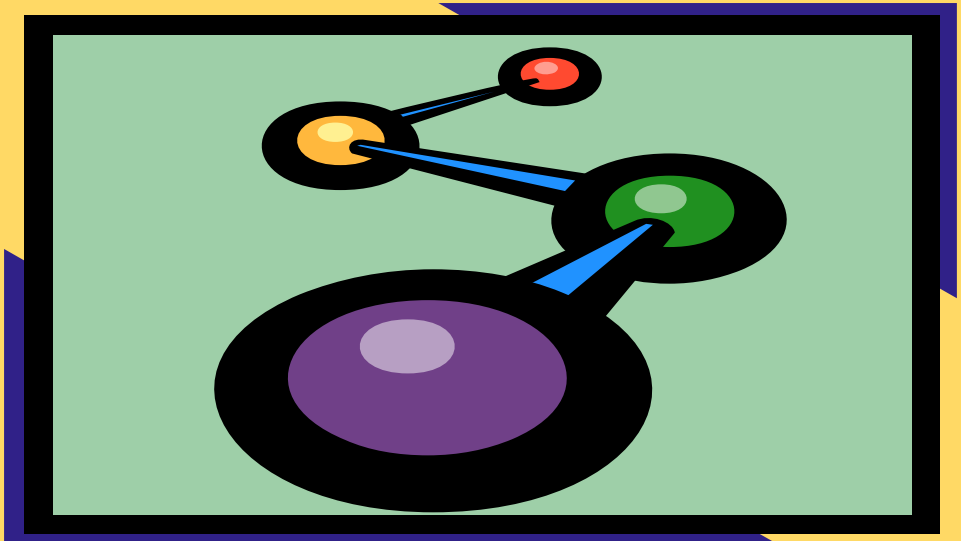
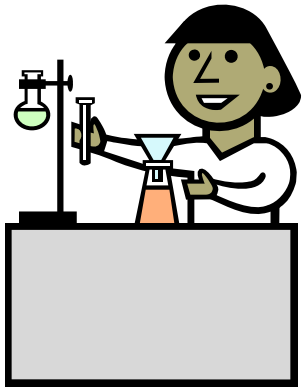
Aligned Lessons

Grades 3-5 Science Plan Guide



Division of Science Education

Adapted from the 3 -5 Elementary Science Resource



The Five Essential Components to Inquiry

- Learners are engaged by scientifically oriented **questions**.
- Learners give priority to ***evidence*** allowing them to develop and evaluate explanations that address scientifically-oriented questions.
- Learners formulate **explanations** from evidence to address scientifically-oriented questions.
- Learners **evaluate** their explanations in light of alternative explanations, particularly those reflecting scientific understanding.
- Learners **communicate** and justify their proposed explanations.

Adapted from the article: The Five Essential Components to Inquiry

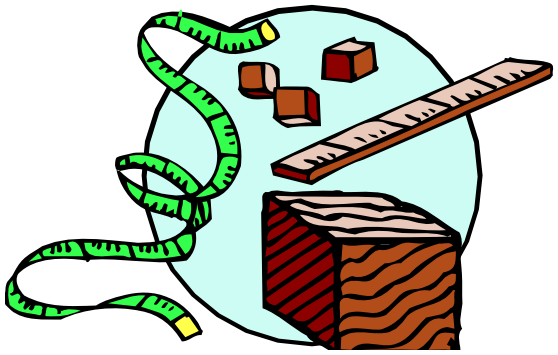
Making Sense of Density

Florida Sunshine State Standard Benchmark: SC.A.1.2.1 – The student determines that the properties of materials (e.g., density and volume) can be compared and measured (e.g., using rulers, balances, and thermometers).

Overview:

The following set of activities helps students begin to make sense of the concept of density, mass and volume. An understanding of these concepts begins with defining the property of a substance. Properties are characteristics of a substance that can be observed or measured. Density is the concentration of matter within an object. It is the amount of matter in a certain volume. Density is calculated by using the following formula: Density = Mass/Volume. Mass is the amount of material in an object, it is easily confused with weight. Weight is the measure of the pull of gravity on an object. Weight is measured on a spring scale, mass is measure on a balance. Volume is the amount of space that an object takes up, it can be measured in several ways. Volume of a liquid can be measured by using a graduated cylinder. Volume of a solid can be calculated by using the following formula: Volume = Length x Width x Height. Students will role play, use prior knowledge in guided imagery, and observe layers of different materials remaining separated in the same container.

Time Frame: Two 30 minute lessons



Part A: Filling a Square Meter

Material:
1 Meter stick
1 roll of masking tape

Procedure

1. Create three separate square meters on the floor using a meter stick and masking tape.
2. Place three learners in the first square meter. Ask them to move around. Have the peers observe that it is easy for the three to move around in space. "These are gas molecules. There is lots of space between them."
3. Place six learners in the next square meter. Ask them to move around. Have the peers observe that it is not as easy for the six to move around in the same space as the gas molecules, but they can "slide" past each other fairly easily. "These are liquid molecules. There is not as much space between them as there is for the gas molecules."
4. Place nine learners in the third square meter (more if necessary to fill the meter completely). Ask the group to move around. Have peers observe that it is very difficult to move. "These are solid molecules. There is very little room between them. They are very tightly packed."

Assessment

- If the word density means how many of something is packed in a space, which group is the most dense? (The solid group)
- Which group is the least densely packed? (The gas molecules)

Part B: Layered Liquids

Material:

250 ml graduated cylinder
50 ml cooking oil
50 ml water with blue food coloring
50 ml corn syrup
50 ml rubbing alcohol
1 small cork

1 glass marble

1 small rock

1 wood cube

1 metal nut

Procedure

1. Add the food coloring to the water.
2. Pour the liquids in the graduated cylinder in this order: corn syrup, colored water, oil and rubbing alcohol.
3. Predict which layers the cork, marble, rock, wood, and metal will settle above.
4. Gently drop in the cork, marble, rock, wood, and metal and observe.
5. Discuss and record observations and draw conclusions.

Assessment:

- Why do liquids separate into four layers?
- In which liquid does each of the objects end up?
- How does this match your predictions?
- Why do some objects sink, while others float?

It's All in the Mix

Florida Sunshine State Standard Benchmark: SC.A.1.2.4 – The student knows that different materials are made by physically combining substances and that different objects can be made by combining different materials.

Overview:
A mixture is two or more substances that are mixed together but can be easily separated because each substance keeps its own physical properties. In some mixtures it's easy to tell that each type of matter keeps its own physical properties because you can still see the parts of the mixture. One example of this is a salad. A solution is a mixture in which the particles two substances are evenly mixed. Solutions cannot be easily separated. An example would be sugar and water. The sugar dissolves into the water. A solution does not always have to be a solid and a liquid. Two liquids or two metals can also mix together to produce a solution. Rubbing alcohol is a solution of water and alcohol, while brass is a solution of zinc and copper. In this lesson students will produce both a mixture and a solution to be able to identify the similarities and differences between the two.

