8th Grade Statewide Science Assessment Study Guide

East Learning Community
2016-17
Thank you to:

Florida Department of Education - SSA Science Test Item Specifications

CPALMS

The date of my Statewide Science Assessment is:
<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Content Focus</th>
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</table>
| SC.6.N.2.2 | I can evaluate new evidence and create explanations based on evidence.  
I can explain that scientific explanations are based on empirical evidence, logical reasoning, predictions, and modeling.  
I can explain that scientific knowledge is a result of a great deal of debate and confirmation within the scientific community.  
I can identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered. |
| SC.7.N.1.2 | I can compare methods and/or results obtained in a scientific investigation.  
I can differentiate between repetition and replication in an experiment or investigation.  
I can explain why scientific experiments should be replicable.  
I can evaluate the use of repeated trials or replication in a scientific investigation. |
| SC.7.N.1.5 | I can understand that a model represents (brings to mind) one or more aspects of the thing being modeled.  
I can understand that a model does not accurately represent all aspects of the thing being modeled.  
I can identify the benefits and/or limitations of the use of scientific models.  
I can identify how technology is essential to science.  
I can explain how advancements in technology contribute to changes in scientific knowledge and understanding. |
| SC.7.N.3.1 | I can recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them.  
I can modify my ideas based on new evidence. |
| SC.8.N.1.1 | I can evaluate a scientific investigation / procedure using evidence or scientific thinking and problem solving.  
I can interpret and analyze data to make predictions and/or generate a hypothesis about a scientific investigation.  
I can identify and explain the impact of outcome (dependent) variables and test (independent) variables in a scientific investigation.  
I can identify and explain the importance of a control group in a scientific investigation.  
I can organize data from an investigation and use the information to make and support claims and defend conclusions about a scientific investigation. |
| **Life** | **I can:** |
| SC.6.L.14.1 | I can describe and identify levels from a diagram of the levels of structural organization.  
I can identify four types of tissue found in animals. |
| SC.6.L.14.2 | I can investigate and explain the three components of the Cell theory. |
| SC.6.L.14.4 | I can recognize and explore how cells of all organisms undergo similar processes to maintain homeostasis.  
I can compare and contrast the structure and function of major organelles from plant and animal cells to include:  
Cell membrane  
Vacuoles  
Cell wall  
Chloroplasts |
<table>
<thead>
<tr>
<th>SC.6.L.14.5</th>
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<tbody>
<tr>
<td>I can identify the eight major body systems and how they interact to maintain homeostasis:</td>
</tr>
<tr>
<td>Circulatory system</td>
</tr>
<tr>
<td>Immune system</td>
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<tr>
<td>Digestive system</td>
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<tr>
<td>Nervous system</td>
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<tr>
<td>Respiratory system</td>
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<tr>
<td>Reproductive system</td>
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<tr>
<td>Excretory system</td>
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<tr>
<td>Musculoskeletal system</td>
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<tr>
<td>I can compare and contrast the different infectious agents:</td>
</tr>
<tr>
<td>Viruses</td>
</tr>
<tr>
<td>Bacteria</td>
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<tr>
<td>Parasite</td>
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<tr>
<td>Fungi</td>
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<table>
<thead>
<tr>
<th>SC.6.L.15.1</th>
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<tbody>
<tr>
<td>I can analyze and describe how and why organisms are classified according to the Linnaean system combined with the concept of domains.</td>
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<table>
<thead>
<tr>
<th>SC.7.L.15.2</th>
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<tbody>
<tr>
<td>I can recognize that fossil evidence is consistent with the scientific theory of evolution.</td>
</tr>
<tr>
<td>I can recognize and explain the four factors of natural selection:</td>
</tr>
<tr>
<td>Adaptation</td>
</tr>
<tr>
<td>Genetic variation (environmental factors)</td>
</tr>
<tr>
<td>Overproduction</td>
</tr>
<tr>
<td>Selection (survival of the fittest)</td>
</tr>
<tr>
<td>I can explain how the inability to adapt contributes to the extinction of a species.</td>
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<thead>
<tr>
<th>SC.7.L.16.1</th>
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<tbody>
<tr>
<td>I can explain how all organisms require a set of instructions (DNA) that consist of genes and chromosomes found in the nuclei of cells and that it is passed from generation to generation.</td>
</tr>
<tr>
<td>I can determine the probabilities for genotype and phenotype combinations using Punnett squares and pedigrees.</td>
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<tr>
<td>I can compare and contrast the general processes of sexual reproduction requiring meiosis and asexual reproduction requiring mitosis.</td>
</tr>
<tr>
<td>---</td>
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<tr>
<td><strong>SC.7.L.17.2</strong> I can compare and contrast symbiotic relationships: Mutualism Predation Competition Commensalism Parasitism I can describe and investigate various limiting factors in the local ecosystem and their impact on native populations. I can explain the process of energy transfer through a food web, as well as the roles of and relationships among producers, consumers, and decomposers.</td>
</tr>
<tr>
<td><strong>SC.8.L.18.4</strong> I can explain the relationship between photosynthesis and cellular respiration as well as identify the starting and ending components of the chemical equations. I can cite evidence that living systems follow the laws of conservation of mass and energy and that energy and mass are not created or destroyed but transformed. I can 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.</td>
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<tr>
<td><strong>Earth and Space</strong> I can:</td>
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<tr>
<td><strong>SC.6.E.7.4</strong> I can differentiate and show interactions among the geosphere, hydrosphere, cryosphere, atmosphere and biosphere. I can differentiate between weather and climate. I can explain how energy provided by the sun influences global patterns of atmospheric movement and the temperature difference between air, water, and land.</td>
</tr>
<tr>
<td><strong>SC.6.E.7.5</strong> I can differentiate among radiation, conduction and convection, the three mechanisms by which heat is transferred through Earth’s system.</td>
</tr>
</tbody>
</table>
| SC.7.E.6.2 | I can recognize that there are a variety of different landforms on Earth’s surface such as coastlines, dunes, rivers, mountain, glaciers, deltas, and lakes and relate these landforms as they apply to Florida. 

I can 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.

I can 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.

I can identify the patterns within the rock cycle and relate them to surface events (weathering and erosion) and subsurface events (plate tectonics and mountain building). |
| SC.7.E.6.4 | I can identify examples of and explain physical evidence that supports scientific theories that Earth has evolved over geologic time, including the law of superposition and radioactive dating. |
| SC.7.E.6.5 | I can explain the 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. |
| SC.8.E.5.3 | I can compare and contrast the relative distance, size and general composition of astronomical bodies in the universe.

