

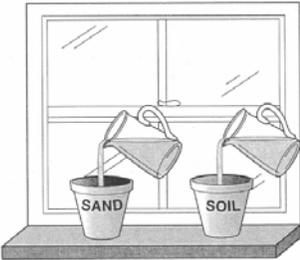
Science Areas of Focus: Grade 4
(Reflects knowledge and skill expectations for Grades K-4)

***Mission:** Scientific literacy encompasses understanding key concepts and principles of science; familiarity with the natural world for both its diversity and unity; and use of scientific knowledge and scientific ways of thinking for individual and social purposes. (AAAS, Science for All Americans)*

Standard 5.1 Scientific Processes	
All students will develop problem-solving, decision-making and inquiry skills, reflected by formulating useable questions and hypotheses, planning experiments, conducting systematic observations, interpreting and analyzing data, drawing conclusions, and communicating results.	
Big Idea: Science is a way of thinking about and investigating the world in which we all live.	
5.1.4 A. Habits of Mind	
Essential Questions	Enduring Understandings
<ul style="list-style-type: none"> ▪ What constitutes evidence? ▪ When do you know you have enough and the right kind of evidence? ▪ How can this result be best justified and explained to others? 	<ul style="list-style-type: none"> ▪ Scientific inquiry involves asking scientifically-oriented questions, collecting evidence, forming explanations, connecting explanations to scientific knowledge and theory, and communicating and justifying explanations.
Areas of Focus	Comments and Examples
<ol style="list-style-type: none"> 1. Raise questions about the world around them and be willing to seek answers through making careful observations and experimentation. 	<p>Instructional/Assessment Focus:</p> <ul style="list-style-type: none"> ▪ The quality of a student’s response to the question “How do you know?” is important. ▪ Teacher models supporting claims with reasons for students. ▪ Introduce reasoning by analogy. Analogies should be simple and obvious at first, and attention should focus on how the analogy is similar to or different from what is being studied. ▪ Scientists may have different explanations for the same set of observations which lead to making more observations to resolve the differences. <p>Suggested Instructional/Assessment Strategies:</p> <p>Students:</p> <ul style="list-style-type: none"> ▪ Offer reasons for their findings and consider reasons suggested by others. ▪ Seek better reasons for believing something other than “Everybody knows that…” or “I just know” and discount such reasons when given by others. ▪ Support their reasoning statements with facts found in books, articles, and electronic resources, identify the sources used, and expect others to do the same. ▪ Keep notebooks that describe observations (plants, class pets, aquarium, playground, etc.). Students should be able to distinguish observation from ideas and speculations about what is being observed. Students’ notes should be clear and comprehensive enough that they are understandable weeks or months after the observations are recorded. <p>Sample Assessment Item:</p> <ol style="list-style-type: none"> 1. A geologist wrote many books on how rivers affect land. The geologist described detailed observations made over a long time. <p style="padding-left: 40px;">Why do scientists record details about scientific observations?</p> <ul style="list-style-type: none"> A. to prove that scientists work hard B. to make science books more interesting C. to make people want to read about science * D. to provide evidence that supports conclusions
<ol style="list-style-type: none"> 2. Keep records that describe observations, carefully distinguish actual observations from ideas and speculations, and are understandable weeks and months later. 	
<ol style="list-style-type: none"> 3. Recognize that when a science investigation is replicated, very similar results are expected. 	
<ol style="list-style-type: none"> 4. Know that when solving a problem it is important to plan and get ideas and help from other people. 	

5.1.4 B. Inquiry and Problem Solving

Essential Questions	Enduring Understandings
<ul style="list-style-type: none"> What makes a question scientific? 	<ul style="list-style-type: none"> Scientific inquiry involves asking scientifically-oriented questions, collecting evidence, forming explanations, connecting explanations to scientific knowledge and theory, and communicating and justifying explanations.
Areas of Focus	Comments and Examples
<p>1. Develop strategies and skills for information-gathering and problem-solving, using appropriate tools and technologies.</p>	<p>Instructional/Assessment Focus:</p> <ul style="list-style-type: none"> Students use simple instruments such as: <ul style="list-style-type: none"> Rulers to measure length, height, and depth of objects and materials; Thermometers to measure temperature; Watches to measure time; Balances and spring scales to measure weight and force, and Hand lenses to observe finer details of plants, animals, rocks, and materials. Students also develop skills using computers, probe ware, and calculators when conducting investigations. <p>Suggested Instructional/Assessment Strategy:</p> <ul style="list-style-type: none"> Recognize when comparisons might not be valid because some conditions are not kept the same. <p>Sample Assessment Items:</p> <ol style="list-style-type: none"> Mrs. Henderson's class has five small, covered boxes. One contains perfume; another contains dried onions. There is also a box with pine needles, a box of lemon pieces, and a box with a paper towel wet with vanilla flavoring. Without opening the boxes, describe what the students should do to get the best information about what is inside each box. One hot sunny day, Sally left two buckets of water out in the sun. The two buckets were the same except that one was black and one was white. At the end of the day, Sally noticed that the water in the black bucket felt warmer than the water in the white bucket. <p>Sally wondered why this happened, so the next day, she left the buckets of water out in the hot sun again. She made sure that there was the same amount of water in each bucket. This time she carefully measured the temperature of the water in both buckets at the beginning of the day and at the end of the day. The pictures below show what Sally found.</p> <div style="text-align: center;"> </div> <ul style="list-style-type: none"> What changes do you see? Tell why the changes happened.

	<p>3. A student asks, “Does the size of the wheels affect how far toy cars roll on the floor?”</p> <p>The student hypothesizes that toy cars with large wheels roll farther.</p> <ul style="list-style-type: none"> • Describe how the student can set up an investigation of his hypothesis. • Describe how the student can collect data to support his hypothesis.
<p>2. Identify the evidence used in an explanation.</p>	<p>Instructional/Assessment Focus:</p> <ul style="list-style-type: none"> ▪ The emphasis is on students’ thinking as they use data to formulate explanations. Students learn what constitutes evidence and judge the merits or strengths of the data and information that will be used to make explanations. ▪ Students begin developing the abilities to communicate, critique, and analyze their work and the work of other students. ▪ Students check their explanations against scientific knowledge, experience and observations of others. ▪ Communication can be written, spoken, or in the form of a drawing. <p>Sample Assessment Item: <i>Use the picture below to answer the following question.</i></p>  <p>1. Sarah put 10 marigold seeds in a pot of sand and 10 marigold seeds in a pot of soil. She then put both pots near a window and watered them the same amount of water every few days. After three weeks, Sarah measured the height of the marigold seedlings in each pot. What was Sarah probably testing?</p> <ul style="list-style-type: none"> A. how light affects the growth of marigolds B. which type of marigold grows best * C. whether marigolds grow better in soil or in sand D. how water affects the growth of marigolds
5.1.4 C. Safety	
<p>Essential Questions</p> <ul style="list-style-type: none"> • What does Safety First demand of us in each setting? • What rules are general and what are situation-specific? 	<p>Enduring Understandings</p> <ul style="list-style-type: none"> ▪ Safety first!
<p>Areas of Focus</p> <p>1. Recognize that conducting science activities requires an awareness of potential hazards and the need for safe practices.</p>	<p>Comments and Examples</p> <p>Instructional/Assessment Focus:</p> <ul style="list-style-type: none"> ▪ Students are coached in developing a proactive approach to safety. ▪ Students engage safely in investigations inside and outside the classroom.
<p>2. Understand and practice safety procedures for conducting science investigations.</p>	

Standard 5.2 Science and Society

All students will develop an understanding of how people of various cultures have contributed to the advancement of science and technology, and how major discoveries and events have advanced science and technology.

Big Idea: Science is a human endeavor. People from many cultures have contributed to our understanding of science.

5.2.4 A. Cultural Contributions

Essential Questions	Enduring Understandings
<ul style="list-style-type: none"> What do we mean in science when we say that we stand on the shoulders of giants? 	<ul style="list-style-type: none"> Understanding the development of scientific ideas is essential for building scientific knowledge.
Area of Focus	Comments and Examples
<ol style="list-style-type: none"> Describe how people in different cultures have made and continue to make contributions to science and technology. 	<p>Instructional/Assessment Focus: As students study science, they should be aware of the historical context that has impacted the development of various scientific theories and that the body of scientific knowledge is constantly changing. It is not expected that students memorize the specific contributions of individual scientists, but rather that they appreciate the context of scientists' work and how it has impacted what we know about the world in which we live.</p>

5.2.4 B. Historical Perspectives

Essential Questions	Enduring Understandings
<ul style="list-style-type: none"> How do science and technology influence each other? 	<ul style="list-style-type: none"> Technology evolves at an ever accelerating pace based on the needs and wants of society, and is influenced by the cultural, political, and environmental values and constraints.
Areas of Focus	Comments and Examples
<ol style="list-style-type: none"> Hear, read, write, and talk about scientists and inventors in historical context. 	<p>Sample Assessment Item:</p> <ol style="list-style-type: none"> Robert Hooke was one of the first people to identify cells. Which invention did he use in order to see cells? <div style="display: flex; flex-direction: column; align-items: center; gap: 20px;"> <div style="display: flex; align-items: center;"> A  </div> <div style="display: flex; align-items: center;"> B  </div> <div style="display: flex; align-items: center;"> C  </div> <div style="display: flex; align-items: center;"> D  </div> </div>

Standard 5.3 Mathematical Applications

All students will integrate mathematics as a tool for problem-solving in science, and as a means of expressing and/or modeling scientific theories.