Time Frame: 45 – 60 minutes

Materials: (per group)

Mixture	Solution
1 head of lettuce	1 pack of powered drink mix
1 tomato	1 cup of water
1 cucumber	1 spoon
10 croutons	1 coffee filter
1 carrot	
1 bowl	

Procedure:

1. Break students into groups of four and have materials manager collect all of the mixture materials.
2. In a bowl, combine all mixture materials and note the new substance that has been created.
3. Have students then separate all the mixture materials into their original piles.
4. Have materials manager collect the materials for the solution.
5. Fill the clear glass with water.
6. Using the spoon, add two scoops of drink mix to the glass of water.
7. Observe and record changes in the solution created.
8. Pour the solution through the filter and note that the materials can't be separated.

Assessment:

Create a Venn diagram comparing and contrasting mixtures and solutions. Write a brief summary of the activity using vocabulary covered in the lesson.

Beach Erosion

Florida Sunshine State Standard Benchmark: SC.D.1.2.4 – **The student knows that the surface of the Earth is in a continuous state of change as waves, weather, and shifts of the land constantly change and produce many new features.**

Overview:
The earth is in a constant state of change. There are many variables that contribute to this continuous evolution. An example of this change is weathering. Weathering is the breaking up or the wearing away of rocks. Another example of this change is erosion. Erosion is the process of moving sediment from one place to another. Erosion can come from weathering, shifting of the earth's surface, and waves. The goal of this activity is to demonstrate the process of erosion caused by waves.

Time Frame: **45-60 minutes**

Materials: **(per group)**
2 books
Rectangular baking pan
Sand (enough to tightly pack 1/3 of the pan)
1 cup of pebbles
1 quart of water
1 sponge
Soil (enough to tightly pack 1/3 of the pan)

Procedure:
1. **Put books under one side of the baking pan so that one side is raised 6 centimeters.**
2. **Put sand and pebbles on the raised side of the pan to form a beach.**
3. **Pour enough water into the bottom of the pan so that it reaches the beach.**

4. **Put a sponge into the end of the pan with the water.**
5. **Push down on the sponge repeatedly to make small waves.**
6. **Observe and record the effect that the waves have on the sand and pebbles.**
7. **Repeat this activity using soil.**

Assessment:

- **Describe the effect of the simulated waves on the sand.**
- **Describe the relationship between this activity and actual beach erosion.**
- **Compare and contrast the effects that the water had on the sand versus the soil.**
- **Why are most waterfront areas made of sand and gravel instead of soil?**

Note:

A variation of this activity is to use colored sand in place of standard white sand. This will allow an easier observation of the process of erosion on the sand.

Home learning:

Have students bury rocks under a mound of sand or dirt and slowly pour water over the mound. Write up their observations.

The Gravity of It All
Newton's Laws

Florida Sunshine State Standard Benchmark: SC.C.2.2.4 – The student knows that the motion of an object is determined by the overall effect of all of the forces acting on the object.

Overview:

This activity involves Newton's second law of motion: An object's acceleration depends on the size and direction of the force acting on it and on the mass of the object. A large force will cause more acceleration than a smaller force. A force has more effect on an object with less mass than it has on an object with more mass. Friction is one force that has an effect on the motion of an object. Friction is a force that opposes, or acts against, motion when two surfaces rub against each other. Gravity is another force that has an effect on an objects motion. Gravity is the force that holds all objects on Earth. In this activity learners will investigate the effects of gravity and friction on different masses (different size balls) by measuring the distance each travels down a desk top ramp. This investigation can be broken up in to several activities but is best offered in one extended experience.

Time Frame: 90 minute integrate math/science block

Materials: (per group)

2 grooved metric rulers,
1 small marble
1 large marble
1 washer
1 steel ball
1 meter tape
1 small paper cup (cut in $\frac{1}{2}$ lengthwise)
Masking tape
Books (to support ramps)

Ramps data sheet

Procedure:

1. Assemble the ruler/ramp using several books. Place the cup with the open end covering the bottom of the ruler so that the marbles will collide with the bottom of the cup. Tape a washer to the top of the cup to add mass (weight).
2. Ask the learners to tell you what they think will happen when the marble you roll down the ruler/ramp hits the cup/slider at the bottom. Ask the learners what would happen to the slider if you used a large marble, a smaller marble.
3. Mark how far your cup travels. Use the masking tape to mark the distance and label the tape 'marble A'". (Instruct the learners to leave the tape marks if you plan to continue by changing a variable in the next set of trials).
4. As the teams are assembling their lab, circulate through the classroom and make sure all teams have a data table and a recorder and a data collector. They could use a two column data table to record the distance the cup traveled for three trails and calculate the average.
5. Allow time for each group to investigate. When it appears that most teams are finished, encourage the others to wrap up their investigations. Have them stop and report out what they discovered. Use visuals and labeling to record their findings.
6. Introduce a new size marble (the weight will change as well). Ask the learners to predict how this new size will react in comparison to the first size marble. (If it is a larger marble the cup rolls further because it is heavier too! If it is smaller, it will not roll as far as the first marble.)
7. You will need to mark how far your marble travels so label these distances with masking tape. These we will call 'marble B'. Run three trials and record your data.
8. Continue the investigation by trying another size marble.
9. Once you have a class set of data for three size marbles you can instruct the class to calculate the average distance each size cup traveled. This data of the averages can then be graphed. Conclusions should be included on the graph paper so that you can assess the learners' understanding of the benchmark- the more mass the more force.

Assessment

The teacher may use daily data sheets, averages, paperwork, graphs of the large and small-sized marbles, and conclusions.

Sample Data Sheet

Trials	Small Marble	Large Marble
1	cm	cm
2	cm	cm
3	cm	cm
4	cm	cm
5	cm	cm

Earth and Seasons

Florida Sunshine State Standard Benchmark: SC.E.1.2.1 – The student knows that the tilt of the Earth on its own axis as it rotates and revolves around the sun causes changes in season, length of day and energy available.

Overview:
The path Earth takes as it revolves around the sun is called its orbit. Earth's orbit is an ellipse, a shape that is not quite circular. As Earth orbits the sun, it rotates or spins on its axis. The axis is an imaginary line that passes through Earth's center and its North and South Poles. Earth's rotation results in day and night. As Earth revolves around the sun, its axis is always tilted in the same orientation. During the year, the part of Earth tilted toward the sun gets more direct sunlight. The part of Earth tilted away from the sun gets less direct sunlight. It is the tilt of Earth's axis and Earth's revolutions that causes the seasons. A season lasts about three months. The following activity models Earth's position to the Sun as it relates to the change in seasons.