I can describe the distances between objects in space in the context of light and space travel.

I can describe that the universe contains billions of galaxies and stars. |
| SC.8.E.5.5 | I can describe the properties of the Sun.

I can describe and classify the properties of stars: apparent magnitude (brightness), temperature (color), size and luminosity (absolute brightness). |
| SC.8.E.5.7 | I can 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, |
| SC.8.E.5.9 | I can identify the positions of the Sun-Earth-Moon for a solar eclipse and a lunar eclipse.  
I can explain how the Moon's impact on Earth creates tides.  
I can explain how the position of the Sun and the Earth creates seasons.  
I can identify the seasons on Earth based on the tilt of Earth’s axis.  
I can explain the impact of the Moon on the Earth, including phases, tides, and eclipses and the relative position of each body. |
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<tbody>
<tr>
<td>Physical</td>
<td>I can:</td>
</tr>
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</table>
| SC.6.P.13.1 | I can explain the factors affecting the gravitational force acting between objects.  
I can explain how gravitational force is affected by mass and distance.  
I can identify contact and non-contact forces.  
I can distinguish between weight and mass and describe how gravitational force affects weight but not mass. |
| SC.6.P.13.3 | I can investigate and describe how an unbalanced force acting on an object changes its speed, or direction of motion, or both.  
I can measure, graph, and interpret distance versus time for an object moving at constant speed. (SC.6.P.12.1) |
| SC.7.P.10.1 | I can identify, compare and/or contrast the variety of types of radiation present in radiation from the Sun.  
I can identify and/or compare characteristics of the electromagnetic spectrum.  
I can identify common uses and/or applications of electromagnetic waves. |
<table>
<thead>
<tr>
<th>Standard</th>
<th>I can understand the relative order of frequencies and wavelengths in the electromagnetic spectrum.</th>
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</thead>
<tbody>
<tr>
<td><strong>SC.7.P.10.3</strong></td>
<td>I can observe and explain that light can be reflected, refracted, and/or absorbed. I can recognize that light waves, sound waves, and other waves move at different speeds in different materials.</td>
</tr>
<tr>
<td><strong>SC.7.P.11.2</strong></td>
<td>I can distinguish between potential energy and kinetic energy. I can explain the Law of Conservation of Energy. I can describe how energy is transformed in different situations.</td>
</tr>
<tr>
<td><strong>SC.7.P.11.4</strong></td>
<td>I can describe how heat flows in predictable ways. I can recognize that adding heat to or removing heat from a system may result in a temperature change and possibly a change of state.</td>
</tr>
<tr>
<td><strong>SC.8.P.8.4</strong></td>
<td>I can describe density and compare the densities of various materials using the materials’ masses and volumes. I can calculate the densities of various materials. I can classify and compare substances based on their physical properties such as density, thermal or electrical conductivity, solubility, magnetic properties, melting and boiling points.</td>
</tr>
<tr>
<td><strong>SC.8.P.8.5</strong></td>
<td>I can explain the difference between compounds, mixtures and solutions. I can explain the particle motion as a change in the kinetic energy of matter. I can explain the Atomic Theory of Matter, that all matter is made of a finite number of elements and that atoms combine in a lot of different ways. I can explain that compounds make-up all living and nonliving things. I can create a model of an atom to explain protons, neutrons and electrons.</td>
</tr>
</tbody>
</table>
I can identify the chemical and physical properties of compounds and atoms.

I can identify pure substances and mixtures.

I can identify mixtures as heterogeneous or homogeneous.

I can use a periodic table to list characteristics of atoms.

<table>
<thead>
<tr>
<th>SC.8.P.9.2</th>
<th>I can distinguish between physical and chemical changes in matter.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I can explain the influence of temperature on chemical changes.</td>
</tr>
<tr>
<td></td>
<td>I can explain the Law of Conservation of Mass.</td>
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</tbody>
</table>

**Nature of Science Standards Summary and Practice Questions**

**SC.6.N.2.2: Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered.**

1) Scientific knowledge is based on empirical evidence, and is appropriate for understanding the natural world, but it provides only a limited understanding of the supernatural, aesthetic, or other ways of knowing, such as art, philosophy, or religion.

2) Scientific knowledge is durable and robust, but open to change.

3) Because science is based on empirical evidence it strives for objectivity, but as it is a human endeavor the processes, methods, and knowledge of science include subjectivity, as well as creativity and discovery.

**QUESTIONS:**

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) If a theory is challenged by new evidence, which of the following could occur?
   A. The theory could be altered
   B. The theory is accepted, not the evidence
   C. The evidence is wrong
   D. A vote is taken to accept new evidence

3.) How is a scientific experiment different from other investigations?
   A. A procedure is followed
   B. Only one variable is changed
   C. Precision and accuracy are used to record data
   D. All of the above

SC.7.N.1.2: Differentiate replication (by others) from repetition (multiple trials). (Also assesses SC.6.N.1.2, SC.6.N.1.4, and SC.8.N.1.2.)

1. Replication is the ability of a test or experiment to be accurately reproduced by another scientist. It is an exact copy of an experiment.
   a. Scientific investigations need replication to confirm the results of the investigation by other scientists. We are not “taking their word for it” if we can replicate the investigation/experiment.

2. Repetition is performing multiple measurements or trials in an experiment.

QUESTION:

1) The following statements were taken from the procedures of four different investigations.

<table>
<thead>
<tr>
<th>Investigation</th>
<th>Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pour 50 milliliters (mL) of water down four inclined surfaces.</td>
</tr>
<tr>
<td>2</td>
<td>Roll a marble down the ramp from a height of 10 centimeters (cm), 20 cm, and 30 cm.</td>
</tr>
<tr>
<td>3</td>
<td>Take the mass of five rocks separately and then determine the average mass in grams (g).</td>
</tr>
<tr>
<td>4</td>
<td>Conduct four trials of counting the bubbles produced by a water plant for 1 minute (min) each.</td>
</tr>
</tbody>
</table>

The statement from which investigation is an example of repetition?
A. Investigation 1
B. Investigation 2
C. Investigation 3
D. Investigation 4
SC.7.N.1.5: (Also assesses SC.7.N.3.2, SC.8.N.1.5, and SC.8.E.5.10.) Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.

1. Common methods include the use of scientific steps in a laboratory setting and field sciences use qualitative and / or quantitative observations on site and the use of models used in each of the different fields of study.