Big Idea: Science cannot be practiced or learned without an appreciation of the role of mathematics in discovering and expressing natural laws. Tables, graphs, and equations are alternative ways of representing information or relationships- each with advantages and disadvantages.

5.3.4 A. Numerical Operations

Essential Questions	Enduring Understandings
<ul style="list-style-type: none"> ▪ How do we use mathematics to model objects, events and relationships? 	<ul style="list-style-type: none"> ▪ Mathematics is a tool used to model objects, events, and relationships in the natural and designed world.
Areas of Focus	Comments and Examples
1. Determine the reasonableness of estimates, measurements, and computations of quantities when doing science.	Instructional/Assessment Focus: <ul style="list-style-type: none"> ▪ Students use estimation to determine the reasonableness of measurements, and computations, whether done using pencil and paper or calculators. Suggested Instructional/Assessment Strategy: <ul style="list-style-type: none"> ▪ Incorporate estimation in measurement activities (e.g., estimate before measuring).
2. Recognize and comprehend the orders of magnitude associated with large and small physical quantities.	
3. Express quantities using appropriate number formats, such as: <ul style="list-style-type: none"> • integers. • fractions. 	Instructional/Assessment Focus: <ul style="list-style-type: none"> ▪ How a number is written says something about how precise the measurement was made. ▪ Specifying the unit of measurement is always necessary. ▪ These principles can be treated as general ideas and obvious examples can be provided. Teachers should not require the memorization of sophisticated rules.

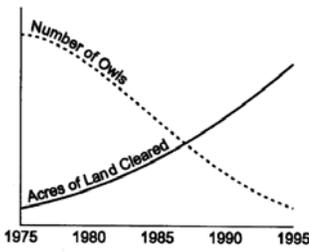
5.3.4 B. Geometry and Measurement

Essential Questions	Enduring Understandings
<ul style="list-style-type: none"> ▪ How do we use mathematics to model objects, events and relationships in science? 	<ul style="list-style-type: none"> ▪ Mathematics is a tool used to model objects, events, and relationships in the natural and designed world.
Areas of Focus	Comments and Examples
1. Select appropriate measuring instruments based on the degree of precision required.	Instructional/Assessment Focus: <ul style="list-style-type: none"> ▪ Measurements are likely to yield slightly different numbers, even if what is being measured stays the same.
2. Use a variety of measuring instruments and record measured quantities using the appropriate units.	Instructional/Assessment Focus: <ul style="list-style-type: none"> ▪ When recording and reporting measurements, it is important for students to include the units. Three degrees Fahrenheit is different from three centimeters and three miles is different from three miles per hour. Suggested Instructional/Assessment Strategy: <ul style="list-style-type: none"> ▪ Students use, thermometers, watches, balances, spring scales, hand lenses, probe ware and/or computers, to take and record measurements. (height of plants over time, temperature of water in an aquarium, outdoor temperature, wind speed, etc).

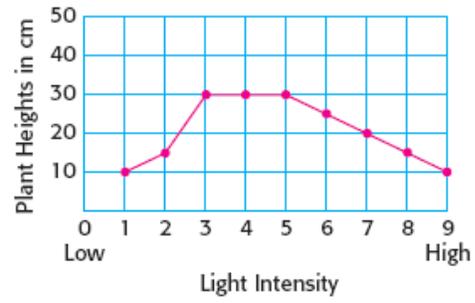
5.3.4 C. Patterns and Algebra

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Essential Questions	Enduring Understandings												
<ul style="list-style-type: none"> ▪ How do we use mathematics to model objects, events and relationships in science? 	<ul style="list-style-type: none"> ▪ Mathematics is a tool used to model objects, events, and relationships in the natural and designed world. 												
Area of Focus	Comments and Examples												
<p>1. Identify patterns when observing the natural and constructed world.</p>	<p>Instructional/Assessment Focus:</p> <ul style="list-style-type: none"> ▪ Mathematical statements using symbols are valid only when the symbols are replaced by certain numbers. <p>Sample Assessment Item: Students at Hoover Elementary School did a survey of the eye colors of all fourth graders at their school. The results are shown in the data chart below.</p> <p style="text-align: center;">Hoover Elementary School Fourth-Grade Eye Colors</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;"></th> <th style="width: 15%;">Blue</th> <th style="width: 15%;">Brown</th> <th style="width: 10%;">Green</th> </tr> </thead> <tbody> <tr> <td>Ms. Musso's class</td> <td style="text-align: center;">9</td> <td style="text-align: center;">7</td> <td style="text-align: center;">1</td> </tr> <tr> <td>Mr. Broussard's class</td> <td style="text-align: center;">2</td> <td style="text-align: center;">10</td> <td style="text-align: center;">4</td> </tr> </tbody> </table> <p>1. What does the chart show about Hoover Elementary School?</p>		Blue	Brown	Green	Ms. Musso's class	9	7	1	Mr. Broussard's class	2	10	4
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Ms. Musso's class	9	7	1										
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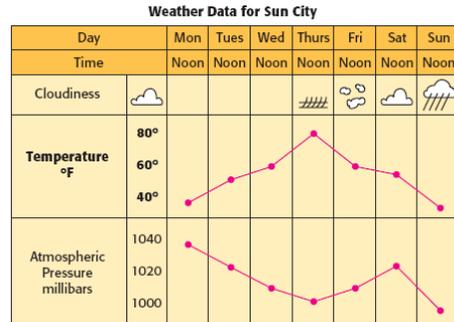
5.3.4 D. Data Analysis and Probability

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Essential Questions	Enduring Understandings
<ul style="list-style-type: none"> ▪ How do we use mathematics to model objects, events and relationships in science? 	<ul style="list-style-type: none"> ▪ Mathematics is a tool used to model objects, events, and relationships in the natural and designed world.
Areas of Focus	Comments and Examples
<p>1. Use tables and graphs to represent and interpret data.</p>	<p>Instructional/Assessment Focus:</p> <ul style="list-style-type: none"> ▪ Tables and graphs can show how values of one quantity are related to values of another. <p>Suggested Instructional/Assessment Strategy:</p> <ul style="list-style-type: none"> ▪ As an integral part of scientific investigations, students create and interpret a variety of charts, diagrams, tables, and graphs as they offer reasons for their findings. <p>Sample Assessment Items:</p> <p>Use the graph below to answer question 1.</p> <div style="text-align: center;">  </div> <p>The graph above shows the owl population in a large forested area over a 20 year period. The graph also shows the acres of forest that were cleared for housing developments over the same time period.</p> <p>1. Why did the owl population change?</p>

Use the graph below to answer question 2.



2. Nine bean plants were grown in varying amounts of light. What conclusion can be drawn from the graph?
- A. As the temperature rose, the pressure remained the same.
 - B. As the pressure rose, the temperature remained the same.
 - C. As the pressure rose, the temperature dropped.
 - * D. As the temperature rose, the pressure dropped.
3. Look at the diagram below for the days Monday through Thursday. Which best describes the relationship between temperature and pressure for those days?



Standard 5.4 Nature And Process Of Technology

All students will understand the interrelationships between science and technology and develop a conceptual understanding of the nature and process of technology.

Big Idea: The study of science and technology is interrelated and as such can assist in solving problems.

5.4.4 A. Science and Technology

Essential Questions	Enduring Understandings
<ul style="list-style-type: none"> How do science and technology influence each other? 	<ul style="list-style-type: none"> The development of technology and advances in science are mutually supportive in driving innovation in both fields.
Areas of Focus	Comments and Examples
<ol style="list-style-type: none"> Distinguish between things that occur in nature and those that have been designed to solve human problems. 	Instructional/Assessment Focus: <ul style="list-style-type: none"> Through science and technology, a wide variety of materials that do not appear in nature have become available, ranging from steel to nylon to liquid crystals.

5.4.4 B. Nature of Technology

Essential Questions	Enduring Understandings
<ul style="list-style-type: none"> Are there ways to circumvent physical and social constraints when using technology? 	<ul style="list-style-type: none"> Physical constraints and social values play a role in limiting the use of technology to solve problems.
Area of Focus	Comments and Examples
<ol style="list-style-type: none"> Demonstrate how measuring instruments are used to gather information in order to design things that work properly. 	