Time Frame: Two 30 minute sessions

Materials:
5 plastic foam balls
4 narrow sticks (15 cm long)
5 paper cups
Large sheet of paper
Box of tooth picks
Markers or crayons
Colored stars
Globe

Procedures:
1. Place the sheet of paper on a tabletop. Place one cup in the center of the paper.
2. Color one plastic-foam ball yellow. It will represent the Sun. Place it on the cup in the center of the paper.

3. Draw a circle representing an orbit around the Sun on the paper. Place a cup on each side of the Sun in a North, East, South and West position along the orbit. Label each position using A – D.
4. Position the four narrow sticks around an imaginary orbit in the Sun, one on each of the labeled sides. The sticks represent the Sun's direct rays.
5. Use a crayon or a marker and draw a colored band around the middle of each of the other four balls. The colored bands represent the equator.
6. Find the top and the bottom of each ball. Place a dot at each spot. Push a toothpick into the dot at each end. Let most of each toothpick stick out. The toothpick represents Earth's axis.
7. Place each ball on top of one the cup. Make sure that all the balls are tilted in the same direction which is a model of the Earth's tilt.
8. On the globe find the spot where you live. Find a similar spot on each plastic-foam ball. Place a colored star on the spot. Make sure that all the stars are facing the Sun.
9. Discuss the various seasons represented on the globes at each starred location and possible reasons for the seasonal differences.

Assessment:

- Have the students describe and explain how the Earth's position as it revolves around the Sun causes the changes in seasons.

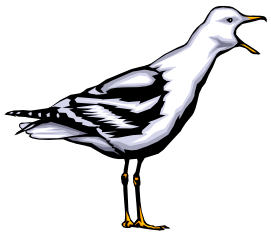
Home Learning:

Choose a country that is opposite from Florida, describe and explain how the seasons differ from yours.

Extensions:

Pick a different place on the globe and based on its location currently, describe how the people might dress.

Bird Beak



Florida Sunshine State Standard Benchmark: SC.G.1.2.2 – The student knows that living things compete in a climatic region with other living things and that structural adaptations make them fit for an environment.

Overview:
Every organism has adaptations that help it compete for resources. For example, a cheetah's speed allows it to hunt and capture prey such as zebras and antelopes. Models of bird beaks are used to show structural adaptations within this lesson. For example, representations for birds such as wading birds (toothpicks), parrots and cockatoos (clothes pin) and flamingos or pelicans (fishnet) will be utilized by the students. This activity will allow students a chance to see how the adaptation of bird beaks assists in their ability to hunt for food.

Time Frame: 60 minutes

Materials:
1 tablecloth
½ cup of beans
½ cup of rice
Pan of water
½ cup of macaroni
½ cup of Gummy Worms
½ cup of cooked spaghetti
6 clothes pins
6 toothpicks
6 spoons
6 chopsticks

6 small fish nets
Paper cup (1 per student)

Procedure:

1. Discuss the concept of animal adaptations with your students.
2. Show the students the bird adaptation sheet and discuss the different features that help them survive.
3. Take the students outside and have them gather around the tablecloth.
4. Give each child in the group a tool to represent a beak. Demonstrate how each tool represents a bird's beak and how they use that beak to feed (ex. Toothpick, clothespin, chopstick, spoon, and a small fishing net).
5. Explain to the students that you are going to put down a variety of food that represents the different types of foods that birds might eat (ex. Macaroni, beans, gummy worms, cooked spaghetti, and rice).
6. Place the same items in the pan of water to represent the water birds.
7. Give the students a cup to put the food in that they will catch with their simulated beaks.
8. Give the students one minute to catch as many food items as they can.
9. Have the students examine the food that they caught. Discuss the different adaptations that allowed each type of beak to catch that type of food.
10. Discuss what possible type of bird each simulated beak represented and how this adaptation enables birds to eat certain types of food (or the teacher may choose to have students research and determine which type of bird each beak represented on their own).

Assessment:

Have the students write up a conclusion statement about the relationship between the bird beak adaptations and the food they are able to consume.

Home Learning:

Pick an animal and give it a new adaptation. Name it and tell how it would help the animal to survive better.

Additional Lessons Aligned to Benchmarks

STRAND	BENCHMARK	ACTIVITY/ASSESSMENT
NATURE OF MATTER	**SC.A.1.2.1** Determines that the properties of materials (e.g., density and volume) can be compared and measured (e.g., using rulers, balances, and thermometers). ***AA***	• Uses scientific equipment to classify or order a set of objects using length, weight, or volume and explains the classification scheme used. • Compares properties of oil and water and discusses the implications for oil spills.
	SC.A.1.2.2 Knows that common materials (e.g., water) can be changed from one state to another by heating and cooling. CS	• Observes, describes, and compares changes of state for several common substances.
	SC.A.1.2.3 Knows that the weight of an object always equals the sum of its parts. CS	• Compares the weight of a box of crayons or an orange when whole and when taken apart.
	SC.A.1.2.4 Knows that different materials are made by physically combining substances and that different objects can be made by combining different materials. ***AA***	• Constructs different things using the same small parts (e.g., blocks, Legos, Tinker Toys, or geometric shapes), takes the structures apart, and rearranges them to form other constructs.
	SC.A.1.2.5 Knows that materials made by chemically combining two or more substances may have properties that differ from the original materials. CS	• Observes and describes the properties of vinegar-and-oil and starch-and-water mixtures respectively and compares the properties of the mixtures to those of each ingredient.
	SC.A.2.2.1 Knows that materials may be made of parts too small to be seen without magnification. CS	• Uses a hand lens to observe things smaller than the eye can normally see. The student then describes and records his or her observations.

STRAND	BENCHMARK	ACTIVITY/ASSESSMENT
ENERGY	**SC.B.1.2.1** Knows how to trace the flow of energy in a system (e.g., as in an ecosystem). ***AA***	• Draws a food pyramid for a terrarium and explains the transfers of energy.
	SC.B.1.2.2 Recognizes various forms of energy (e.g., heat, light, and electricity). ***AA***	• Explores the room and identifies different energy sources.
	SC.B.1.2.3 Knows that most things that emit light also emit heat. CS	• Designs an experiment to measure the amount of heat released from various light sources.
	SC.B.1.2.4 Knows the many ways in which energy can be transformed from one type to another. CS	• Identifies several processes that involve energy transformation.
	SC.B.1.2.5 Knows that various forms of energy (e.g., mechanical, chemical, electrical, magnetic, nuclear, and radiant) can be measured in ways that make it possible to determine the amount of energy that is transformed. CS	• Calculates and reports the amount of energy used by the school each day and graphs the results.
	SC.B.1.2.6 Knows ways that heat can move from one object to another. CS	• Designs, conducts, and explains an experiment to show that some materials conduct heat better than others.
	SC.B.2.2.1 Knows that some source of energy is needed for organisms to stay alive and grow. CS	• Designs, conducts, and explains an experiment to identify the effects of energy on plant or animal growth.