2. Scientific models can be used to explain concepts that are too microscopic, or macroscopic to comprehend but limit the concept to representations.

3. The use of technology is essential in the development and new discoveries within the different fields.

QUESTIONS:

1) The model below represents a rocket in flight.

What would be the best use of this model by a scientist?

A. To model one-directional forces, as the rocket is affected only by one force.
B. To model the idea of zero gravity, as the rocket is not affected by gravity.
C. To model the transition between the kinetic and potential energy of the rocket.
D. To model the effects of wind resistance on the rocket’s descent to the ground.
2) Which of the following describes a limitation of the drawing but NOT the clay model?

**Answer Options:**

A. The drawing does not represent the main parts of a cell.
B. The drawing does not contain the correct number of nuclei.
C. The drawing cannot represent a living cell, since a true cell is three-dimensional.
D. The drawing cannot represent a living cell, since the cytoplasm should be in constant motion.
SC.7.N.3.1 Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them.

1. A scientific theory is a scientific explanation of why or how something occurs in the natural world. It is not a guess made by scientists, but is well-supported by evidence from many sources.

2. A scientific law is a generalization of what happens and should apply in every situation throughout the universe.

3. Laws and theories can both change over time as new evidence is uncovered and accepted by the scientific community.

QUESTIONS:

1) What is the difference between a scientific theory and a scientific law?

A. Theories are upgraded into laws once they are proven.
B. Laws use mathematical explanations and theories do not.
C. Laws describe what happens but theories explain why or how.
D. Theories combine several laws into one.

2) A timeline of some models of atoms throughout the history is shown below. Those models have contributed to the formation of the atomic theory. Which of the following statements best summarizes the formation of atomic theory?
A. The discovery of new evidence resulted in changes to the atomic theory.
B. Advancements in atomic models proved the atomic theory was accurate.
C. The atomic theory was modified with the discovery of every new element.
D. Changes in the atomic models showed that the atomic theory was based on opinions.

3) Mai tells Jaz his theory about what sea turtles nest on the beach instead of in the ocean. She says, “The turtle eggs would sink to the bottom of the ocean, and the baby turtle would drown.” Mai says her uncle, a fisherman, told Mai this information. Jaz tells Mai that her theory is not scientific. Why does Mai’s idea not meet the requirement to be a scientific theory?
A. Mai’s idea is already a scientific law.
B. Mai’s idea is not supported by scientific evidence.
C. Mai’s idea is a good guess that can be tested by experiments.
D. Mai and her uncle are not scientists.

4) What is the best definition of the term "theory", as it’s used in science?
A. It is just a guess.
B. It is well tested set of ideas that explains events that occur in nature.
C. A theory is based on laws that can be proven true.
D. It is a hypothesis that has been confirmed.
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, evaluate a scientific investigation using evidence of scientific thinking and/or problem solving.

- identify test variables (independent variables) and/or outcome variables (dependent variables) in a given scientific investigation
- interpret data to make predictions and/or defend conclusions
- analyze data to make predictions and/or defend conclusions
- distinguish between an experiment and other types of scientific investigations where variables cannot be controlled
- explain how hypotheses are valuable

**Supporting Standards.**
SC.8.N.1.3, SC.8.N.1.4.

**Embedded and Also Assessed Standards.**
SC.8.N.1.2, SC.8.N.1.5, SC.8.N.1.6, SC.8.N.2.2, SC.8.N.3.1

1. What is the test variable (independent variable)?
   This is the one (and only one) variable that is changed on purpose in an experiment.

2. What is the outcome variable (dependent variable)?
   This is the variable that changes as a result of changing the test variable. It is the variable that is measured during the experiment.

3. What are controlled variables?
   This describes all of the variables in an experiment other than the test variable. These variables must be “controlled” to ensure a fair test.

4. What is a control group?
   This describes the group(s) in an experiment, which do not have the test variable changed. This group is the “same” as it was before the test.

5. What is the test group?
   This describes the group(s) that have the test variable changed during the experiment.

6. What is a fair test?
   This describes an experiment which has one (and only one) test variable that is changed on purpose during the experiment.

7. What can create an unfair test for an experiment?
   An unfair test is created when an experiment has more than one test variable (independent variable) - even if it happened by accident.
8. How is a data table created to organize data in an experiment? Experimental data is organized in a data table. All data tables must have a title. The title of the data table must include the name of the outcome variable (dependent variable).

9. How is data from an experiment analyzed? Data from an experiment is analyzed in graphs. All graphs have a title. The title of the graph must include the name of the outcome variable (dependent variable). Graphs allow data to be interpreted.

10. What is a hypothesis? A hypothesis is a well-supported conditional statement that IF something happens, THEN something else will occur. In real science, a hypothesis is based on research (of the scientific evidence from experiments conducted by other scientists). A hypothesis is NOT a guess!

11. What is included in a conclusion for an experiment? A conclusion is the last part of an experiment and includes the following information:
   1. A summary of all of the data - not a restatement, just a summary.
   2. A statement which says whether the hypothesis is “supported” or “not supported.” (A hypothesis is not “true” or “false” or “right” or “wrong”).
   3. A statement of what the next will be after this experiment is complete. If the hypothesis was supported, the next step is to repeat the experiment. If the hypothesis is not supported, the next step is to re-evaluate the hypothesis and then to repeat the experiment.

QUESTIONS:

1) Keesha did an experiment to study the rate of photosynthesis in the water plant Elodea. She placed a piece of Elodea in a beaker of water and set the beaker 10 centimeters (cm) from a light source. Keesha counted the bubbles released from the plant every minute for five minutes (min). She repeated the process two more times. First, she moved the light to 20 cm from the beaker, and then she moved the light to 30 cm from the beaker. Keesha’s setup and data are shown below.

<table>
<thead>
<tr>
<th>Time (min)</th>
<th>Distance (cm)</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>10</td>
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<tr>
<td>2</td>
<td>29</td>
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<td>3</td>
<td>31</td>
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<td>4</td>
<td>31</td>
</tr>
<tr>
<td>5</td>
<td>30</td>
</tr>
</tbody>
</table>

What is the outcome variable (dependent variable) in this experiment?
Answer Options:

A. the number of bubbles produced
B. the type of plant placed in the beaker
C. the distance of the light source from the plant
D. the amount of time the bubbles were counted

2) Ernest Rutherford developed an experiment that showed protons can pass through gold atoms untouched and/or un-deflected. Sometimes the protons were deflected by something, but this did not happen too often. Most of the atoms pass straight through. His experiment changed the way scientists viewed the structure of an atom. What conclusion did Rutherford draw from his experiment?