5.4.4 C. Technological Design

Essential Questions	Enduring Understandings
<ul style="list-style-type: none"> How is the overarching concept of systems related to design and technology? 	<ul style="list-style-type: none"> Thinking systematically means looking for the relationships between parts.
Areas of Focus	Comments and Examples
<ol style="list-style-type: none"> Describe a product or device in terms of the problem it solves or the need it meets. Choose materials most suitable to make simple mechanical constructions. 	Instructional/Assessment Focus: <ul style="list-style-type: none"> Students exhibit growing confidence in their ability to develop designs and analyze a product: "Does it work?" "Could I make it work better?" "Could I have used better materials?"
<ol style="list-style-type: none"> Use the design process to identify a problem, look for ideas, and develop and share solutions with others. 	Instructional/Assessment Focus: <ul style="list-style-type: none"> Factors such as cost, safety, appearance, environmental impact, and what will happen if the solution fails must be considered in technological design. There is no perfect design. Designs that are best in one respect (safety or ease of use, for example) may be inferior in other ways (cost or appearance). Typically one design feature may be omitted in place of another feature. <p>Sample Assessment Item:</p> <ol style="list-style-type: none"> What could be done to make this kite fly better? <div style="text-align: center;">  </div> <p>* A. Add a tail. B. Add more string. C. Add more designs. D. Add another side.</p>

Standard 5.5 Characteristics Of Life

All students will gain an understanding of the structure, characteristics, and basic needs of organisms and will investigate the diversity of life.

Big Idea: The natural world is defined by organisms and life processes which conform to principles regarding conservation and transformation of matter and energy. Knowledge about life processes can be applied to improving human health and well being.

5.5.4 A. Matter, Energy and Organization in Living Systems

Essential Questions	Enduring Understandings														
<ul style="list-style-type: none"> ▪ How is matter transformed, and energy transferred/transformed in living systems? 	<ul style="list-style-type: none"> ▪ All organisms transfer matter and convert energy from one form to another. ▪ Both matter and energy are necessary to build and maintain structures within the organism. 														
Areas of Focus	Comments and Examples														
<p>1. Identify the roles that organisms may serve in a food web.</p>	<p>Instructional/Assessment Focus:</p> <ul style="list-style-type: none"> • A source of energy is needed for all organisms to stay alive and grow. • Almost all kinds of an animal's food can be traced back to plants and ultimately to sunlight. • Insects and various other organisms depend on dead plant and animal material for food. <p>Suggested Instructional/Assessment Strategy:</p> <ul style="list-style-type: none"> • Pick any food product (e.g., cookies, cereal, beef jerky) and trace the energy therein back to the sun. <p>Sample Assessment Items:</p> <ol style="list-style-type: none"> 1. Which organisms in the pond ecosystem break down dead plants and animals? <ul style="list-style-type: none"> A. green algae * B. bacteria C. water lily D. frogs 2. Tell why it is important for dead animals and plants in the pond ecosystem to be broken down. 4. A class observed that grasshoppers, frogs, mice, snakes, and owls in a grassy field are all part of the same food web. Students combined their observations of what the organisms eat in the table. <table border="1" style="margin: 10px auto;"> <thead> <tr> <th colspan="2" style="text-align: center;">What Eats What</th> </tr> <tr> <th style="text-align: center;">Organism</th> <th style="text-align: center;">Food Eaten</th> </tr> </thead> <tbody> <tr> <td>grasshopper</td> <td>grass</td> </tr> <tr> <td>mouse</td> <td>grass, grasshoppers</td> </tr> <tr> <td>frog</td> <td>grasshoppers</td> </tr> <tr> <td>snake</td> <td>grasshoppers, mice, frogs</td> </tr> <tr> <td>owl</td> <td>grasshoppers, mice, frogs, snakes</td> </tr> </tbody> </table> <ul style="list-style-type: none"> • Draw a food web with four of these organisms and be sure to label each organism with its name. • Draw arrows to trace the energy flow among the organisms. 	What Eats What		Organism	Food Eaten	grasshopper	grass	mouse	grass, grasshoppers	frog	grasshoppers	snake	grasshoppers, mice, frogs	owl	grasshoppers, mice, frogs, snakes
What Eats What															
Organism	Food Eaten														
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frog	grasshoppers														
snake	grasshoppers, mice, frogs														
owl	grasshoppers, mice, frogs, snakes														
<p>2. Differentiate between the needs of plants and those of animals.</p>	<p>Instructional/Assessment Focus:</p> <ul style="list-style-type: none"> • Plants and animals both need to take in water, and animals need to take in food. In addition, plants need light. • A source of "energy" is needed for all organisms to stay alive and grow. 														
<p>3. Recognize that plants and animals are composed of different parts performing different functions and working together for the well being of the organism.</p>	<p>Instructional/Assessment Focus:</p> <ul style="list-style-type: none"> • Each plant and animal has different structures that serve different functions in growth, survival, and reproduction. 														

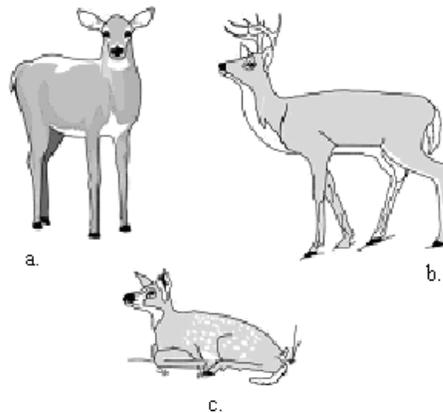
Suggested Instructional/Assessment Strategies:

- Compare and contrast structures that have similar functions in various organisms (e.g., eyes, ears, mouths). Explain that the function of the structure is similar although the structures may have different physical appearances (e.g., compare eyes of an owl with the eyes of a crayfish).
- Observe and identify structures of plants and describe the function of each structure.

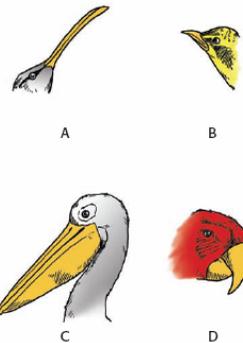
Sample Assessment Items:

1. How do most fish get the oxygen they need to survive?
 - A. They take in water and break it down into hydrogen and oxygen.
 - * B. Using their gills, they take in oxygen that is dissolved in water.
 - C. They get their oxygen from the food they eat.
 - D. They come to the surface every few minutes to breathe air into their lungs.

Look at the pictures of deer below to answer question 2.



2. Look at the picture above. Name one feature about the deer's body that helps it to survive and tell how the feature helps it to survive.
3. Nathan is creating a diagram to show photosynthesis. In addition to leaves, which plant part would be BEST to include in his diagram?
 - A. bark, because it protects the stem
 - * B. roots, because they bring in water
 - C. soil, because it holds the plant down
 - D. bacteria, because they provide nitrogen
4. Which bird beak would be most helpful for a bird that eats insects in the bark of trees?

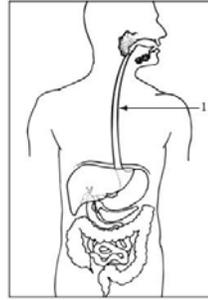


- * A. A.
- B. B.
- C. C.
- D. D.

5. Describe the basic functions of the major systems of the human body including, but not limited to:

- digestive system.
- circulatory system.
- respiratory system.
- nervous system.
- skeletal system.
- muscular system.
- reproductive system.

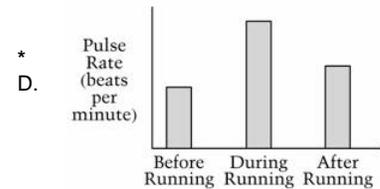
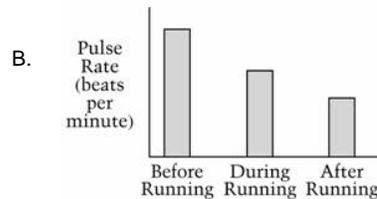
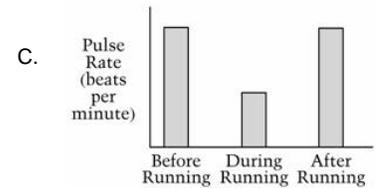
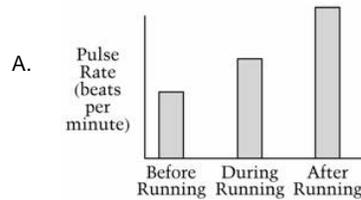
Sample Assessment Items:



1. Look at the picture above, which shows some of the organs that can be found inside the human body. What is the main job of the organ labeled 1?
 - A. carrying air
 - * B. carrying food
 - C. carrying blood
 - D. carrying messages from the brain

2. Which other system works with the skeletal system to provide physical support for the body?
 - * A. muscular
 - B. digestive
 - C. circulatory
 - D. respiratory

3. Julio wanted to know how his pulse rate changed when he ran very fast. He measured his pulse rate before he started running, while he was running, and two minutes after he stopped running. Which graph best shows how Julio's pulse rate changed?