STRAND	BENCHMARK	ACTIVITY/ASSESSMENT
ENERGY	**SC.B.2.2.2** Recognizes the costs and risks to society and the environment posed by the use of nonrenewable energy. (Assessed as SC.G.2.2.1)	• Gives examples of substances, situations, and materials that store energy and explains how that energy can be released.
	SC.B.2.2.3 Knows that the limited supply of usable energy sources (e.g., fuels such as coal or oil) places great significance on the development of renewable energy sources. (Assessed as SC.G.2.2.1)	• Uses common objects to design and construct an apparatus or device that will store energy.
FORCE AND MOTION	**SC.C.1.2.1** Understands that the motion of an object can be described and measured. CS	• Describes and compares the distance traveled and the speed and motion of various types and sizes of balls. • Describes the motion of an object traveling down an incline plane placed at various heights in terms of time, distance traveled, and direction.
	SC.C.1.2.2 Knows that waves travel at different speeds through different materials. CS	• Generates waves in different materials, then measures and compares the time required for waves to move the same distance.
	SC.C.2.2.1 Recognizes that forces of gravity, magnetism, and electricity operate simple machines. CS	• Designs a simple machine, explains how the effort force is applied and how the machine applied resistance force, and suggests uses for the machine. • Uses building blocks to make simple machines.

STRAND	BENCHMARK	ACTIVITY/ASSESSMENT
FORCE AND MOTION	**SC.C.2.2.2** Knows that an object may move in a straight line at a constant speed, speed up, slow down, or change direction dependent on net force acting on the object. (Assessed as SC.C.2.2.4)	• Concludes which of several magnets exerts the largest force by counting how many paper clips it will pick up. The student then describes the motion of the clips toward the magnet. • Uses a spring to launch paper airplanes by applying different amounts of pressure. The student then determines and reports the speed, distance, and direction traveled.
	SC.C.2.2.3 Knows that the more massive an object is, the less effect a given force has. CS	• Collects data and draws conclusions about the relationship between the mass of a ball and the distance traveled when pushed.
	SC.C.2.2.4 Knows that the motion of an object is determined by the overall effect of all of the forces acting on the object. **AA**	• Identifies the forces that act on an object. • Determines, compares, and reports the distance traveled and the speed and motion of various kinds and sizes of balls as they are thrown.
PROCESSES THAT SHAPE THE EARTH	**SC.D.1.2.1** Knows that larger rocks can be broken down into smaller rocks, which in turn can be broken down to combine with organic material to form soil. (Assessed as SC.D.1.2.4)	• Investigates properties of rocks and minerals using hand lenses and microscopes. The student then develops systems to group minerals and rocks into sets that have similar properties and reports findings.
	SC.D.1.2.2 Knows that 75 percent of the surface of the Earth is covered by water. (Assessed as SC.D.1.2.4)	• Calculates, compares, and reports the area of the surface of the Earth that is water and the area that is land.

STRAND	BENCHMARK	ACTIVITY/ASSESSMENT
PROCESSES THAT SHAPE THE EARTH	**SC.D.1.2.3** Knows that the water cycle is influenced by temperature, pressure, and the topography of the land. CS	• Graphs daily weather changes and then describes and compares weather situations in various places on Earth.
	SC.D.1.2.4 Knows that the surface of the Earth is in a continuous state of change as waves, weather, and shifts of the land constantly change and produce many new features. **AA**	• Collects, analyzes, and presents data on the location, size, and distribution of earthquakes recorded during the last ten years. • Predicts the outcome when a quart of water is dumped into one end of a sand-filled tank and makes observations to verify the prediction.
	SC.D.1.2.5 Knows that some changes in the Earth's surface are due to slow processes and some changes are due to rapid processes. (Assessed as SC.D.1.2.4)	• Uses local examples to show and compare geologic processes that occur in a week (e.g., gully washes) and those that take years (e.g., riverbeds).
	SC.D.2.2.1 Knows that reusing, recycling, and reducing the use of natural resources improve and protect the quality of life. CS	• Develops, implements, and reports on a plan to recycle in the home and in school.
EARTH AND SPACE	**SC.E.1.2.1** Knows that the tilt of the Earth on its own axis as it rotates and revolves around the Sun causes changes in season, length of day, and energy available. **AA**	• Demonstrates and relates day and night to the rotation of the Earth on its axis and the concept of seasons to the tilted axis of the Earth.

STRAND	BENCHMARK	ACTIVITY/ASSESSMENT
EARTH AND SPACE	**SC.E.1.2.2** Knows that the combination of the Earth's movement and the Moon's own orbit around the Earth results in the appearance of cyclical phases of the Moon. CS	• Uses a ball, globe, and light source to demonstrate the phases of the Moon and makes a chart to record observations and communicate the pattern observed.
	SC.E.1.2.3 Knows that the Sun is a star and that its energy can be captured or concentrated to generate heat and light for work on Earth. CS	• Designs, builds, and uses a solar cooker to cook or warm food and reports on the experience.
	SC.E.1.2.4 Knows that the planets differ in size, characteristics, and composition and that they orbit the Sun in our Solar System. CS	• Classifies planets by atmospheres, chemical makeup, sets of rings, and natural satellites and explains the classification.
	SC.E.1.2.5 Understands the arrangement of planets in our Solar System. CS	• Constructs models that demonstrate the distance between the Earth, Sun, and other planets.
	SC.E.2.2.1 Knows that, in addition to the Sun, there are many other stars that are far away. CS	• Compares the color and brightness of our Sun with other stars.
PROCESSES OF LIFE	**SC.F.1.2.1** Knows that the human body is made of systems with structures and functions that are related. CS	• Constructs a model of the human body that shows major organ systems and makes a class presentation on how these systems work.
	SC.F.1.2.2 Knows how all animals depend on plants. CS	• Constructs food chains to show how animals are dependent on plants.