A. The gold atoms are not close to each other.
B. The subatomic particles in the gold atoms are very close together.
C. Inside of the gold atom consists of empty spaces.
D. There can be no conclusion drawn from this observation.

3) A student wants to find out if temperature affects the behavior of goldfish. He has four fish bowls and 20 goldfish. Which of the following experiments should he do?
4) University of Florida scientists developed a new type of wound dressing that keeps bacteria out of the wound. What is a conclusion that you can make from this information?

A. Scientific discoveries always lead to new technologies.
B. Scientists often respond to the needs in our society.
C. Scientific advance are always made in the field of medicine.
D. Scientists may make discoveries that have no impact on society.

5) A farmer wants to find out which type of soil is best for growing his corn. He also wants to find out which type of fertilizer is best for growing his corn. He does the following experiment using two different types of soil and two different types of fertilizer:

What can the farmer conclude from this experiment?

A. He can conclude that Soil B is the best soil for growing his corn.
B. He can conclude that Fertilizer Y is the best fertilizer for growing his corn.
C. He can conclude that Soil B is the best soil for growing his corn and that Fertilizer Y is the best fertilizer for growing his corn.
D. It is NOT possible to conclude from this experiment which soil is best for growing his corn or which fertilizer is best for growing his corn.
Chandler trained ten rats to reach through a hole in their cage, press a button, and be rewarded with a food pellet. He trained them with many flavors of food pellets, recording how long it took each rat to press the button for each flavor. Having watched how quickly his rats ate bananas in their cages, he hypothesized that the rats would push the button the fastest with banana flavored pellets. All ten rats pressed the button the fastest while reaching for the banana pellet. Based on his evidence, he concluded that rats in the wild prefer banana to any other food.

Though there could be bias in one investigation, why could Chandler's conclusion be plausible based on his investigation?

A. Because he performed a true scientific investigation, since he collected empirical evidence in the form of direct observations from a replicable planned experiment.

B. Because he performed a true scientific investigation, since he likely met with and discussed ideas with a prestigious scientist at a university about lab rats.

C. Because he performed a true scientific investigation since he observed behaviors.

D. Because he performed a true scientific investigation since he observed lab rats.
SC. 7.N.1.4: Students will identify test variables (independent variables) and outcome variables (dependent variables) in a given scientific investigation.

1) A student wants to know if the weight of a cart affects its speed at the bottom of a ramp. He can change the weight of the cart by adding different numbers of balls, and he can change the height of the ramp by using different numbers of blocks. Which set of tests should he compare (set A, B, C, or D)?

A.  

B.  

C.  

D.  

2) A student is interested in the behavior of fish. He has 4 fish bowls and 20 goldfish. He puts 8 fish in the first bowl, 6 fish in the second bowl, 4 fish in the third bowl and 2 fish in the fourth bowl. He places each fish bowl under light, he keeps the temperature at 75°F for all four bowls, and he observes the behavior of the fish.
What can the student find out from doing just this experiment?

A. If the number of fish in the fishbowl affects the behavior of the fish.
B. If the temperature of the fish bowl affects the behavior of the fish.
C. If the temperature of the fish bowl and the amount of light affect the behavior of the fish.
D. If the number of fish, the temperature, and the amount of light affect the behavior of the fish.

SC. 7.N.1.3 (SC.6.N.1.3): Students will distinguish between an experiment and investigation

1) Scientists do many types of work. Their work often includes making field observations, conducting surveys, creating models, and carrying out experiments. Which description characterizes an experiment?

A. Observation of plants or animals in their natural environment.
B. Physical or mathematical representation of an object or process.
C. An organized procedure to study something under controlled conditions.
D. Collection of data from unregulated world for comparative purpose.
SC.6.L.14.1 - 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. (Content Complexity Level 1)

The levels of the hierarchical organization of organisms from smallest to largest are atoms to molecules, to cells, to tissues, to organs, to organ systems, to organisms. Hierarchical organization of organisms relates to the size and structure of the organism.

QUESTIONS:

1) Eugene drew the following diagram to describe the levels of structural organization of an animal’s body. At the top of the pyramid he put the animal’s body. The level of organization that is least specialized will be at the bottom.

Which of the following should Eugene list at the bottom of his diagram?

A. organ  
B. tissue  
C. cell  
D. organ system
2) The diagram shows parts of the human body. These parts work together to help you digest the food you eat.

Which term best describes the entire group of parts that are labeled?

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

3) Kevin is making a class display about different types of tissue. To illustrate one type of tissue, he draws a mail truck moving along a system of roads. His display explains how the truck carries messages from one place to another. Which type of tissue is Kevin most likely comparing to a mail truck carrying messages?

A. ground tissue  
B. muscle tissue  
C. nerve tissue  
D. protective tissue

4) Identify the hierarchical organization of an organism.

A. atoms, molecules, cells, tissues, organs, organ systems, organisms  
B. organisms, atoms, molecules, cells, tissues, organs, organ systems  
C. organ systems, organisms, atoms, molecules, cells, tissues, organs  
D. organs, organ systems, organisms, atoms, molecules, cells, tissues
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 multi-cellular), all cells come from preexisting cells, and cells are the basic unit of life. (Content Complexity Level 2)

The scientific theory of cells is comprised of three main components: all cells come from preexisting cells, the cell is the basic unit of life and all organisms are made up of one or more cells.

QUESTIONS:

1) Kayla summarizes the cell theory to her class. She states that all organisms are made up of one or more cells. Which pair of statements correctly completes her summary?

A. All cells come from existing cells, and all cells have the same parts.
B. All cells are the same size, and the cell is the basic unit of all organisms.
C. The cell is the basic unit of all organisms, and all cells have the same parts.
D. The cell is the basic unit of all organisms, and all cells come from existing cells.

2) One part of the cell theory states that cells come from other cells. Which statement below best explains that this part of cell theory applies to all organisms?

A. The cells of all organisms excrete waste.
B. The cells of all organisms have cytoplasm.
C. The cells of all organisms divide to make more cells.
D. The cells of all organisms take in nutrients from their environment.

