# M/J Science Florida SSA (Grade 8) Data Analysis and Standard Focus

with assessments



# Middle School FCAT Science (Grade 8) DATA ANALYSIS-Standard FOCUS

Nature of Science – 19%
SC.8.N.1.1 (Also assesses: SC.6.N.1.1; SC.6.N.1.3; SC.7.N.1.1; SC.7.N.1.3; SC.7.N.1.4; SC.8.N.1.3; SC.8.N.1.4.)
SC.7.N.1.2 (Also assesses: SC.6.N.1.2; SC.6.N.1.4; SC.8.N.1.2)
SC.7.N.1.5 (Also assesses: SC.7.N.3.2; SC.8.N.1.5; SC.8.E.5.10)
SC.6.N.2.2 (Also assesses: SC.7.N.1.6; SC.7.N.1.7; SC.7.N.2.1; SC.8.N.1.6)
SC.7.N.3.1 (Also assesses: SC.6.N.3.1; SC.8.N.3.2)
Earth and Space Science – 27%
SC.8.E.5.3 (Also assesses: SC.8.E.5.1; SC.8.E.5.2)
SC.8.E.5.5 (Also assesses: SC.8.E.5.6)
SC.8.E.5.7 (Also assesses: SC.8.E.5.4; SC.8.E.5.8)
SC.8.E.5.9
SC.7.E.6.2 (Also assesses: SC.6.E.6.1; SC.6.E.6.2; SC.7.E.6.6)
SC.7.E.6.4 (Also assesses: SC.7.E.6.3)
SC.7.E.6.5 (Also assesses: SC.7.E.6.1; SC.7.E.6.7)
SC.6.E.7.4 (Also assesses: SC.6.E.7.2; SC.6.E.7.3; SC.6.E.7.6; SC.6.E.7.9
SC.6.E.7.5 (Also assesses: SC.6.E.7.1)
Physical Science – 27%
SC.8.P.8.4 (Also assesses: SC.8.P.8.3)
SC.8.P.8.5 (Also assesses: SC.8.P.8.1; SC.8.P.8.6; SC.8.P.8.7; SC.8.P.8.8; SC.8.P.8.9)
SC.8.P.9.2 (Also assesses: SC.8.P.9.1; SC.8.P.9.3)
SC.7.P.10.1 (Also assesses: SC.8.E.5.11)
SC.7.P.10.3 (Also assesses: SC.7.P.10.2)
SC.7.P.11.2 (Also assesses: SC.6.P.11.1; SC.7.P.11.3)
SC.7.P.11.4 (Also assesses: SC.7.P.11.1)
SC.6.P.13.1 (Also assesses: SC.6.P.13.2; SC.8.P.8.2)
SC.6.P.13.3 (Also assesses: SC.6.P.12.1)
Life Science - 27%
SC.6.L.14.1
SC.6.L.14.2 (Also assesses: SC.6.L.14.3)
SC.6.L.14.4
SC.6.L.14.5 (Also assesses: SC.6.L.14.6)
SC.6.L.15.1
SC.7.L.15.2 (Also assesses: SC.7.L.15.1; SC.7.L.15.3)
SC.7.L.16.1 (Also assesses: SC.7.L.16.2; SC.7.L.16.3)
SC.7.L.17.2 (Also assesses: SC.7.L.17.1; SC.7.L.17.3)
SC.8.L.18.4 (Also assesses: SC.8.L.18.1; SC.8.L.18.2; SC.8.L.18.3)

#### The following Standards are NOT assessed on FCAT Grade 8 Science:

SC.6.N.1.5 Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence.

SC.6.N.2.1 Distinguish science from other activities involving thought.

SC.8.N.2.1 Distinguish between scientific and pseudoscientific ideas.

SC.8.N.2.2 Discuss what characterizes science and its methods.

SC.6.N.2.3 Recognize that scientists who make contributions to scientific knowledge come from all kinds of backgrounds and possess varied talents, interests, and goals.

SC.8.N.3.1 Select models useful in relating the results of their own investigations.

**SC.6.N.3.2** Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws are different from societal laws.

**SC.6.N.3.3** Give several examples of scientific laws.

SC.6.N.3.4 Identify the role of models in the context of the sixth grade science benchmarks.

SC.8.N.4.1 Explain that science is one of the processes that can be used to inform decision making at the community, state, national, and international levels.

SC.8.N.4.2 Explain how political, social, and economic concerns can affect science, and vice versa.

SC.8.E.5.12 Summarize the effects of space exploration on the economy and culture of Florida.

SC.6.E.7.7 Investigate how natural disasters have affected human life in Florida.

SC.6.E.7.8 Describe ways human beings protect themselves from hazardous weather and sun exposure.

SC.7.L.16.4 Recognize and explore the impact of biotechnology (cloning, genetic engineering, artificial selection) on the individual, society, and the environment.

## Overview of FCAT Grade 8 Standards

Category: Nature of Science		Percentage of Points derived from content area: 19%		Notes
Benchmark	Clarification	Content Limits	Item Attributes	
SC.8.N.1.1 Define a problem from the eighth grade curriculum using appropriate reference materials to support scientific understanding; plan and carry out scientific investigations of various types, such as systematic observations or experiments; identify variables; collect and organize data; interpret data in charts, tables, and graphics; analyze information; make predictions; and defend conclusions.	<ul> <li>Students will evaluate a scientific investigation using evidence of scientific thinking and/or problem solving.</li> <li>Students will identify test variables (independent variables) and/or outcome variables (dependent variables) in a given scientific investigation.</li> <li>Students will interpret and/or analyze data to make predictions and/or defend conclusions.</li> <li>Students will distinguish between an experiment and other types of scientific investigations where variables cannot be controlled.</li> <li>Students will explain how hypotheses are valuable.</li> <li>Students will explain the sixth grade curriculum: use appropriate reference materials to support scientific understanding; plan and carry out scientific investigations of various types, such as systematic observations or experiments; identify variables; collect and organize data; interpret data in charts, tables, and graphics; analyze information; make predictions; and defend conclusions.</li> <li>Sc.6.N.1.3 Explain the difference between an experiment and other types of scientific investigation, and explain the relative benefits and limitations of each.</li> <li>(continued)</li> </ul>	<ul> <li>Items addressing hypotheses will not assess whether the hypothesis is supported by data.</li> <li>Items will not address or assess replication, repetition, or the difference between replication and repetition.</li> <li>Items will not assess the reason for differences in data across groups that are investigating the same problem.</li> </ul>	Stimulus Attributes Scenarios in items will be limited to those familiar to a middle-school student rather than global situations. The term <i>test</i> variable should be followed by ( <i>independent</i> variable), and the term <i>outcome</i> variable should be followed by ( <i>dependent variable</i> ). Response Attributes The term <i>test</i> variable should be followed by ( <i>independent</i> variable), and the term <i>outcome</i> variable should be followed by ( <i>independent</i> variable should be followed by ( <i>independent</i> variable), and the term <i>outcome</i> variable should be followed by ( <i>dependent variable</i> ).	

<ul> <li>SC.7.N.1.1 Define a problem from the seventh grade curriculum: use appropriate reference materials to support scientific understanding; plan and carry out scientific investigations of various types, such as systematic observations or experiments; identify variables; collect and organize data; interpret data in charts, tables, and graphics; analyze information; make predictions; and defend conclusions.</li> <li>SC.7.N.1.3 Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation, and explain that not all scientific knowledge is derived from experimentation.</li> <li>SC.7.N.1.4 Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment.</li> <li>SC.8.N.1.3 Use phrases such as "results support" or "fail to support" in science, understanding that science does not offer conclusive "proof" of a knowledge claim.</li> <li>SC.8.N.1.4 Explain how hypotheses are valuable if they lead to further investigations, even if they turn out not to be supported by the data.</li> </ul>		
--	--	--

Answers: 1-B, 2-B, 3-A, 4-C, 5-B, 6-B, 7-C, 8-D, 9-C, 10-C

1) Dana is reading about the best conditions for worm composting. Worm composting involves keeping worms in a bin with vegetable scraps from the kitchen along with other plant waste, and using the soil and drippings they produce to improve gardens.

- A. She should test the variables all at once in three different bins with the same amount of worms.
- B. She should test the variables one at a time by keeping two of the variables constant and testing the third.
- C. She should test the variables at the same time by keeping one of them constant and testing the other two.
- D. She should test a different variable in the same bin over the course of a week, allowing two days for each variable.

2) Kevin has designed an experiment to determine the quickest way to create usable compost. Composting breaks down organic material into matter that is beneficial to soil and gardens. To make composting happen faster, the compost pile needs to be turned. Kevin wants to find out if turning a compost pile twice a day will create usable compost faster than turning a pile just once a day. How many sets of compost piles would be best for Kevin to include in his experiment?

- A. two: one that is turned once a day and one that is turned twice a day
- B. three: one that will never be turned, one that is turned once a day, and one that is turned twice a day
- C. seven: one for each day of the week
- D. fourteen: one for each of the days of the week over a two-week period

3) Katarina's class was studying worm systems. They had two separate, identical worm bins with 1,000 worms in each bin. They want to determine how to best feed the worms. They fed the worms in Bin 1 chunks of fruits and vegetables. For the worms in Bin 2, the class put the fruits and vegetables in a blender before feeding the worms.

After a month, Bin 1 contained 947 worms, while Bin 2 contained 1,249 worms. Why did Katarina's class include two methods of feeding in their experiment?

- A. to create a variable to test
- B. to include a constant for the other variables
- C. to offer more explanations for the differences
- D. to ensure at least some of the worms survive

4) Jenny was conducting an experiment in her science lab and had to mix several chemicals. She wrote down the first three chemicals she added, but she was then interrupted and forgot to write down the last two chemicals that were part of the solution. What impact will this have on her results?

- A. Her teacher will value the results of her experiment regardless of her notes.
- B. The results of her experiment will be valid as long as she gets the expected results.
- C. If her records are not accurate, then her results will be inconclusive and unreliable.
- D. If she doesn't write every step down, her results will not be the same when she repeats the investigation.

5) Sam is conducting an experiment with pendulums; he thinks that more massive objects will swing faster. He is testing whether the mass of the swinging object has an effect on how long it takes to make one swing. He tests two different masses and collects the data shown in the table. What should Sam do based on these results?

Trial	Mass	Time for one swing (in seconds)
1	100 g	1.93 s
2	100 g	2.10 s
3	100 g	1.98 s
Average for 100 g		2.00 s
1	200 g	2.09 s
2	200 g	2.05 s
3	200 g	1.98 s
Average for 200 g		2.04 s

A. Throw out the data because it doesn't support his hypothesis.

- B. Do more trials to see if the difference in time really is significant.
- C. Conclude that less massive objects always take more time to swing.
- D. Conclude that more massive objects always take more time to swing.

6) Colleen waters the plants in her greenhouse once every day. She wants to find out if the plants will grow more leaves if they are watered more often. She counts the number of leaves on each plant before she starts. She then continues to water half of each type of plant once daily, but she waters the other half of each type twice a day.

What is the dependent variable in Colleen's experiment?

- A. the type of plant being grown
- B. the number of leaves the plants grow
- C. the amount of light the plants receive
- D. the number of times the plants are watered

7) Christy wants to find out if the birds that visit the bird feeders in her backyard would rather build nests in birdhouses or in trees. She puts a birdhouse next to the feeder containing sunflower seeds and hangs a feeder containing cracked corn from a tree.

She observes the birds' nesting activities over the next two weeks and records her observations. Which of the following would improve Christy's investigation?

- A. putting more food in both bird feeders
- B. setting the feeders up closer to each other
- C. putting the same kind of food in both bird feeders
- D. setting up a third bird feeder containing fruit near a bird bath

8) Randy's science teacher is giving a demonstration to show how a metal reacts with different acids. He places a small piece of the metal in each of three beakers containing a solution of a different acid. He adds a piece of the metal to a fourth beaker that contains only water. What is the purpose of the fourth beaker?

- A. It ensures that the hypothesis will be correct.
- B. It provides more data to include in a lab report.
- C. It adds an independent variable to the experiment.
- D. It is the control and serves as the basis for comparison.

9) The science club at Tracy's school is researching how temperature affects fish reproduction. They conducted a study to find out if raising the water temperature would decrease the number of bass eggs that hatched. They gathered bass eggs from a local lake and put half of them in each of ten small aquariums in the lab. Half of the aquariums were kept at room temperature, and the other half were placed in a sunny window. One student recorded that nearly 80% of the room temperature eggs hatched, while only 50% of the eggs kept in the window hatched. Another student found no difference in the hatch rate. What should their next step be?

- A. The science club should ignore the results of the second student.
- B. The science club should conduct an experiment with another type of fish egg.
- C. The science club should repeat the experiment again and compare the two sets of results.
- D. The science club should use the results to conclude that an increase in temperature decreases the hatch rate of the eggs.

10) Carol is doing a science fair project for her science class. She wants to investigate how the amount of water given to a plant affects its growth. She tests 30 plants and is careful to record how much water each plant gets. She also controls the type and amount of soil in each pot and the number of seeds in each pot. She uses 1 cup of water each day for her control group, giving 1 cup of water to ten plants and she gives 2 cups of water to ten plants, and 3 cups of water to ten plants.

When it is time to present her project, she concludes that the plants getting 3 cups of water a day grew better than the control group that received 1 cup of water a day or the plants receiving 2 cups of water each day.

Which additional piece of information is most important to include if someone wants to reproduce Carol's experiment?

- A. the color of the pots
- B. the school she attends
- C. the type of plants used
- D. the type of measuring cup used

Category: Nature of Science		Percentage of Points derived from content area: 19%		Notes
Benchmark	Clarification	Content Limits	Item Attributes	
<b>SC.7.N.1.2</b> Differentiate replication (by others) from repetition (multiple trials).	<ul> <li>Students will differentiate between replication and repetition.</li> <li>Students will explain why scientific investigations should be replicable.</li> <li>Students will compare methods and/or results obtained in a scientific investigation.</li> <li>Students will evaluate the use of repeated trials or replication in a scientific investigation.</li> <li>Also Assesses:</li> <li>SC.6.N.1.2 Explain why scientific investigations should be replicable.</li> <li>SC.6.N.1.4 Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.</li> <li>SC.8.N.1.2 Design and conduct a study using repeated trials and replication.</li> </ul>	None specified	Stimulus Attributes None specified Response Attributes None specified	

Answers: 1-D, 2-A, 3-D, 4-D, 5-A, 6-C, 7-D, 8-B, 9-D, 10-C

1) When scientists conduct experiments, they share their data and conclusions with other scientists so that

- A. society will accept what the scientists say.
- B. new scientific laws and theories can be quickly established.
- C. other scientists can also get credit for scientific discoveries.
- D. other scientists can try to verify the results by repeating the same procedure.

2) Gregor Mendel was able to figure out a great deal about how traits are passed from one generation to the next by studying garden peas. He grew thousands of pea plants and counted and recorded the traits of all the peas they produced in order to do this.

Why did Mendel grow and use so many peas to conduct his experiment?

- A. Having many replicates in an experiment decreases the possibility that chance will affect the outcome.
- B. Many pea plants are identical, so in order for Mendel to ensure variety in his findings, he had to use thousands of pea plants.
- C. Other scientists do not need to repeat the experiment if there is sufficient data gathered during the initial experiment.
- D. Mendel was overly cautious and grew far more peas than he really needed in order to prove his hypothesis.

3) Emily claims to have made a new scientific discovery. However, while conducting her experiments, she did not keep accurate records or data. Which of the following should happen next?

- A. Society should accept the results, since a new discovery was made.
- B. The whole procedure should be disregarded and is not worth repeating.
- C. Emily should try to remember her results and write them down from memory.
- D. The experiment should be repeated, this time keeping accurate records.

4) Jasmine entered the school science fair competition. She wanted to see if colored light affected plant growth. However, when several other students repeated Jasmine's procedure, they all obtained different results than Jasmine's. What do the different results mean?

- A. The other students should design their own experiments about light.
- B. The results will probably be different every time an experiment is conducted.
- C. Jasmine's results should be accepted since she conducted the experiment first.
- D. Jasmine's results should not be accepted because scientific results should be repeatable.

5) When a scientist conducts an experiment, it is important that he or she maintains accurate records and shares the results with other scientists. If this does not happen, or if other scientists are not able to replicate the results, what would most likely be the consequence?

- A. The scientist will lose credibility with other scientists and society.
- B. The scientist will be able to publish the results in fewer scientific journals.
- C. Nothing will happen, since the purpose of science is to find answers, no matter how they are found.
- D. The scientist will actually become more successful if she is the only one able to produce the results.

6) Two scientists are conducting similar experiments. The results of their experiments are very different. Which of the following would be best for the scientists to do next?

- A. Assume that both scientists are correct.
- B. Change the experiment that is incorrect.
- C. Redo the experiments to see who is correct.
- D. Determine that both scientists are incorrect.

7) Mandy wanted to see if a new, environmentally-friendly pesticide will prevent insect damage to tomato plants. After making her hypothesis, she conducts her experiment.

She treats five tomato plants with traditional pesticide and five with the new pesticide. Mandy also leaves five plants untreated as a control. She makes careful notes of how she set up her experiment and then records her data about all of the plants.

Why is it important for Mandy to record her procedures and data accurately?

- A. so that the hypothesis will always be correct
- B. so that she can look intelligent when she presents her data
- C. so that society does not waste money on buying pesticides that do not work
- D. so that other scientists can replicate the experiment and make sure the results are correct

8) A scientist makes a major new discovery that provides some evidence that a different approach to gene therapy might be helpful. Which of the following should happen next?

- A. Her work must be proven wrong.
- B. Her work must be repeated by other scientists.
- C. Her work must be published on the Internet.
- D. Her work should be used in treating patients.

9) Alex and Jennifer conducted an experiment to test reaction times in grabbing a meter stick after it is dropped. They each tested 15 friends. Alex dropped the meter stick for his friends and Jennifer dropped the meter stick for her friends while the other one timed the reactions. Jennifer's friends reacted, on average, 0.9 seconds faster than Alex's friends. Jennifer concluded that her friends were faster.

Which of the following should she do next to check her results?

- A. Try a different reaction time experiment.
- B. Try the experiment again, this time using a ruler instead of a meter stick.
- C. Repeat the experiment as it was done the first time but using only Jennifer's friends.
- D. Repeat the experiment and have one person drop the meter stick for all the friends tested.

10) A student conducted a microbiology experiment and put his data into a table, which is shown below. Based on the data he collected, he states that bacteria increased by 15 every 20 minutes. What would be the best thing for him to do next?

Sample Number	Number of bacteria after <b>20</b> minutes	Number of bacteria after <b>40</b> minutes	Number of bacteria after <b>60</b> minutes
1	15	No data	45
2	20	35	No data
3	25	No data	55

A. Write a conclusion for his experiment.

B. Design a hypothesis for the experiment.

C. Repeat his experiment and record the missing data.

D. Run the experiment for a longer amount of time.

Category: Nature of Science		Percentage of Points derived from content area: 19%		Notes
Benchmark	Clarification	Content Limits	Item Attributes	
<b>SC.7.N.1.5</b> Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.	<ul> <li>Students will describe and/or analyze common methods and/or models used in different fields of study.</li> <li>Students will identify the benefits and/or limitations of the use of scientific models.</li> <li>Students will identify how technology is essential to science.</li> <li>Also Assesses:</li> <li>SC.7.N.3.2 Identify the benefits and limitations of the use of scientific models.</li> <li>SC.8.N.1.5 Analyze the methods used to develop a scientific explanation as seen in different fields of science.</li> <li>SC.8.E.5.10 Assess how technology is essential to science for such purposes as access to outer space and other remote locations, sample collection, measurement, data collection and storage, computation, and communication of information.</li> </ul>	Items assessing technology will focus on the role of technology in science as opposed to specific technologies.	Stimulus Attributes None specified Response Attributes None specified	

Answers: 1-A, 2-B, 3-A, 4-C, 5-B, 6-D, 7-A, 8-C, 9-C, 10-B

1) Janine is learning about how waves in the ocean form and move. For a class assignment, she builds a wave machine using a glass jar, water, mineral oil, and food coloring. Which best describes how Janine's model helps her to learn about waves?