STRAND	BENCHMARK	ACTIVITY/ASSESSMENT
PROCESSES OF LIFE	**SC.F.1.2.3** Knows that living things are different but share similar structures. ***AA***	• Collects and compares a variety of insects attracted to a light at night and sorts them into groups based on structural characteristics.
	SC.F.1.2.4 Knows that similar cells form different kinds of structures. CS	• Observes a video-micrograph or microscope slide of a plant leaf and identifies the types of cells present.
	SC.F.2.2.1 Knows that many characteristics of an organism are inherited from the parents of the organism, but that other characteristics are learned from an individual's interactions with the environment. CS	• Prepares a list of characteristics that are inherited from parents and those that are learned from experiences in life.
HOW LIVING THINGS INTERACT WITH THEIR ENVIRONMENT	**SC.G.1.2.1** Knows ways that plants, animals, and protists interact. CS	• Writes the script and acts out a play demonstrating the impact of a natural disaster (e.g., hurricane, tornado, or flood) on all living things in an ecosystem, with emphasis placed on the interrelationships of organisms and how the fate of one affects the others. • Identifies and compares the ways that protists help and/or harm plants and animals.
	SC.G.1.2.2 Knows that living things compete in a climatic region with other living things and that structural adaptations make them fit for an environment. ***AA***	• Uses native plants to explain the regional climate and geography.

STRAND	BENCHMARK	ACTIVITY/ASSESSMENT
HOW LIVING THINGS INTERACT WITH THEIR ENVIRONMENT	**SC.G.1.2.3** Knows that green plants use carbon dioxide, water, and sunlight energy to turn minerals and nutrients into food for growth, maintenance, and reproduction. **AA**	• Grows plants through a complete life cycle and experiments to identify the factors essential to plant life.
	SC.G.1.2.4 Knows that some organisms decompose dead plants and animals into simple minerals and nutrients for use by living things and thereby recycle matter. CS	• Investigates the extent to which everyday waste products (e.g., yard clippings, paper, plastic materials, and cans) decay naturally; keep records of observations, and uses findings to make specific suggestions on how to improve the appearance of the local environment.
	SC.G.1.2.5 Knows that animals eat plants or other animals to acquire the energy they need for survival. CS	• Constructs a simple food chain for a specific habitat, shows how organisms are linked, and discusses the possible consequences arising from a break or interruption to the chain. • Invents and makes models of plants with special adaptations against predators (e.g., a lawnmower-proof plant or one that grazers will not eat).
	SC.G.1.2.6 Knows that organisms are growing, dying, and decaying and that new organisms are being produced from the materials of dead organisms. CS	• Examines garden soil and isolates, identifies, and quantifies the contents.

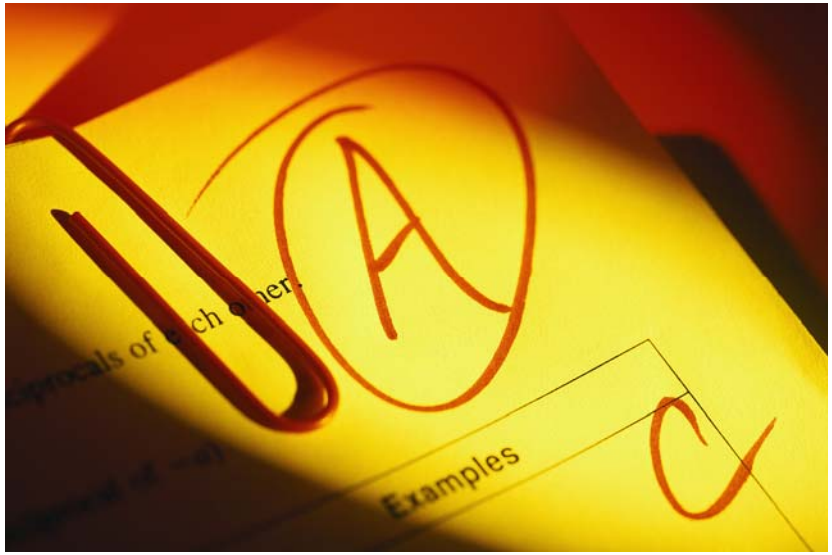
STRAND	BENCHMARK	ACTIVITY/ASSESSMENT
HOW LIVING THINGS INTERACT WITH THEIR ENVIRONMENT	**SC.G.1.2.7** Knows that variations in light, water, temperature, and soil content are largely responsible for the existence of different kinds of organisms and population densities in an ecosystem. CS	• Designs and makes a model of a fictitious organism that possesses adaptations enabling it to succeed in unusual habitats (e.g., the bottom of the ocean, another planet, a cave, or a subterranean environment) and defends the needs and/or benefits of each adaptation. • Designs and makes a model of a local ecosystem and explains how the communities, populations, and individuals interact.
	SC.G.2.2.1 Knows that all living things must compete for Earth's limited resources; organisms best adapted to compete for the available resources will be successful and pass their adaptations (traits) to their offspring. **AA**	• Uses populations of brine shrimp, radish seeds, or other rapidly reproducing organisms to make observations, collect data, and make inferences about the results of uncontrolled growth in a population with limited resources in its environment. The student then reports on the processes used and the findings. • Designs an energy conservation public-service announcement, using a variety of communication and media formats. The student then presents the announcement to the class, the whole school, and/or the community. • Participates in an aluminum-recycling drive or a roadside or coastal clean-up project.

STRAND	BENCHMARK	ACTIVITY/ASSESSMENT
HOW LIVING THINGS INTERACT WITH THEIR ENVIRONMENT	**SC.G.2.2.2** Knows that the size of a population is dependent upon the available resources within its community. CS	• Reports on the limited resources that are used by living things in order to survive. • Discusses the resources that limit the size of particular populations.
	SC.G.2.2.3 Understands that changes in the habitat of an organism may be beneficial or harmful. CS	• Writes a story about an organism whose habitat has changed, describing the consequences of this change to the organism. • Explains how damage caused by rodents can be reduced by using poisons but how their use may harm other plants or animals.
NATURE OF SCIENCE	**SC.H.1.2.1** Knows that it is important to keep accurate records and descriptions to provide information and clues on causes of discrepancies in repeated experiments. ***AA***	• Compares recorded observations with other students to verify accuracy. • Develops a game that requires each participant to record the events of the same staged phenomena and compares the records for accuracy.
	SC.H.1.2.2 Knows that a successful method to explore the natural world is to observe and record, and then analyze and communicate the results. ***AA***	• Produces oral and computer-generated written reports, diagrams, charts, maps, graphs, mathematical equations, and visual demonstrations of research.
	SC.H.1.2.3 Knows that to work collaboratively, all team members should be free to reach, explain, and justify their own individual conclusions. Not Assessed	• Analyzes the conclusions of members of a team and reaches consensus.