SC.6.L.14.4 - 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. (Content Complexity Level 3)

**Plant cell wall**: composed of cellulose and is used in both protection and structure.
**Cell membrane**: protects the cell from its surroundings.
**Nucleus**: found in eukaryotic cells and functions as the brain of the cell. Also contains the majority of the cell's genetic material.
**Cytoplasm**: jelly-like fluid that fills up the cell.
**Chloroplasts**: work to convert light energy of the Sun into sugars
**Mitochondria**: produce the energy through respiration and to regulate cellular metabolism.
**Vacuole**: in plant cell & are filled with water to support organelle.
**Eukaryotic cell**: contain a nucleus surrounded by a membrane and whose DNA is bound together by proteins into chromosomes.
**Prokaryotic cell**: lack nucleus and membrane-bound organelles

QUESTIONS:

1) Which of the following correctly pairs a structure in a plant cell with its description?

A. Nucleus; supports the cell’s shape.
B. Mitochondria; transports materials.
C. Cell membrane; separates a cell from its environment
D. Cell Wall; consists of all genetic information needed by the cell.
2) Latoya adds sugar molecules to the cells she is studying. The cell will produce energy by the process of respiration. Toward which organelle is Latoya likely to find the sugar molecules moving?

A. chloroplast  B. lysosome  C. mitochondrion  D. nucleus

3) What cellular processes are necessary for cells to perform in order to maintain homeostasis?

A. Vacuole, respiration, chloroplast and photosynthesis
B. Photosynthesis, respiration, diffusion, osmosis
C. Nucleus, respiration, osmosis, diffusion
D. Chloroplast, respiration, osmosis, diffusion

4) Fill in the 3 indicators that are missing in the last column of the graphic organizer.

<table>
<thead>
<tr>
<th></th>
<th>Plant Cells</th>
<th>Animal Cells</th>
<th>Plant and Animal Cells</th>
</tr>
</thead>
<tbody>
<tr>
<td>cell membrane</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
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<tr>
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<td>no</td>
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<tr>
<td>cytoplasm</td>
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<td>E.R.</td>
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<tr>
<td>Golgi bodies</td>
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<tr>
<td>lysosome</td>
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<tr>
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<td>ribosome</td>
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<tr>
<td>vacuole</td>
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</tbody>
</table>

A. Lysosomes: plant only  Chloroplasts: both  Cell wall: animal only
B. Lysosomes: animal only  Chloroplasts: animal only  Cell wall: plant only
C. Lysosomes: Both  Chloroplasts: plant only  Cell wall: plant only

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 systems interact with each other to maintain homeostasis. (Content Complexity Level 3)
QUESTIONS:

1) Which two body systems make movement possible?

A. the skeletal and muscular systems.
B. the nervous and endocrine systems.
C. the lymphatic and immune systems.
D. the cardiovascular and respiratory systems.

2) Which process best describes respiration?

A. removing wastes from the blood stream.
B. breaking down food into smaller nutrients.
C. obtaining oxygen and releasing carbon dioxide
D. eliminating pathogens from the blood and lymph fluid.

3) Bones are the major part of the body’s skeletal system. What is one of the main functions of bones?

A. release growth hormones
B. provide structure and support
C. carry oxygen to the body’s cells
D. serve as the main source of calcium

4) The failure of body systems can disrupt homeostasis. The failure of which body system can cause an immediate problem?

A. digestive
B. reproductive
C. respiratory  
D. urinary

5) How can the circulatory and digestive systems work together?

A. The digestive system absorbs nutrients and the circulatory system transports nutrients around the body.  
B. The digestive system takes in food and the circulatory system controls the muscles of the stomach.  
C. The digestive system breaks down food and circulatory system protects organs.  
D. The digestive system gets rid of waste and circulatory system gets rid of carbon dioxide.

6) Organ systems work together to meet the needs of the human body. How is the skeletal system related to the nervous system?

A. The skeleton protects the brain and spinal cord.  
B. The brain determines how the skeleton develops.  
C. The brain and spinal cord hold the skeleton together.  
D. The skeletal system works as a part of the nervous system.

7) Which phrase defines the term homeostasis?

A. division of cells that make up the body  
B. regulation of the environment outside the body  
C. maintenance of a stable environment inside the body  
D. removal of waste materials produced by the cells of the body

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. (Content Complexity Level 3)

All living things have seven characteristics: Nutrition, Respiration, Growth, Excretion, Movement, Reproduction and Sensitivity. Living organisms are classified into groups according to how closely related they are. Each species of organism is given a unique two-word Latin name called a binomial. The first word of the binomial is the genus and the second word is the species.

King Philip Came Over For Good Soup, Linnaean Classification

This system was created long before scientists understood that organisms evolved. Because the Linnaean system is not based on evolution, most biologists are switching to a classification system that reflects the organisms’ evolutionary history.
QUESTIONS:

1) Which of the following identifies the levels of classification in correct order?

A. domain, kingdom, phylum, class, order, family, genus, species  
B. genus, species, domain, kingdom, phylum, class, order, family  
C. domain, kingdom, genus, species, phylum, class, order, family  
D. genus, species, phylum, class, order, family, domain, kingdom

2) How are members of Domain Eukarya different from members of Domain Archaea and Domain Bacteria?

A. Members of Domain Eukarya are less complex than the members of Domain Archaea and Domain Bacteria.  
B. Members of Domain Archaea and Domain Bacteria are multicellular, and members of Domain Eukarya are usually single-celled organisms.  
C. Members of Domain Eukarya have cells with membrane-bound organelles, and members of Domain Archaea and Domain Bacteria lack nuclei.  
D. Members of Domain Bacteria and Domain Archaea have structures for making their own food, and members of Domain Eukarya lack these structures.

3) What are the two parts of a scientific name?

A. genus and species  
B. phylum and class  
C. domain and genus  
D. domain and kingdom

4) Which memory tool will you remember the levels of classification?

A. King Phillip Came Over For Good Soup  
B. Kids Playing Chess on Freeways Get Squished  
C. Both A and B

5) Using the chart below what level(s) of classification do you have in common with a cat?

A. Domain, Kingdom, Phylum, Class  
B. Domain, Kingdom Class, Order  
C. Species, Genus, Family, Order  
D. Species, Genus, Family Class
6) What does the “E” in Mrs. Gren represent?

A) Excrete means living things can hear.
B) Excrete means to eliminate waste.
C) Excrete means to make babies.