- A. It lets her observe wave motion without having to be near the ocean.
- B. It helps her describe the differences between types of ocean waves.
- C. It shows all the microscopic parts of the wave she couldn't normally see.
- D. It allows her to explain how weather affects the formation of ocean waves.

2) A scientist is testing a new design for the blade of a wind turbine used to generate electricity. Which of the following is the best first step for the scientist to take?

- A. Take an existing blade and modify it with the new design.
- B. Design a computer simulation to test how well the blade will work.
- C. Construct a scale-model of the blade and test it in actual weather conditions.
- D. Build several full-size versions of the blade and place them on existing turbines.

3) Sara is studying the human skeletal system. Her classroom has a model skeleton. What main advantage does a model skeleton have over a drawing of a skeleton?



- A. It shows how the body moves.
- B. It displays all of the bones at once.
- C. It displays the skeleton in three dimensions.
- D. It makes it easier to learn the names of each bone.

4) A car company is designing a new seatbelt. To test the design, engineers place a simulation dummy into the car and crash the car into a wall at a high speed. What benefit does this method of testing provide?

- A. The company can save money by testing fewer cars.
- B. The company can eliminate the need for testing in the future.
- C. The company can test the design without harming any real people.
- D. The company can design many different types of seatbelts at once.

5) A biologist is studying the migratory behavior of a species of sharks. Which is the best method the biologist could use in the study?

- A. Develop a theory for why the sharks behave a certain way.
- B. Collect data by observing the behavior of the sharks in the wild.
- C. Design a controlled experiment to test the behavior of the sharks.
- D. Create a prediction of sharks' behavior by using other scientists' data.

### Middle School FCAT Science (Grade 8) DATA ANALYSIS-Standard FOCUS

6) Francesca creates a model that shows the movement of the tectonic plates of the Earth's surface. If she wants to use the model to understand the concept of how a mountain is formed, how does that model help her?

- A. It shows all of the plates in the correct layout.
- B. It explains in detail how mountains are formed.
- C. It displays details that cannot be seen in a drawing.
- D. It speeds up a process that takes millions of years.

7) Bernard is designing a new boat. His first step is to use a computer modeling software to create and test his design in simulated weather and wave conditions. How does Bernard benefit from using a computer-generated model instead of a full-sized boat?

- A. It is more cost-effective and safer for him to test.
- B. It is easier to communicate his findings to others.
- C. It allows him to observe things he could not normally see.
- D. It proves that his design will work in real weather conditions.

8) Using a new computer modeling technique, astronomers predict the location of a massive black hole at the center of a distant galaxy. In this example, how is technology helpful to the astronomers?

- A. It helps them discard inaccurate data and improve their hypothesis.
- B. It makes it easy for them to develop new experiments and collect data.
- C. It allows them to observe things they may not be able to see with their eyes.

3

D. It permits them to share their results with the rest of the scientific community.

9) Coral is making a model of a water molecule using colored balls and sticks. Which of the following best describes an advantage that her ball-and-stick model has over a model drawing of a water molecule?



- A. It shows motion of the molecule's atoms.
- B. It shows the size of the molecule's atoms to scale.
- C. It shows the shape of the molecule in three dimensions.
- D. It shows the parts of the molecule with the correct colors.

10) A biologist hypothesizes that a squirrel's body size is affected by the inclusion of a particular type of food in its diet.

Which is the best method the scientist could use to prove this hypothesis?

- A. Collect data by observing the squirrels eating food in the wild.
- B. Design a controlled experiment to test different types of food.
- C. Analyze data from existing scientific studies on the different types of food.
- D. Develop a theoretical model to predict how the food type will affect body size.

Category: Nature of Science		Percentage of Points derived from content area: 19%		Notes
Benchmark	Clarification	Content Limits	Item Attributes	
SC.6.N.2.2 Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered.	<ul> <li>Students will explain that scientific knowledge may change as new evidence is discovered or new scientific interpretations are formed.</li> <li>Students will explain that scientific explanations are based on empirical evidence, logical reasoning, predictions, and modeling.</li> <li>Students will identify instances in the history of science in which scientific knowledge has changed as a result of new evidence.</li> <li>Also Assesses:</li> <li>SC.7.N.1.6 Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific knowledge is the result of a great deal of debate and confirmation within the science community.</li> <li>SC.7.N.2.1 Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered.</li> <li>SC.8.N.1.6 Understand that scientific investigations involve the collection of relevant empirical evidence; the use of logical reasoning; and the application, explanations, and modeling.</li> </ul>	<ul> <li>Items will not require identification of the scientist(s) and/or details associated with a particular event/discovery.</li> <li>Items will not use the term <i>durable</i>.</li> </ul>	Stimulus Attributes Scenarios referring to empirical evidence will use the term <i>evidence</i> . The phrase <i>natural</i> <i>event</i> should be used rather than <i>natural</i> <i>phenomenon</i> . Response Attributes None specified	

Answers: 1-B, 2-D, 3-A, 4-C, 5-B, 6-C, 7-C, 8-B

1) Scientific knowledge may change as new evidence or information is discovered. Which of the following would NOT be a result of new scientific research and information?

- A. Binomial nomenclature is assigned to a recently identified plant species.
- B. An endangered monkey species is put in a reserve for protection from extinction.
- C. A newly discovered chemical element will be added to the periodic table of the elements.
- D. A nonnative plant species will begin to reproduce rapidly after being introduced into a swamp ecosystem.
- 2. Which of the following is **most** likely to change scientific knowledge?
  - A. more expensive experiments
  - B. more links added to the Internet
  - C. improved methods for conducting opinion polls
  - D. new data or interpretations of the natural world

3. Which of the following is the best reasoning for why scientific theories change throughout time?

- A. all of earth's processes change
- B. humans have larger brains
- C. improvements are made in tools and technology
- D. the invention of television
- 4. The theory of continental drift was improved upon by the theory of
  - A. biogenesis
  - B. plate tectonics
  - C. hollow earth
  - D. geologic time scale

5. The atomic theory has been modified as atoms are no longer thought to be indivisible but instead are seen as \_\_\_\_\_\_.

- A. impossible to split
- B. one uniform piece
- C. impenetrable
- D. composites
- 6. Which of the following is true about scientific knowledge?
  - A It never changes because new evidence is discarded if it contradicts what is already known.
  - B It is based mostly on opinions and beliefs.
  - C It is a collection of facts open to new evidence and interpretations.
  - D It is voted on every year to see what will be taught in books.

7. Scientists once thought that nothing could live at extreme depths in the oceans. When tube worms were discovered living at the bottom of the sea, scientists:

- A. dismissed this as a hoax immediately.
- B. thought that the worms must have gotten there by accident.
- C. studied the worms and changed their theories about whether life can exist at extreme depths.
- D. moved the worms to a better place to live.
- 8. A scientific law is
  - A. a rule enacted by the National Academy of Sciences.
  - B. what scientists expect will always happen under particular circumstances.
  - C. a form of scientific inquiry.
  - D. a well-accepted scientific theory.

Category: Nature of Science		Percentage of Points derived from content area: 19%		Notes
Benchmark	Clarification	Content Limits	Item Attributes	
<b>SC.7.N.3.1</b> Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them.	<ul> <li>Students will explain the difference between theories and laws.</li> <li>Students will identify examples of theories and/or laws.</li> <li>Students will explain why theories may be modified but are rarely discarded.</li> <li>Also Assesses:</li> <li>SC.6.N.3.1 Recognize and explain that a scientific theory is a well-supported and widely accepted explanation of nature and is not simply a claim posed by an individual. Thus, the use of the term theory in science is very different than how it is used in everyday life.</li> <li>SC.8.N.3.2 Explain why theories may be modified but are rarely discarded.</li> </ul>	Items addressing scientific theories and/or laws are limited to those found in the middle school science benchmarks, such as law of universal gravitation, law of superposition, theory of plate tectonics, atomic theory, law of conservation of mass, law of conservation of energy, cell theory, and the scientific theory of evolution.	Stimulus Attributes None specified Response Attributes None specified	

Answers: 1-A, 2-C, 3-B, 4-B, 5-B, 6-C, 7-D, 8-C, 9-D, 10-C

1) In the early 1900s, a scientist named Alfred Wegener proposed the idea that all the continents were once joined together into one supercontinent, which he called Pangaea. At first, this theory was rejected by society, but now it can be found in textbooks.

Which of the following most likely caused people to accept the theory that the continents were once all connected?

- A. A lot of scientific evidence was found that supported this theory.
- B. Studies showed that each of today's continents has a unique ecosystem.
- C. Another scientist wrote an article supporting this theory at the same time.
- D. The continents started to move back into the shape of the original supercontinent.

2) One of the scientists who proposed the theory that the Sun was the center of our Solar System was Copernicus. This was different from the accepted theory of the time, which stated that Earth was the center of our solar system. How was the theory that the Sun was the center of the Solar System finally accepted?

- A. Ancient documents were discovered that supported his ideas.
- B. He tested his theory by throwing rocks and recording where they fell.
- C. Scientific evidence was gathered that proved the old theory to be wrong.
- D. Copernicus sent rovers into space to see whether the Sun or Earth moved.

3) Many discoveries have been unintentionally made while conducting experiments for other purposes. Which best describes how theories are affected by these new discoveries?

- A. They are usually discarded.
- B. They are sometimes modified.
- C. They are completely unchanged.
- D. They are no longer widely accepted.

4) In the 1800s, Darwin proposed the Theory of Natural Selection, which states that organisms that are best adapted to their environment will survive and pass on their traits. This theory was controversial in Darwin's time.

Which of the following is the **best** way that today's scientists should gather support for a new theory?

- A. creating websites
- B. providing evidence
- C. altering existing data
- D. publishing their ideas

5) In 1912, Alfred Wegener proposed a hypothesis of continental drift, which lacked a clear explanation of how continents moved, but was based on some supporting evidence. Then, through rigorous investigations and development of new evidence, the modern theory of plate tectonics was developed. Why is the theory of plate tectonics useful to scientists?

- A. It will eventually become a fact-based law.
- B. It explains how continental land masses move.
- C. It offers the first widely accepted and respected explanation.
- D. After many years of investigation, it resulted in a testable model.

6) In science, a theory is different from how we use the term "theory" to apply to everyday ideas. The statement, "It's only a theory" might mean something very different than "theory" when used as a scientific term.

What is the best way to explain the word, "theory," when used in science?

- A. In science, there is no difference between a law and a theory.
- B. In science, there are few principles that can be considered theories.
- C. In science, a theory is well supported by observations and/or experimental data.
- D. In science, a theory is a completely accurate and reliable fact about natural events.

7) In what way is a scientific law different from a scientific theory?

- A. A law is true in all situations and all circumstances, while a theory is only true in certain instances.
- B. A law describes the major ideas of the universe, while theories are based on the smaller ideas of the universe.
- C. A law is based on testable facts and data, while a theory is just a combination of one or more hypotheses that have not been tested.
- D. A law expresses a relationship between two or more variables, while a theory explains the causal mechanism of how something happens.

8) The invention of the microscope made the development of cell theory possible in the 1600s. Robert Hooke first named the tiny pores that he saw in his microscope, cells. However, he was not able to explain their purpose or function.

How did the version of cell theory that we know today come about?

- A. Hooke's original idea remains unchanged. Others added new ideas.
- B. The only contribution Hooke made to current cell theory was naming the cell.
- C. Others developed more evidence and refined ideas related to what Hooke had originally proposed.
- D. Hooke's ideas were proven wrong and dismissed, and the current cell theory was developed from new ideas.

9) Which of the following statements about scientific laws and scientific theories is true?

- A. Neither is based on reliable, testable evidence.
- B. Both require further testing and experimentation.
- C. Neither receives any notable attention from modern scientists.
- D. Both are generally accepted by scientists to be accurate and valid.

10) Which of the following correctly uses the word theory in the scientific sense?

- A. What is your theory on who stole the paper from the supply closet?
- B. I have a theory that will explain why Andrea was late to science class.
- C. A valid theory provides a useful and powerful tool for explaining phenomena.
- D. At this point, Harold's ideas about grades in high school predicting future success are pure theory

Category: Earth and Space Science		Percentage of Points derived from content area: 27%		Notes
Benchmark	Clarification	Content Limits	Item Attributes	
<b>SC.8.E.5.3</b> Distinguish the hierarchical relationships between planets and other astronomical bodies relative to solar system, galaxy, and universe, including distance, size, and composition.	<ul> <li>Students will compare and/or contrast the relative distance, relative size, and general composition of astronomical bodies in the universe.</li> <li>Students will describe distances between objects in space in the context of light and space travel.</li> <li>Students will describe that the universe contains billions of galaxies and stars.</li> </ul> Also Assesses: SC.8.E.5.1 Recognize that there are enormous distances between objects in space travel to understand this distance. SC.8.E.5.2 Recognize that the universe contains many billions of galaxies and that each galaxy contains many billions of stars.	<ul> <li>Items assessing astronomical bodies are limited to planets, stars, moons, asteroids, nebulae, galaxies, dwarf planets, and comets.</li> <li>Items will not assess the order of the planets from the Sun in our Solar System in isolation.</li> <li>Items will not require memorization of quantitative astronomical data.</li> <li>Items will not assess the specific chemical composition of astronomical bodies.</li> <li>Items will not require calculations but may require comparison or use of quantitative data, including tables.</li> </ul>	Stimulus Attribute Distances will be given in units of astronomical units (AU) or light- years. Response Attribute Distances will be given in units of astronomical units (AU) or light- years.	

Answers: 1-C, 2-B, 3-C, 4-C, 5-A, 6-D, 7-B, 8-A, 9-B, 10-B

1) Abby reads that light travels almost 900,000 times faster than sound. She also knows that it takes light from the Sun about 8 minutes to reach Earth. Why does it take light from the Sun so long to reach us on Earth when it is traveling so fast?

- A. Light slows down as it travels through space.
- B. It is difficult for light to pass through Earth's atmosphere.
- C. Light from the Sun travels a vast distance before it reaches Earth.
- D. Most of light from the Sun is absorbed by different objects in space.

2) The inner terrestrial planets are composed of hard rocky material with metallic cores. In contrast, the outer planets are called gas giants because of their deep massive atmospheres that are composed of gas. Despite this major difference, what is one thing all of these planets have in common?

- A. They all have moons.
- B. They travel in elliptical orbits.
- C. They are all larger than Earth.
- D. They are all known to contain water.

3) Neptune is the farthest planet in our solar system and it has thirteen identified satellites. Pluto is considered a dwarf planet and has only three satellites. Why is Pluto classified as a dwarf planet and not a regular planet like Neptune?

- A. Pluto is much smaller than Neptune.
- B. Pluto has less gravity than Neptune.
- C. There are other objects in Pluto's orbit.
- D. Pluto has too few moons to be a planet.

4) As you travel from the gas giants to the terrestrial planets, which of the following is true?

- A. The planets get larger.
- B. The speed of rotation increases.
- C. The period of revolution decreases.
- D. The density of each planet decreases.

5) The table below shows the distance from the Sun of each planet in the solar system, as well as the diameters of each planet.

If a new object is observed in the solar system that has a distance of approximately 25 Astronomical units (AU) from the Sun, which of the following is most likely true?

Planet	Distance from the Sun	Diameter
Mercury	0.387 AU	900 km
Venus	0.723 AU	12,100 km
Earth	1.000 AU	12,800 km
Mars	1.524 AU	6,800 km 🤎
Jupiter	5.203 AU	143,000 km
Saturn	9.523 AU	120,500 km
Uranus	19.208 AU	51,100 km
Neptune	30.087 AU	49,500 km

A. The object is a comet.

B. The object is a planet.

- C. The object has a satellite.
- D. The object has an irregular orbit.

6) Objects are classified as planets because they orbit the Sun and have cleared their neighborhood of other objects. What are objects that revolve around planets while the planets revolve around the Sun?

- A. asteroids
- B. comets
- C. meteoroids
- D. satellites

7) What common factor do all the terrestrial planets share?

- A. They all have moons.
- B. They are all inside the asteroid belt.
- C. The all have dense gaseous atmospheres.
- D. They are all less than or equal to one AU (astronomical unit) from the Sun.

8) Which answer correctly orders astronomical bodies according to their distance from the Sun?

- A. Venus < Earth < asteroid belt < Neptune
- B. asteroid belt < Saturn < Pluto < Uranus
- C. Pluto < Uranus < Neptune < asteroid belt
- D. asteroid belt < Earth's moon < Venus < Mercury

9) As you travel from the inner to the outer planets, which of the following decreases?

- A. the number of moons
- B. the surface temperature
- C. the time for one revolution
- D. the distance from the Sun

10) Which of the following correctly describes the relationship between astronomical bodies in outer space?

- A. Mars is larger than Earth.
- B. The Milky Way is much larger than our Solar System.
- C. The Moon is further away from the Sun than the asteroid belt.
- D. The orbits of planets are greater than the orbits of the satellites.

Category: Earth and Space Science		Percentage of Points derived from content area: 27%		Notes
Benchmark	Clarification	Content Limits	Item Attributes	
<b>SC.8.E.5.5</b> Describe and classify specific physical properties of stars: apparent magnitude (brightness), temperature (color), size, and luminosity (absolute brightness).	<ul> <li>Students will describe and/or classify physical properties of stars: apparent magnitude, temperature (color), size, and absolute brightness.</li> <li>Students will evaluate models of solar properties and/or explain solar characteristics, including rotation, structure of the Sun, convection, sunspots, solar flares, and prominences.</li> </ul>	<ul> <li>Items addressing stars will focus on main sequence stars and their properties.</li> <li>Items will not assess stages of stellar evolution.</li> <li>Items will not assess the specific chemical composition of stars.</li> </ul>	Stimulus Attributes Distances will be given in units of astronomical units (AU) or light-years. The phrase <i>absolute</i> <i>brightness</i> should be used rather than <i>luminosity</i> .	
	Also Assesses: SC.8.E.5.6 Create models of solar properties, including rotation, structure of the Sun, convection, sunspots, solar flares, and prominences.		<b>Response Attribute</b> Distances will be given in units of astronomical units (AU) or light-years.	

Answers: 1-A, 2-B, 3-A, 4-B, 5-B, 6-A, 7-B, 8-A, 9-A, 10-C

1) While looking at the night sky, Dana sees that one star looks much brighter than the other stars. Which of the following is a property of stars used to describe how bright the star looks to an observer on Earth?

- A. apparent magnitude
- B. luminosity
- C. stellar evolution
- D. temperature

2) The stars, Rigel and Betelgeuse, are both found in the constellation, Orion. Rigel is a blue supergiant, and Betelgeuse is a red supergiant. Which of the following correctly compares the temperatures of Rigel and Betelgeuse?

- A. Betelgeuse is hotter than Rigel, because red stars are hotter than blue stars.
- B. Rigel is hotter than Betelgeuse, because blue stars are hotter than red stars.
- C. Rigel and Betelgeuse are close to the same temperature, because they are both supergiants.
- D. Betelgeuse and Rigel are close to the same temperature, because they are about the same distance from the Sun.

3) Christine is reading about the different properties of stars, including luminosity, temperature, apparent magnitude, and size. How does the size of a subgiant compare to the size of a neutron star?

- A. A subgiant is larger than a neutron star.
- B. A neutron star is larger than a subgiant.
- C. A subgiant and a neutron star are approximately the same size.
- D. A neutron star may be larger than a subgiant, depending on its temperature.

4) Brandon learns that a star's luminosity is a measure of the star's absolute brightness, and is determined by a combination of the star's physical properties. Which of the following correctly describes the relationship between the luminosity of two stars that have the same radius?

- A. The star that is hotter will have a lower luminosity.
- B. The star that is hotter will have a higher luminosity.
- C. The stars' luminosities will depend on how close they are to the Sun.
- D. The stars will have the same luminosity since their radii are the same.

5) Cara is building a model of the solar system, which includes the Sun. She plans to include a written description to provide details about each piece in her model. In order for her model to be realistic, which of the following should she include in her representation of the Sun?