STRAND	BENCHMARK	ACTIVITY/ASSESSMENT
NATURE OF SCIENCE	**SC.H.1.2.4** Knows that to compare and contrast observations and results is an essential skill in science. (Assessed as SC.H.1.2.2)	• Reads an article on the research of several teams of scientists on the same question and reports on how the data and results compare. • Designs an investigation for the class to do in groups and compares the data from each group's trial.
	SC.H.1.2.5 Knows that a model of something is different from the real thing, but can be used to learn something about the real thing. CS	• Develops models of the water cycle.
	SC.H.2.2.1 Knows that natural events are often predictable and logical. CS	• Predicts the changes in weather based on the appearance of the clouds.
	SC.H.3.2.1 Understands that people, alone or in groups, invent new tools to solve problems and do work that affects aspects of life outside of science. **AA**	• Describes the research and development done by a company in the production of a new product. • Compares the information that can be gained by a team to the information that can be gained by an individual.
	SC.H.3.2.2 Knows that data are collected and interpreted in order to explain an event or concept. (Assessed as SC.H.1.2.2)	• Compares the results of an investigation that involves more than one strategy and tests for discrepant events or results.

STRAND	BENCHMARK	ACTIVITY/ASSESSMENT
NATURE OF SCIENCE	**SC.H.3.2.3** Knows that before a group of people build something or try something new, they should determine how it may affect other people. (Assessed as SC.H.3.2.1)	• Makes valid observations of common substances.
	SC.H.3.2.4 Knows that through the use of science processes and knowledge, people can solve problems, make decisions, and form new ideas. **AA**	• Gives examples of how the processes of science can be used to select a new pair of tennis shoes.

Assessment



Grade 5 Annually-Assessed Benchmarks for the Science FCAT

The following lists the fifteen Annually-Assessed Benchmarks that will be tested each year of the Grade 5 Science FCAT. It should be noted that within specific benchmarks other benchmarks are embedded and could be tested annually.

- SC.A.1.2.1- Determines that the properties of materials (e.g., density and volume) can be compared and measured (e.g., using rulers, balances, and thermometers).

- SC.A.1.2.4- Knows that different materials are made by physically combining substances and that different objects can be made by combining different materials.

- SC.B.1.2.1- Knows how to trace the flow of energy in a system (e.g., as in an ecosystem).

- SC.B.1.2.2- Recognizes various forms of energy (e.g., heat, light, and electricity).

- SC.C.2.2.4- Knows that the motion of an object is determined by the overall effect of all of the forces acting on the object. **(Also Assesses SC.C.2.2.2)**

- SC.D.1.2.4- Knows that the surface of the Earth is in a continuous state of change as waves, weather, and shifts of the land constantly change and produce many new features. **(Also Assesses SC.D.1.2.1; SC.D.1.2.2; SC.D.1.2.5)**

- SC.E.1.2.1-Knows that the tilt of the Earth on its own axis as it rotates and revolves around the sun causes changes in season, length of day, and energy available.

- SC.F.1.2.3-Knows that living things are different but share similar structures.

- SC.G.1.2.2-Knows that living things compete in a climatic region with other living things and that structural adaptations make them fit for an environment.

- SC.G.1.2.3-Knows that green plants use carbon dioxide, water, and sunlight energy to turn minerals and nutrients into food for growth, maintenance, and reproduction.

- SC.G.2.2.1-Knows that all living things must compete for Earth's limited resources; organisms best adapted to compete for the available resources will be successful and pass their adaptations (traits) to their offspring. **(Also Assesses SC.B.2.2.2; SC.B.2.2.3)**

- SC.H.1.2.1-Knows that it is important to keep accurate records and descriptions to provide information and clues on causes of discrepancies in repeated experiments.

- SC.H.1.2.2-Knows that a successful method to explore the natural world is to observe and record, and then analyze and communicate the results. **(Also Assesses SC.H.1.2.4; SC.H.3.2.2)**

- SC.H.3.2.1-Understands that people, alone or in groups, invent new tools to solve problems and do work that affects aspects of life outside of science. **(Also Assesses SC.H.3.2.3)**

- SC.H.3.2.4-Knows that through the use of science processes and knowledge, people can solve problems, make decisions, and form new ideas.

The chart below represents the annually assessed-AA and content sample- CS benchmarks for elementary science grade five.

Benchmark Coding	Description of Benchmark	Assessment Schedule	Item Format
SC.A.1.2.1	The student determines that the properties of materials (e.g., density and volume) can be compared and measured (e.g., using rulers, balances, and thermometers).	**AA**	MC
SC.A.1.2.2	The student knows that common materials (e.g., water) can be changed from one state to another by heating and cooling.	CS	MC
SC.A.1.2.3	The student knows that the weight of an object always equals the sum of its parts.	CS	MC
SC.A.1.2.4	The student knows that different materials are made by physically combining substances and that different objects can be made by combining different materials.	**AA**	MC
SC.A.1.2.5	The student knows that materials made by chemically combining two or more substances may have properties that differ from the original materials.	CS	MC
SC.A.2.2.1	The student knows that materials may be made of parts too small to be seen without magnification.	CS	MC
SC.B.1.2.1	The student knows how to trace the flow of energy in a system (e.g., as in an ecosystem).	**AA**	MC, SR
SC.B.1.2.2	The student recognizes various forms of energy (e.g., heat, light, and electricity).	**AA**	MC
SC.B.1.2.3	The student knows that most things that emit light also emit heat.	CS	MC

Benchmark Coding	Description of Benchmark	Assessment Schedule	Item Format
SC.B.1.2.4	The student knows the many ways in which energy can be transformed from one type to another.	CS	MC
SC.B.1.2.5	The student knows that various forms of energy (e.g., mechanical, chemical, electrical, magnetic, nuclear, and radiant) can be measured in ways that make it possible to determine the amount of energy that is transformed. **(Also assesses B.1.2.6)**	CS	MC
SC.B.1.2.6	The student knows ways that heat can move from one object to another. **(Assessed as B.1.2.5)**	CS	MC
SC.B.2.2.1	The student knows that some source of energy is needed for organisms to stay alive and grow.	CS	MC
SC.B.2.2.2	The student recognizes the costs and risks to society and the environment posed by the use of nonrenewable energy. **(Assessed as G.2.2.1)**	**AA**	MC, SR
SC.B.2.2.3	The student knows that the limited supply of usable energy sources (e.g., fuels such as coal or oil) places great significance on the development of renewable energy sources. **(Assessed as G.2.2.1)**	**AA**	MC, SR
SC. C.1.2.1	The student understands that the motion of an object can be described and measured.	CS	MC
SC.C.1.2.2	The student knows that waves travel at different speeds through different materials.	CS	MC
Benchmark Coding	**Description of Benchmark**	**Assessment Schedule**	**Item Format**
SC.C.2.2.1	The student recognizes that forces of gravity, magnetism, and electricity operate simple machines.	CS	MC
SC.C.2.2.2	The student knows that an object may move in a straight line at a	**AA**	MC, SR

