly in a bowl of water. They record their observations and explain what they think happened.</p> <p>Activity: Pupils construct and use a string telephone. They explain how sound was transmitted.</p> <p>Activity: Teacher demonstrates wave action by using a slinky and diagrams the compression and expansion of air molecules. See Waves with Slinky in Van Cleaves` Physics For Kids, pp.178-179 or See Appendix C.</p> <p>*Activity: Pupils use a diagram of the human ear. They label all parts and trace a sound wave moving through the various part of the outer and inner ear.</p> <p>*Activity: Pupils compare and contrast the structures of the human ear and the telephone. Pupils label a diagram of a telephone and identify the structures that are comparable in the human ear.</p>

State Standards: 5.2 - Perceiving and responding to information about the environment is critical to the survival of organisms.

Structure and Function: How are organisms structured to ensure efficiency and survival?

- ◆ *The sense of organs perceive stimuli from the environment and send signals to the brain through the nervous system.*

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs * Required
<p>Energy is the ability to do work.</p> <p>Light is a form of energy.</p> <p>Light can be obtained from natural sources and from artificial sources.</p> <p>Light affects our lives.</p> <p>Some plants and animals make their own light.</p> <p>Light from the sun and stars is produced by nuclear fusion reactions.</p>	<p>B 19. Describe how light is absorbed and/or reflected by different surfaces. Expectations:</p> <ol style="list-style-type: none"> 1) Light travels in straight paths away from a source of illumination in all directions until it hits an object. Some sources of illumination produce their own light (for example, the sun, fire, light bulb); other sources of illumination reflect light produced by something else (for example, the moon or a mirror). 2) Light interacts with objects in various ways; it can be reflected off the object, absorbed by the object, or refracted through the object. 3) Materials can be classified based on how much light passes through them. Transparent materials allow most light to pass through them. Translucent materials allow some light to pass through them. Opaque materials do not allow any light to pass through them. 4) Objects that have flat, smooth surfaces 	<p>Activity: Pupils discuss their concept of energy and list the different types of energy.</p> <p>Activity: Pupils obtain and display illustrations of natural and artificial sources of light.</p> <p>Activity: Pupils differentiate between natural and artificial light and cite examples of how these forms are generated.</p> <p>Activity: Pupils prepare lists of how light affects our lives, compare their lists and summarize the data.</p> <p>Activity: Pupils search the Web and report on bioluminescence. (BINQ.2 Seek relevant information in books, magazines and electronic sources of information.)</p> <p>Activity: Pupils do experiment: Straight Lines. Use notched cards, flashlight, clay and ruler. Line and misline card using notches. Van Cleaves` Physics For Every Kid, pp.180-181 or See Appendix C.</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs * Required
<p>Light travels in a straight line.</p> <p>Light is a form of energy that can be absorbed by objects.</p> <p>Some materials are transparent to light, Some materials are others are translucent and some are opaque.</p> <p>Light rays are refracted when they pass through something curved</p> <p>A curved piece of glass or plastic can be a lens.</p> <p>Light is a form of energy that can be reflected by a mirror.</p> <p>A droplet of water can serve as a lens.</p> <p>There is a variety of lenses such as convex and concave lenses.</p>	<p>reflect light and produce mirror-like images. Objects that have curved or uneven surfaces scatter the reflected light and produce distorted or blurry images.</p> <p>5) Light always reflects away from a mirror at the same angle that it hits the mirror. The angle of incoming light equals the angle of reflected light.</p> <p>6) Objects that block light traveling from the source produce shadows. The shape, length, direction and clarity of a shadow depend on the shape and position of the object.</p> <p>7) Light that strikes a material at an angle changes direction (refracts) as it passes from one transparent material to another (for example, as it passes from air to water or through lenses).</p>	<p>*Activity: Pupils design an experiment to demonstrate that some materials or objects absorb heat. Provide pupils with thermometers. Use format of scientific method</p> <p>Activity: Lamp and Fabric Experiment, See Appendix C.</p> <p>Activity: Demonstrate with solar calculator.</p> <p>Activity: Pupils make sun prints using blueprint paper and small opaque objects.</p> <p>*Activity: Process Skills: Pupils describe what happens, predict what will happen if they use transparent objects and translucent objects and test their hypotheses.</p> <p>*Activity: Pupils conduct a Mirror Experiment. Illustrate the path in which light travels. See Appendix C. Observe and describe the reflection of light.</p> <p>Activity: Pupils conduct “Pencil in Water” experiment.</p> <p>Activity: Differentiate among materials that are transparent, translucent and opaque and cite examples of each</p> <p>Activity: Pupils conduct the “See Through” Experiment, Van Cleaves` Physics For Kids,</p>