- A. She should show that sunspots can be seen as white areas on the Sun's surface.
- B. She should explain that the Sun is made up of gaseous layers that surround an iron core.
- C. She should show that the Sun revolves around the planets, determining the length of year.
- D. She should explain that the Sun rotates, even though different parts rotate at different rates.

6) On a dark, clear night, James looks up at the night sky and is amazed at how many stars he is able to see. He notices that some of the stars are very faint, and that he can barely see them. Which of the following is a property of stars used to describe the brightness of a star to an observer on Earth?

- A. apparent magnitude
- B. luminosity
- C. solar rotation
- D. temperature

7) Our Sun is a yellow main sequence star, while Proxima Centauri, the next closest star to Earth, is a red dwarf. Which of the following correctly compares the temperatures of the Sun and Proxima Centauri?

- A. Proxima Centauri is hotter than the Sun, because red stars are hotter than yellow stars.
- B. The Sun is hotter than Proxima Centauri, because yellow stars are hotter than red stars.
- C. The Sun is hotter than Proxima Centauri, because it is so much larger than Proxima Centauri.
- D. The Sun and Proxima Centauri are close to the same temperature, because they are both visible from Earth.

8) Katie learned that different types of stars differ in their physical properties, including apparent magnitude, color, luminosity, and size. How does the size of a neutron star compare to the size of a main sequence star?

- A. A main sequence star is larger than a neutron star.
- B. A neutron star is larger than a main sequence star.
- C. A main sequence star and a neutron star are approximately the same size.
- D. A neutron star may be larger than a main sequence star, depending on its temperature.

9) Jacob is reading about the luminosity, or absolute brightness, of a star. The luminosity of a star is determined by a combination of the star's physical properties. Which of the following correctly describes the relationship between the luminosity of two stars that are the same temperature?

- A. The star with the greater radius will have a higher luminosity.
- B. The star with the smaller radius will have a higher luminosity.
- C. The stars' luminosities will depend on how close they are to the Sun.
- D. The stars will have the same luminosity, since their temperatures are the same.

10) For Morgan's science project, she is building a model of the Sun. Her model will also include a written description of the different features of the Sun. Which of the following does NOT describe something Morgan should include in the explanation accompanying her model, in order to accurately represent the Sun?

- A. She should explain that the Sun is not solid, and it is instead made up of gas and plasma.
- B. She should explain that the Sun rotates, even though different parts rotate at different rates.
- C. She should explain that the Sun revolves around the planets, which determines the length of the planet's year.
- D. She should explain that sunspots appear as dark areas on the Sun's surface, and can last for a very long time.

Category: Earth and Space Science		Percentage of Points derived from content area: 27%		Notes
Benchmark	Clarification	Content Limits	Item Attributes	]
SC.8.E.5.7 Compare and contrast the properties of objects in the Solar System, including the Sun, planets, and moons to those of Earth, such as gravitational force, distance from the Sun, speed, movement, temperature, and atmospheric conditions.	<ul> <li>Students will compare and/or contrast the characteristics of objects in the Solar System.</li> <li>Students will identify and/or explain the role that gravity plays in the formation and motion of planets, stars, and solar systems.</li> <li>Students will compare and/or contrast various historical models of the Solar System.</li> <li>Also Assesses:</li> <li>SC.8.E.5.4 Explore the Law of Universal Gravitation by explaining the role that gravity plays in the formation of planets, stars, and solar systems and in determining their motions.</li> <li>SC.8.E.5.8 Compare various historical models of the Solar System, including geocentric and heliocentric</li> </ul>	<ul> <li>Items will not require the use of the formula for the law of universal gravitation or the gravitational constant.</li> <li>Items may assess the presence, absence, and/or relative thickness of planetary atmospheres but not the chemical composition of the atmosphere.</li> <li>Items may assess the relationship between distance from the Sun and the length of year and/or the relationship between distance from the Sun and average surface temperature.</li> <li>Items will not require memorization of quantitative astronomical data.</li> <li>Items will not assess the relative distance of objects in our Solar System from the Sun.</li> <li>Items will not assess the change in velocity dependent upon distance from the Sun in isolation.</li> <li>Items may assess the concept of eccentricity of orbital paths of astronomical bodies in terms of the differing shapes of orbits but not specific values of eccentricity or the term <i>eccentricity</i>.</li> <li>Items may assess the general properties of specific planets but will not assess characteristics of inner and outer planets as groups.</li> </ul>	Stimulus Attribute Distances will be given in units of astronomical units (AU) or light-years. Response Attribute Distances will be given in units of astronomical units (AU) or light-years.	

Answers: 1-C, 2-B, 3-B, 4-B, 5-B, 6-A, 7-B, 8-C, 9-B, 10-B

1) When moving from the outer planets to the inner planets, what can be said about their periods of revolution?

- A. They triple.
- B. They double.
- C. They decrease.
- D. They do not change.

2) The planets in our Solar System share some similarities, but their differences often outnumber the similarities. For example, one day on Neptune is only about 16.1 hours, and while Earth and Neptune both have natural satellites, Earth has only one moon, while Neptune has 13. Which of the following is also an accurate comparison of Earth and Neptune?

- A. Neptune has a more solid surface than Earth.
- B. Earth has a shorter period of revolution than Neptune.
- C. Neptune has a longer period of rotation than Earth.
- D. Earth has a lower average temperature than Neptune.

3) Of all the planets in our Solar System, Earth is the only one on which life as we know it exists. Which of the following best describes a factor that allows Earth to be capable of supporting life, while other planets are unable to do so?

- A. Earth revolves slowly enough for seasons to occur.
- B. Earth is large enough to sustain a variety of species.
- C. Earth has an atmosphere to filter and trap energy from the Sun.
- D. Earth rotates fast enough for gravity to hold objects on its surface.

4) From space, Earth appears blue. Both Neptune and Uranus also appear blue in color. Which of the following best describes the cause of the blue color of these planets?

- A. Earth has a solid core which absorbs blue light, while Neptune and Uranus have a small gaseous core which reflects all light.
- B. Earth is mostly covered with water, which reflects blue light, while gases in the atmosphere of Neptune and Uranus affect their color.
- C. Earth has a large amount of plant foliage that reflects blue light into space, while Neptune and Uranus have atmospheres consisting of blue gases.
- D. Earth's surface has a solid core consisting of metals that reflect blue light, while Neptune and Uranus contain silicates that reflect blue light particles.

5) Based on the position of Venus as it relates to Earth and the Sun, which of the following describes the length of a year on Venus?

- A. The length of a year on Venus is the same as a year on Earth.
- B. The length of a year on Venus is shorter than a year on Earth.
- C. The length of a year on Venus is twice as long as a year on Earth.
- D. The length of a year on Venus is nearly ten times as long as a year on Earth.

6) Sam enjoys looking at stars through his telescope. He learns that stars were originally clouds made of dust and gasses. Which statement best describes how these clouds eventually become stars?

- A. The clouds eventually collapse under the force of gravity.
- B. The clouds increase in temperature until they eventually form a solid.
- C. The clouds contain particles that are magnetically attracted to each other.
- D. The clouds begin to cool and form masses of ice that eventually fuse together.

7) Teresa is studying the Solar System. She learns that Jupiter has 18 named moons as well as many small unnamed ones, and that Earth has just one moon. Which of the following best explains why Jupiter has so many more moons than Earth?

- A. Jupiter is much farther away from the Sun than Earth, so it attracts more moons.
- B. Jupiter has a much greater mass, and therefore a greater gravitational pull, than Earth.
- C. Jupiter has a thicker, denser atmosphere than Earth, and it condenses rock particles to form moons.
- D. Jupiter is so much colder than Earth that clumps of ice form moons in its upper atmosphere more readily.

8) Which of the following best explains how modern astronomers view Galileo's model of the Solar System?

- A. Modern astronomers would disagree with Galileo's entire model of the Solar System.
- B. Modern astronomers would suggest that Galileo was wrong about almost everything except the position of the Sun in the Solar System.
- C. Modern astronomers would suggest the Sun is not the exact center of the Solar System, but would agree that the Sun is not revolving around Earth.
- D. Modern astronomers would disagree with Galileo's idea that the planets revolve around the Sun, but would agree with his arrangement of the planets.

9) Hillary is studying Kepler's laws of planetary motion. She learns that each planet follows an elliptical orbit around the Sun, as shown in the diagram below. Which statement below best explains why the planets orbit the Sun?



- A. The forces between each of the planets keep them in orbit.
- B. The gravitational force of the Sun keeps the planets in orbit.
- C. The planets are drawn into orbit by the magnetic force of the Sun.
- D. The constant velocity of each planet keeps it moving in orbit around the Sun.

3

10) Based on the position of the planets relative to the Sun, what can you predict about the difference in temperatures between Mars and Neptune?A. Neptune is much hotter than Mars.

- A. Neptune is much notter than Mars.
- B. Neptune is much colder than Mars.
- C. Mars and Neptune are both very similar in temperature.
- D. Mars may be hotter or colder than Neptune, depending on its tilt.

# Middle School FCAT Science (Grade 8) DATA ANALYSIS-Standard FOCUS

Category: Earth and Space Science		Percentage of Points derived from content area: 27%		Notes
Benchmark	Clarification	Content Limits	Item Attributes	
<b>SC.8.E.5.9</b> Explain the impact of objects in space on each other, including: 1. the Sun on the Earth, including seasons and gravitational attraction; 2. the Moon on the Earth, including phases, tides, and eclipses, and the relative position of each body.	Students will explain the effect of astronomical bodies on each other, including the Sun's and/or the Moon's effects on Earth.	Items addressing eclipses should be assessed at the conceptual level and will not assess specific vocabulary associated with eclipses, such as <i>umbra</i> and <i>penumbra</i> .	Stimulus Attributes None specified Response Attribute Options may be in the form of labeled illustrations.	

Answers: 1-B, 2-C, 3-C, 4-C, 5-A, 6-B, 7-C, 8-C, 9-C, 10-B

#### Middle School FCAT Science (Grade 8) DATA ANALYSIS-Standard FOCUS

1) Julia and her father are planning a fishing trip. They think that fishing is better during the incoming tide. Which of the following diagrams shows the arrangement of the Sun, the Moon, and Earth that will result in the largest change in tides so that Julie and her dad have the best fishing experience?



- A. Diagram A
- B. Diagram B
- C. Diagram C
- D. Diagram D

2) Charlotte's class is learning about the movements of Earth, the Sun, and the Moon. They discover that different phenomena result when the relative positions of Earth, the Sun, and the Moon change. Which of the following happens when the Sun, the Moon, and Earth are lined up in a straight line?

- A. Seasons on Earth last longer than normal.
- B. The shape of Earth's orbit around the Sun changes.
- C. Earth experiences higher high tides and lower low tides.
- D. Gravity from both Earth and the Sun prevents the Moon from rotating.

3) Kyle and Ryan are camping in Ryan's backyard in order to watch a lunar eclipse through a telescope that they have set up. Which of the following describes the positions of Earth, the Moon, and the Sun during a lunar eclipse?

- A. The Sun passes between Earth and the Moon.
- B. The Moon passes between Earth and the Sun.
- C. Earth passes between the Moon and the Sun.
- D. The Sun and the Moon pass Earth at the same time.

4) Allyse's family lives near the beach. Every day there is a high tide and a low tide. Allyse notices that sometimes the high tides are higher and the low tides are lower than they are at other times. She realizes that this happens in a predictable pattern. What causes the highest of high tides and the lowest of low tides to occur?

- A. Earth's axis changes the direction in which it is tilted.
- B. The Moon is in the first-quarter and last-quarter phases.
- C. The Sun, the Moon, and Earth are lined up in a straight line.
- D. The season changes and the temperature differences affect the water levels.

5) While Deena is watching the news on TV, she hears that there is going to be a solar eclipse the next day. The news announcer gives advice on how to view a solar eclipse safely, and describes what is happening when a solar eclipse occurs. What causes a solar eclipse to occur?

- A. The Moon passes between the Sun and Earth.
- B. The Sun, the Moon, and Earth form a right angle.
- C. Earth and the Moon are on opposite sides of the Sun.
- D. Earth and the Moon are at their farthest distance from the Sun.

2 3

6) Sir Isaac Newton's theory of universal gravitation helped explain how the Sun, other planets, and Earth's gravity influences the orbit of the Moon. Because of the influence of these bodies, the Moon's orbital path has what shape?

- A. circular
- B. elliptical
- C. semi-circular
- D. spherical

7) What causes the phases of the Moon?

- A. the tilt of Earth on its axis
- B. Earth's shadow being cast on the Moon
- C. the relative positions of the Sun, Moon, and Earth
- D. the elliptical orbit that Earth travels around the Sun

8) The average temperature for the month of June is 20.1 degrees Celsius (°C) in Minneapolis, Minnesota. In December, the average temperature in Minneapolis is -7.8 °C. Why is it colder in Minneapolis during December?

- A. Earth is farther from the Sun in December.
- B. Earth revolves at a slower rate in December.
- C. The Northern Hemisphere is tilted away from the Sun in December.
- D. The Northern Hemisphere has a shorter period of rotation in December.

9) One of Earth's characteristics is that it experiences seasons. Higher temperatures result in summer and lower temperatures result in winter. Why does Earth experience seasons?

- A. Temperatures on Earth vary from one location to another, causing seasons.
- B. Cloud cover is heavier in the winter, blocking radiation from the Sun and creating seasons.
- C. As Earth revolves around the Sun, the hemisphere that is tilted toward the Sun receives more direct sunlight, causing seasons.
- D. Earth's orbit around the Sun is elliptical, and Earth is farther from the Sun in winter, resulting in seasons.

10) Colin is visiting his grandparents at the beach. While walking on the beach, he notices the tide pools that are left behind when the ocean recedes. Which of the following explains the cause of tides?

- A. Tides are caused by the centrifugal force of Earth's rotation.
- B. Tides are caused by the gravitational interaction between Earth and the Moon.
- C. Tides are caused by the expansion of ocean water due to warming by sunlight.
- D. Tides are caused by the force of attraction between the Earth's oceans and the Sun.

2 3

Category: Earth and Space Science		Percentage of Points derived from content area: 27%		Notes
Benchmark	Clarification	Content Limits	Item Attributes	
SC.7.E.6.2 Identify the patterns within the rock cycle and relate them to surface events (weathering and erosion) and subsurface events (plate tectonics and mountain building).	<ul> <li>Students will identify and/or describe steps of the rock cycle and relate them to surface and subsurface events.</li> <li>Students will describe and/or explain how Earth's surface is built up and torn down through the processes of physical and chemical weathering, erosion, and deposition.</li> <li>Students will identify different types of landforms commonly found on Earth.</li> <li>Students will describe similarities and/or differences among landforms found in Florida and those found outside of Florida.</li> <li>Students will identify and/or describe the impact that humans have had on Earth.</li> <li>Also Assesses:</li> <li>SC.6.E.6.1 Describe and give examples of ways in which Earth's surface is built up and torn down by physical and chemical weathering, erosion, and deposition.</li> <li>SC.6.E.6.2 Recognize that there are a variety of different landforms on Earth's surface, such as coastlines, dunes, rivers, mountains, glaciers, deltas, and lakes, and relate these landforms as they apply to Florida.</li> <li>SC.7.E.6.6 Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, and changing the flow of water.</li> </ul>	<ul> <li>Items may use the context of plate tectonics to assess the rock cycle but will not directly assess plate tectonics.</li> <li>Items will not assess the role of plate tectonics in landform formation.</li> <li>Items may assess the features of karst topography, such as aquifers, caverns, and/or sinkholes but will not use the term <i>karst topography</i>.</li> </ul>	Stimulus Attributes None specified Response Attributes None specified	

Answers: 1-D, 2-A, 3-D, 4-C, 5-A, 6-C, 7-A, 8-C, 9-A, 10-D

1) Beaches and barrier islands along Florida's coast often change shape quite dramatically when a hurricane or other strong storm hits them. What causes this change in shape?

- A. The rain from the storm erodes the sand.
- B. The waves from the storm wear away the rock underneath the sand.
- C. Tornadoes created by the storms pick up the sand and drop it out in the ocean.
- D. The storms cause wind and waves that move the sand from one place to another.

2) Alicia is reading a magazine article that describes the effects of deforestation on an ecosystem. She learns that deforestation can lead to soil erosion and climate change. Which of these is also a consequence of deforestation?

- A. decreased biodiversity
- B. increased annual precipitation
- C. decreased availability of sunlight
- D. increased oxygen in the atmosphere

3) Suzanne is making a list of examples of weathering. Which of the following should Suzanne be sure to include?

- A. A rainstorm washes away soil from a garden.
- B. A sudden flood transports pebbles into a river.
- C. A landslide moves rocks down the side of a mountain.
- D. A windstorm scratches the surface of a rock with sand.

4) On a trip to the beach, Jacob noticed many signs that read "Keep off dunes." His mother told him that walking or digging on the dunes make them vulnerable to erosion. What other human activity would also contribute to the erosion of the sand dunes?

- A. building new dunes where none exist
- B. restricting construction near the dunes
- C. destroying the beach grass on the dunes
- D. adding sand from the ocean to the dunes

5) Kari and her aunt are visiting the California desert. On her visit, Kari sees sand dunes much like the ones from the beaches near her home in Florida. How are the California and Florida dunes similar?

- A. They were both formed by wind erosion.
- B. They were both formed by ancient floods.
- C. They are both found in areas with few people.
- D. They are both made of the same type of sand.

6) Henry visits his aunt's house on Jacksonville Beach several times a year. He notices how much sand is between the ocean and the seawall in June. During July, there is a hurricane. In September, Henry notices that there is much less sand between the ocean and the seawall.

What is the best explanation as to what happened to the sand?



- A. The wind from the hurricane destroyed the sand.
- B. The heavy rains from the hurricane packed the sand down.
- C. The hurricane created giant waves that washed away the sand.
- D. The hurricane damaged the sea wall, and the sand behind it washed away.

7) Over the past 50 years, people have diverted much of the water in the Everglades to support large sugar cane farms. What negative result would you expect that this had on the Everglades area?

- A. It reduced the number and types of plants and animals.
- B. It prepared a once useless area to be used as farmland.
- C. It decreased the amount of land on which people could live.
- D. It lowered the number of disease-causing mosquitoes in the area.

8) Lori is learning about two parts of the rock cycle: weathering and erosion. She needs to explain how weathering and erosion are different. Which of the following correctly describes the difference between weathering and erosion?

- A. Weathering is the movement of rocks by wind; erosion is the movement of rocks by water.
- B. Weathering is the formation of rocks from lava; erosion is the weathered materials from an area.
- C. Weathering is the breaking down of rocks; erosion is the movement of weathered materials.
- D. Weathering is when rocks change from one type of rock to another; erosion is when rocks are broken down.

9) As Franklin is walking to school, he notices a new neighborhood being built. The first thing the builders do is remove all of the trees. Which of the following effects would result from this action?

3

- A. an increase in soil erosion
- B. a creation of new plant species
- C. a reduction in levels of pollution
- D. a growth in the variety of animals

10) The Florida Keys are an archipelago (chain of islands) off the southern coast of Florida. The Keys are made of mainly softer materials like limestone and fossilized coral. The Hawaiian Islands are also an archipelago, but are made of much harder igneous rock.

Which of the following explains why the Hawaiian Islands are made of such different materials than the Florida Keys?



- A. Coral does not grow near the Hawaiian Islands.
- B. The Hawaiian Islands were built mostly by people.
- C. Igneous rocks are only found in the Hawaiian Islands.
- D. The Hawaiian Islands formed through volcanic eruptions.