	constant speed, speed up, slow down, or change direction dependent on net force acting on the object. **(Assessed as C.2.2.4)**		
SC.C.2.2.3	The student knows that the more massive an object is, the less effect a given force has.	CS	MC
SC.C.2.2.4	The student knows that the motion of an object is determined by the overall effect of all of the forces acting on the object.	**AA**	MC, SR
SC.D.1.2.1	The student knows that larger rocks can be broken down into smaller rocks, which in turn can be broken down to combine with organic material to form soil. **(Assessed as SC.D.1.2.4)**	**AA**	MC, SR, ER
SC.D.1.2.2	The student knows that 75 percent of the surface of the Earth is covered by water. **(Assessed as SC. D.1.2.4)**	**AA**	MC, SR, ER
SC. D.1.2.3	The student knows that the water cycle is influenced by temperature, pressure, and the topography of the land.	CS	MC
SC.D.1.2.4	The student knows that the surface of the Earth is in a continuous state of change as waves, weather, and shifts of the land constantly change and produce many new features. **(Also assesses SC.D.1.2.1, SC.D.1.2.2, SC.D.1.2.5)**	**AA**	MC, SR, ER
Benchmark Coding	**Description of Benchmark**	**Assessment Schedule**	**Item Format**
SC.D.1.2.5	The student knows that some changes in the Earth's surface are due to slow processes and some changes are due to rapid processes. **(Assessed as D.1.2.4)**	**AA**	MC, SR, ER
SC.D.2.2.1	The student knows that reusing, recycling, and reducing the use of natural resources improves and protects the quality of life. **(Assessed as G.2.2.3)**	CS	MC

SC.E.1.2.1	The student knows that the tilt of the Earth on its own axis as it rotates and revolves around the sun causes changes in season, length of day, and energy available.	**AA**	MC, SR
SC.E.1.2.2	The student knows that the combination of the Earth's movement and the moon's own orbit around the Earth results in the appearance of cyclical phases of the moon.	CS	MC
SC.E.1.2.3	The student knows that the Sun is a star and that energy can be captured or concentrated to generate heat and light for work on Earth.	CS	MC
SC.E.1.2.4	The student knows that the planets differ in size, characteristics, and composition and that they orbit the sun in our Solar System. **(Also assesses E.1.2.5)**	CS	MC
SC.E.1.2.5	The student understands the arrangement of planets in our Solar System. **(Assessed as E.1.2.4)**	CS	MC
SC.E.2.2.1	The student knows that, in addition to the sun, there are many other stars that are far away.	CS	MC
Benchmark Coding	**Description of Benchmark**	**Assessment Schedule**	**Item Format**
SC.F.1.2.1	The student knows that the human body is made of systems with structures and functions that are related.	CS	MC
SC.F.1.2.2	The student knows how all animals depend on plants.	CS	MC
SC.F.1.2.3	The student knows that living things are different but share similar structures.	**AA**	MC, SR
SC.F.1.2.4	The student knows that similar cells form different kinds of structures.	CS	MC

SC.F.2.2.1	The student knows that many characteristics of an organism are inherited from the parents of the organism, but that other characteristics are learned from an individual's interactions with the environment.	CS	MC
SC.G.1.2.1	The student knows ways that plants, animals, and protists interact.	CS	MC
SC.G.1.2.2	The student knows that living things compete in a climatic region with other living things and that structural adaptations make them fit for an environment.	**AA**	MC, SR
SC.G.1.2.3	The student knows that green plants use carbon dioxide, water, and sunlight energy to turn minerals and nutrients into food for growth, maintenance, and reproduction.	**AA**	MC, SR
SC.G.1.2.4	The student knows that some organisms decompose dead plants and animals into simple minerals and nutrients for use by living things and thereby recycle matter. **(Assessed as G.1.2.6)**	CS	MC
Benchmark Coding	**Description of Benchmark**	**Assessment Schedule**	**Item Format**
SC.G.1.2.5	The student knows that animals eat plants or other animals to acquire the energy they need for survival.	CS	MC
SC.G.1.2.6	The student knows that organisms are growing, dying, and decaying and that new organisms are being produced from the materials of dead organisms. **(Also assesses G.1.2.4)**	CS	MC, SR
SC.G.1.2.7	The student knows that variations in light, water, temperature, and soil content are largely responsible for the existence of different kinds of organisms and population densities in an ecosystem.	CS	MC
SC.G.2.2.1	The student knows that all living things must compete for Earth's limited resources; organisms best adapted to compete for the available resources will be successful and pass their adaptations (traits) to their offspring. **(Also assesses B.2.2.2, B.2.2.3)**	**AA**	MC, SR

SC.G.2.2.2	The student knows that the size of a population is dependent upon the available resources within its community.	CS	MC
SC.G.2.2.3	The student understands that changes in the habitat of an organism may be beneficial or harmful. **(Also assesses D.2.2.1)**	CS	MC
SC.H.1.2.1	The student knows that it is important to keep accurate records and descriptions to provide information and clues on causes of discrepancies in repeated experiments.	**AA**	MC
Benchmark Coding	**Description of Benchmark**	**Assessment Schedule**	**Item Format**
SC.H.1.2.2	The student knows that a successful method to explore the natural world is to observe and record, and then analyze and communicate the results. **(Also assesses H.1.2.4, H.3.2.2)**	**AA**	MC, SR, ER
SC.H.1.2.3	The student knows that to work collaboratively, all team members should be free to reach, explain, and justify their own individual conclusions. **(NOT ASSESSED)**		
SC.H.1.2.4	The student knows that to compare and contrast observations and results is an essential skill in science. **(Assessed as H.1.2.2.)**	**AA**	MC, SR, ER
SC.H.1.2.5	The student knows that a model of something is different from the real thing, but can be used to learn something about the real thing.	CS	MC
SC.H.2.2.1	The student knows that natural events are often predictable and logical.	CS	MC
SC.H.3.2.1	The student understands that people, alone or in groups, invent new tools to solve problems and do work that affects aspects of life outside of science. **(Also assesses H.3.2.3)**	**AA**	MC, SR

SC.H.3.2.2	The student knows that data are collected and interpreted in order to explain an event or concept. **(Assessed as H.1.2.2)**	**AA**	MC, SR, ER
Benchmark Coding	**Description of Benchmark**	**Assessment Schedule**	**Item Format**
SC.H.3.2.3	The student knows that before a group of people build something or try something new, they should determine how it may affect other people. **(Assessed as H.3.2.1)**	**AA**	MC, SR
SC.H.3.2.4	The student knows that through the use of science processes and knowledge, people can solve problems, make decisions, and form new ideas.	**AA**	MC, SR

Hints for Taking the Grade 5 Science FCAT

Here are some hints to help you do your best when you take the FCAT science test. Keep these hints in mind when you answer the sample questions.