SC.7.L.15.2 - Explore the scientific theory of evolution by recognizing and explaining ways in which genetic variation and environmental factors contributes to evolution by natural selections and diversity of organisms. Complexity level 3

Summary: Theory of Evolution

- Species are different due to variation in their genes (variation results from random mutation).
- Some individuals are better suited for survival, and will leave more offspring (natural selection or “survival of the fittest”).
- Over time, change within species leads to the replacement of old species by new species as less successful species becomes extinct.
- There is clear evidence from fossils, anatomy, physiology, DNA, and embryology that the species now on Earth have evolved from ancestors that are now extinct.

QUESTIONS:

1) What is Natural Selection?

A. The process by which humans breed a species for certain traits.
B. The process in which inherited traits of a population change over many generations.
C. The process by which Charles Darwin noted the differences in finches while visiting the Galápagos Islands.
D. The process by which individuals that are better adapted to their environment are more likely to survive and reproduce.

2) A scientist described two modern-day species as sharing a common ancestor. What does it mean when two species share a common ancestor?

A. It means that the two species are actually the same species.
B. It means that one of the species evolved from other species.
C. It means that both species evolved from one species that lived in the past.
D. It means that the two species share all the same traits.
3) Based on the illustration above what type of evidence is presented for the evolution of a horse?
   A. Comparative Anatomy
   B. Comparative Embryology
   C. Molecular Biology

4) How does the anatomy and structure shown below provide evidence of evolution?
   A) Fossils are generally found in sedimentary rock layers formed from sediments of sand, dust, mud, soil and other particles found at the bottom of water.
   B) There are different types of fossils (petrified remains, molds, casts, frozen remains, footprints amber and caprolites)
   C) Comparing the anatomy of different organisms reveals basic similarities even if their functions are different.

SC.7.L.16.1 - 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. (Content Complexity Level 3)

Genotype is the set of genes in our DNA which is responsible for a particular trait.

Phenotype is the physical expression, or characteristics, of that trait.

Homozygous describes a genotype consisting of two identical alleles at a given locus.

Heterozygous describes a genotype consisting of two different alleles at a locus.
Every organism requires a set of chemical instructions (DNA) that specifies its traits. Hereditary information (DNA) contains genes located in the chromosomes of each cell. Heredity is the passage of these instructions from one generation to another.

QUESTIONS:

1) DNA contains genes that provide instructions for inherited traits. What is the relationship between the genes and chromosomes?

A. Genes are segments of DNA that are located on the chromosomes of each cell.
B. Genes are made up of thousands of chromosomes.
C. Genes correspond to the phenotype, while chromosomes correspond to the genotype.
D. Chromosomes correspond to the phenotype, while genes correspond to the genotype.

2) A Siamese cat has genes that affect its fur color. Its fur color is also affected by temperature. Which of the following is true?

A. The environment changes the cat’s genotype.
B. The environment changes the cat’s phenotype.
C. The cat’s genotype changes the environment.
D. The cat’s phenotype changes its genotype.

3) In the Punnett Square below what is the probability a homozygous recessive offspring?

A. 50%
B. 25%
C. 75%
D. 100%
4) Which of the following is mitosis NOT used for?
   A. Repair (a wound) in multicellular organisms
   B. Asexual reproduction in unicellular organisms
   C. Development (ex. Baby in the mother’s womb).
   D. Production of gametes

5) Meiosis produces which of the following?
   A. Plant cells
   B. Animal cells
   C. Sex cells
   D. Skin cells

6) Based on the Pedigree above what is the probability of a 2nd or 3rd generation female having a Widow’s Peak?
   A) 25%
   B) 50%
   C) 100%

SC.7.L.17.2 - Compare and contrast the relationships among organisms, such as mutualism, predation, parasitism, competition, and commensalism. (Content Complexity Level 2)
Abiotic factors are nonliving chemical and physical parts of the environment that affect living organisms and the functioning of ecosystems. **Biotic factors** are living things or any living component within an environment in which the action of the organism affects the life of another organism.

There are five ecological relationships in which two are oppositional and four are symbiotic. The oppositional relationships are predation and competition. The symbiotic relationships are mutualism, commensalism, and parasitism.

**How are predation & parasitism similar? How do they differ?**
- **Predation & parasitism** are both relationships in which one organism benefits while the other is harmed.
- In predation, the predator needs to kill its prey in order to benefit.
- In parasitism, the parasite benefits by keeping its host alive.

**QUESTIONS:**

1) What is the primary source of energy used by producers during photosynthesis?

   A. Thermal energy from the sun
B. Light energy from the sun
C. Chemical energy from food and oxygen
D. Chemical energy from carbon dioxide and water

2) What type of organisms provides the base for this food web?
   A. Predators and prey
   B. Autotrophs and decomposers
   C. Predators and decomposers

3) What is the primary role of decomposers in an ecosystem?
   A. To control the population of producers and consumers
   B. To compete with producers for energy and other resources
   C. To provide a source of energy for the producers in the ecosystem
   D. To recycle energy and materials from dead producers and consumers

4) One relationship between organisms is that of predator-prey. Which of the following is the best description of a predator?
   A. An organism that eats another organism
   B. An organism that participates in symbiosis
   C. An organism that is eaten by another organism
   D. An organism that benefits at the expense of another organism

5) Which relationship is most likely to increase the population of one species in an ecosystem without affecting the population of its associated species?
   A. predation
   B. mutualism
   C. parasitism
   D. commensalism

6) The graph below shows the population of a group of rabbits in a restricted area studied over a period of 5 years. Which statement might explain why the population levels off as shown in the graph?
A. The resources in the area ran out.
B. Predators were introduced into the area.
C. The rabbits encountered a new disease.
D. Competition for resources limits the rabbit population.

7) What is the relationship between the primary and secondary consumers in the following web?
A) Predator / Prey
B) Parasitism
C) Mutualism
8) what is the amount of energy transferred from each level in the above illustration?

A) 50%
B) 100%
C) 10%

SC.8.L.18.4 - Cite evidence that living systems follow the Laws of Conservation of Mass and Energy.
(Content Complexity Level 3)

**Conservation**
- **Law of Conservation of Mass:**
  Mass cannot be created or destroyed.

- **Law of Conservation of Energy:**
  Energy cannot be created or destroyed; it may only change from one form to another.

THE CARBON CYCLE
Photosynthesis

The way plants make its food is a very important kind of natural chemical reaction. It takes in carbon dioxide from the air and turns them into carbohydrates the food for the plant. It also produces oxygen as part of the process. A chemical in a plant's leaves, called chlorophyll uses the energy from sunlight to carry out the chemical reaction.