Category: Earth and Space Science		Percentage of Points derived from content area: 27%		Notes
Benchmark	Clarification	Content Limits	Item Attributes	
<b>SC.7.E.6.4</b> Explain and give examples of how physical evidence supports scientific theories that Earth has evolved over geologic time due to natural processes.	<ul> <li>Students will identify examples of and/or explain physical evidence that supports scientific theories that Earth has evolved over geologic time due to natural processes.</li> <li>Students will identify and/or describe current scientific methods for measuring the age of Earth and its parts.</li> <li>Also Assesses:</li> <li>SC.7.E.6.3 Identify current methods for measuring the age of Earth and its parts, including the law of superposition and radioactive dating.</li> </ul>	<ul> <li>Items may address fossil records but should not require knowledge or recognition of specific organisms.</li> <li>Items may address folding and faulting as related to the law of superposition.</li> <li>Items assessing radioactive dating will be limited to a conceptual level. Items will not require calculations or address half-life.</li> <li>Items addressing geologic time will not require specific knowledge of eras, periods, or epochs.</li> </ul>	Stimulus Attributes None specified Response Attributes None specified	

Answers: 1-B, 2-B, 3-D, 4-A, 5-C, 6-C, 7-D, 8-D, 9-B, 10-A

1) Cassie is studying rock formations. Which of the following principles can Cassie use to date the rocks in the different layers of the formation?

- A. The youngest layers of rock will contain fossils.
- B. The oldest layers of rocks will be on the bottom.
- C. The oldest layers of rock will be primarily igneous rocks.
- D. The youngest layers of rock will be primarily sedimentary rocks.

2) On a trip to the desert, Geraldo finds fossils of ancient oceanic shells. Which of the following best explains how these fossils ended up in the desert?

- A. Oceanic storms washed the shells into the desert.
- B. The desert was once covered by an ocean that receded.
- C. Earthquakes shifted debris from the ocean into the desert.
- D. Animals carried the shells from the ocean to the area for food.

3) Scientists have evidence that the Earth has gone through several "ice ages" in which most of the Earth's surface was covered by thick sheets of ice. Which of the following would provide support that these ice ages existed?

- A. a lack of the fossils of any living organisms
- B. an absence of human remains or civilizations
- C. the extinction of plant life in the fossil record
- D. finding fossils of cold-adapted organisms in warm climates

4) Sammie is using radiocarbon dating to determine the age of a sample of objects. Which best explains why radiocarbon dating can be used to determine the accurate age of these items?

- A. They contain radioactive isotopes that decay at a constant rate.
- B. They are made primarily of radioactive carbon that is easy to detect.
- C. They give off radioactive isotopes when an electrical charge is applied.
- D. They have been exposed to large amounts of radioactivity in the atmosphere.

5) Scientists have found fossils from a land-dwelling animal, called Kannemeyerid, in Canada and in Africa. These findings provide evidence for which of the following scientific theories?



- A. Only certain continents were inhabitable.
- B. Many land-dwelling animals could also swim.
- C. Earth's continents were once joined together.
- D. Animals evolved in the same way on two continents.

6) Thomasine has a sample of materials and needs to determine its age. She can determine its relative-age by comparing the rock layer the sample came from to another rock layer.

Why is it sometimes difficult to determine the age of materials in this way?

- A. The oldest layers of rock are too close to the Earth's liquid mantle.
- B. The youngest layers of rocks do not contain enough materials to evaluate.
- C. The sequence of rock layers can be disturbed by erosion and earthquakes.
- D. The rock layers have too many different types of rocks to determine their age.

7) Scientists use fossils to help them date the age of rocks. What else can studying fossils provide evidence for?

- A. the development of animal behaviors
- B. the total number of organisms on Earth
- C. the conditions on Earth before life existed
- D. the climatic changes that occurred on Earth

8) Scientists hypothesize that 66 million years ago an enormous asteroid hit Earth, sending out a cloud of dust into the Earth's atmosphere. Which of the following would be evidence to support this hypothesis?

- A. Fossils show that all plant and animal life became extinct.
- B. The fossils of ancient trees show very little growth during this time.
- C. A large portion of the asteroid is still embedded in the Earth's crust.
- D. An identical layer of sediment can be seen in different parts of the world.

9) Cory is explaining the principle of superposition to his friend. Which of the following is the best explanation Cory could give?

- A. "Layers of rock are usually made of completely different substances."
- B. "In an area of undisturbed rock, the oldest layers of rock will be on the bottom."
- C. "The age of rocks can be determined by the ratio of radioactive isotopes present."

3

D. "To estimate the age of rocks accurately, use fossils embedded in the rock layers."

10) Scientists have observed that some of the features in rocks found in North America are very similar to those found in other continents, like Africa. This could be considered evidence for which of the following scientific theories?



- A. The continents used to be joined together.
- B. The ocean had once covered most of Earth.
- C. A large asteroid hit Earth millions of years ago.
- D. A group of early humans traveled across the oceans.
| Category: Earth and Space Science  |   | Percentage of Points derived from content area: 27%   |   | Notes |
|--|---|---|---|-------|
| Benchmark  | Clarification   | Content Limits  | Item Attributes   |       |
| <b>SC.7.E.6.5</b> Explore the scientific theory of plate tectonics by describing how the movement of Earth's crustal plates causes both slow and rapid changes in Earth's surface, including volcanic eruptions, earthquakes, and mountain building. | <ul> <li>Students will describe the scientific theory of plate tectonics and/or how the movement of Earth's crustal plates and the flow of heat and material cause various geologic events to occur.</li> <li>Students will identify and/or describe the layers of Earth.</li> </ul> Also Assesses: SC.7.E.6.1 Describe the layers of the solid Earth, including the lithosphere, the hot convecting mantle, and the dense metallic liquid and solid cores. SC.7.E.6.7 Recognize that heat flow and movement of material within Earth causes earthquakes and volcanic eruptions and creates mountains and ocean basins. | <ul> <li>Items will not assess types of volcanoes but may assess different causes of volcano formation.</li> <li>Items will not assess types of earthquake waves.</li> <li>Items may assess density differences between layers of Earth but will not assess density differences as they relate to plate tectonics.</li> <li>Items assessing the layers of Earth are limited to the crust, the lithosphere, the hot convecting mantle, the outer (liquid) core, and the inner (solid) core.</li> </ul> | Stimulus Attributes<br>None specified<br>Response<br>Attributes<br>None specified |       |

Answers: 1-C, 2-B, 3-C, 4-D, 5-A, 6-A, 7-C, 8-D, 9-C, 10-D

1) The Appalachian Mountains stretch from Mississippi to Canada. What is the best explanation for how this mountain range formed?

- A. Meteorites hit the area where the mountains are, pushing up rocks and soil.
- B. Hundreds of volcanoes erupted along the range, forming mountains and hills.
- C. Plates of Earth's crust slowly collided until one plate was on top of the other and pushed upward.
- D. Rivers and streams flowing down from Canada deposited soil in large amounts until the mountains formed.
- 2) Tectonic plates are found in which layer of Earth?
  - A. liquid outer core
  - B. lithosphere
  - C. mantle
  - D. solid inner core

3) Mountains are formed at which of the following areas?

- A. where tectonic plate movement is rare
- B. where tectonic plates grind past each other
- C. where tectonic plates move toward each other
- D. where tectonic plates move away from each other

4) According to the most widely accepted hypothesis, what is the main force that causes tectonic plates to move?

- A. force of Earth's rotation
- B. magnetic fields of Earth's crust
- C. gravitational pull of Earth's core
- D. convection currents in Earth's lithosphere

5) Which of the following correctly describes the effects of tectonic plate movement on Earth's crust?

- A. The amount of crust on the surface of Earth is fairly stable.
- B. The amount of crust on the surface of Earth is slowly shrinking.
- C. The total amount of Earth's crust will eventually be pulled into the mantle.
- D. The total amount of Earth's crust is steadily increasing due to volcanic activity.

6) The Andes Mountains are the longest of all the world's continental mountain ranges. Which of the following correctly explains how this mountain range was formed?



- A. Tectonic plates collided, and Earth's crust was pushed upwards.
- B. Tectonic plates separated, and exposed magma boiled upwards.
- C. Tectonic plates slid past each other and pushed material upwards.
- D. Tectonic plates collided, and thousands of volcanoes were formed.

## Middle School FCAT Science (Grade 8) DATA ANALYSIS-Standard FOCUS

7) Convection currents occur in which of Earth's layers?

- A. crust
- B. lithosphere
- C. mantle
- D. solid core

8) Earthquakes tend to occur most often in areas where tectonic plates do which of the following?

- A. move apart
- B. move very little
- C. push into each other
- D. grind past each other
- 9) Which of the following best describes Earth's crust, according to the theory of plate tectonics?
  - A. entirely, completely still
  - B. occasionally, rapidly moving
  - C. constantly, gradually moving
  - D. consistently, suddenly moving

10) The chain of Hawaiian islands is over 3,700 miles long. These islands form when crustal plates move over a hot spot in Earth's mantle. When the hot spot erupts in a volcano, magma becomes lava and is deposited, which forms a new island. Over time, which of the following happens?



- A. The plate is lifted up and the newly formed island is raised from the hot spot.
- B. The plate is pulled under and the newly formed island is separated from the hot spot.
- C. The plate becomes stable and the newly formed island is detached from the hot spot.
- D. The plate continues to move and the newly formed island moves away from the hot spot

Cognitive Complexity Level 1

2 3

Category: Earth and Space Science		Percentage of Points derived from content area: 27%		Notes
Benchmark	Clarification	Content Limits	Item Attributes	
SC.6.E.7.4 Differentiate and show interactions among the geosphere, hydrosphere, cryosphere, and biosphere.	<ul> <li>Students will differentiate and/or explain interactions among the geosphere, hydrosphere, cryosphere, atmosphere, and biosphere.</li> <li>Students will describe and/or explain how the cycling of water and global patterns influence local weather and climate.</li> <li>Students will differentiate between weather and climate.</li> <li>Students will describe the composition and structure of the atmosphere and/or how the atmosphere protects life and insulates the planet.</li> <li>Also Assesses:</li> <li>SC.6.E.7.2 Investigate and apply how the cycling of water between the atmosphere and hydrosphere has an effect on weather patterns and climate.</li> <li>SC.6.E.7.3 Describe how global patterns such as the jet stream and ocean currents influence local weather in measurable terms such as temperature, air pressure, wind direction and speed, and humidity and precipitation.</li> <li>SC.6.E.7.9 Describe how the composition and structure of the atmosphere protects life and insulates the planet.</li> </ul>	<ul> <li>Items will not assess atmospheres of planets other than Earth.</li> <li>Items may assess atmospheric conditions and their resulting weather phenomena, such as hurricanes, tornadoes, lightning, fronts, and precipitation.</li> <li>Items will not address auroras.</li> <li>Items will not assess the causes of global warming or the ozone hole but may assess their effects.</li> <li>Items may assess the layers of the atmosphere and/or the function of each.</li> <li>Items should not assess the water cycle in isolation.</li> </ul>	Stimulus Attributes Items assessing the jet stream, the Gulf Stream, or other winds and/or currents must include a map showing these patterns. Temperature should be shown in degrees Celsius followed by the equivalent degrees Fahrenheit temperature in parentheses. <b>Response Attribute</b> Temperature should be shown in degrees Celsius followed by the equivalent degrees Fahrenheit temperature in parentheses.	

Answers: 1-C, 2-A, 3-D, 4-C, 5-D, 6-B, 7-B, 8-B, 9-D, 10-D

1) The climate of an area can be different from its weather. Which of the following statements describes the climate of an area?

- A. There should be heavy rains tomorrow morning.
- B. The rains next week are expected to cause some flooding.
- C. The average temperature from 1930–1996 was 23°C (74°F).
- D. The high temperature on September 4, 2009, was 32°C (89°F).

2. Identify the example that shows how the biosphere and atmosphere can interact.

- A. people breathing in oxygen
- B. plants obtaining nutrients from the soil
- C. ocean waves breaking down rocks
- D. animals eating other animals
- 3. Which two spheres interact when a glacier erodes rock?
  - A. the geosphere and the atmosphere
  - B. the biosphere and the geosphere
  - C. the biosphere and the cryosphere
  - D. the cryosphere and the geosphere
- 4. What effect do oceans have on the temperature of coastal areas?
  - A. Ocean breezes warm the coastal land constantly.
  - B. Ocean currents always cool a coastline.
  - C. Ocean winds prevent extremes of temperature on coastal lands.
  - D. Ocean breezes cause extreme temperatures in coastal areas.
- 5. The atmosphere is
  - A. all the solid rocks on Earth.
  - B. all the life on Earth.
  - C. the layer of water in the oceans.
  - D. the layer of gases that surrounds Earth.

6. Which is the name given to all of the Earth's water, land, and atmosphere within which life exists?

- A. a population
- B. the biosphere
- C. an ecosystem
- D. a biotic community

7. In which step of the water cycle does water move from Earth's surface into the atmosphere?



- A. condensation
- B. evaporation
- C. precipitation
- D. surface runoff

8. Increased amounts of carbon dioxide in Earth's atmosphere may lead to global warming. What might global warming then lead to?

- A. more photochemical smog
- B. melting of the polar ice caps
- C. a hole in the ozone layer
- D. less of a greenhouse effect

9. The graph below represents the current makeup of the atmosphere. Nitrogen and oxygen are the most abundant gases in air. Only about 1 percent consists of other gases. If gases such as carbon dioxide and methane continue to increase in the atmosphere, how might the graph look in the future?

## Gases in Earth's Atmosphere

10. Volcanic activity can be responsible for major climate and landscape changes to an area. Which of the following types of volcanic activity has the **greatest** effect on climate?

- A. quiet eruptions
- B. earthquakes
- C. island building
- D. ash in the atmosphere



- A. It will look the same.
- B. It will have fewer sections.
- C. The darker sections will be larger.
- D. The narrowest section will be larger.

Category: Earth and Spa	ice Science	Percentage of Points derived from	content area: 27%	Notes
Benchmark	Clarification	Content Limits	Item Attributes	
<b>SC.6.E.7.5</b> Explain how energy provided by the Sun influences global patterns of atmospheric movement and the temperature differences between air, water, and land.	<ul> <li>Students will explain how energy provided by the Sun influences global patterns of atmospheric movement and/or the temperature differences among air, water, and land.</li> <li>Students will differentiate among radiation, conduction, and convection in Earth's systems.</li> <li>Also Assesses: SC.6.E.7.1 Differentiate among radiation, conduction, and convection, the three mechanisms by which heat is transferred through Earth's system.</li> </ul>	<ul> <li>Items may assess causes of wind and wind patterns but will not assess knowledge of the Coriolis effect.</li> <li>Items assessing radiation, conduction, and/or convection should be in the context of the atmosphere, geosphere, and hydrosphere on Earth.</li> </ul>	Stimulus Attribute Temperature should be shown in degrees Celsius, followed by the equivalent degrees Fahrenheit temperature in parentheses. Response Attribute Temperature should be shown in degrees Celsius, followed by the equivalent degrees Fahrenheit temperature in parentheses.	

Answers: 1-D, 2-C, 3-A, 4-A, 5-C, 6-D, 7-D, 8-B

1) The arrows in the picture below show several ways heat is transferred from the Sun as it strikes sand on the surface of a beach.



Which arrow shows convection?

- A. 1
- B. 2
- C. 3
- D. 4

2. By what process can heat be transferred through empty space that does not contain matter?

- A. conduction.
- B. convection.
- C. radiation.
- D. temperature.

3. Earth's surface absorbs about 50 percent of the energy from the sun. This energy heats the atmosphere through

- A. conduction.
- B. infrared radiation.
- C. ultraviolet radiation.
- D. reflection.

4. By which process do your feet feel hot when you walk barefoot on hot sand at the beach?

- A. conduction
- B. convection currents
- C. radiation
- D. thermal energy

5. The diagram below shows how heat transfer occurs near Earth's surface. What do the arrows represent?



- A. heat transfer by electromagnetic waves
- B. the cycles of water vapor in the atmosphere
- C. the upward movement of warm air and the downward movement of cold air
- D. land breezes that form locally

6. What is happening at point A in the diagram below?



- A. The sun warms Earth's surface through radiation.
- B. The ground warms the atmosphere through conduction.
- C. The air warms the ground through convection.
- D. Heat moves through the air due to convection.

- 7. Local winds and global winds are generally
  - A. influenced by Earth's tilted axis.
  - B. unpredictable.
  - C. changing directions from day to day.
  - D. created by the unequal heating of Earth's surface.
- 8. Which is the major source of energy for most of Earth's weather patterns?
  - A. earthquakes along fault zones
  - B. radiation received from the Sun
  - C. convection currents in Earth's mantle
  - D. radioactive decay within Earth's interior

2 3

Category: Physical Science		Percentage of Points derived from content area: 27%		Notes
Benchmark	Clarification	Content Limits	Item Attributes	
<b>SC.8.P.8.4</b> Classify and compare substances on the basis of characteristic physical properties that can be demonstrated or measured: for example, density; thermal or electrical conductivity; solubility; magnetic properties; melting and boiling points; and know that these properties are independent of the amount of the sample.	<ul> <li>Students will classify and/or compare substances on the basis of their physical properties and/or explain that these properties are independent of the amount of the sample.</li> <li>Students will describe density and/or calculate and compare the densities of various materials using the materials' masses and volumes.</li> <li>Also Assesses: SC.8.P.8.3 Explore and describe the densities of various materials through measurement of their masses and volumes.</li> </ul>	<ul> <li>Items may require use of the density formula to calculate density, mass, or volume when comparing substances.</li> <li>Items that assess conductivity, solubility, or magnetic properties will be at a conceptual level only. Items will not require calculations for these topics.</li> <li>Items addressing solubility may include the terms <i>solvent, solute</i>, and <i>saturation</i>. Items may assess the concept of saturation.</li> <li>Items will not require memorization of the specific melting points and/or boiling points of substances.</li> </ul>	Stimulus Attributes Temperature will only be shown in degrees Celsius . (°C) Scenarios requiring calculation of density must include the density equation. Response Attributes None specified	

Answers: 1-C, 2-C, 3-C, 4-A, 5-C, 6-A, 7-C, 8-C, 9-C, 10-D

1) A jeweler has two blocks of gold. The first block has a mass of 60 grams (g) and a volume of 3 cubic centimeters (cm3). The second block has half the mass and half the volume of the first block.

What is the density of the smaller block of gold, in grams per cubic centimeter (g/cm3)?

A. 5 g/cm3

- B. 10 g/cm3
- C. 20 g/cm3
- D. 80 g/cm3

2) Kendall has 4 beakers, each containing 10 milliliters (mL) of a different liquid. He finds the mass, in grams (g), of each liquid and records it in his notebook. His data are shown in the table.

Kendall wants to know what will happen when the liquids are all combined. He pours them all into a 50-mL beaker, and after a few minutes, the liquids separate into different layers. Which liquid would make up the bottom layer of the beaker?

Liquid	Karo syrup	Milk	Vegetable oil	Water
Color	Dark brown	White	Yellow	Clear
Mass	14.0 grams	10.3 grams	9.1 grams	10.0 grams
Volume	10 mL	10 mL	10 mL	10 mL

- A. Milk, because it contains fat.
- B. Water, because it sinks into all substances.
- C. Karo syrup, because it has the greatest density.
- D. Vegetable oil, because it has the least amount of mass.

3) Kari likes to play marbles, and she wants to find out if the density of a marble has any effect on how far the marble rolls. To begin, she selects ten different marbles of various sizes from her collection. She measures the first marble on a balance and finds that its mass is 13.8 grams (g). Then she takes a 100-milliliter (mL) graduated cylinder and fills it to the 50-mL mark.

After she places the marble in the graduated cylinder, the water level reads 56 mL. What is the density of this marble, in grams per milliliter (g/mL)?

A. 0. 25 g/mL B. 0. 43 g/mL C. 2.3 g/mL D. 4.1 g/mL

4) Tim is helping his mom make a dessert. Tim measures out one gram of peanuts and one gram of marshmallows. Which of these will need the largest container?

- A. The marshmallows will need a larger container because they are less dense.
- B. The peanuts will need a larger container because they are irregularly shaped.
- C. They will need the same size container because there is one gram of each.
- D. The peanuts will need a larger container because a peanut is heavier than a marshmallow.

5) Jan noticed that when she put a tomato in water, it sank. When she put an apple in water, it floated. Why did the tomato sink while the apple floated?

- A. The apple has more surface area than the tomato, which allowed the apple to float.
- B. The apple is more dense than the water, and the tomato is less dense than the water.
- C. The tomato is more dense than the water, and the apple is less dense than the water.
- D. The apple and the tomato have the same density, but the tomato skin absorbed water, making it sink.