5.5.4 B. Diversity and Biological Evolution

Essential Questions	Enduring Understandings
<ul style="list-style-type: none"> How are organisms of the same kind different from each other? How does this help them reproduce and survive? 	<ul style="list-style-type: none"> Organisms are grouped in nature based upon similarities.
Areas of Focus	Comments and Examples
<p>1. Develop a simple classification scheme for grouping organisms.</p>	<p>Instructional/Assessment Focus:</p> <ul style="list-style-type: none"> Living things can be sorted into groups in many ways using various features to decide which things belong to which group. Features used for grouping depend on the purpose of the grouping. <p>Suggested Instructional/Assessment Strategy:</p> <ul style="list-style-type: none"> Given a selection of fruits and vegetables, develop a way to classify them by using their features. Explain the classification scheme used. <p>Sample Assessment Item:</p> <p>1. Which group of living things shares the most characteristics?</p> <p>* A.    Cat Dog Rabbit</p> <p>B.    Fish Crab Crayfish</p> <p>C.    Bird Butterfly Bat</p> <p>D.    Spider Grasshopper Worm</p>
<p>2. Recognize that individuals vary within every species, including humans.</p>	<p>Instructional/Assessment Focus:</p> <ul style="list-style-type: none"> Individuals of the same kind differ in their characteristics, and sometimes differences give individuals an advantage in surviving and reproducing. <p>Suggested Instructional/Assessment Strategy:</p> <ul style="list-style-type: none"> Select two parents from known breeds of dogs, which if used for breeding, would potentially produce a mix of desired traits, such as a dog that herds and fetches.

5.5.4 C. Reproduction and Heredity

Essential Questions	Enduring Understandings
<ul style="list-style-type: none"> How do organisms change as they go through their life cycles? 	<ul style="list-style-type: none"> Organisms reproduce, develop, have predictable life cycles, and pass on heritable traits to their offspring.
Areas of Focus	Comments and Examples
<p>1. Identify different stages in the lives of various organisms.</p>	<p>Instructional/Assessment Focus:</p> <ul style="list-style-type: none"> Over the entire earth, organisms are growing, dying, and decaying and new organisms are being produced by the older ones. Plants and animals have life cycles that may include being born, developing into adults, reproducing, and eventually dying. The details of a life cycle are different for different organisms. Some likenesses between children and parents are inherited, others are learned or acquired.

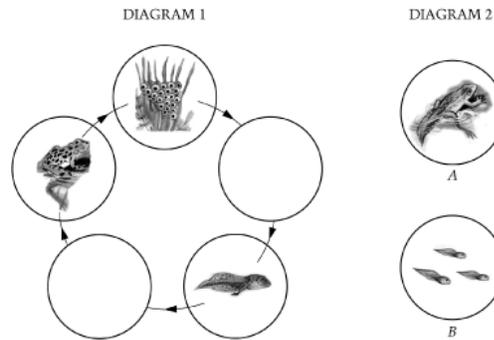
Suggested Instructional/Assessment Strategies:

- Construct the life cycle of a bean plant through the use of diagrams. Describe the plant in different stages of its life cycle from seed, to seedling, to mature plant, to death, and explain how the structures of the plant change over time.
- Research the life cycle of an organism. Model the life cycle of the organism and describe how the organism changes over time. Compare the life cycle of this organism to the life cycle of various other organisms.

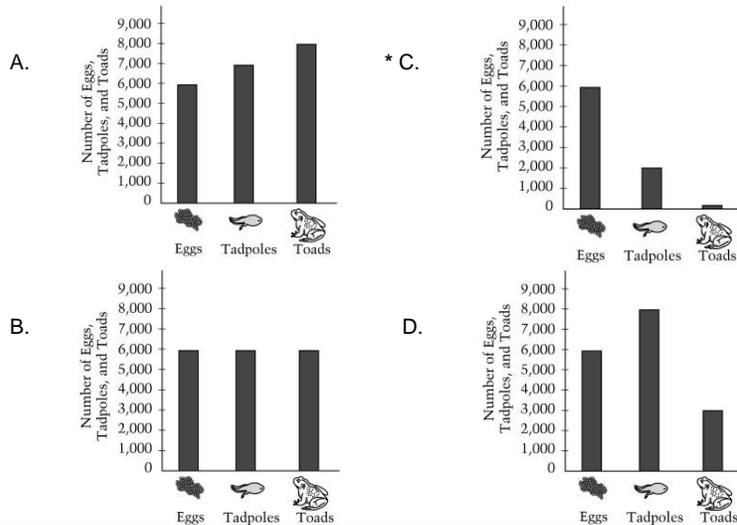
Sample Assessment Items:

1. **Diagram 1** shows a frog's life cycle with two missing stages. **Diagram 2** shows the two stages that are missing from the frog's life cycle in diagram 1. They are labeled A and B.

- Complete the frog's life cycle in Diagram 1 by writing A in the empty circle where stage A belongs and B in the empty circle where stage B belongs.
- Explain why you placed the letters A and B where you did.



2. An adult toad lays 6,000 eggs at a time in a pond. Which graph shows the number of tadpoles and toads that will most likely result in the pond from these eggs?



Standard 5.6 Chemistry

All students will gain an understanding of the structure and behavior of matter.

Big Idea: Materials exist throughout our physical world. The structures of materials influence their physical properties, chemical reactivity and use.

5.6.4 A. Structure and Properties of Matter

Essential Questions	Enduring Understandings
<ul style="list-style-type: none"> ▪ How do properties of materials determine their use? 	<ul style="list-style-type: none"> ▪ The structures of materials determine their properties.
Areas of Focus	Comments and Examples
<p>1. Sort materials based on physical characteristics that can be seen by using magnification.</p>	<p>Instructional/Assessment Focus:</p> <ul style="list-style-type: none"> • Objects have many observable properties, including size, weight, shape, color, temperature, and the ability to react with other substances. Those properties can be measured using tools, such as rulers, balances, and thermometers. • Materials may be composed of parts that are too small to be seen without magnification. <p>Suggested Instructional/Assessment Strategies:</p> <ul style="list-style-type: none"> • Use a hand lens to observe objects to reveal more than can be seen with the unaided eye (salt, talcum powder, sugar cubes, etc.). • Sort objects using unaided eyes according to the materials from which they are made or their physical properties, and give a reason why each object belongs to a specific group. Repeat the sorting activity using a hand lens then compare and contrast the observations.
<p>2. Observe that water can be a liquid or a solid and can change from one form to the other and the mass remains the same.</p>	<p>Instructional/Assessment Focus:</p> <ul style="list-style-type: none"> • Water can be a liquid or a solid and can go back and forth from one form to the other. 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>3. Recognize that water, as an example of matter, can exist as a solid, liquid or gas and can be transformed from one state to another by heating or cooling.</p>	<p>Instructional/Assessment Focus:</p> <ul style="list-style-type: none"> • When liquid water disappears, it turns into a gas (vapor) in the air and can reappear as a liquid when cooled, or a solid, if cooled below the freezing point of water. <p>Suggested Instructional/Assessment Strategy:</p> <ul style="list-style-type: none"> • Observe water in its various forms and change the state by heating or cooling. <p>Sample Performance Task: As a technician for FEMA, you have been given the job of designing a simple strategy that homeowners can use to convert salt water into drinking water in the event of a long term power outage. Create a multimedia presentation that describes the strategy and explains how it works.</p>

	<p>Sample Assessment Item: Use the following data table to answer question 1.</p> <p style="text-align: center;">How Temperature Affects Air in a Balloon</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Conditions of Balloon</th> <th>Length of Line Around Balloon (in centimeters)</th> </tr> </thead> <tbody> <tr> <td>Balloon after coming out of the freezer</td> <td>12 cm</td> </tr> <tr> <td>Balloon at room temperature</td> <td>20 cm</td> </tr> <tr> <td>Balloon after being warmed for 2 minutes</td> <td>35 cm</td> </tr> <tr> <td>Balloon after being warmed for 4 minutes</td> <td>51 cm</td> </tr> </tbody> </table> <p>1. A student conducted an experiment to find out how temperature affects air in a balloon. He drew a line around the center of the balloon and measured the length of the line around the balloon. According to the chart, what conclusion can be made about how temperature affects air in a balloon?</p> <p>* A. The warmer the balloon gets, the more it expands. B. The balloon bursts after being warmed for 4 minutes. C. The colder the balloon gets, the faster the gas moves. D. The balloon is unaffected by changes in temperature.</p>	Conditions of Balloon	Length of Line Around Balloon (in centimeters)	Balloon after coming out of the freezer	12 cm	Balloon at room temperature	20 cm	Balloon after being warmed for 2 minutes	35 cm	Balloon after being warmed for 4 minutes	51 cm
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Balloon after being warmed for 4 minutes	51 cm										
<p>1. Show that not all materials respond in the same way when exposed to similar conditions.</p>	<p>Instructional/Assessment Focus:</p> <ul style="list-style-type: none"> The measurement of mass and other characteristics that can be seen without changing how that object looks are its physical properties. When you look at oranges, you know that they are oranges because of their color, shape, and smell. Mass, color, shape, volume, and density are some physical properties. Chemical properties are properties that can only be observed by changing the identity of the substance. A piece of paper burns and turns to a black substance. After the flame goes out you can no longer burn the new substance. The chemical properties have been changed. <p>Suggested Instructional/Assessment Strategies:</p> <ul style="list-style-type: none"> Students determine whether various objects sink or float in water. Whether an object sinks or floats in a liquid depends mainly on two factors: density and buoyancy. However, at this level, students do not need to explain why objects sink or float. They are rather to be encouraged to observe that the same objects will sink or float every time, i.e., that there is consistency in the way the objects behave. This will help students devise their own ideas about physical properties and how they can be used to describe and categorize objects. Students investigate how common household materials such as cream of tartar, baking soda, laundry detergent, and Epsom salts react with water, vinegar, and litmus paper. (See <i>Inquiry in Action: Investigating Matter through Inquiry</i> for this and other instructional and assessment ideas.) 										
5.6.4 B. Chemical Reactions											
<p style="text-align: center;">Essential Questions</p> <ul style="list-style-type: none"> What determines the type and extent of a chemical reaction? 	<p style="text-align: center;">Enduring Understandings:</p> <ul style="list-style-type: none"> There are several ways in which elements and compounds react to form new substances and each reaction involves the flow of energy. 										
<p style="text-align: center;">Areas of Focus</p> <p>1. Combine two or more materials and show that the new material may have properties that are different from the original material.</p>	<p style="text-align: center;">Comments and Examples</p> <p>Instructional/Assessment Focus:</p> <ul style="list-style-type: none"> When a new material is made by combining two or more materials, it has properties that are different from the original materials. For that reason, many different materials can be made from a small number of basic kinds of materials. (ex: antacid tablet and vinegar produce a gas) <p>Suggested Instructional/Assessment Strategy:</p> <ul style="list-style-type: none"> You are an educational toy maker that has been asked to design a rocket that can be safely launched in a school gymnasium. Explain why an antacid tablet and vinegar are the best choice for an engine. 										