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Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs * Required
	<p>B 20. Describe how light absorption and reflection allow us to see the shapes and colors of objects.</p> <p>Expectations:</p> <ul style="list-style-type: none"> 1) For anything to be visible, light must be present. For a person to see an object, the light it reflects or produces must have a straight, unobstructed path to the eye. 2) Human eyes have receptors for perceiving shades of red, orange, yellow, green, blue, indigo and violet. 3) Sunlight (or white light) is a combination of colors. White light passed through prisms, water droplets or diffraction gratings can be refracted to show its component colors: red, orange, etc. 4) The perceived color of an object depends on the color of the light illuminating it and the way the light interacts with the object. The color humans see is the color that is reflected by the object. For example, an object that appears green is absorbing all colors except green, which is reflected to the eye. 	<p>pp.182-183.</p> <p>Activity: Pupils conduct the “Water Prism” Experiment, Van Cleaves` Physics For Kids pp. 188-189. Observe and describe the refraction of light.</p> <p>Activity: Pupils construct a periscope.</p> <p>Activity: Pupils make a water lens and describe what is happening.</p> <p>*Activity: Teacher displays a variety of lenses and illustrates what they do. Pupils illustrate the light rays passing through a convex and a concave lens. Compare and contrast the size of an object when seen with and without a water lens</p> <p>*Activity: Pupils use a diagram of the human eye.</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs * Required
	<p>B 21. Describe the structure and function of the human senses and the signals they perceive.</p> <p>Expectations:</p> <ol style="list-style-type: none"> 1) Sense organs transfer information through a network of nerves to the brain where it is interpreted and responded to. The brain responds by sending messages to all parts of the body. The type of response and the amount of time it takes for the response to occur vary depending on the stimulus. 2) The human eye is structured to collect light through the cornea and the pupil. The amount of light that enters the eye is controlled by the iris. The cornea and the lens refract the light and focus it onto the retina and the optic nerve where it is transformed into electrical signals that are sent to different parts of the brain. 3) Human skin is structured to detect information related to texture, temperature, pressure and vibration. Each sensation has different receptors distributed around the body; some areas of the body have greater concentrations of receptors for certain sensations, making those areas more sensitive than others to texture, temperature, or pressure. 4) Human noses are structured to collect and detect chemicals floating in the air 	<p>They label all parts and trace a light ray moving through the various parts and relate the parts to a camera.</p> <p>Activity: Catch It state embedded task.</p> <p>Activity: explore the senses of taste, smell and touch.</p> <p>SEE Optical Technologies standard.</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs * Required
	<p>(odors). Tiny hairs behind the nose have special receptors that respond to airborne chemicals and produce electrical signals that are transmitted to different parts of the brain by the olfactory nerve.</p> <p>5) Human tongues are sense organs that are structured for detecting chemicals dissolved in saliva (flavors). Taste buds respond to 4 basic tastes: salty, sweet, sour and bitter.</p> <p>Vocabulary: reflect, absorb, refract, transparent, translucent, opaque, angle, sense organ, receptor, stimulus, response, nervous system, vibration, refract, cornea, pupil, iris, lens, retina, white light</p>	

State Standard: 5.3 - Most objects in the solar system are in a regular and predictable motion.

Earth in the Solar System - How does the position of Earth in the solar system affect the conditions on our planet?

- ◆ *The movement of the Earth and the moon relative to the sun explains the cycles of day and night, the monthly moon phases and the yearly seasons.*

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs * Required
<p>The sun is a star.</p> <p>The earth spins or rotates on its axis, which is an imaginary line that passes through the earth’s center and its north and south poles.</p> <p>The earth’s rotation causes day and night.</p> <p>When one part of the earth’s surface faces the sun, that part has daylight. When one part faces away from the sun, that part has night.</p> <p>The earth is a planet.</p> <p>The moon is the earths nearest neighbor.</p> <p>The moon is a satellite.</p>	<p>B 20. Describe how light absorption and reflection allow us to see the shapes and colors of objects:</p> <p>B 22. Explain the cause of day and night based on the rotation of Earth on its axis.</p> <p>Expectations:</p> <ol style="list-style-type: none"> 1) The sun, Earth and its moon are spherical objects that move in two ways: they spin (rotate) and they change positions relative to each other (revolve). 2) The sun is a star that produces light that travels in straight lines away from the sun in all directions. Light from the sun illuminates objects that reflect light, including Earth and its moon. The side of the earth that is facing the sun experiences daylight; the side of the earth facing away from the sun experiences night. All parts of the earth experience a cycle that includes both day and night, providing evidence that 	<p>Activity: Pupils describe stars and the significance of our sun. Activity: Pupils do experiment: Distant Star. See Appendix C.</p> <p>Activity: Pupils demonstrate a method to prove that the earth rotates. Do experiment Rotate. See Appendix C. *Activity: Pupils demonstrate rotation using their bodies and illustrate rotation using a diagram.</p> <p>Activity: Pupil constructs a model of the planets in our solar system.</p> <p>Activity: Pupils do experiment: Same Place. See Appendix C.</p>