6) Sarah is completing a lab in which she is required to identify an unknown substance. She records several observations and measurements of the substance.

Which of the following properties will be most helpful to Sarah in making a correct identification?

- A. density
- B. mass
- C. volume
- D. weight

7) Which of the following best explains why silicon dioxide is a solid at room temperature, but water is a liquid?

- A. Silicon dioxide is soluble in water.
- B. Water has a higher density than silicon dioxide.
- C. Silicon dioxide has a higher melting point than water.
- D. Water conducts electricity, but silicon dioxide does not.

8) Daryl is conducting experiments on samples of pure copper (Cu). While collecting data, he records both physical and chemical properties of the metal. Which of the following is dependent on the amount of Cu in the sample?

- A. electrical conductivity
- B. density
- C. mass
- D. melting point

9) Katie's teacher has given her a sample that contains a mixture of salt, sand, and iron filings. She is instructed to separate the mixture into the three individual components.

What would be the best physical property to focus on for the first step in separating the mixture?

- A. density
- B. electrical conductivity
- C. magnetism
- D. melting point

10) In 1969, Neil Armstrong became the first person to walk on the Moon. Video coverage showing the astronaut walking on the surface of the Moon gives the impression that he was bouncing while he walked. What is the reason for this?

- A. The astronaut's mass on the Moon decreases.
- B. The density of the astronaut on the Moon is higher than on Earth.
- C. The atmosphere of the Moon affects the way the astronaut is able to move.
- D. The astronaut's weight on the Moon depends on the Moon's gravitational force.

1 2 3

Category: Physical Science		Percentage of Points derived from content area: 27%		Notes
Benchmark	Clarification	Content Limits	Item Attributes	
SC.8.P.8.5 Recognize that there are a finite number of elements and that their atoms combine in a multitude of ways to produce compounds that make up all of the living and nonliving things that we encounter.	<ul> <li>Students will describe how elements combine in a multitude of ways to produce compounds that make up all living and nonliving things.</li> <li>Students will describe the motion of particles in solids, liquids, and/or gases.</li> <li>Students will explain that elements are grouped in the periodic table according to similarities of their properties.</li> <li>Students will explain that atoms are the smallest unit of an element and are composed of subatomic particles.</li> <li>Students will identify common examples of acids, bases, and/or salts.</li> <li>Students will compare, contrast, and/or classify the properties of compounds, including acids and bases.</li> <li>Students will differentiate among pure substances, mixtures, and solutions.</li> </ul> Also Assesses: SC.8.P.8.1 Explore the scientific theory of atoms (also known as atomic theory) by using models to explain the motion of particles in solids, liquids, and gases. SC.8.P.8.6 Recognize that elements are grouped in the periodic table according to similarities of their properties. SC.8.P.8.7 Explore the scientific theory of atoms (also known as atomic theory) by recognizing that atoms are the smallest unit of an element and are composed of subatomic particles (electrons surrounding a nucleus containing protons and neutrons). SC.8.P.8.8 Identify basic examples of and compare and classify the properties of compounds, including acids, bases, and salts. SC.8.P.8.9 Distinguish among mixtures (including acids, bases, and salts.	<ul> <li>Items referring to elements are limited to the elements 1–57 and 72 –89.</li> <li>Items referring to subatomic particles will only assess protons, neutrons, and electrons.</li> <li>Items will not assess chemical bonding.</li> <li>Items may assess a conceptual understanding of the pH scale. Items will not require knowledge of the pH of specific substances.</li> <li>Items addressing the properties of acids and bases are limited to pH.</li> <li>Items assessing mixtures and solutions may include components in different states of matter (e.g., gas dissolved in liquid).</li> <li>Items will not assess valence electrons or electron configurations.</li> </ul>	Stimulus Attributes None specified Response Attributes None specified	

Answers: 1-B, 2-D, 3-A, 4-C, 5-C, 6-D, 7-B, 8-B, 9-B, 10-C

1) Susie wants to make lemonade on a hot summer day. She mixes lemon juice, water, and sugar in a large container. Which of the following happens as she combines the ingredients?

- A. They mix together to form a new compound.
- B. They mix together to form a homogeneous solution.
- C. The stirring motion causes them to break down into elements.
- D. The heavier items will not completely dissolve, creating a suspension.

2) Kaitlyn is blending together ingredients to create different mixtures. Which combination of substances would most likely result in a homogeneous mixture?

- A. sand and gravel
- B. sand and salt
- C. gravel and water
- D. salt and water

3) Which of the following statements regarding matter is true?

- A. Atoms can combine to form compounds.
- B. The elements make up the building blocks of all matter.
- C. Every atom will bond in order to achieve a stable neutron-proton ratio.
- D. There are more than 100 naturally occurring elements that make up all matter.

4) In the modern periodic table of elements, all of the known elements are arranged by which property?

- A. radioactivity
- B. atomic mass
- C. atomic number
- D. number of neutrons

5) Which of the following correctly describes a property of an atom?

- A. It has more protons than neutrons.
- B. It has a negative or positive charge.
- C. It has an equal number of protons and electrons.
- D. It has an equal number of neutrons and electrons.

6) Ocean water is a combination of salt and water. Which of the following best describes the composition of ocean water?

- A. It is an element, since water is found in all living things.
- B. It is a suspension, since particles can be found in ocean water.
- C. It is a compound, since it results from the combination of elements.
- D. It is a solution, since it is made up of one substance dissolved in another.

7) Jimmy put some dirt and water into a jar, put the lid on, and then shook the jar. The contents of the jar turned brown. Jimmy set the jar on the table and checked back every 5 minutes for 20 minutes. The pictures show what Jimmy saw. Which of the following best explains what happened in the jar?



- A. The dirt and water combined to form new compounds.
- B. The water and dirt combined to form a heterogeneous mixture.
- C. The water dissolved some of the dirt particles, creating a solution.
- D. The dirt broke down into elements and settled in the jar according to density.

8) Which of the following statements regarding the periodic table of elements is true?

- A. The periodic table does not list all of the known elements in the universe.
- B. All elements on the periodic table are made up of the same fundamental particles: protons, neutrons and electrons.
- C. The properties of elements can be predicted by their positions in the periodic table, but their bonding patterns cannot be predicted.
- D. All nonliving things consist of elements on the periodic table; all living things consist of things that are not listed on the periodic table.

9) In the modern periodic table, which of the following describes atoms with similar chemical behavior and properties?

- A. They have similar atomic masses.
- B. They are located in the same group.
- C. They are located in the same period.
- D. They have the same number of isotopes.

- 10) Which of the following statements about atoms is TRUE?
- A. They are the same for all elements.
- B. They are both stable and nonradioactive.
- C. They are arranged in the periodic table according to number of protons.
- D. They are made up of protons and electrons in a nucleus surrounded by orbiting neutrons.

Category: Physical Science		Percentage of Points derived from content area: 27%		Notes
Benchmark	Clarification	Content Limits	Item Attributes	
<b>SC.8.P.9.2</b> Differentiate between physical changes and chemical changes.	<ul> <li>Students will differentiate between physical and chemical changes.</li> <li>Students will explain that mass is conserved when substances undergo physical and chemical changes, according to the law of conservation of mass.</li> <li>Students will describe how temperature influences chemical changes.</li> <li>Also Assesses:</li> <li>SC.8.P.9.1 Explore the Law of Conservation of Mass by demonstrating and concluding that mass is conserved when substances undergo physical and chemical changes.</li> <li>SC.8.P.9.3 Investigate and describe how temperature influences chemical changes.</li> </ul>	<ul> <li>Items will not require balancing equations or analysis of chemical formulas.</li> <li>Items will focus on a conceptual understanding of the law of conservation of mass; items will not require mathematical computations.</li> <li>Items will not assess reaction rates.</li> </ul>	Stimulus Attribute Temperature will only be shown in degrees Celsius . (°C) Response Attribute Temperature will only be shown in degrees Celsius . (°C)	

Answers: 1-D, 2-d, 3-C, 4-D, 5-B, 6-B, 7-A, 8-A, 9-D, 10-C

1) Walter left his school bag in the car one hot September afternoon while he went into the mall. In it he had his homework paper, six crayons, an empty plastic water bottle, and a chocolate bar. Which of these things is most likely to show the greatest amount of physical change when he returns to the car in an hour?

- A. homework paper
- B. crayons
- C. water bottle
- D. chocolate bar

2) Jenna wants to paint her room light purple. She makes a mixture of 70% pink paint and 30% blue paint to create the shade she likes. Which of the following best describes what occurs when she mixes the paint?

- A. An energy change occurs as the paint's chemical properties change.
- B. A phase change occurs, allowing the two colors to mix evenly together.
- C. A chemical change occurs as the different color particles react with each other.
- D. A physical change occurs, since only the physical properties of the paint change.

3) Robert is hiking through the forest and writing down his observations. He steps on a branch and it breaks into several pieces. Which of the following best describes the resulting properties of the branch?

- A. The density of the branch decreased, since it now takes up less space.
- B. The molecular arrangement of the branch changed as the broken pieces changed phase.
- C. The total mass of the branch pieces is the same, and only a physical change has occurred.
- D. The chemical composition of the branch changed as the broken pieces reacted with the environment.

4) Which of the following is an example of a chemical change?

- A. freezing water to make ice
- B. boiling water to make steam
- C. making salt water from salt and water
- D. separating water into hydrogen and oxygen
- 5) Which of the flowing is an example of a chemical change?
  - A. A rock breaks into pebbles.
  - B. Wood burns and becomes charcoal.
  - C. Water boils and changes from a liquid to a gas.
  - D. Dry ice (solid carbon dioxide) sublimes into carbon dioxide gas.

6) Chemical changes involve a change in the composition of a substance. Which of the following is NOT an indicator that a chemical change has occurred?

- A. color change
- B. change in mass
- C. formation of a precipitate
- D. increase or decrease in temperature

7) Which of the following best describes how chemical changes differ from physical changes?

- A. Physical changes produce no new substances and chemical changes do
- B. Physical changes always involve the formation of a gas while chemical changes may not.
- C. Physical changes involve a change of state; chemical changes involve a change of shape.
- D. Physical changes can be either intensive or extensive; chemical changes are always extensive.

8) Which of the following events involves a chemical change?

- A. A cake rises in the oven.
- B. Salt is dissolved in warm water.
- C. A pencil is broken into two pieces.
- D. Sandy water is filtered to extract the sand from the water.

9) Joey is performing an experiment in science class. He mixes two liquids in a test tube, and gas bubbles appear at the surface of the test tube. Which of the following describes what is most likely taking place?

- A. A physical change is causing a change in phase from liquid to gas.
- B. A chemical change has caused the liquids to undergo combustion and gas is escaping.
- C. A physical change is causing the solution to exhibit different properties than the original substances.
- D. A chemical change has resulted in the production of a new substance, which is being given off as a gas.
- 10) Which of the following is an example of a chemical change?
- A. evaporating
- B. melting
- C. oxidizing
- D. tearing

Category: Physical Science		Percentage of Points derived from content area: 27%		Notes
Benchmark	Clarification	Content Limits	Item Attributes	
<b>SC.7.P.10.1</b> Illustrate that the Sun's energy arrives as radiation with a wide range of wavelengths, including infrared, visible, and ultraviolet, and that white light is made up of a spectrum of many different colors.	<ul> <li>Students will identify, compare, and/or contrast the variety of types of radiation present in radiation from the Sun.</li> <li>Students will identify and/or compare characteristics of the electromagnetic spectrum.</li> <li>Students will identify common uses and/or applications of electromagnetic waves.</li> </ul> Also Assesses: SC.8.E.5.11 Identify and compare characteristics of the electromagnetic spectrum, such as wavelength, frequency, use, and hazards, and recognize its application to an understanding of planetary images and satellite photographs.	<ul> <li>Items may assess relative order of frequencies and wavelengths in the electromagnetic spectrum but will not require memorization of specific frequencies and wavelengths of electromagnetic radiation.</li> <li>Items will not address hazards of electromagnetic radiation.</li> <li>Items will address only electromagnetic waves and the electromagnetic spectrum.</li> <li>Items will not require calculations.</li> </ul>	Stimulus Attributes None specified Response Attributes None specified	

Answers: 1-A, 2-B, 3-A, 4-B, 5-B, 6-B, 7-D, 8-A, 9-B, 10-C

1) The human eye is only sensitive to certain wavelengths of light. We call the range of light we can see the visible spectrum. It ranges from the lowest energy color of red to the highest energy of violet.

Using the table, what is the range of wavelength of light, in nanometers (nm), that humans can see?

Color	Wavelength
Red	620-750 nm
Orange	590-620 nm
Yellow	570-590 nm
Green	495-570 nm
Blue	450-495 nm
Violet	380-450 nm
A. 380 - 750 B. 380 - 495 C. 570 - 750 D. 570 - 590	

2) One afternoon, Huyen and Phong go outside after it stops raining. The Sun comes out, and when they look up, they can see a rainbow. Huyen knows that the different colors of light in the rainbow come from waves that have different wavelengths.

If each color has a different wavelength, why are Huyen and Phong able to see all of the different colors at the same time?

- A. The light waves have the same amplitude.
- B. The light waves all travel at the same speed.
- C. The light waves all have the same frequency.
- D. The light waves result in colors that blend together.

3) Visible light and ultraviolet (UV) light are both forms of electromagnetic radiation, and waves of each travel at the same speed. Human eyes are unable to see UV light because it is not in the visible range of the electromagnetic spectrum.

If the frequency of one UV light wave is twice that of a visible light wave, how will their wavelengths compare?

- A. The wavelength of the UV light wave will be half that of the visible light wave.
- B. The wavelength of the UV light wave will be twice that of the visible light wave.
- C. The wavelength of the UV light wave will be four times that of the visible light wave.
- D. The wavelength of the UV light wave will be the same as that of the visible light wave.

4) Glen is explaining the relationship between the wavelength and frequency of electromagnetic radiation to his friend, Harold. Which of the following would be a correct explanation of this relationship?

- A. The frequency of a wave is not related to its wavelength.
- B. If a wave has a long wavelength, it will have a low frequency.
- C. If a wave has a low frequency, it will have an equally low wavelength.
- D. All electromagnetic waves have the same frequency, but different wavelengths.

5) Opal is making a list of the uses of electromagnetic radiation. Which of the following should Opal NOT include in her list?

- A. a man using a microwave to boil water
- B. a submarine using sonar to locate a ship
- C. a girl using a remote control to change television channels
- D. a hospital using an X-ray machine to take a picture of a broken bone

6) The chart below shows part of the electromagnetic spectrum. Which statement is true regarding this part of the spectrum?

Color	Wavelength
Red	620-750 nm
Orange	590-620 nm
Yellow	570-590 nm
Green	495-570 nm
Blue	450-495 nm
Violet	380-450 nm

- A. Violet has the longest wavelength.
- B. Violet has the highest frequency.
- C. Violet has the lowest energy levels.
- D. Violet is not able to be seen by humans.

7) Francesca is drawing a picture of the electromagnetic spectrum. She needs to order the types of electromagnetic radiation from the lowest to highest frequency.

Which of the following shows the correct order of the electromagnetic spectrum, from lowest to highest frequency?

- A. visible, UV, infrared, X-ray, microwave, radio, gamma
- B. radio, visible, microwave, infrared, UV, X-ray, gamma
- C. gamma, UV, microwave, infrared, radio, X-ray, visible
- D. radio, microwave, infrared, visible, UV, X-ray, gamma

8) Part of the electromagnetic spectrum is shown in the image below. Which of the following statements correctly compares ultraviolet and visible light?



- A. Ultraviolet light has more energy than visible light.
- B. Ultraviolet light has a lower frequency than visible light.
- C. Ultraviolet light has a longer wavelength than visible light.
- D. Ultraviolet light has a smaller amplitude than visible light.

9) Gamma rays have the shortest wavelength of the electromagnetic waves. Which of the following is also true of gamma rays?

- A. They are visible to humans.
- B. They have the highest energy.
- C. They have the lowest frequency.
- D. They are only emitted by the Sun.

10) Josie is making a chart to show some of the ways electromagnetic waves can be used. Which of the following should she NOT include on her chart?

- A. A radar is used by a satellite to map the ocean floor.
- B. A telescope uses gamma rays to detect distant galaxies.
- C. A battery is used to store electricity from a wind generator.
- D. A navigation system uses radio waves to determine position.

Category: Physical Science		Percentage of Points derived from content area: 27%		Notes
Benchmark	Clarification	Content Limits	Item Attributes	
<b>SC.7.P.10.3</b> Recognize that light waves, sound waves, and other waves move at different speeds in different materials.	<ul> <li>Students will describe and/or explain that waves move at different speeds through different materials.</li> <li>Students will explain that light waves can be reflected, refracted, and/or absorbed.</li> </ul> Also Assesses: SC.7.P.10.2 Observe and explain that light can be reflected, refracted, and/or absorbed.	<ul> <li>Items may assess the general relative order of wave speed in different phases but will not assess the motion of the particles in the substance.</li> <li>Items will not assess color as related to wavelength.</li> <li>Items will not assess electromagnetic waves traveling in a vacuum.</li> <li>Items will not require calculations of wave speed through different materials.</li> <li>Items may address water waves but not in the context of water waves at the beach.</li> <li>Items will not assess the interaction of multiple waves.</li> </ul>	Stimulus Attributes None specified Response Attributes None specified	

Answers: 1-D, 2-A, 3-C, 4-C, 5-A, 6-A, 7-C, 8-B, 9-D, 10-A

1) While Paul is swimming at the pool, he uses the ladder to get out of the water. When he looks down at the water, he notices that the ladder appears bent at the point where it enters the water. This phenomenon is a result of which of the following?

- A. conduction
- B. diffraction
- C. reflection
- D. refraction

2) Nicole is measuring the time it takes for a beaker of boiling water to return to room temperature once it is removed from its heat source. When she uses a thermometer to record the water's temperature, she notices that the thermometer's appearance changes as it enters the water. Her teacher explains that this is because of refraction. At the point where it

enters the water, refraction causes the thermometer to appear to be

- A. bent.
- B. darker.
- C. less dense.
- D. narrower.

3) Ryan is experimenting with different materials to see which one will transmit sound the fastest. He knows that the density of a solid will affect the speed that a wave travels through it.

Through which of the following materials will sound waves travel the slowest?

Material	Density (kg/m³)
aluminum	2700
iron	7870
lead	11350
steel	7820

- A. aluminum
- B. iron
- C. lead
- D. steel

4) Yvonne placed a spoon into a glass. When she looked at the spoon under the water, it looked broken. Which best explains why this happens?



- A. Light bounces off the spoon and causes refraction inside the water.
- B. The water in the glass absorbs the light, causing a reflection of the spoon.
- C. Light traveling through the air slows down when it moves through water, causing it to refract.
- D. The water reflects light back out of the glass and bends as it travels around the perimeter of the spoon.

5) Petra is measuring sound waves as they travel through different materials. Which of the following will Petra find to be true about sound waves?

- A. They travel the fastest through solids.
- B. They travel the fastest in very dense solids.
- C. They travel more slowly in solids than in liquids.
- D. They will speed up as they travel from a solid to the air.

6) Tonya shines a flashlight at a mirror. Which of the following best describes what will happen to the beam of light?



- A. It will hit the mirror and change direction.
- B. It will bend as it passes through the mirror.
- C. It will bounce back directly toward the flashlight.
- D. It will stop at the mirror as the light waves are absorbed.

7) Warren is tuning his guitar. He notices that as he tightens the string, the pitch of the string increases. Which best explains why tightening the string raises the pitch?

- A. It makes the string more flexible.
- B. It improves the string's ability to make sounds.
- C. It increases the frequency of the string's vibration.
- D. It allows sound waves to move along the string more easily.

8) Arianna is experimenting with different materials to see which one will transmit sound the fastest.

Through which of the following materials will sound waves travel the fastest? A. air

- B. concrete
- C. oil
- D. water

9) Carmen has two plates: one clear glass plate and one solid plastic white plate. She holds both plates up to the Sun. The solid plastic plate makes a shadow on the ground, but the glass plate does not.