✓ Learn how to answer each kind of question. The FCAT Science Test will have three types of questions:

- → Multiple-choice,
- → Short-response, and
- → Extended-response.

✓ Read each question carefully.

✓ Check each answer to make sure it is the best answer for the question asked.

✓ Answer the questions you are sure about first. If a question seems too difficult, skip it and go back to it later.

✓ Be sure to fill in the answer bubbles correctly. Do not make any stray marks around answer spaces.

✓ Think positively. Some questions may seem hard to you, but you may be able to figure out what to do if you reread the question carefully.

- ✓ When you have finished each question, reread it to make sure your answer is reasonable.
- ✓ Relax. Some people get nervous about tests. It's natural. Just do your best.

What Every Teacher Should Know about the Science FCAT

- Use questions that require students to explain their answers. Make sure when responding that the answer is concise and scientifically sound.
- Use open-ended question formats that are similar to the Science FCAT format. Most classroom-developed questions should be Cognitive Level II.
- Rate and grade students' work using the Science FCAT rubrics. If you actually use the FCAT rubrics to score papers, reports, test questions, projects, etc., then students will develop a clear understanding of the levels of performance expected of them on FCAT.
- Use and develop questions for class discussions and tests that are of the same cognitive rigor as those on FCAT.
- Require students to collect, analyze and interpret data frequently and incorporate the Nature of Science in all activities.
- Whenever possible, include graphics on classroom-developed assessments, such as illustrations, flow charts, data tables, and graphs.

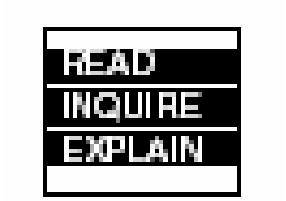
Adapted from Florida DOE

Science FCAT
How to Answer the "Read, Inquire, Explain" Questions

Answers to the short- and extended-response problems can receive full or partial credit. You should try to answer these questions even if you are not sure of the correct answer. If a portion of the answer is correct, you may get a portion of the points.

- **Allow about 5 minutes to answer the short "Read, Inquire, Explain" questions and about 10 to 15 minutes to answer the long ones.**
- **Read each question carefully.**
- **If you do not understand the question, read it again and try to answer one part at a time.**
- **Be sure to answer every part of the question.**
- **Use the information provided to answer the question.**
- **Write your explanations in clear, concise language. Use only the space provided.**
- **Reread your explanation to make sure it says what you want it to say.**

Science FCAT
Rubric for Short-Response Questions



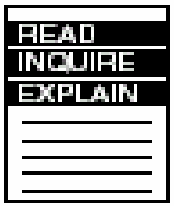
2 points A score of two indicates that the student has demonstrated a thorough understanding of the scientific concepts and/or procedures embodied in the task. The student has completed the task correctly, in a scientifically sound manner. When required, student explanations and/or interpretations are clear and complete. The response may contain minor flaws that do not detract from the demonstration of a thorough understanding.

1 point A score of one indicates that the student has provided a response that is only partially correct. For example, the student may arrive at an acceptable conclusion or provide an adequate interpretation, but may demonstrate some misunderstanding of the underlying scientific concepts and/or procedures. Conversely a student may arrive at an unacceptable conclusion or provide a faulty interpretation, but could have applied appropriate and scientifically sound concepts and/or procedures.

0 points A score of zero indicates that the student has provided a completely incorrect or un-interpretable response, or no response at all.

Science FCAT

Rubric for Extended-Response Questions



4 points A score of four indicates that the student has demonstrated a thorough understanding of the scientific concepts and/or procedures embodied in the task. The student has completed the task correctly, used scientifically sound procedures, and provided clear and complete explanations and interpretations. The response may contain minor flaws that do not detract from a demonstration of a thorough understanding.

3 points A score of three indicates that the student has demonstrated an understanding of the scientific concepts and/or procedures embodied in the task. The student's response to the task is essentially correct, but the scientific procedures, explanations, and/or interpretations provided are not thorough. The response may contain minor flaws that reflect inattentiveness or indicate some misunderstanding of the underlying scientific concepts and/or procedures.

2 points A score of two indicates that the student has demonstrated only a partial understanding of the scientific concepts and/or procedures embodied in the task. Although the student may have arrived at an acceptable conclusion or provided an adequate interpretation of the task, the student's work lacks an essential understanding of the underlying scientific concepts and/or procedures. The response may contain errors related to misunderstanding important aspects of the task, misuse of scientific procedures/processes, or faulty interpretations of results.

1 point A score of one indicates that the student has demonstrated a very limited understanding of the scientific concepts and/or procedures embodied in the task. The student's response is incomplete and exhibits many flaws. Although the student's response has addressed some of the conditions of the task, the student has reached an

inadequate conclusion and/or provided reasoning that is faulty or incomplete. The response exhibits many flaws or may be incomplete.

0 points A score of zero indicates that the student has provided a completely incorrect solution or un-interpretable response, or no response at all.

Science FCAT Glossary by Grade Level

This vocabulary list is a resource to assist teachers in the development of science concepts. These concepts and words can be introduced at the specified grade level initially and each subsequent grade thereafter. Complete understanding of scientific concepts may require more than one year of study. These concepts spiral throughout the curriculum to enhance understanding and learning. Starting the use of key terminology as early as Kindergarten will support the acquisition of the terms and concepts by grade five.

Kindergarten

- properties
- matter
- observe
- measure
- senses
- shape
- size
- texture
- temperature
- gas
- liquid
- solid
- energy

First grade

- heat
- cool
- classify
- similarities
- compare
- push
- pull
- sound
- Earth
- seasons
- habitat
- light
- hypothesis

Second grade

- investigate
- pitch
- loudness
- waves
- sound
- vibrations
- rotation
- revolution
- axis
- orbit
- structures
- energy
- force
- food chain
- environment
- adaptation

Third grade

- characteristics
- magnification
- gravity
- friction
- results
- vertebrates
- change
- constant
- speed
- food web
- machines
- evaporation
- precipitation
- attributes
- physical change
- insulator
- conductor

Fourth grade

- axis
- systems
- chemical energy
- electrical energy
- magnetic energy
- solar energy
- frequency
- wavelength
- electricity
- weathering
- erosion
- variable
- photosynthesis
- volume
- chemical change
- mechanical

Fifth grade

- ecosystem
- density
- attributes
- wavelength
- intensity
- potential
- kinetic energy
- mixture
- solution
- decomposers
- cells
- displacement
- reproduction
- consumers
- producers