Standard 5.7 Physics

All students will gain an understanding of natural laws as they apply to motion, forces, and energy transformations.

Big Idea: The flow of energy drives processes of change in all biological, chemical, physical and geological systems. The conservation of energy is a law that can be used to analyze and build understandings of diverse physical and biological systems.

5.7.4 A. Motion and Forces

Essential Questions	Enduring Understandings
<ul style="list-style-type: none"> How would the universe be different if one or more of the laws of motion were suspended? 	<ul style="list-style-type: none"> The same basic rules govern the motion of all bodies, from planets and stars to birds and billiard balls.
Areas of Focus	Comments and Examples
<p>1. Recognize that changes in the speed or direction of a moving object are caused by force and that the greater the force, the greater the change in motion will be.</p>	<p>Suggested Instructional/Assessment Strategy:</p> <ul style="list-style-type: none"> Observe the evidence of the push of air on objects such as pinwheels and kites. Compare how the direction and speed of moving air affects the motion of the objects. <p>Sample Assessment Items: Use the picture below of Sharon pulling a wagon on a level sidewalk to answer questions 1 and 2.</p> <div data-bbox="873 831 1295 1087" data-label="Image"> </div> <ol style="list-style-type: none"> How would the movement of the wagon be affected if she pulled harder on the wagon? How would the movement of the wagon be affected if her little brother were sitting in the wagon? <p>3. Each horse is pulling with the same force, which direction will the rock move?</p> <div data-bbox="863 1331 1289 1701" data-label="Image"> </div> <ol style="list-style-type: none"> north south east west <p>* Correct answer to a multiple-choice item</p>

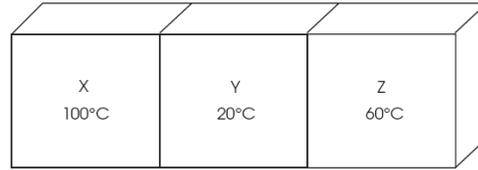
<p>2. Recognize that some forces can act at a distance.</p> <ul style="list-style-type: none"> • gravity • magnetism • static electricity 	<p>Instructional/Assessment Focus:</p> <ul style="list-style-type: none"> • The earth's gravity pulls any object toward it without touching it. • A magnet pulls on all things made of iron and either pushes or pulls on other magnets without touching them, • Material that has been electrically charged pulls on all other materials and may either push or pull other charged materials without touching them. <p>Suggested Instructional/Assessment Strategies:</p> <ol style="list-style-type: none"> 1. Using a charged rod, move small pieces of paper without touching them. 2. Explain why two bar magnets move toward or away from each. <p>Sample Assessment Item:</p> <ol style="list-style-type: none"> 1. An object is placed on a table. A magnet is slowly moved toward it and the object moves away from the magnet. The object is most likely — <ul style="list-style-type: none"> * A. another magnet B. a piece of glass C. a copper coin D. an iron nail
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5.7.4 A. B. Energy Transformations

Essential Questions	Enduring Understandings
<ul style="list-style-type: none"> ▪ How do we know that things have energy? 	<ul style="list-style-type: none"> ▪ Energy takes many forms. ▪ These forms can be grouped into types of energy that are associated with the motion of mass (kinetic energy), and types of energy associated with the position of mass and with energy fields (potential energy).

Areas of Focus	Comments and Examples
<ol style="list-style-type: none"> 1. Identify sources of heat and demonstrate that heat can be transferred from one object to another. 	<p>Instructional/Assessment Focus:</p> <ul style="list-style-type: none"> • When warmer things are paced with cooler ones, the warmer ones lose heat and the cooler ones gain it until they are all the same temperature. • A warmer object can warm a cooler one by contact or at a distance. • Some materials conduct heat much better than others. Poor conductors can reduce heat loss. <p>Suggested Instructional/Assessment Strategies:</p> <ul style="list-style-type: none"> • Identify, as basic forms of energy: light, heat, sound, electrical and energy of motion. • Observe that sunlight can be used to heat the inside of homes and other buildings by allowing sunlight to pass through windows. <p>Sample Assessment Items:</p> <ol style="list-style-type: none"> 1. People wear hats when outside in the winter. How do hats help people stay warm? <ul style="list-style-type: none"> * A. Hats stop heat energy from leaving their heads. B. Hats stop electrical energy from leaving their heads. C. Hats stop cold from entering their bodies through their heads. D. Hats slow down electrical energy from entering their bodies through their heads.

2. Three identical blocks are pushed together. The starting temperature of each is shown.



Which traces the transfer of heat energy among the blocks?

- A. $X \leftarrow Y \rightarrow Z$
- B. $X \rightarrow Y \rightarrow Z$
- * C. $X \rightarrow Y \leftarrow Z$
- D. $X \leftarrow Y \leftarrow Z$

2. **Identify sources of light and demonstrate that light can be reflected from some surfaces and pass through others.**

Instructional/Assessment Focus:

- Light travels and tends to maintain its direction of motion until it interacts with an object or material.
- Light can be absorbed, redirected, bounced back, or allowed to pass through.

Sample Assessment Items:

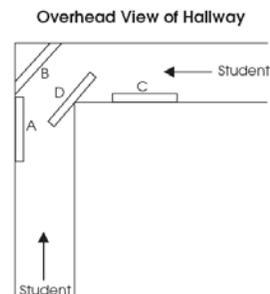
Use the picture below to answer the question.



1. The spoon appears to be broken where it enters the water because

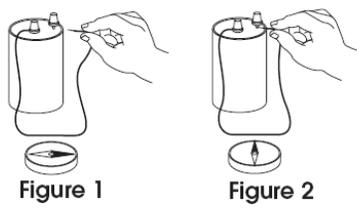
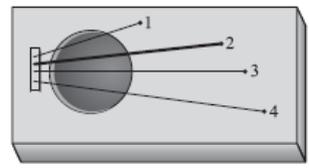
- A. Light is reflected by the water.
- B. Light is absorbed by the water.
- * C. Light is bent by the water.
- D. Light is dissolved by the water.

2. Students bump into each other when they turn the corner in the hallway shown below.



They plan to place a mirror in the hall so that they can see one another before reaching the corner.

- Where should they place the mirror?
- Explain your choice.