Which of the following correctly compares what happens with each type of plate?

- A. The plastic plate absorbs light; the glass plate reflects light.
- B. The plastic plate bends the light around it; the glass plate absorbs light.
- C. The plastic plate reflects light; the glass plate allows light to bend around it.
- D. The plastic plate reflects light; the glass plate allows it to pass straight through.

10) Elizabeth is tapping her pencil on a glass of water to make a sound. Through which of the following would a sound wave travel the fastest?

- A. the glass
- B. surrounding air
- C. water in the glass
- D. water vapor in the air

Cognitive Complexity Level 1 2 3

Category: Physical Science		Percentage of Points derived from content area: 27%		Notes
Benchmark	Clarification	Content Limits	Item Attributes	
SC.7.P.11.2 Investigate and describe the transformation of energy from one form to another.	<ul> <li>Students will identify and/or describe the transformation of energy from one form to another.</li> <li>Students will differentiate between potential energy and kinetic energy.</li> <li>Students will identify and/or explain situations where energy is transformed between kinetic energy and potential energy.</li> <li>Students will identify and/or describe examples of the law of conservation of energy.</li> <li>Also Assesses:</li> <li>SC.6.P.11.1 Explore the Law of Conservation of Energy by differentiating between potential and kinetic energy. Identify situations where kinetic energy is transformed into potential energy and vice versa.</li> <li>SC.7.P.11.3 Cite evidence to explain that energy cannot be created nor destroyed, only changed from one form to another.</li> </ul>	<ul> <li>Items will not assess transformations involving nuclear energy.</li> <li>Items may address a maximum of five energy transformations.</li> <li>Items will not require calculations.</li> <li>Items assessing energy transformations will not be placed in a Life Science context.</li> </ul>	Stimulus Attributes None specified Response Attributes None specified	

Answers: 1-D, 2-C, 3-C, 4-B, 5-D, 6-A, 7-A, 8-C, 9-A, 10-D

1) Amber likes riding her bicycle through her neighborhood where there are lots of hills. She rides down a very steep hill, and then goes up a small hill. She doesn't need to pedal as her bicycle carries her up the small hill. How do Amber's kinetic energy and potential energy change as she goes uphill?

- A. Her kinetic energy and her potential energy both increase.
- B. Her kinetic energy and her potential energy both decrease.
- C. Her kinetic energy increases and her potential energy decreases.
- D. Her kinetic energy decreases and her potential energy increases.

2) When an object moves, its energy changes form. When a ball bounces, it has changing amounts of potential energy and kinetic energy. Eventually, however, the ball will stop bouncing. Why does the ball stop bouncing?



- A. The ball's energy gets used up each time it bounces.
- B. The mass of the ball is too small to allow it to continue its own motion.
- C. The ball's energy gets transferred to other energy types like heat and sound that don't help it bounce.
- D. The pull of gravity is stronger than the energy in the ball, which makes the ball slow down to a stop.

3) Valerie and Greg want to bake a cake. They mix the cake batter and preheat the oven. Once the oven reaches the right temperature, they pour the batter in a cake pan, put it in the oven, and close the door. They know that while the cake is in the oven, a chemical change that involves energy occurs. Which of these statements describes the amount of energy in the oven while the cake is baking?

- A. The total amount of energy increases because the oven gets very hot.
- B. The total amount of energy decreases because it changes into matter.
- C. The total amount of energy stays the same, but it changes from one form to another.

D. The total amount of energy will either increase or decrease, depending on how much cake batter there is.

4) Jenna's dog eats a mixture of dry and canned dog food. When she feeds him, she pours some dry dog food into a bowl and gets a can of dog food out of the pantry. She plugs an electric can opener into an outlet to open the can. To open the can, the can opener converts electric energy into which of the following?

- A. chemical energy
- B. mechanical energy
- C. potential energy
- D. radiant energy

5) For part of a project, Antonio is creating a poster to describe different ways energy is used in his home. Before he creates the poster, he makes several observations of energy being used and writes them in his notebook. Which of the following actions in Antonio's list describes potential energy being converted to kinetic energy?

- A. An electric blanket is used to keep warm.
- B. A microwave oven is used to reheat leftovers.
- C. A lamp is turned on and used to read the paper.
- D. A battery is used to operate a remote control car.

6) On a sunny day, Heidi and some of her classmates are playing kickball during PE. She kicks the ball past second base, and it rolls uphill to a stop. She runs to first base, but before she gets any farther, the bell rings and everyone has to go back inside.

Which of these is an example of kinetic energy changing to potential energy?

- A. the ball rolling uphill to a stop
- B. the bell ringing inside the school
- C. the Sun warming the playground
- D. the players running from base to base

## Middle School FCAT Science (Grade 8) DATA ANALYSIS-Standard FOCUS

7) When an object moves, its energy changes form. When a ball bounces, it has changing amounts of potential energy and kinetic energy. At which point does potential energy change to kinetic energy?



- A. as the ball is falling
- B. before the ball is released
- C. when the ball comes to a stop
- D. at the crest of the ball's bounce

8) Polly is explaining the Law of Conservation of Energy to her friend. She is using a light bulb as an example. Which of the following statements best explains this law?

- A. "Electrical energy is destroyed to create light and thermal energy."
- B. "Potential energy is used to create electrical energy and release light and thermal energy."
- C. "Electrical energy is transformed into light and thermal energy and released to the surroundings."
- D. "Electrical energy created by the light bulb is converted into light and thermal energy and used up by the surroundings."

9) Sherri is sliding down a slide at a playground. When is Sherri's potential energy the greatest?



- A. before she starts to slide
- B. right after she starts to slide
- C. right before she comes to a stop
- D. after she comes to a complete stop

10) Walter is making a list of energy transformations for a homework assignment. He needs at least one example in which electrical energy is transformed to mechanical energy.

Which of the following transformations should he include?

- A. turning on a radio
- B. turning on a stove
- C. turning on a light bulb
- D. turning on a ceiling fan

Category: Physical Science		Percentage of Points derived from content area: 27%		Notes
Benchmark	Clarification	Content Limits	Item Attributes	
<b>SC.7.P.11.4</b> Observe and describe that heat flows in predictable ways, moving from warmer objects to cooler ones until they reach the same temperature.	<ul> <li>Students will describe how heat flows in predictable ways.</li> <li>Students will explain that adding heat to or removing heat from a system may result in a temperature change and possibly a change of state.</li> <li>Also Assesses:</li> <li>SC.7.P.11.1 Recognize that adding heat to or removing heat from a system may result in a temperature change and possibly a change of state.</li> </ul>	<ul> <li>Items will not address chemical changes.</li> <li>Items will not require calculations.</li> <li>Items will not assess the concepts of conductors and insulators or examples of either in isolation.</li> <li>Items will not require the use or memorization of formulas or values of specific heat, heat of fusion, or heat of vaporization for substances.</li> <li>Items may assess the concept of specific heat.</li> </ul>	Stimulus Attributes Scenarios addressing methods of heat transfer (conduction, convection, radiation) will not use an Earth Science context. Temperature will only be shown in degrees Celsius . (°C) Response Attribute Temperature will only be shown in degrees Celsius . (°C)	

Answers: 1-C, 2-A, 3-B, 4-A, 5-D, 6-B, 7-A, 8-A, 9-C, 10-A

1) Sascha drops some of her ice cream sundae on a hot sidewalk. Which of the following correctly describes what happens next?

- A. The temperature of the sidewalk and the ice cream both remain unchanged.
- B. The temperature of the ice cream increases as it sends cold into the sidewalk.
- C. Heat from the sidewalk is transferred to the ice cream, increasing the temperature of the ice cream.
- D. Cold from the ice cream is transferred to the sidewalk, decreasing the temperature of the sidewalk.

2) Erin places some ice cubes into freshly made tea that is still quite warm. Which of the following correctly describes what happens to the ice cubes?

- A. Some of the heat from the tea is transferred to the ice cubes and causes them to melt.
- B. The temperature of the ice cubes remains the same as the temperature of the tea drops.
- C. The cold from the ice cubes is transferred into the tea and causes the cubes to warm up and melt.
- D. Heat is transferred between the ice cubes and the tea, which causes the temperature of the tea to increase.

3) On a particularly cold winter day, Kurt takes a plate of hot food outside to eat lunch. His mother calls him back inside and he forgets the plate outside. Which of the following will happen next?

- A. Cold from the air gets inside the food until the food is the same temperature as the air.
- B. Heat from the food transfers to the surrounding air until the food reaches the same temperature as the air.
- C. Cold from the air moves into the food until the temperature of the food drops below the temperature of the air.
- D. Heat from the food increases the temperature of the surrounding air until the air is the same temperature as the food.

4) Randy is observing an experiment on heat flow. He has three objects at differing temperatures, as shown in the table below. Randy places the objects in a beaker of water that has been heated to 100 degrees Celsius (°C). Which of the following correctly describes the flow of heat in this system?

	Object A	Object B	Object C
Temperature (°C)	0	10	99

A. Heat from the water moves into Objects A, B, and C.

- B. Heat from Object C moves into the water and into Objects A and B.
- C. Heat from the water moves into Object A, but not Objects B and C.
- D. Heat from the water moves into Objects A and B, but not Object C.

5) Georgia places a pot of cold water on a hot stove. She accidentally turns the stove off. What will most likely happen after about 30 minutes?

- A. The temperature of the stove will decrease, but the temperature of the water will remain the same.
- B. The cold temperature of the water will cause the temperature of the stove to drop to room temperature.
- C. The temperature of the water will continue to increase until some of it is changed to a gas and evaporates into the surrounding air.
- D. The temperature of the water will increase, and the temperature of the stove will decrease until they are both room temperature.

6) Vinnie places his cold drink on the roof of a hot car. Which of the following correctly describes what happens next?

- A. The temperature of the drink increases as it sends cold into the hot metal of the car.
- B. Heat is transferred from the car into the drink and increases the temperature of the drink.
- C. Cold is transferred from the drink into the metal of the car, decreasing the temperature of the roof.
- D. The temperature of the area under the drink decreases until it is the same temperature as the cold drink.

7) Eric places some room-temperature strawberries into his freezer. Which of the following correctly describes what happens to the strawberries?

- A. The heat from the strawberries is transferred to the freezer and causes the strawberries to freeze.
- B. Some of the cold from the freezer is transferred to the strawberries and causes the strawberries to freeze.
- C. The temperature of the freezer remains the same as the temperature of the strawberries decreases.
- D. Heat is transferred from the freezer to the strawberries and causes the temperature of the strawberries to decrease.

8) On a cold day, Rick puts a hot cup of coffee down on a picnic table. Which of the following correctly describes what happens next?

- A. The heat from the coffee cup is transferred to the picnic table.
- B. The picnic table transfers its cold temperature to the coffee cup.
- C. The temperature of the picnic table decreases as it transfers cold to the cup.
- D. The coffee cup remains the same temperature as the temperature of the table increases.

9) Victoria is observing an experiment on heat flow. She has two marbles at differing temperatures, as shown in the table below. She places the marbles in a beaker of water that has been heated to 100 degrees Celsius (°C). How will heat flow in this system?

	Blue Marble	Red Marble
Temperature (°C)	0	100

A. from the blue marble to the water

- B. from the red marble to the beaker
- C. from the water to the blue marble
- D. from the blue marble to the red marble

10) Alec places a jar of cold mustard on a counter at room temperature. Which best describes what happens after 3 hours?

- A. The jar and the counter become the same temperature as the room.
- B. The counter gains heat and becomes the same temperature as the cold jar.
- C. The counter releases heat to the jar until they both become colder than the room.
- D. The jar loses cold to the surrounding air and becomes the same temperature as the room.

Category: Physical Science		Percentage of Points derived from content area: 27%		Notes
Benchmark	Clarification	Content Limits	Item Attributes	
<b>SC.6.P.13.1</b> Investigate and describe types of forces, including contact forces and forces acting at a distance, such as electrical, magnetic, and gravitational.	<ul> <li>Students will identify and/or describe types of forces.</li> <li>Students will describe the relationship among distance, mass, and gravitational force between any two objects.</li> <li>Students will differentiate between mass and weight.</li> </ul> Also Assesses: SC.6.P.13.2 Explore the Law of Gravity by recognizing that every object exerts gravitational force on every other object and that the force depends on how much mass the objects have and how far apart they are. SC.8.P.8.2 Differentiate between weight and mass, recognizing that weight is the amount of gravitational pull on an object and is distinct from, though proportional to, mass.	<ul> <li>Items assessing gravity will use a conceptual understanding of the law of universal gravitation by keeping either the mass or distance constant.</li> <li>Items will not assess nuclear forces.</li> <li>Items will not require the use of formulas or calculations.</li> <li>Items addressing mass and/or weight will not assess and weight.</li> </ul>	Stimulus Attributes None specified Response Attributes None specified	

Answers: 1-C, 2-A, 3-B, 4-C, 5-D, 6-C, 7-C, 8-D, 9-C, 10-C

1) Luis rubbed a balloon on his hair and held the balloon next to the wall. He observed the balloon stick to the wall. Which of the following is responsible for the balloon sticking to the wall?

- A. friction
- B. gravity
- C. electric force
- D. magnetic force
- 2) What characteristics can you use to describe a force?
  - A. the direction in which it acts and its strength
  - B. only the direction in which it acts
  - C. only its strength
  - D. its speed and the direction in which it acts
- 3) Which of the following weighs the most?
  - A. a cubic meter of freshwater
  - B. a cubic meter of saltwater
  - C. a cubic centimeter of freshwater
  - D. a cubic centimeter of saltwater

4) Objects with an equal number of positive and negative charges are considered \_\_\_\_\_.

- A. even
- B. overall positive
- C. neutral
- D. overall negative
- 5) Forces that act at a distance include electrical force, gravitational force, and
  - A. applied forces.
  - B. the normal force.
  - C. friction.
  - D. the magnetic force.

6) Two objects that have different masses attract each other gravitationally. Which of the following statements is **true** about the sizes and directions of the gravitational forces exerted by one object on the other?

- A. The gravitational forces are equal in size and in the same direction.
- B. The gravitational forces are equal in size and in opposite directions.
- C. The gravitational forces are unequal in size and in the same direction.
- D. The gravitational forces are unequal in size and in opposite directions.

7) What determines the strength of the gravitational attraction between two objects?

- A. charge and mass
- B. density and mass
- C. distance and mass
- D. size and mass

8) If the two balls below have equal mass, what must be **true** about the gravitational force each ball exerts on the other?



- A. Ball A will exert a lesser gravitational force on ball B because ball A is less massive.
- B. Ball A will exert a greater gravitational force on ball B because ball A has a greater density.
- C. Ball B will exert a greater gravitational force on ball A because ball B has a larger volume.
- D. The two balls will exert the same gravitational force on each other.

9) Suppose the two balls in the diagram below were solid and made of the same substance. How would the gravitational forces exerted by each ball on a distant mass compare?



- A. Ball A would exert a greater gravitational force because it is smaller.
- B. Ball B would exert a lesser gravitational force because it has a larger surface area.
- C. Ball B would exert a greater gravitational force because it would have greater mass.
- D. The two balls would exert the same gravitational force.

- 10) Which SI unit is used to measure the strength of a force?
  - A. joule (J)
  - B. kilogram (kg)
  - C. newton (N)
  - D. meter (m)

Category: Physical Science		Percentage of Points derived from content area: 27%		Notes
Benchmark	Clarification	Content Limits	Item Attributes	
SC.6.P.13.3 Investigate and describe that an unbalanced force acting on an object changes its speed, or direction of motion, or both.	<ul> <li>Students will describe and/or explain that an unbalanced force acting on an object changes its speed and/or direction.</li> <li>Students will interpret and/or analyze graphs of distance and time for an object moving at a constant speed.</li> </ul> Also Assesses: SC.6.P.12.1 Measure and graph distance versus time for an object moving at a constant speed. Interpret this relationship.	<ul> <li>Items requiring the interpretation and/or analysis of a graph may assess the relative speed of an object at various points or sections of the graph and the direction of motion.</li> <li>Items will not require a comparison of the speeds of more than five different objects.</li> <li>Items will not assess the addition of nonparallel vectors.</li> <li>Items will not require the calculation of acceleration.</li> <li>Items may require the calculation of net force.</li> <li>Items addressing force and motion are limited to conceptual understanding. Items will not require the terms <i>positive acceleration</i> and <i>negative acceleration</i>.</li> <li>Items may assess understanding of friction as a force in both sliding and stationary situations. Items will not require knowledge of coefficient of friction.</li> <li>Items will not imply that a calculation is required in scenarios assessing understanding of no acceleration of no acceleration of no acceleration of not set force.</li> </ul>	<ul> <li>Stimulus Attributes</li> <li>Force diagrams may have a maximum of two sets of parallel forces acting on an object.</li> <li>Scenarios addressing the calculation of average speed will not require the calculation of speed using data from a graph.</li> <li>Graphs of distance and time may include no more than five constant speeds.</li> </ul> Response Attribute Responses will not require the creation of graphs.	

Answers: 1-B, 2-C, 3-C, 4-A, 5-D, 6-D, 7-A, 8-C, 9-D, 10-B

1) The diagram below shows forces acting on a model airplane. Both its speed and height above the ground are constant.



Which of the following conditions would cause the model airplane to descend toward the ground?

- A. The lift is equal to the drag.
- B. The lift is less than the weight.
- C. The thrust is equal to the weight.
- D. The thrust is greater than the drag.

2) During a tug of war, the rope accelerates toward the left. What is **true** about the forces acting on the rope?

- A. The force toward the right is greater than the force toward the left.
- B. The force toward the left is equal to the force toward the right.
- C. The force toward the left is greater than the force toward the right.
- D. There can only be a force pulling toward the left.
- 3) What is net force?
  - A. a push or pull
  - B. the amount of energy an object has
  - C. the combination of all forces acting on an object
  - D. a measure of how fast an object is moving

4) Which of the graphs below describes the motion of a person who first rode her bicycle at a constant speed and then rested?



A. Graph 1

Distar

 $\mathbf{O}$ 

Distar

- B. Graph 2
- C. Graph 3
- D. Graph 4

5) You exert a force of 120 N to push a box down the hallway. Your friend helps by exerting a force of 150 N against the box in the same direction. Which net force do you and your friend exert on the box?

- A. 30 N
- B. 120 N
- C. 150 N
- D. 270 N

6) According to Newton's Second Law of Motion, an object's acceleration depends on the force applied to it and its

- A. velocity.
- B. position.
- C. length.
- D. mass.

- 7) Which of the following is a true statement about action-reaction forces?
  - A. They are equal and act in opposite directions
  - B. They act on different objects.
  - C. Both act at a distance.
  - D. They act only when there is no friction.

8) A girl jumps forward off a boat. According to Newton's third law of motion, what happens to the boat?

- A. The boat also moves forward.
- B. The boat remains motionless.
- C. The boat moves backward.
- D. The boat moves forward and then backward.

9) According to Newton's first law of motion, which of the following carts has the greatest amount of inertia?



10) How can the girl increase the acceleration of the cart without changing the force she exerts?



- A. take the wheels off the cart
- B. take the object off the cart
- C. take her shoes off
- D. put the cart on top of the object

Category: Life Science		Percentage of Points derived from content area: 27%		Notes
Benchmark	Clarification	Content Limits	Item Attributes	
<b>SC.6.L.14.1</b> Describe and identify patterns in the hierarchical organization of organisms from atoms to molecules and cells to tissues to organs to organ systems to organisms.	Students will identify and/or describe patterns in the hierarchical organization of organisms, from atoms to molecules, to cells, to tissues, to organs, to organ systems, to organisms.	<ul> <li>Items will not assess cell specialization.</li> <li>Items may use the terms for the types of tissues in animals (epithelial, muscle, nervous, connective) but will not assess knowledge of the structure or function of these types of tissues.</li> </ul>	Stimulus Attribute Scenarios referring to atoms and molecules are limited to biotic contexts. Response Attributes None specified	

Answers: 1-D, 2-A, 3-B, 4-D, 5-B, 6-A, 7-D, 8-D, 9-D, 10-C
1) Structures in the human body work together to perform specific functions. The diagram below shows the organization of structures found in the human body.