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs * Required
<p>The moon’s surface is very different from the earth’s surface in that it has a large number of craters.</p> <p>The moon is the brightest object in the night sky and the earth’s nearest neighbor.</p> <p>Both the earth and the moon are pulled by the sun’s gravity.</p> <p>The moon is held in its path or orbit around the earth by the earth’s gravity.</p> <p>Like the earth, the moon rotates on its axis. It takes the moon about 28 days or a month to complete one rotation.</p> <p>The moon always has its same side to the earth as it rotates. We always see the same side of the moon since the moon makes one rotation on its axis in 28 days.</p> <p>The moon is visible to us because it reflects the sun’s light.</p> <p>As the moon moves around the earth its position in the sky changes. This produces different shapes or phases of the moon.</p>	<p>the earth is rotating on its axis.</p> <p>3) The amount of time it takes for the earth to rotate once on its axis is regular and predictable (24 hours), and is called a “day.” Earth’s rotation makes it appear as if the sun is moving across the sky from east to west.</p> <p>B 23 Describe the monthly changes in the moon’s appearance related to its orbit around the Earth.</p> <p>Expectations:</p> <p>.1) The moon is a rocky object that revolves around the earth on its axis in a circular path called an orbit. The amount of time it takes for the moon to revolve once around the earth is about 29 days and is called a “lunar month.”</p> <p>2) Half of the moon is always illuminated by the sun. Phases of the moon occur because a different portion of the lit half of the moon is visible from the Earth each day as the moon revolves around the earth.</p> <p>3) At the beginning of a lunar month, no lit part of the moon is visible from the Earth (new moon). As the moon progresses through the</p>	<p>*Activity: Pupils construct a model of the earth and its satellite moon.</p> <p>Activity: Pupil does experiment: The Moon’s Craters, See Appendix C.</p> <p>Activity: Pupil does experiment: Plop. See Appendix C.</p> <p>Activity: Splatter. Pupils do experiment: Splatter, See Appendix C.</p> <p>Activity: Compare the moon’s surface with the earth’s surface. Illustrate a crater and its formation</p> <p>Activity: Pupils do experiment Spinner. See Appendix C. BINQ.3 Design and conduct simple investigations</p> <p>*Activity: Pupils demonstrate why we always see the same side of the moon. Do experiment Face Forward. See Appendix C.</p> <p>Activity: Pupils demonstrate how and why the moon shines. Do experiment Shiner. See Appendix C.</p> <p>Activity: Pupils do experiment Changes demonstrating reflected light from the moon’s</p>

The codes for the Student Content Outcomes and Skills are used to identify them for alignment with the State Standards. (Appendix A) 102

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs * Required
<p>Eclipses occur when an object passes through the shadow of another object.</p> <p>During a solar eclipse, the earth passes through the moon's shadow. In a solar eclipse, the moon is directly in the path of the sun blotting out the sun. The sun is no longer visible.</p> <p>During a lunar eclipse, the moon passes through the earth's shadow. In a lunar eclipse, the earth is directly in the path of the sun's rays blotting out the moon. Astronomers have a variety of tools such as telescopes and satellites to explore space.</p> <p>Astronomers use a variety of instruments and satellites in their exploration of space.</p> <p>The earth and moon revolve around the sun.</p> <p>The earth revolves or goes around the sun in a path called an orbit.</p> <p>It takes the earth 365 days or one year to make a complete journey around the sun.</p>	<p>first two quarters of its complete trip around the earth, larger portions of the right side of the moon are illuminated each day. When the moon has completed half of its trip around the earth, the full moon is illuminated. During the third and fourth quarters of the moon's trip around the earth, the illuminated portion gradually decreases so only the left side is illuminated and finally no lit portion of the moon is visible from the Earth again.</p> <p>4) Like the sun, the moon appears to rise at the eastern horizon and set at the western horizon due to the earth's rotation. From one day to the next, when observed at the same time from the same location, the moon's position in the sky varies in predictable ways.</p> <p>Vocabulary: sphere, illuminate, reflect, rotate, day/night cycle (24-hour rotation period), horizon, orbit, revolve, month (one lunar cycle), moon phase, new moon</p>	<p>surface.</p> <p>*Activity: Pupils demonstrate what causes the phases of the moon. Do experiment What Causes the Phases of the Moon. See Appendix C.</p> <p>Activity: Pupils simulate a Mini Solar Eclipse. See Appendix C.</p> <p>Activity: Pupils construct a chart illustrating both a solar and lunar eclipse.</p> <p>*Activity: Pupils demonstrate revolution by using their bodies to move around a "sun".</p> <p>Activity: Pupils demonstrate how an object stays in orbit. See In and Out in Appendix C.</p> <p>Activity: Pupils explain the origin of a year on earth. Cite examples of years on other planets.</p>