<p>3. Use devices that show electricity producing heat, light, sound, and magnetic effects.</p>	<p>Instructional/Assessment Focus:</p> <ul style="list-style-type: none"> • Things that give off light often also give off heat. Heat is produced by mechanical and electrical machines, and any time one thing rubs against something else. • Electricity in circuits can produce light, heat, sound, and magnetic effects. Electrical circuits require a complete loop through which an electrical current can pass. <p>Suggested Instructional/Assessment Strategy: In their science and technology activities, students should be looking for things and processes that give off heat –lights, radios, television sets, the sun, sawing wood, polishing surfaces, bending things, running motors, people, animals etc, - and then those that do not seem to give off heat. It is appropriate to explore how heat spreads from one place to another.</p> <p>Sample Assessment Items:</p> <p>1. What is an energy change that takes place in a light bulb?</p> <p>A. Chemical energy changes to light energy. B. Chemical energy changes to heat energy. * C. Electrical energy changes to light energy. D. Electrical energy changes to chemical energy.</p> <p>2. A copper wire with a plastic coating is placed near a compass, as shown in figure 1. When both ends of the wire are connected to a battery as shown in figure 2, the compass needle moves.</p>  <p style="text-align: center;">Figure 1 Figure 2</p> <p>Why does the compass needle move?</p> <p>A. Electricity flows from the wire to the compass. B. Magnetic force flows from the battery to the wire. C. Thermal energy flows through the wire to the compass. * D. Electricity flows through the wire, producing magnetic force.</p>
<p>4. Show that differences in sound (loud or soft, high or low) can be produced by varying the way objects vibrate.</p>	<p>Instructional/Assessment Focus:</p> <ul style="list-style-type: none"> • Sound is produced by vibrating objects. The pitch of the sound can be varied by changing the rate of vibration. <p>Suggested Instructional/Assessment Strategy:</p> <ul style="list-style-type: none"> • Use a musical instrument to demonstrate how different vibrations produce different sounds (loud or soft, high or low). <p>Sample Assessment Item:</p> <p>1. The picture below shows a musical instrument that Jamie made during science class. Each string on the instrument will produce a different sound when plucked. Which string will produce the lowest sound?</p>  <p>A. String 1, because it is the shortest. B. String 2, because it is the thickest. C. String 3, because it is centered over the hole. * D. String 4, because it is the longest.</p>

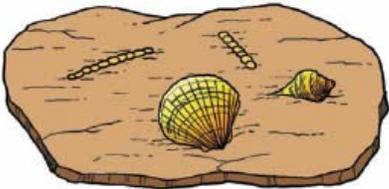
Standard 5.8 Earth Science

All students will gain an understanding of the structure, dynamics, and geophysical systems of the earth.

Big Idea: Earth's dynamic systems are made up of the geosphere, hydrosphere, atmosphere and biosphere. Interactions among these spheres have resulted in ongoing changes to the system. Some of these changes can be measured on human time scale, but others occur so slowly, that they must be inferred from geological evidence.

5.8.4 A. Earth's Properties and Materials

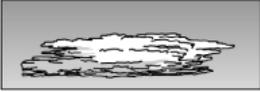
Essential Questions	Essential Understandings																
<ul style="list-style-type: none"> ▪ How does understanding the properties of Earth materials and the physical laws that govern behavior lead to predictions of Earth events? 	<ul style="list-style-type: none"> ▪ Earth systems can be broken down into individual components which have observable measurable properties. 																
Areas of Focus	Comments and Examples																
<p>1. Observe that most rocks and soils are made of several substances or minerals.</p>	<p>Instructional/Assessment Focus:</p> <ul style="list-style-type: none"> • Rock is composed of different combinations of minerals. Smaller rocks come from the breakage and weathering of bedrock and larger rocks. • Soil is made partly from weathered rock, partly from plant remains – and also contains many living organisms. <p>Suggested Instructional/Assessment Strategies:</p> <ul style="list-style-type: none"> • Examine rocks in order to observe their composition and describe the many components found in rocks. • Observe and identify basic components of soil. Use senses to observe and then describe the physical properties of soil components. <p>Sample Assessment Item:</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 20%;"></th> <th style="width: 15%;"> Mineral A</th> <th style="width: 15%;"> Mineral B</th> <th style="width: 15%;"> Mineral C</th> </tr> </thead> <tbody> <tr> <td>Mineral A scratches:</td> <td>--</td> <td>no</td> <td>no</td> </tr> <tr> <td>Mineral B scratches:</td> <td>yes</td> <td>--</td> <td>yes</td> </tr> <tr> <td>Mineral C scratches:</td> <td>yes</td> <td>no</td> <td>--</td> </tr> </tbody> </table> <p>1. The table above shows whether or not each mineral can scratch the other minerals.</p> <ul style="list-style-type: none"> • Based on the table, which mineral is the hardest? • Explain your answer. 		 Mineral A	 Mineral B	 Mineral C	Mineral A scratches:	--	no	no	Mineral B scratches:	yes	--	yes	Mineral C scratches:	yes	no	--
	 Mineral A	 Mineral B	 Mineral C														
Mineral A scratches:	--	no	no														
Mineral B scratches:	yes	--	yes														
Mineral C scratches:	yes	no	--														
<p>2. Observe that the properties of soil vary from place to place and will affect the soil's ability to support life.</p>	<p>Instructional/Assessment Focus:</p> <ul style="list-style-type: none"> • Soils have properties of color and texture, capacity to retain water, and ability to support the growth of many kinds of plants, including those in our food supply. <p>Sample Performance Task:</p> <p>You and your classmates want to establish a vegetable garden on the school's property.</p> <ul style="list-style-type: none"> • Conduct simple tests to identify three basic components of soil (sand, clay, humus) and to compare and contrast the properties of each of the components. • Interpret test results (touch and roll, smear, settling, ability to absorb and retain water) and draw conclusions about a soil's components. • Record and organize the results of soil tests and explain these results through writing, drawing and discussion. • Reflect on the test results and predict how plants will grow on the school grounds. Apply this knowledge to describe what you would need to do in order to successfully grow plants. 																

<p>3. Recognize that fossils provide evidence about the plants and animals that lived long ago and the nature of the environment at that time.</p>	<p>Instructional/Assessment Focus:</p> <ul style="list-style-type: none"> • Different plants and animals have external features that help them thrive in different kinds of environments. • Fossils can be compared to one another and to living organisms according to their similarities and differences. Some organisms that lived long ago are similar to existing organisms, but some are quite different. <p>Suggested Instructional/Assessment Strategy:</p> <ul style="list-style-type: none"> • Examine a variety of fossils to determine the environmental conditions in which they lived. <p>Sample Assessment Item:</p>  <p>1. This rock was brought to school. The class found fossils of water plants and shells in the rock. What does this tell us about the rock?</p> <p>A. The rock needs to be washed off.</p> <p>* B. The rock was once at the bottom of the sea.</p> <p>C. The rock is heavier than most rocks.</p> <p>D. The rock is gray and brown.</p>
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5.8.4 B. Atmosphere and Water

Essential Questions	Enduring Understandings
<ul style="list-style-type: none"> ▪ How do changes in one part of an Earth system affect other parts of the system? 	<ul style="list-style-type: none"> ▪ Earth's components form systems. These systems continually interact at different rates of time, affecting the Earth regionally and globally.
Areas of Focus	Comments and Examples
<p>1. Recognize that air is a substance that surrounds us, takes up space, and moves around us as wind.</p>	<p>Suggested Instructional/Assessment Strategies:</p> <ul style="list-style-type: none"> ▪ Using common items such as wind mills, kites, or balloons, students create demonstrations to show that there is air all around and that the wind is moving air. ▪ Use instruments to quantitatively measure wind speed and describe by using a simplified Beauford scale.
<p>2. Recognize that most of Earth's surface is covered by water and be able to identify the characteristics of those sources of water.</p> <ul style="list-style-type: none"> • oceans • rivers • lakes • underground sources • glaciers 	<p>Instructional/Assessment Focus:</p> <ul style="list-style-type: none"> ▪ Fresh water, limited in supply, is essential for life and also for most industrial processes. Rivers, lakes, and groundwater can be depleted or polluted, becoming unavailable or unsuitable for life. <p>Suggested Instructional/Assessment Strategy:</p> <ul style="list-style-type: none"> ▪ Create a model that illustrates the flow of water through a water cycle while the quantity of water remains constant.
<p>3. Observe weather changes and patterns by measurable quantities such as temperature, wind direction and speed, and amounts of precipitation.</p>	<p>Instructional/Assessment Focus:</p> <ul style="list-style-type: none"> ▪ Large masses of air with certain properties move across the surface of the Earth. ▪ The movement and interaction of these air masses is used to forecast the weather. <p>Suggested Instructional/Assessment Strategies:</p> <ul style="list-style-type: none"> ▪ Keep daily records of weather conditions (wind speed and direction, type and amount of precipitation, cloud cover and type, temperature) and use these records to identify short term and seasonal patterns in New Jersey. ▪ Identify and describe different types of storm systems that occur in New Jersey (i.e., tornadoes, hurricanes, thunderstorms, blizzards). From observed and gathered historical data, identify the times of the year when these storms are most likely to occur.