A picture of which of the following structures belongs in the box above?

- A. cell
- B. organ
- C. organelle
- D. tissue
- 2) A tissue within a multicellular organism contains cells that
  - A. perform a specific function.
  - B. no longer divide.
  - C. function independently from one another.
  - D. do not grow.

3) Which of the following lists the levels of cell organization from least to most complex?

- A. organs, cells, organ systems, tissues
- B. cells, tissues, organs, organ systems
- C. tissues, organs, organ systems, cells
- D. cells, organs, organ systems, tissues

- 4) A group of two or more atoms held together by chemical bonds is called
  - A. an element.
  - B. a unit.
  - C. a lipid.
  - D. a molecule.
- 5) Your heart is on which level of structural organization?
  - A. tissue
  - B. organ
  - C. cells
  - D. organ system

6) A sunflower and a bacterium are both living organisms. How is the structure of a sunflower different from the structure of a bacterium?

- A. The cells in the sunflower are specialized.
- B. The cells in the sunflower do not work together.
- C. The cells in the sunflower are smaller.
- D. The cells in the sunflower do not form organs.

7) What is the lowest level of living organization in a tissue?

- A. an organ
- B. a molecule
- C. an atom
- D. a cell

8) In tadpoles, blood is pumped through a single loop. In many adult amphibians, blood flows from the heart to the lungs and skin in one loop. Then in a second loop, blood flows to the rest of the amphibian's body, delivering oxygen-rich blood to the cells. In which structural level do the heart and blood vessels belong?

- A. cell
- B. organ
- C. tissue
- D. organ system

9) The science class played a game to see who could name the most organ systems. Which correct response won the game?

- A. circulatory, digestive, skin, immune
- B. nervous, skeletal, kidney, lymphatic
- C. reproductive, respiratory, excretory, brain
- D. excretory, muscular, immune, endocrine
- 10) A substance that cannot be broken down into simple elements is a(n):
  - A. particle.
  - B. carbohydrate.
  - C. element.
  - D. compound.

Category: Life Science		Percentage of Points derived from content area: 27%		Notes
Benchmark	Clarification	Content Limits	Item Attributes	
SC.6.L.14.2 Investigate and explain the components of the scientific theory of cells (cell theory): all organisms are composed of cells (single-celled or multicellular), all cells come from preexisting cells, and cells are the basic unit of life.	<ul> <li>Students will identify, describe, and/or explain the components of cell theory.</li> <li>Students will describe how cells undergo similar processes to maintain homeostasis.</li> </ul> Also Assesses: SC.6.L.14.3 Recognize and explore how cells of all organisms undergo similar processes to maintain homeostasis, including extracting energy from food, getting rid of waste, and reproducing.	<ul> <li>Items will assess neither scientists who contributed to the cell theory nor the historical development of the cell theory.</li> <li>Items addressing homeostasis should focus on cells maintaining homeostasis and are limited to the cellular level. Items will not address permeability, osmosis, or diffusion.</li> <li>Items may use the terms <i>cellular respiration</i> and <i>photosynthesis</i> in the context of homeostasis and the functions of cell structures but will not assess knowledge of these processes.</li> <li>Items will not assess cellular reproduction.</li> </ul>	Stimulus Attributes None specified Response Attributes None specified	

Answers: 1-B, 2-B, 3-C, 4-B, 5-B

1) The cell theory applies to all organisms, including the five shown below.

# **Drawings of Five Organisms**



Which of the following statements describes how these organisms are an example of the cell theory?

- A. The organisms have cells that lack a nucleus.
- B. The organisms are made of one or more cells.
- C. The cells of the organisms undergo photosynthesis.
- D. The cells of the organisms are identical to each other.
- 2) Which of the following statements is true?
  - A. Although viruses are not cells, they are alive.
  - B. All living things are made up of cells.
  - C. Cells can form from the remains of once-living cells.
  - D. Cells did not exist until the 1600s.
- 3) According to the cell theory, all cells come from
  - A. animals.
  - B. plants.
  - C. existing cells.
  - D. nonliving matter.

4) How do animal cells get the raw materials they need for the growth stages of the cell cycle?

- A. by conducting photosynthesis
- B. by taking in food molecules
- C. by packaging proteins
- D. by carrying out replication

5) An amoeba is a single-celled form of life. It engulfs its food. This suggests that chemical reactions within the amoeba can carry out

- A. passive transport.
- B. digestion.
- C. osmosis.
- D. diffusion.

Category: Life Science		Percentage of Points derived from	Notes	
Benchmark	Clarification	Content Limits	Item Attributes	
<b>SC.6.L.14.4</b> Compare and contrast the structure and function of major organelles of plant and animal cells, including cell wall, cell membrane, nucleus, cytoplasm, chloroplasts, mitochondria, and vacuoles.	Students will compare and/or contrast the structure and/or function of major organelles of plant and animal cells.	Items assessing cellular structures are limited to the cell wall, cell membrane, nucleus, cytoplasm, chloroplasts, mitochondria, and vacuoles.	Stimulus Attribute Scenarios will require a comparison or contrast of organelles in plant and/or animal cells. Response Attributes None specified	

Answers: 1-B, 2-C, 3-B, 4-A, 5-A, 6-C, 7-D, 8-C



1. Plant cells are different from animal cells. The diagram below identifies four different structures in a plant cell.

- Compared to the structures in an animal cell, which of the following structures is found only in a plant cell?
- A. Mitochondrion
- B. Cell Wall
- C. Cytoplasm
- D. Nucleus

2. The cell in the diagram is **most** likely



A an algal cell. B a cell from a plant. C a cell from an animal. D a bacterial cell.

- 3. What is the function of the chloroplast of a plant cell? A lt protects and supports the cell.
  - B It traps energy and uses it to make food.
  - C It controls what enters and leaves the cell.
  - D It packages and transports proteins.
- 4. How are plant cells different from animal cells? A Plant cells have cell walls.
  B Animal cells have cell membranes.
  C Animal cells have a nucleus.
  D Plant cells have vacuoles.

5. Look at the structures labeled A, B, C, and D in the diagram below. These are organelles that plant and animal cells have in common. Which one is used for a storage site for the cell?



- A vacuole B chloroplast C nucleus D mitochondrion
- 6. What is the main function of a cell membrane?
  - A to protect and support the cell
  - B to perform different functions in each cell
  - C to control what enters and leaves the cell
  - D to form a hard outer covering for the cell

7. Which cell function is provided by the structure labeled C? **A Plant Cell** 



- A circulation B reproduction C body maintenance D structural support
- 8. Which organelle is found only in plants and some algae?
  A vacuoles
  B ribosomes
  C chloroplasts
  D mitochondria

2 3

Category: Life Science		Percentage of Points derived from content area: 27%	Notes
Benchmark	Clarification	Content Limits Item Attributes	
SC.6.L.14.5 Identify and investigate the general functions of the major systems of the human body (digestive, respiratory, circulatory, reproductive, excretory, immune, nervous, and musculoskeletal) and describe ways these systems interact with each other to maintain homeostasis.	<ul> <li>Students will identify and/or describe the general functions of the major systems of the human body.</li> <li>Students will identify and/or describe how the major systems of the human body interact to maintain homeostasis.</li> <li>Students will identify, compare, and/or contrast the types of infectious agents that affect the human body.</li> </ul> Also Assesses: SC.6.L.14.6 Compare and contrast types of infectious agents that may infect the human body, including viruses, bacteria, fungi, and parasites.	<ul> <li>Items are limited to the human digestive, respiratory, circulatory, reproductive, excretory, immune, nervous, and musculoskeletal systems.</li> <li>Items will not assess the structures or functions of individual organs in isolation.</li> <li>Items assessing the interactions of systems to maintain homeostasis should include a reference to homeostasis and are limited to the organismal level.</li> <li>Items will not require specific knowledge of diseases that affect the human body or their causal agents.</li> <li>Items assessing infectious agents are limited to viruses, bacteria, and fungi.</li> <li>Items may assess the interactions of no more than three systems.</li> </ul>	te ve

Answers: 1-B, 2-C, 3-B, 4-C, 5-C, 6-A, 7-D, 8-A, 9-A, 10-B

1. In order to maintain homeostasis, the systems of the human body work together to keep a constant internal temperature. Which of the following statements describes how the human body responds in a cold environment?

- A. The nervous system moves the jaw bones and causes the chattering of teeth.
- B. The nervous system signals the muscles of the muscular system to contract and warm the body.
- C. The circulatory system delivers less carbon dioxide to the muscular system, resulting in stiffening of the muscles.
- D. The skeletal system produces more blood cells that circulate through the blood vessels, increasing the warmth of the body.
- 2. When you enter a cold room your overall body temperature
  - A rises to a much warmer temperature than usual.
  - B lowers to the temperature of the room.
  - C is not affected by the room's temperature and remains the same.
  - D will rise and then fall because it cannot stay at a constant temperature.
- 3. Cells of all organisms are able to maintain internal stability despite changes in their environment. What is the name for this internal stability?
  - A osmosis
  - B homeostasis
  - C responsiveness
  - D gradualism

4. The process by which your body breaks down food into small nutrient molecules is called

- A enzyme.
- B peristalsis.
- C digestion.
- D absorption.

5. Which organ systems help deliver oxygen to body cells?

- A digestive and excretory systems
- B circulatory and immune systems
- C respiratory and circulatory systems
- D endocrine and muscular systems

- 6. One way the nervous system helps maintain homeostasis is by A pulling your hand away from a hot object.
  - A pulling your hand away from a not of
  - B breathing quickly after exercise.
  - C attacking an invading virus.
  - D digesting food particles.
- 7. Why do you need to drink more water when you are hot and perspiring?
  - A because it makes you hungry
  - B to get more vitamins
  - C so you can make enough energy
  - D to restore the water needed for cell functions
- 8. How are the biceps and the bones of the arm related?



A They work together to lift the forearm.

- B They work independently to react to stimuli.
- C They work together to pump blood to the fingers.
- D They work independently with specialized functions.
- 9. Immunity is the body's ability to
  - A. destroy pathogens before they can cause disease.
  - B. distinguish pathogens from one another.
  - C. fight disease with the inflammation response.
  - D. produce antigens.
- 10. In order to multiply, a virus must
  - A. conjugate with another virus.
  - B. invade a host cell.
  - C. manufacture extra food.
  - D. remain hidden.

Category: Life Science		Percentage of Points derived from content area: 27%		Notes
Benchmark	Clarification	Content Limits	Item Attributes	
SC.6.L.15.1 Analyze and describe how and why organisms are classified according to shared characteristics, with emphasis on the Linnaean system combined with the concept of Domains.	Students will analyze and/or describe how and/or why organisms are classified.	<ul> <li>Items may assess how characteristics are used to classify organisms but will not assess specific characteristics of individual types of organisms.</li> <li>Items assessing the classification of organisms into domains are limited to Bacteria, Archaea, and Eukarya. Items assessing the classification of organisms into kingdoms are limited to Protist, Fungus, Plant, and Animal.</li> <li>Items may assess knowledge of the hierarchy of classification but will not assess the specific characteristics of organisms classified in a particular phylum, class, order, family, genus, or species.</li> <li>Items may use scientific names and the term <i>binomial nomenclature</i> but will not require specific knowledge of an organism's scientific name and common name.</li> </ul>	Stimulus Attributes None specified Response Attributes None specified	

Answers: 1-D, 2-D, 3-C, 4-B, 5-B

 Cognitive Complexity Level
 1
 2
 3

1) Mushrooms, bread molds, and yeasts are classified together in the fungi kingdom. Specific characteristics are used to classify these organisms. Which of the following is a characteristic used to classify these organisms as fungi?

- A. They are parasites.
- B. They are unicellular.
- C. They are prokaryotes.
- D. They are heterotrophs.

- 4) Why do scientists organize living thing into groups?
  - A. They can find them in the wild more easily.
  - B. The organisms are easier to study.
  - C. They can make sense of the variety of rocks on Earth.
  - D. The products from living things can easily be found in groceries.

2) Which of the following is a species?

- A. organisms that perform a certain function in an environment
- B. the organisms that belong to the domain Eukarya
- C. all the organisms that live and interact in an environment
- D. organisms that can mate with one another and produce fertile offspring

5) Which two organisms that are classified in the table above are most similar? **Table of Classification Labels** 

Classification Level	Aardwolf	Grey Wolf	Coyote	Lion	Blue Whale
Kingdom	Animalia	Animalia	Animalia	Animalia	Animalia
Phylum	Chordata	Chordata	Chordata	Chordata	Chordata
Class	Mammalia	Mammalia	Mammalia	Mammalia	Mammalia
Order	Carnivora	Carnivora	Carnivora	Carnivora	Cetacea
Family	Hyaenidae	Canidae	Canidae	Felidae	Balaenopteridae
Genus	Proteles	Canis	Canis	Panthera	Balaenoptera
Species	Proteles cristatus	Canis lupus	Canis latrans	Panthera leo	Balaenoptera musculus

3) Which of the following statements about the characteristics of a species is correct?

- A. A species is a group of animals across a wide area that cannot reproduce together.
- B. A species is a group of animals that does not mate.
- C. Species share similar characteristics, can reproduce, and have fertile offspring.
- D. A species is a group of animals that have similar characteristics and that live together.

A coyote and lion

B grey wolf and coyote

C aardwolf and grey wolf

D aardwolf and blue whale

Category: Life Science		Percentage of Points derived from content area: 27%		Notes
Benchmark	Clarification	Content Limits	Item Attributes	
<b>SC.7.L.15.2</b> Explore the scientific theory of evolution by recognizing and explaining ways in which genetic variation and environmental factors contribute to evolution by natural selection and diversity of organisms.	<ul> <li>Students will identify and/or explain ways in which genetic variation and environmental factors contribute to evolution by natural selection and diversity of organisms.</li> <li>Students will identify and/or explain ways in which fossil evidence is consistent with the scientific theory of evolution.</li> <li>Students will identify and/or explain how a species' inability to adapt may contribute to the extinction of that species.</li> <li>Also Assesses:</li> <li>SC.7.L.15.1 Recognize that fossil evidence is consistent with the scientific theory of evolution that living things evolved from earlier species.</li> <li>SC.7.L.15.3 Explore the scientific theory of evolution by relating how the inability of a species to adapt within a changing environment may contribute to the extinction of that species.</li> </ul>	<ul> <li>Items will not address topics such as speciation, genetic drift, or gene pools.</li> <li>Items will not assess or address hominid evolution or primate fossils.</li> <li>Items assessing fossil evidence should focus on progressions over time/evolution from earlier species and/or the idea that not all species alive today were alive in the past.</li> <li>Items will not assess fossils in the context of relative dating or plate tectonics/continental movement.</li> </ul>	Stimulus Attributes None specified Response Attributes None specified	

Answers: 1-C, 2-B, 3-C, 4-B, 5-B, 6-D, 7-D, 8-D, 9-A, 10-B

1) Budgies, or parakeets, are one of the most popular pets in the world. Captive budgies come in a variety of colors, including white and blue. Wild budgies live in Australia and are only green and yellow. How might the color of their feathers help the wild budgies to survive?

- A. It helps them to find a mate.
- B. Their color makes it easier for them to find food.
- C. It makes it easier for them to blend into the trees.
- D. Their color makes them more likely to be collected as pets.

2) Elephants are the largest land animals alive today. They are the only mammals to have four knees. Evidence of extinct woolly mammoths shows that they shared the trait of having four knees, but they were not African or Asian elephants. How could the mammoths and elephants share this characteristic?

- A. Today's elephants are clones of the woolly mammoths.
- B. Elephants and woolly mammoths had a common ancestor.
- C. Today's elephants have adapted to look like woolly mammoths.
- D. Woolly mammoths are one of the three species of today's elephants.

3) In plants and animals, sexual reproduction causes variation within a species. This variation is vital to their survival. How does genetic variation affect a species' survival?

- A. A species with variation is more easily found by predators.
- B. A species that shows more variation will have a longer life cycle.
- C. A species that has no variation might eventually become extinct.
- D. A species without variation will overpopulate and produce new species.

4) Scientists studying a breed of tuna noticed that some of the tuna could swim faster than others. After 10 years, the number of these "fast swimming" tuna outnumbered the slower tuna. What could account for this change in population?

- A. The slower tuna could not find food and starved.
- B. The slower tuna were not able to out swim predators.
- C. The slower tuna were exposed to a disease that killed them.
- D. The slower tuna were not able to navigate to breeding areas.

5) The modern horse, Equus ferus caballus, is so wide-spread that it can be found on nearly every continent on Earth. However, the modern horse does not appear in the fossil record until about 3 million years ago. Which of the following best explains why?

- A. Its bones were not able to fossilize.
- B. It evolved from other ancient species of horses.
- C. It was extinct and then came back 30 million years ago.
- D. Its fossils were destroyed by lava from volcanic eruptions.

6) Male crickets chirp to attract a mate. Chirping is dangerous because it can attract predators of the crickets like birds or bats. Sometimes, other male crickets will wait quietly and intercept the female on her way to a chirping male. How is the cricket that intercepts the female cricket at an advantage?

- A. The male will be more attractive to females and predators.
- B. The female is more attracted to the male and the predator.
- C. The female is less likely to get eaten and less likely to reproduce.
- D. The male will be less likely to attract predators and more likely to reproduce.

7) Each zebra has slightly different stripes that allow it to blend into the herd and confuse predators. Blending into the herd helps the zebras do which of the following?

- A. find water
- B. hunt for prey
- C. adapt and evolve
- D. survive and reproduce

8) Natural selection is the process by which organisms with favorable traits will survive and reproduce, increasing those favorable traits in a population. Which of the following is the best example of a favorable trait which helps with survival that was developed by natural selection?

- A. a frog eating a fly
- B. a wolf hunting a deer
- C. a mouse burrowing a hole
- D. a moth blending with a tree

9) The different finches found in the Galapagos Islands developed very different beaks, depending on the type of food available on each of the islands. Finches that eat seeds have large crushing beaks made to crack the shells of seeds. Other finches have developed beaks for drilling holes in wood, eating cactus, or even drinking the blood of other birds.

If a storm hits and causes the death of nearly all of the cacti on the islands, which of the following will be the most likely outcome for the Cactus ground finch?



10) Fossils of the Dorudon, an aquatic mammal that lived over 40 million years ago, show a whale-like animal that had small, underdeveloped hind limbs. Which best explains how fossils like the Dorudon support the theory that plant and animal life has evolved over time?



- A. They confirm that many animals have not evolved.
- B. They show that some animals evolved from other animals.
- C. They prove that all animals evolved from a single ancestor.
- D. They demonstrate that animals that don't evolve will die out.

- A. They will be unable to eat and will die out.
- B. They will evolve into a different species of finch.
- C. They will adapt to eating a different source of food.
- D. They will form social groups with other finches to collect food.

3

Category: Life Science		Percentage of Points derived from	Notes	
Benchmark	Clarification	Content Limits	Item Attributes	
<b>SC.7.L.16.1</b> Understand and explain that every organism requires a set of instructions that specifies its traits, that this hereditary information (DNA) contains genes located in the chromosomes of each cell, and that heredity is the passage of these instructions from one generation to another.	<ul> <li>Students will describe and/or explain that every organism requires a set of instructions that specifies its traits.</li> <li>Students will identify and/or explain that hereditary information (DNA) contains genes located in the chromosomes of each cell and/or that heredity is the passage of these instructions from one generation to another.</li> <li>Students will use Punnett squares and pedigrees to determine genotypic and phenotypic probabilities.</li> <li>Students will compare and/or contrast general processes of sexual and asexual reproduction that result in the passage of hereditary information from one generation to another.</li> <li>Also Assesses:</li> <li>SC.7.L.16.2 Determine the probabilities for genotype and phenotype combinations using Punnett squares and pedigrees.</li> <li>SC.7.L.16.3 Compare and contrast the general processes of sexual reproduction requiring meiosis and asexual reproduction requiring meiosis and asexual reproduction requiring meiosis</li> </ul>	<ul> <li>Items will not assess incomplete dominance, sex-linked traits, polygenic traits, multiple alleles, or codominance.</li> <li>Items addressing Punnett squares are limited to the P and generations. F1</li> <li>Items will not assess mutation.</li> <li>Items will not address or assess the stages of meiosis, fertilization, or zygote formation.</li> <li>Items will not address or assess human genetic disorders or diseases.</li> </ul>	Stimulus Attribute Genotype and phenotype probabilities will only be in percents. Response Attribute Options may be in the form of percents or percentages.	