Photosynthesis is the process by which plants use the energy from sunlight to produce sugar, which cellular respiration converts into the "fuel" used by all living things. The conversion of unusable sunlight energy into usable chemical energy, is associated with the actions of the green pigment chlorophyll. Most of the time, the photosynthetic process uses water and releases the oxygen.

QUESTIONS:

1) Which of the following statements best defines the law of conservation of mass?
   A. Mass cannot be created but it can be destroyed under extreme pressures.
   B. Mass cannot be conserved during a chemical reaction; a little bit of mass is always lost.
   C. The mass of a closed system cannot change over time; mass cannot be created nor destroyed.
   D. Mass cannot be conserved during a chemical reaction; a little bit of mass is always lost.
2.) Which pigment reflects orange, yellow, and red light and absorbs the other colors to provide energy for photosynthesis?
   A. chlorophyll
   B. thylakoid
   C. carotenoids
   D. chloroplast

3) How can the law of conservation of energy be expressed in the case of a chemical reaction?
   A. Total energy before the reaction is always less than the total energy after the reaction.
   B. Energy cannot be measured in a chemical reaction.
   C. Total energy before the reaction is always equal to the total energy after the reaction.
   D. Total energy before the reaction is always greater than the total energy after the reaction.

4. Plants and animals exchange materials through the processes of photosynthesis and respiration.
Which of these statements is true about the way these two processes are related?

   A. The products of photosynthesis inhibit respiration.
   B. The products of photosynthesis are also the products of respiration.
   C. The reactants of photosynthesis are also the reactants of respiration.
   D. The product of photosynthesis are the reactants of respiration.

5. Which of these substances is used for producers during photosynthesis and released during respiration?
   A. CO₂
   B. C₆H₁₂O₆
   C. O₂
   D. H₂

6. Which chemical compounds are the reactants of photosynthesis and products of cellular respiration?
7. In the human body, muscle cells have an increased need for energy during exercise. To help supply this energy, the body will immediately increase —
   A. activity in the nervous system to stimulate intake of carbon dioxide
   B. the need for waste products to be retained
   C. the breathing rate to supply more oxygen to cells for the release of energy
   D. food intake to increase the substances available for respiration

8. Which organelle does cellular respiration take place in, in eukaryotic cells?
   A. mitochondria
   B. vacuole
   C. lysosome
   D. chloroplast

9. Energy in food is released through
   A. photosynthesis
   B. electron transport chain
   C. cellular respiration
   D. Calvin cycle

7th grade Earth/Space Science Standards Summary and Practice Questions

SC.6.E.7.4: Differentiate and show interactions among the geosphere, hydrosphere, cryosphere, atmosphere, and biosphere.

1. Interactions of Earth’s Spheres and Earth Systems
   - **Hydrosphere**: Liquid Water (Ex. Lakes, Rivers, Oceans, Water cycle)
2. Weather and Climate

<table>
<thead>
<tr>
<th></th>
<th>Weather</th>
<th>Climate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition</td>
<td>Describes the atmospheric conditions at a specific place at a specific point in time. Weather generally refers to day-to-day temperature and precipitation activity.</td>
<td>Describes the average conditions expected at a specific place at a given time. A region's climate is generated by the climate system, which has five components: atmosphere, hydrosphere, cryosphere, geosphere, and biosphere.</td>
</tr>
<tr>
<td>Time Period</td>
<td>Measured for short term</td>
<td>Measured over a long period</td>
</tr>
</tbody>
</table>

QUESTIONS:
1) When nitrogen is returned to the soil when dead plants decompose, the interaction is between which two spheres?
   A. Hydrosphere and geosphere  
   B. Cryosphere and geosphere  
   C. Biosphere and Geosphere  
   D. Biosphere and atmosphere

2) Which of the following statements refers to weather?
   A. “It rains a lot in the Spring in my city.”  
   B. “It’s very hot and sunny today. Let’s go to the beach.”  
   C. “There are many people who don’t believe there is a hole in the ozone layer’”  
   D. “We are going south to Florida in January because it will be warmer.”

3) The water cycle is the continuous movement of water on, in and above the Earth. Which of the following describes evaporation in the water cycle?
   A. Water vapor meets cold air and changes back into a liquid  
   B. Plants take in water from the soil  
   C. Water gets heated and changes from liquid water to water vapor  
   D. Water freezes

SC.6.E.7.5: Explain how energy provided by the Sun influences global patterns of atmospheric movement and the temperature differences between air, water, and land.
QUESTIONS:

1) Which of the following is the best explanation for sea breezes and land breezes along Florida’s coasts?
   A. The Gulf Stream current in the Atlantic.
   B. Continental polar air masses moving in from the north.
   C. Conduction currents of rising cool air and falling warm air.
   D. Convection currents of rising, less-dense warm air and falling, denser cool air caused by differences in how quickly water and land absorb or lose the Sun’s heat.

2) 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 radiation?
   A. 1
   B. 2
   C. 3
   D. 4
SC.7.E.6.2: Recognize that there are a variety of different landforms on Earth's surface such as dunes, coastlines, mountains, glaciers, deltas, and lakes and relate these landforms as they apply to Florida.

The Rock Cycle

Earth’s Processes

<table>
<thead>
<tr>
<th>Earth Process</th>
<th>Description</th>
<th>Agents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weathering</td>
<td>The BREAKING DOWN of rock</td>
<td>Water, ice, wind, animals, growing plants</td>
</tr>
<tr>
<td>Erosion</td>
<td>The MOVEMENT of sediment from one place to another</td>
<td>Water, wind, ice, gravity</td>
</tr>
<tr>
<td>Deposition</td>
<td>The DROPPING of sediment in a NEW place</td>
<td>Deposits in lakes and oceans and can also form sand dunes</td>
</tr>
</tbody>
</table>

Human Impact on the Earth

<table>
<thead>
<tr>
<th>Human Impact</th>
<th>Definition</th>
<th>The Impact on Earth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deforestation</td>
<td>Permanent destruction of forests in order to make land available for other uses.</td>
<td>Loss of biodiversity; increase of greenhouse gas emissions; disruption of the water cycle and creation of soil erosions</td>
</tr>
<tr>
<td>Urbanization</td>
<td>An increase in population in cities in towns and areas that were once pastures and farmland.</td>
<td>Loss of biodiversity; increase of greenhouse gas emissions; pollution due to human consumption of food, energy, water and land</td>
</tr>
<tr>
<td>Desertification</td>
<td>The process by which fertile land becomes desert, typically as a result of drought, deforestation, or inappropriate agriculture</td>
<td>Reduces the ability of land to support life, affecting wild species, domestic animals, agricultural crops and people. The reduction in plant leads to accelerated soil erosion by wind and water.</td>
</tr>
</tbody>
</table>