<p>4. Observe that when liquid water disappears, it turns into a gas (vapor) in the air and can reappear as a liquid when cooled, or as a solid if cooled below its freezing point.</p>	<p>Suggested Instructional/Assessment Strategy:</p> <ul style="list-style-type: none"> Identify and describe the mechanism that causes liquid water to turn into a vapor or a liquid into a solid. <p>Sample Assessment Items:</p> <p>1. It rained early in the morning. A student sees a puddle of water on the sidewalk when she travels to school. The water in the puddle is gone when she travels home. What happened to the water in the puddle?</p> <p>A. It froze. B. It melted. C. It condensed. * D. It evaporated.</p> <p>2. The table below shows information about the weather in four cities on the same day.</p> <table border="1" data-bbox="776 653 1393 905"> <thead> <tr> <th></th> <th>City 1</th> <th>City 2</th> <th>City 3</th> <th>City 4</th> </tr> </thead> <tbody> <tr> <td>High Temperature (Fahrenheit)</td> <td>65° F</td> <td>80° F</td> <td>48° F</td> <td>25° F</td> </tr> <tr> <td>Low Temperature (Fahrenheit)</td> <td>56° F</td> <td>66° F</td> <td>38° F</td> <td>10° F</td> </tr> <tr> <td>Precipitation-Rain or Snow (inches)</td> <td>2 in</td> <td>0 in</td> <td>1 in</td> <td>1 in</td> </tr> </tbody> </table> <p>In which city did snow most likely fall at some time during the day?</p> <p>A. city 1 B. city 2 C. city 3 * D. city 4</p>		City 1	City 2	City 3	City 4	High Temperature (Fahrenheit)	65° F	80° F	48° F	25° F	Low Temperature (Fahrenheit)	56° F	66° F	38° F	10° F	Precipitation-Rain or Snow (inches)	2 in	0 in	1 in	1 in
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Precipitation-Rain or Snow (inches)	2 in	0 in	1 in	1 in																	
<p>5. Observe that rain, snow, and other forms of precipitation come from clouds, but that not all clouds produce precipitation.</p>	<p>Instructional/Assessment Focus:</p> <ul style="list-style-type: none"> Not all clouds produce precipitation. Cloud shape can be used to help forecast weather. <p>Suggested Instructional/Assessment Strategies:</p> <ul style="list-style-type: none"> Keep daily records of weather conditions (wind speed and direction, type and amount of precipitation, cloud cover and type, temperature) and use these records to identify short term and seasonal patterns in New Jersey. Using student data about cloud type and precipitation, students propose and modify as appropriate, hypothesize about the types of clouds that they observe and the likelihood that they will produce rain. <p>Sample Assessment Items:</p> <p>1. Omar and Norma are planning to go on a picnic today. They look out of the window and see some high, thin clouds.</p> <ul style="list-style-type: none"> Is it likely it will rain on their picnic today? Explain your answer. 																				

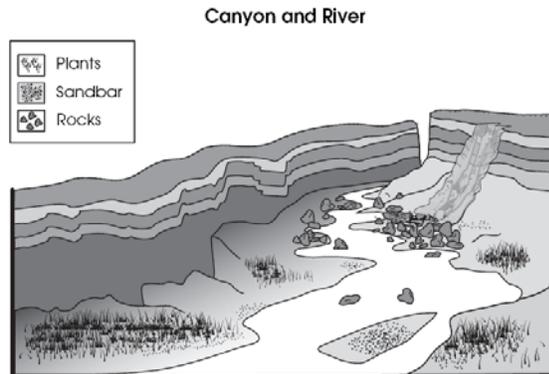
	<p>2. Which type of cloud is most likely to produce heavy rain, lightning, and thunder? * A. tall and dark </p> <p>B. low and gray </p> <p>C. high and broken </p> <p>D. high and wispy </p>
<p>6. Recognize that clouds and fog are made of tiny droplets of water and possibly tiny particles of ice.</p>	<p>Instructional/Assessment Focus:</p> <ul style="list-style-type: none"> • Clouds and fog are made of tiny droplets of frozen crystals of water. • Clouds are shaped by winds and are made of small water droplets or ice crystals. • Cloud shape can be used to help forecast weather.

5.8.4 C. Processes that Shape the Earth

Essential Questions	Enduring Understandings
<ul style="list-style-type: none"> ▪ How do geologic events occurring today provide insight into Earth's past? 	<ul style="list-style-type: none"> ▪ Earth's components form systems. These systems continually interact at different rates of time, affecting the shape of the Earth's surface regionally and globally.
Areas of Focus	Comments and Examples
<p>1. Recognize that some changes of the Earth's surface are due to slow processes such as erosion and weathering, and some changes are due to rapid changes such as landslides, volcanic eruptions, and earthquakes.</p>	<p>Instructional/Assessment Focus:</p> <ul style="list-style-type: none"> • Earth is a dynamic system resulting from interactions among the geosphere, hydrosphere, atmosphere and biosphere. • Water reshapes Earth's land surface by eroding rock and soil in some areas and depositing them in others. • The surface of the Earth changes constantly. Some of these changes happen slowly and are difficult to detect on a daily basis. Other changes happen quickly and result from events (i.e., major storms and volcanoes). • The surface of the Earth is shaped in part by the motion of water and wind over very long periods of time, which act to level mountain ranges. • The interior of the earth is hot. Heat flow and movement of materials within the earth cause earthquakes and volcanic eruptions and create mountains and ocean basins. <p>Suggested Instructional/Assessment Strategies:</p> <ul style="list-style-type: none"> • Use stream tables to observe the creation of landforms as water flows over and through the land. Describe changes that result from the flowing of water, using correct geographic terminology (i.e., canyon, delta, tributary). Describe changes to the water as it flows over land (i.e., color, transparency). • Describe how fast-moving water and slow-moving water over land affect erosion and deposition. • Describe how heat flow within the Earth results in earthquakes and/or volcanic eruptions.

Sample Assessment Items:

1. The picture shows evidence that different natural processes shape the canyon over time.



- Identify one natural process that could have helped shape the canyon in the picture.
 - Describe evidence of this process.
2. How does freezing water cause the weathering of rocks?
- A. It holds them in place.
 - B. It makes them longer.
 - * C. It cracks them.
 - D. It makes them thicker.

2. **Recognize that moving water, wind, and ice continually shape the Earth's surface by eroding rock and soil in some areas and depositing them in other areas.**

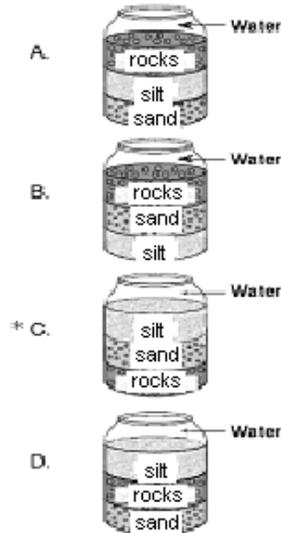
Instructional/Assessment Focus:

- Factors such as abrasion, frost/ice wedging, temperature change, and plant growth cause physical weathering of rocks.
- Erosion is the process by which materials are transported (i.e., mass movement and wind, water and ice processes).
- Sedimentary rocks are formed by the deposition of eroded materials.

Suggested Instructional/Assessment Strategies:

- Investigate and describe how factors such as abrasion, frost/ice wedging, temperature change, and plant growth cause physical weathering of rocks.
- Describe the environment in which the sedimentary particles were formed based on the results of weathering.
- Investigate how weathered materials are transported (i.e., mass movement and wind, water and ice processes) in the process of erosion. Explain how erosion shapes rock particles.
- Describe the process by which eroded materials can form horizontal layers of sedimentary rock.

Sample Assessment Item:
 1. Your teacher has brought to class a sample of water that contains a mixture of small rocks, sand and silt (very fine soil) from the Delaware River. After a few hours, the sample settles. Which picture shows how the sample will settle?



5.8.4 D. How We Study the Earth

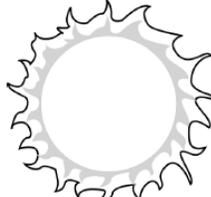
Essential Questions	Enduring Understandings
<ul style="list-style-type: none"> How does technology extend human senses and understanding of Earth? 	<ul style="list-style-type: none"> Technology enables us to better understand Earth's systems and the impact of Earth's systems on human activity.
Areas of Focus	Comments and Examples
<p>1. Use maps to locate and identify physical features on the Earth.</p>	<p>Instructional/Assessment Focus:</p> <ul style="list-style-type: none"> Maps are constructed using common symbols and those symbols represent both natural and human constructed objects. Users' needs determine the scale of the map selected. Some satellites allow scientists to observe over time large-scale changes in the geosphere as well as the development of short term weather events. Students should be introduced to GPS and GIS technology <p>Suggested Instructional/Assessment Strategies:</p> <ul style="list-style-type: none"> Using simple tools, construct an accurate map of a classroom and the school. Using a variety of maps, identify natural and human constructed features (i.e., cities, roads, oceans, rivers, lakes, mountains). Compare and contrast the kinds of physical features that a person can observe on a small scale map vs. a large scale map. Observe and interpret satellite images and weather maps.

Standard 5.9 Astronomy & Space Science

All students will gain an understanding of the origin, evolution, and structure of the universe.

Big Idea: Our Solar System is part of the Milky Way Galaxy, which, in turn, is one of many galaxies in the known Universe. While the composition of planets vary considerably, their components and the applicable laws of science are universal.