Answers: 1-B, 2-C, 3-B, 4-D, 5-A, 6-B, 7-A, 8-A, 9-B, 10-B

1) In pea plants, purple flower color is dominant to white flower color. Susan has pea plants in her garden. Most of them have purple flowers, while some have white flowers. If she crosses two pea plants that have white flowers, what color flowers will the resulting pea plants have?

- A. 100% purple
- B. 100% white
- C. 50% purple and 50% white
- D. 75% purple and 25% white

2) The allele for dimples is dominant and the allele for no dimples is recessive. If two parents that are heterozygous for dimples produce a child, what are the chances the child will have dimples?

- A. 25%
- B. 50%
- C. 75%
- D. 100%

3) In rabbits, brown fur color (F) is dominant to white fur color (f). If two rabbits with brown fur produce a baby with white fur, what are the genotypes of the parents?

- A. FF and Ff
- B. Ff and Ff
- C. FF and FF
- D. ff and ff

4) Jason has freckles (F). His father also has freckles, but his mother does not have freckles (f). If freckles are the result of a dominant trait, what is Jason's genotype?

- A. F
- B. ff
- C. FF
- D. Ff

5) If a homozygous tall (T) pea plant is crossed with a homozygous short (t) pea plant, what will their offspring look like?

- A. They will all be tall.
- B. They will all be short.
- C. Half of them will be tall and half will be short.
- D. Three quarters of them will be tall and one quarter will be short.

6) Leigh Ann is learning about the differences between inherited traits and learned behaviors in organisms. For example, she knows that being able to read is learned, while having straight or curly hair is inherited. How does a person inherit a trait such as hair texture?

- A. through the storage of excess fatty acids in tissues
- B. through DNA that is passed from parents to offspring
- C. through the breakdown of different proteins during birth
- D. through different viruses that are passed from parents to offspring

7) Both of Jacob's parents have lots of freckles, but only one of Jacob's brothers and sisters has any freckles. If freckles are the result of a dominant allele (F), what are the genotypes of Jacob's parents?

- A. Ff and Ff
- B. Ff and FF
- C. Ff and ff
- D. ff and ff

8) In pea plants, smooth seeds are dominant to wrinkled seeds. If a pea plant that is homozygous for smooth seeds is crossed with a plant that is homozygous for wrinkled seeds, which of the following describes the resulting offspring?

- A. They would all be heterozygous for seed shape.
- B. They would all be homozygous for smooth seeds.
- C. They would all be homozygous for wrinkled seeds.
- D. They would all be heterozygous for wrinkled seeds.

9) Sexual reproduction in animals allows traits to be passed to offspring. Genetic information is stored in an animal's

- A. cell membrane.
- B. chromosomes.
- C. cytoplasm.
- D. Golgi bodies.

10) In humans, brown eyes are dominant to blue eyes. Gloria has brown eyes and her two sisters both have blue eyes. If the allele for brown eyes is (B) and the allele for blue eyes is (b), which of the following could be the genotypes of Gloria's parents?

- A. BB and Bb
- B. Bb and bb
- C. bb and bb
- D. BB and BB

Category: Life Science		Percentage of Points derived from content area: 27%		Notes
Benchmark	Clarification	Content Limits	Item Attributes	
SC.7.L.17.2 Compare and contrast the relationships among organisms, such as mutualism, predation, parasitism, competition, and commensalism.	<ul> <li>Students will compare and/or contrast relationships between organisms, such as mutualism, predation, parasitism, competition, and commensalism.</li> <li>Students will describe and/or explain the roles of and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web.</li> <li>Students will identify and/or describe various limiting factors in an ecosystem and their impact on native populations.</li> <li>Also Assesses:</li> <li>SC.7.L.17.1 Explain and illustrate the roles of and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web.</li> <li>SC.7.L.17.3 Describe and investigate various limiting factors in the local ecosystem and their impact on native populations, including food, shelter, water, space, disease, parasitism, predation, and nesting sites.</li> </ul>	<ul> <li>Items assessing the relationships between organisms may require the identification of the relationship as mutualism, predation, parasitism, competition, or commensalism.</li> <li>Items assessing the relationships of organisms may require recognition of common examples of mutualism, predation, parasitism, competition, and/or commensalism.</li> <li>Items will not require specific knowledge of organisms.</li> <li>Items may assess food webs but will not assess food chains.</li> <li>Items assessing consumers in a food web are limited to primary, secondary, and tertiary consumers.</li> <li>Items will not assess that the Sun is the source of energy for living things in isolation.</li> <li>Items will not address energy pyramids or use the term <i>trophic level</i>.</li> </ul>	Stimulus Attributes: Food webs may include a maximum of 15 organisms. Response Attributes None specified	

Answers: 1-A, 2-C, 3-B, 4-C, 5-A, 6-C, 7-D, 8-B, 9-D, 10-B

1) The food web below shows the relationships between the organisms in a forest ecosystem. If a drought occurs and kills off most of the grass, what is the most likely outcome?



- A. The populations of all levels of consumers would decrease.
- B. The primary consumers would have to adapt to eating each other.
- C. Only the population of the secondary and tertiary consumers would decline.
- D. The primary consumers would die and the secondary consumers would eat them.

2) In any ecosystem, the survival of a species depends on the resources that are available. Beneath the tree canopy in a tropical rainforest, growth of some plant species may be limited. The availability of which of these resources most likely limits the growth of plants on the ground level in this ecosystem?

- A. carbon dioxide
- B. minerals
- C. sunlight
- D. water

3) Cleaner fish feed on parasites in a shark's mouth and gills. Which of the following best describes the relationship between the cleaner fish and the shark?

- A. competitive
- B. mutualistic
- C. nonexistent
- D. parasitic

4) Both mistletoe and Spanish moss live in many trees in Florida. Mistletoe, however, is considered a partial parasite, and Spanish moss is a commensal. They both survive quite well, but some of the trees they live in do not. How are some of the trees affected by these plants?

- A. The trees lined with Spanish moss cannot grow under moss.
- B. The trees lined with Spanish moss die quickly from being root-bound.
- C. The trees are disadvantaged because mistletoe robs them of nutrients.
- D. The trees are healthier because mistletoe provides extra nutrients to the trees.

5) Commensalism is the relationship between organisms where one organism benefits while the other is not affected. Which set of organisms is an example of this close interaction?

- A. clownfish and sea anemone
- B. flower and bee
- C. tapeworm and dog
- D. tick and cow

6) Ants burrow into a thorn of the Acacia tree to live and eat sugar secreted by the tree. These ants are a benefit to the Acacia because they attack the tree's predators. What type of relationship do the ants and these trees share?

- A. commensalism
- B. competition
- C. mutualism
- D. parasitism

7) Tracey is studying the population changes of different organisms in a tropical rainforest. After looking at some long-term data, she notices that many years ago, a species of frog had a rapid increase in population, but then the population leveled off and has remained steady ever since.

Which of the following best explains why the frog population would remain steady instead of increasing?

- A. Predators started to eat the frogs instead of other animals.
- B. The frogs probably caught various diseases that killed most of them off.
- C. The frogs' growth was limited by the amount of sunlight the area received.
- D. The resources were limited and could only support a certain number of frogs.

8) In a pond ecosystem, consumers can range from microscopic shrimp to large carnivorous fish. Limiting factors in the pond ecosystem can include sunlight, carbon dioxide, nutrients, and space.

If the amount of sunlight was reduced, what effect would this have on the ecosystem?

- A. The population of producers would increase.
- B. The biodiversity in the pond would decrease.
- C. The number of primary consumers would increase.
- D. The body size of secondary consumers would decrease.

9) Hailey is explaining commensalism to her friend. Which statement correctly describes commensalism?

- A. "Two organisms have a relationship in which both organisms benefit."
- B. "Two organisms have a relationship in which one organism benefits and the other is harmed."
- C. "Two organisms have a relationship in which they are both fighting for the same resources."
- D. "Two organisms have a relationship in which one benefits and the other is neither harmed nor helped."

10) After she explains commensalism to her friend, Hailey tries to think of an example of it. Which of the following is an example of commensalism?

- A. fleas and a dog
- B. barnacles and a whale
- C. a human and chickenpox
- D. a bee and a flower

Category: Life Science		Percentage of Points derived from content area: 27%		Notes
Benchmark	Clarification	Content Limits	Item Attributes	
SC.8.L.18.4 Cite evidence that living systems follow the Laws of Conservation of Mass and Energy.	<ul> <li>Students will explain that living systems obey the law of conservation of mass and the law of conservation of energy.</li> <li>Students will describe and/or explain the general processes of photosynthesis or cellular respiration.</li> <li>Students will describe how matter is transferred in the carbon cycle.</li> <li>Students will describe the role of light, carbon dioxide, water, and/or chlorophyll in the process and products of photosynthesis.</li> <li>Also Assesses:</li> <li>SC.8.L.18.1 Describe and investigate the process of photosynthesis, such as the roles of light, carbon dioxide, water, and chlorophyll; production of food; and release of oxygen.</li> <li>SC.8.L.18.2 Describe and investigate how cellular respiration breaks down food to provide energy and releases carbon dioxide.</li> <li>SC.8.L.18.3 Construct a scientific model of the carbon cycle to show how matter and energy are continuously transferred within and between organisms and their physical environment.</li> </ul>	<ul> <li>Items will not address or assess the stages of photosynthesis or cellular respiration.</li> <li>Items may not assess the interrelatedness of photosynthesis and cellular respiration.</li> <li>Items will not use the term <i>reactant</i>.</li> <li>Items will not use the term <i>ATP</i>.</li> <li>Items will not assess the function of organelles related to the processes of cellular respiration or photosynthesis.</li> <li>Items will not assess anaerobic respiration.</li> <li>Items referring to the carbon cycle may include carbon reservoirs, such as the atmosphere, organisms, fossil fuels, sediments, and oceans/water.</li> </ul>	Stimulus Attribute Scenarios may use word equations for photosynthesis or cellular respiration; chemical equations may not be used. Response Attributes None specified	

Answers: 1-C, 2-B, 3-C, 4-A, 5-B, 6-B, 7-B, 8-A, 9-C, 10-C

1) Vanessa is learning about photosynthesis. Her teacher asks her to draw a diagram showing the process of photosynthesis. What is wrong with Vanessa's drawing?



- A. The diagram has switched the positions of carbon dioxide and water.
- B. The diagram should show oxygen being both absorbed and released.
- C. The diagram has switched the positions of oxygen and carbon dioxide.
- D. The diagram should show carbon dioxide being both absorbed and released.

2) Jimmy is running laps during his physical education class. As he is running, he starts to breathe harder as his body tries to get more oxygen. Which of the following best explains why Jimmy's oxygen requirement increases?

- A. His cells use oxygen as their primary source of energy.
- B. His cells need oxygen to help them break down sugars for energy.
- C. His cells need oxygen to increase the levels of sugars in the blood.
- D. His cells use oxygen to transport substances across their cell membranes.

3) Felicia loves houseplants, but she works in an office that gets very little light. She knows that sunlight is important in photosynthesis. What role does light play in the process of photosynthesis?

- A. It keeps the plant warm during the process of photosynthesis.
- B. It allows the plant to absorb carbon dioxide during photosynthesis.
- C. It provides the energy the plant needs for photosynthesis to occur.
- D. It helps break down the food the plant needs for photosynthesis to take place.

4) Look at the diagram below. Which of the following best describes how carbon dioxide in the atmosphere is changed by living organisms?



- A. It is absorbed by plants during photosynthesis.
- B. It is created when factory workers burn fossil fuels.
- C. It is exchanged for water vapor through the process of respiration.
- D. It is used by plants and animals to convert organic carbon to oxygen.

5) Maggie knows that chlorophyll is important to the process of photosynthesis. Which of the following best explains why chlorophyll is so important to plants?

- A. It helps plants absorb water from the soil.
- B. It helps plants absorb energy from the Sun.
- C. It allows plants to release oxygen into the atmosphere.
- D. It allows plants to release carbon dioxide through respiration.

6) The diagram below shows that carbon dioxide is absorbed during photosynthesis. Which of the following best explains what a plant does with the carbon dioxide (CO2) it absorbs during photosynthesis?



- A. It combines the CO2 with hydrogen to create water.
- B. It uses the CO2 to create the sugars it will use for food.
- C. It uses the CO2 as a main source of energy for photosynthesis.
- D. It breaks down the CO2 to transport water across the cell membrane.

Cognitive Complexity Level 1 2 3

7) Andrea is training to run in a marathon—a 26.2-mile race. For one of her training runs, she will be running for several hours. She plans to eat several energy bars during the run. Why is it important for Andrea to eat during her run?

- A. The protein in the energy bars will help her to build stronger muscles.
- B. The energy bars will replace the sugars her body is breaking down for energy.
- C. The energy bars will deliver important vitamins her body needs during the run.
- D. The carbohydrates in the energy bars will replace the oxygen her cells use in the run.

8) Hanna is going on vacation. She forgets to ask her brother to water her plants while she is gone, and when she returns, she finds that her plants have died. Which best explains why water is so important to plants?

- A. Plants must have water for photosynthesis to occur.
- B. Plants need the oxygen in water in order to produce carbon dioxide.
- C. Plants use water to help them break down proteins for life processes.
- D. Plants break the hydrogen bonds in water to use as a source of energy.

9) Which of the following is NOT a way carbon dioxide returns to the atmosphere?

- A. decay of organisms
- B. emissions by factories
- C. photosynthesis
- D. respiration

10) Janelle needs to draw a diagram of the process of photosynthesis for homework. She begins by writing the equation for photosynthesis. Which of the following correctly shows the overall process of photosynthesis?

- A. carbohydrate + oxygen + light energy  $\rightarrow$  carbon dioxide + water
- B. carbohydrate + water + light energy  $\rightarrow$  carbon dioxide + oxygen
- C. carbon dioxide + water + light energy  $\rightarrow$  carbohydrate + oxygen
- D. carbon dioxide + oxygen + light energy  $\rightarrow$  carbohydrate + water

#### FCAT 2.0 SCIENCE ITEM WRITER GLOSSARY GRADE 8

The following glossary is a reference list provided for the item writers and is **not** intended to comprise a comprehensive vocabulary list for students. The definitions are not intended to provide a thorough scientific definition of the terms. Some definitions are limited by the extent of knowledge intended for the grade level. The terms and definitions in this glossary are specific to the Florida NGSSS in science for grades 6 through 8 and the content assessed on FCAT 2.0 Science. Knowledge of the terms in the glossary for grade 5 is assumed.

- Acceleration—The rate at which velocity is changing. The change may involve an increase or decrease in speed and/or a change in direction. The change may be positive or negative.
- Allele—Any of two or more alternate forms of a gene that an organism may have for a particular trait.
- Amplitude—The maximum absolute variation of any periodic function (e.g., a wave).
- Astronomical unit—A unit used to measure distances in the Solar System equal to the average distance between the Sun and Earth, approximately 150 million kilometers, and abbreviated AU.
- Autotroph—An organism that can produce food from inorganic materials (e.g., carbon dioxide, sunlight, water).
- Binary fission—An asexual reproductive process in which a single cell divides into two cells.
- **Binomial nomenclature**—A system used to name organisms using two words: the genus name and the species name.
- Boiling point—The temperature at which a liquid changes to a gas. The boiling point of water at sea level is . 100°C (212°F)
- Budding—An asexual reproductive process in which an outgrowth of a parent organism detaches and forms a new individual of the same species.
- Chemical properties—Characteristics of substances that describe their composition, reactivity, and how the substance changes into different substances.
- **Controlled variable**—A factor or condition in a scientific experiment that is purposefully kept the same.
- Dominant—The form of a trait that is expressed or shown when the combination of alleles for this trait is heterozygous.
- **Dwarf planet**—A celestial body similar to a planet but orbiting in a zone that has many other objects in it (e.g., Ceres, Pluto).
- Empirical evidence—Evidence based on observations or experiments rather than theory.
- Eukaryote—An organism whose cells contain a nucleus surrounded by a membrane.
- Evolution (scientific theory of evolution)—A cumulative change in the characteristics of organisms or populations over time from generation to generation.
- generation—The first generation of offspring from the mating of parental organisms (P generation).

- Fault—A crack in Earth's crust along which movement has occurred.
- Fold—A bend in a layer or several layers of rock.
- Heterogeneous—A type of mixture in which different parts can be easily distinguished.
- Heterotroph—An organism that cannot produce its own food.
- **Heterozygous**—A cell or organism that has two different alleles for a particular trait.
- Homeostasis—The tendency of a cell, organism, or population to maintain internal stability.
- **Homogeneous**—A type of mixture in which the different parts are blended evenly so that the mixture is the same throughout.
- Homozygous—A type of cell or organism that has identical rather than different alleles for a particular trait.
- Hypothesis—A statement that can be tested scientifically through experiments and/or other scientific investigations.
- Infiltration—A process in which water soaks into the soil.
- Kingdom—The highest Linnaean classification into which organisms are grouped; above phylum.
- Law (scientific law)—A scientific principle based on many observations of naturally occurring events that demonstrate it to be without exception under certain stated conditions. See also theory.
- Light-year—The distance a ray of light travels in a vacuum in one year.
- Melting point—The temperature at which a solid changes to a liquid. The melting point of ice at sea level is . 0°C (32°F)F
- Model (scientific model)—A replica or description designed to show the workings or structure of an object or system.
- **Molecule**—The smallest unit of matter of a substance that retains all the physical and chemical properties of that substance; consists of a single atom or a group of atoms bonded together.
- Nebula—A large cloudlike mass of gas and dust in space that may lead to the formation of a star.
- Net force—The sum of all the forces acting on an object. When forces are balanced, the net force is zero and the object's motion will remain the same. When forces are unbalanced, the net force is nonzero and the object's motion will change.
- Niche—The unique position occupied by a particular species in terms of the area it inhabits and the function it performs within the community.
- Nucleus—The center region of an atom where protons and neutrons are located; also, the cell structure that contains a cell's genetic material.

- **Opaque**—A term used to describe a material that absorbs and/or reflects light and does not allow light to pass through.
- Outcome variable (dependent variable)—A factor, usually being measured or observed, that responds to, or depends on, another factor (test variable).
- **P generation**—The parental generation in a genetic cross.
- Percolation—The movement of water through rock or soil.
- pH—A measure of the acidity or alkalinity of a solution based on a scale from zero to fourteen.
- Pressure—The force exerted per unit area.
- **Prokaryote**—An organism whose cells are characterized by the lack of a defined nucleus.
- Recessive—The form of a trait that will be masked unless the organism is homozygous for this trait.
- **Regeneration**—The growth of new tissues or organs to replace those lost or damaged by injury.
- Repetition—Making multiple sets of measurements or observations in a scientific investigation.
- **Replication**—The reproduction of a scientific investigation by another person to ensure accuracy.
- Saturation—A condition of a solution whereby it has reached a maximum amount of solute under the given conditions.
- Solute—A substance that is being dissolved by another substance.
- **Solvent**—A substance that dissolves another substance.
- Systematic observations—Observations obtained by following a preplanned method of observation.
- **Temperature**—A measure of how hot or cold a substance is; a measure of the average kinetic energy of the particles of a substance.
- Test variable (independent variable)—The variable manipulated by the experimenter in order to study changes in the outcome variable.
- Scientific theory—An explanation for some naturally occurring event developed from extensive observations, experimentation, and reasoning. See also law.
- **Translucent**—A term used to describe a material that cannot be clearly seen through but that allows some light to pass through it.
- Transparent—A term used to describe a material that can be clearly seen through because it allows light waves to pass through in straight lines.