State Standard: 5.4 - Humans have the capacity to build and use tools to advance the quality of their lives.

Science and Technology in Society - How do science and technology affect the quality of our lives?

◆ *Advances in technology allow us to acquire new information about our world.*

Key Concepts (For Teachers)	Student Content Outcomes and Skills	Hands-On Activities / Labs *Required
<p>Humans have the capacity to build and use tools such as the camera, the telephone, and the computer to advance the quality of their lives.</p> <p>The camera, telephone, and computers, are extensions of the human eye, ear, and brain</p> <p>Eyelid-lens cap-protect interior parts of the eye/camera.</p> <p>Pupil-aperture (lens opening)-controls amount of light entering.</p> <p>Cornea, lens-lens (camera)-focus light rays on a point.</p> <p>Retina-film or digital medium-responds to light resulting in an image.</p>	<p>B 24. Compare and contrast the structures of the human eye with those of the camera.</p> <p>B25. Describe the uses of different instruments, such as eye glasses, magnifiers, periscopes and telescopes, to enhance our vision.</p> <p>Expectations:</p> <ol style="list-style-type: none"> 1) People design optical tools (for example, binoculars, telescopes, eyeglasses or periscopes) that enable them to see things better or to see what cannot be seen by the human eye alone. Optical tools change the path of light by reflecting or refracting it. 2) Throughout history new optical technologies have led to new discoveries and understandings that change people’s lives. 3) Periscopes allow people to see things that are not within their straight line of sight (for example, around corners over walls, under a table, or above the ocean’s surface from a submerged submarine). 	<p>*Activity: Diagram a model of an eye and label all parts and functions.</p> <p>*Activity: Identify parts of a camera and compare them to parts of a human eye. Construct a class mural illustrating how technology has extended the use of our senses. (BINQ.6 Analyze, critique and communicate investigations using words, graphs and drawings)</p> <p>Activity: Construct a Venn diagram showing the similarities and differences between the eye and the camera.</p> <p>*Activity: Diagram a model of a human ear.</p> <p>Activity: Prepare a written report on how we hear.</p>

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	<p>4) Telescopes make distant objects appear larger (and therefore closer).</p> <p>5) Magnifiers, such as a hand lens, microscopes or make-up mirrors, make objects appear larger.</p> <p>6) The shape of a lens or mirror (concave, convex or flat) affects the direction in which light travels:</p> <p>a) Telescopes focus light using a lens that refracts the light (refracting telescope) or a curved mirror that reflects the light (reflecting telescope).</p> <p>b) Periscopes use flat mirrors to reflect light to change its path.</p> <p>c) Magnifying glasses use convex lenses to refract light so that objects appear larger.</p> <p>7) Some human eyes do not focus light properly onto the retina. Eyeglasses are lenses that improve vision by changing the path of light (refraction) so that it forms an image on the retina.</p> <p>8) Cameras have parts that function similarly to the human eye.</p> <p>Vocabulary: optical tool, hand lens, magnifying glass, telescope, periscope, lens, mirror, concave, convex, refract, reflect, focus, camera and eye parts</p>	<p>* Activity: Pupils investigate how light travels through the lens of a refracting telescope. See Appendix C.</p> <p>*Activity: Design a time line to illustrate the progression of technology and how it serves to extend our senses.</p> <p>Activity: Pupils research the Web on the use of telescopes and satellites such as GOES (Geostationary Operational Environmental Satellite) and report to class.</p>