5.9.4 A. Earth, Moon, Sun System

Essential Questions	Enduring Understandings
<ul style="list-style-type: none"> ▪ What predictable, observable patterns occur as a result of the interaction between the Earth, Moon, and Sun? ▪ What causes these patterns? 	<ul style="list-style-type: none"> ▪ Observable, predictable patterns of movement in the Sun, Earth, Moon system occur because of gravitational interaction and energy from the Sun.
Areas of Focus	Comments and Examples
<p>1. Observe patterns that result from the Earth's position relative to the Sun and rotation of the Earth on its axis.</p>	<p>Instructional/Assessment Focus:</p> <ul style="list-style-type: none"> • The Sun rises and sets in different locations through the course of the year. • The Earth's axis of rotation is tilted. • The Sun is much larger than the Moon. Although the Moon is closer to Earth than the Sun, the two appear to be the same size when viewed from Earth. This is because objects appear smaller as the distance from the viewer increases. <p>Suggested Instructional/Assessment Strategies:</p> <ul style="list-style-type: none"> • Observe the motion of the Sun across the sky through the course of a year. • Observe the size of the Sun and Moon in the sky. Use models to illustrate the approximate size and distance relationship between the Sun and Moon. Explain why the Sun and Moon appear to be similar in size when observed in the sky. <p>Sample Assessment Items: <i>Use the following illustration to answer questions 1 and 2.</i></p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Sun</p> </div> <div style="text-align: center;">  <p>Earth</p> </div> </div> <ol style="list-style-type: none"> 1. Using the picture of Earth and the Sun below, mark a spot on Earth where it is day with a "D". Then mark a spot on Earth where it is night with an "N." 2. New Jersey goes through a period of day and night every 24 hours. Explain what causes day and night. 3. When you are getting up to go to school in New Jersey, a student on the other side of Earth is getting ready for bed. What is the reason for this?

	<p>Use the illustrations below to answer question 4.</p> <p>4. Which drawing below would best represent the flagpole's shadow at 5:00 PM?</p> <div style="text-align: center;"> </div> <p>5. Which of the following best explains why the Sun appears to move across the sky every day?</p> <p>* A. The Sun rotates on its axis. B. Earth rotates on its axis. C. The Sun orbits around Earth. D. Earth orbits around the Sun.</p>
<p>2. Recognize and describe the phases of the moon.</p>	<p>Instructional/Assessment Focus:</p> <ul style="list-style-type: none"> The Moon's orbit around the Earth once in about 28 days changes which part of the Moon is lighted by the sun and how much of that part can be seen from the Earth – the phases of the moon. The appearance of the Moon changes over the period of a month. These changes are called phases. The Moon's appearance can be classified using terms new, first quarter, full, last (third) quarter. <p>Suggested Instructional/Assessment Strategies:</p> <ul style="list-style-type: none"> Using actual sky observations, chart the appearance of the Moon over the course of at least 2 months. Identify the basic pattern of the Moon's appearance. Classify using terms new, first quarter, full, last (third) quarter.
<p>5.9.4 B. Solar System</p>	
<p>Essential Questions</p>	<p>Enduring Understandings</p>
<ul style="list-style-type: none"> How are planets and other objects in the Solar System similar and different to Earth? What implication does this have for the existence and sustaining of life? 	<ul style="list-style-type: none"> Physical characteristics of planets depend on their distance from the Sun and their size.
<p>Areas of Focus</p>	<p>Comments and Examples</p>
<p>1. Describe Earth as one of several planets that orbit the sun and the moon as a satellite of the Earth.</p>	<p>Instructional/Assessment Focus:</p> <ul style="list-style-type: none"> Earth is one of the planets in our Solar System that orbits the Sun. The Sun we see during the day is our nearest star. Stars we see at night lie outside of our Solar System. The Moon belongs to the Earth and other planets have moons. <p>Suggested Instructional/Assessment Strategies:</p> <ul style="list-style-type: none"> Create an inventory of objects in our Solar System. Locate a planet in the night sky.

	<p>Sample Assessment Item:</p> <p>1. If all the planets started circling the sun at the same time, which one would finish the trip last?</p> <p style="padding-left: 40px;">A. Mercury</p> <p style="padding-left: 40px;">B. Jupiter</p> <p style="padding-left: 40px;">* C. Uranus</p> <p style="padding-left: 40px;">D. Saturn</p>
5.9.4 C. Stars	
Essential Questions	Enduring Understandings
<ul style="list-style-type: none"> ▪ What characteristics does our Sun share with other stars? 	<ul style="list-style-type: none"> ▪ The Sun is a star.
Areas of Focus	Comments and Examples
<p>1. Observe that stars are not all the same in brightness, size, and color.</p>	<p>Instructional/Assessment Focus:</p> <ul style="list-style-type: none"> • There are more stars in the sky than anyone can easily count, but they are not scattered evenly, and they are not all of the same brightness or color. <p>Suggested Instructional/Assessment Strategy:</p> <ul style="list-style-type: none"> • Using direct observations with binoculars or telescopes when possible, planetariums, or web based simulations, observe the brightness and color of a variety of stars.
5.9.4 D. Galaxies and Universe	
Essential Questions	Enduring Understandings
<ul style="list-style-type: none"> ▪ Is there order to the Universe? 	<ul style="list-style-type: none"> ▪ The universe is made up of galaxies, each of which is composed of solar systems, having the same elements and governed by the same laws.
Areas of Focus	Comments and Examples
<p>1. Recognized that images of celestial objects can be magnified and seen in greater detail when observed using binoculars and light telescopes.</p>	<p>Instructional/Assessment Focus:</p> <ul style="list-style-type: none"> • Binoculars and telescopes are magnifiers that allow us to see things in more detail in the sky. <p>Suggested Instructional/Assessment Strategy:</p> <ul style="list-style-type: none"> • Keep a record of changes in the night sky that students have observed with the naked eye or with the use of binoculars, telescopes or computer simulations.
<p>2. Observe and record short-term and long-term changes in the night sky.</p>	<p>Instructional/Assessment Focus:</p> <ul style="list-style-type: none"> • Changes in the night sky are observable and can be recorded in a more detailed manner through the use of technology. <p>Suggested Instructional/Assessment Strategy:</p> <ul style="list-style-type: none"> • Keep a record of changes in the night sky that students have observed with the naked eye or with the use of binoculars or telescopes.

Standard 5.10 Environmental Studies

All students will develop an understanding of the environment as a system of interdependent components affected by human activity and natural phenomena.

Big Idea: Organisms are linked to one another in an ecosystem by the flow of energy and the cycling of materials. Humans are an integral part of the natural system and human activities can alter the stability of ecosystems.

5.10.4 A. Natural Systems and Interactions

Essential Questions	Enduring Understandings
<ul style="list-style-type: none"> ▪ How can change in one part of an ecosystem affect change in other parts of the ecosystem? 	<ul style="list-style-type: none"> ▪ Organisms and their environments are interconnected. ▪ Changes in one part of the system will affect other parts of the system.
Areas of Focus	Comments and Examples
<p>1. Differentiate between natural resources that are renewable and those that are not.</p>	<p>Instructional/Assessment Focus:</p> <ul style="list-style-type: none"> • Resources are things that we get from living and non-living environments to meet the needs and wants of a population. • Some resources are basic materials such as air, water, and soil. • Other resources are produced from basic resources such as food, fuel, and building materials. • Many natural resources are limited. The amount available can be made to last longer by decreasing the use of some resources or by reusing or recycling certain materials. <p>Sample Assessment Item:</p> <p>1. Which of these is a renewable resource?</p> <p style="margin-left: 40px;">* A. wood, because trees grow again B. coal, because more can be made in about 100 years C. petroleum, because it can be refined into gasoline D. gold, because more can be made very easily</p>

5.10.4 B. Human Interactions and Impact

Essential Questions	Enduring Understandings
<ul style="list-style-type: none"> ▪ How do humans impact the diversity and stability of ecosystems? 	<ul style="list-style-type: none"> ▪ Humans can alter the living and non-living factors within an ecosystem, thereby creating changes to the overall system.
Areas of Focus	Comments and Examples
<p>1. Explain how meeting human requirements affect the environment.</p>	<p>Instructional/Assessment Focus:</p> <ul style="list-style-type: none"> • Humans change environments in ways that can be either beneficial or detrimental for themselves and other organisms. • In striving to meet their own needs, humans have had significant impact on local, regional and global environments. • Moving air and water can be used to run machines. • The Sun is the main source of energy for people and they use it in various ways. The energy in fossil fuels comes from plants that grew long ago. • Some energy sources cost less than others and cause less pollution than others. • People try to conserve energy in order to slow down the depletion of energy resources and/or to save money. <p>Suggested Instructional/Assessment Strategy:</p> <ul style="list-style-type: none"> • For more easily observed sources of energy, students can relate inputs and outputs; what it takes for something to work and what the effects are.

Sample Assessment Item:

1. Garbage is a big problem. In many cities and towns, garbage is taken away to landfills, which are often called "dumps." Some landfills are very big and may cover hundreds of acres. But even these big landfills are getting full and may have to be closed.

Here are some ideas for solving the garbage problem. Write what you think is a good point about each idea and what you think is a bad point about each idea.

Ideas for Solving Garbage Problem	<u>Good Points</u>	<u>Bad Points</u>
Recycling		
Burning garbage		
Dumping garbage in the ocean		
Sending garbage to a landfill in another state		