QUESTIONS:

1) Our beaches in Florida are lined with large hotels and condominiums. Natural vegetation was cleared away from the beaches to make room for the buildings. What is a consequence that we have seen on Florida beaches as a result of clearing the vegetation for building?
   A. There is less food from the vegetation to feed the citizens of Florida
   B. There is more and more erosion of the beaches in Florida
   C. The fishing is not as abundant as it once was in Florida
   D. The sand is heating up at record levels on our beach

2) Both Ocala, Florida, and Lexington, Kentucky, are good places to raise racehorses, in part because of the limestone near the surface in both places. Calcium from the limestone helps make a horse's leg bones stronger and better able to withstand the pounding stress of running. Knowing that the
Bluegrass Region around Lexington also sits on top of limestone, what other land features are also likely to be found there?

A. Sand dunes, lakes, and springs  
B. Prairies, swamps, and marshes  
C. Sinkholes, caves, and aquifers  
D. Shallow rivers, flat land, and quartz sand

3) Slate is a metamorphic rock that forms from the sedimentary rock, shale. Which of the following is needed for slate to form from shale?

A. Weathering  
B. Erosion and deposition  
C. Melting and cooling  
D. Heat and pressure

4) Which of the following would be a cause of chemical weathering?

A. Acid rain  
B. Freezing and thawing  
C. Abrasion  
D. Animal action

SC.7.E.6.4 Explain and give examples of how physical evidence supports scientific theories that Earth has evolved over geologic time due to natural processes.

- **Fossil record:** history of life as documented by fossils, the remains or imprints of the organisms from earlier geological periods preserved in sedimentary rock.
- **Law of Superposition:** in any undisturbed sequence of rocks deposited in layers, the youngest layer is on top and the oldest on bottom, each layer being younger than the one beneath it and older than the one above it
- **Radioactive dating:** the process of determining the age of rocks from the decay of their radioactive elements

**QUESTIONS:**

1) The oldest rock formation identified on Earth is found on the shoreline of Hudson Bay in Canada. This rock formed 4.28 billion years ago. What information does a scientist need to more accurately determine the age of a rock?

A. The amount of each radioactive element present in the rock  
B. The percentage of each mineral that makes up the rock  
C. The thickness of younger rock layers that cover the rock  
D. The amount of weathering present on the surface of the rock
2) Which of these is in order from oldest to most recent?

A. 4, 3, 2, 5, 1  
B. 3, 2, 1, 4, 5  
C. 1, 2, 3, 4, 5  
D. 3, 4, 1, 5, 2

3) A trace fossil includes no physical remains of the organism’s body, but only a mark or structure that the fossil left behind. Which of these is not an example of a trace fossil?

A) Dinosaur tracks in sediment  
B) An insect in amber  
C) A burrow in the sea floor  
D) Coprolite in sediment

4) The fossil record shows part of the history of life on Earth and can tell scientists about environmental changes over time. Which of the following statements explains what fossils of palm fronds found in Antarctica tell us about what the climate was once like?

A) Palm fronds indicate an aquatic environment was once present  
B) Palm fronds indicate a period of drought once existed  
C) Palm fronds indicate a tropical climate was once present  
D) Palm fronds indicate Antarctica has always had a polar climate

SC.7.E.6.5 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.
Layers of the Earth

Plate Tectonics- The theory that Earth’s crust is divided into several plates that glide over the mantle. The area where two plates meet are called plate boundaries. There are three kinds of plate boundaries: divergent, convergent and transform. A different type of plate movement occurs along each type of boundary.

QUESTIONS:

1) The “Ring of Fire” is an area along the edge of the Pacific Ocean with many volcanoes. Most of the volcanoes are formed as a result of one tectonic plate. Which of these geological areas is where rock is recycled by one tectonic plate sliding underneath another tectonic plate?
   A. Rift valley
   B. Strike-slip fault
   C. Subduction zone
   D. Divergent boundary

2) If the locations of earthquakes over the past 10 years were plotted on a world map, which of the following would be observed?
   A. Earthquakes occur with the same frequency everywhere on Earth.
B. Earthquakes generally occur along the edges of tectonic plates.
C. Earthquakes most frequently occur near the middle of continents.
D. Earthquakes do not seem to occur in any consistent pattern.

3) The Himalayan Mountains are a result of ….
   A. A divergent plate boundary
   B. A transform fault
   C. A subduction zone
   D. A convergent plate boundary

4) If an oceanic plate and a continental plate collide, the dense ocean plate sinks, or is subducted, beneath the continental plate. Which of these is formed when the subducted plate melts?
   A. Folded mountains and glaciers
   B. Magma and volcanic mountains
   C. Earthquakes and volcanoes
   D. New seafloor and sediments

SC.8.E.5.3 Distinguish the hierarchical relationship between planets and other astronomical bodies relative to solar system, galaxy, and universe, including distance, size and composition.
   • Distances in Space (Astronomical Units (AUs), and Light Years)
   • Relative sizes (Planets, Solar Systems, Nebulae, Stars, Galaxies)

QUESTIONS:
1) If the entire Universe was represented in the diagram below as the #1, which of the following correctly lists the objects of space from largest to smallest?
   A. Earth, Milky Way, Universe, Solar System
   B. Universe, Solar System, Earth, Milky Way
   C. Universe, Milky Way, Solar System, Earth
   D. Earth, Universe, Solar System, Milky Way

2) Scientists have discovered a newly formed object in the Milky Way Galaxy. In addition to calculating the mass of the object to be more than 30 times the mass of the Sun, the study team also found a cloud of dust and gas around the object and found the object to be composed almost entirely of hydrogen and helium. Which type of celestial object would these findings help us learn more about?
   A. A young star
   B. An old star
   C. A terrestrial planet
   D. A gas giant planet

3) The points labeled on the chart below represent the approximate size of Earth, the Milky Way, the Moon, and the Sun. The approximate size of the solar system is also shown. Which point on the chart best represents the approximate size of the Sun?
   A. Z
   B. Y
   C. X
   D. W

SC.8.E.5.5: Describe and classify specific physical properties of stars: apparent magnitude (brightness),
temperature (color), size, and luminosity (absolute brightness).

1. Properties of the sun
- Medium-(1-Solar Radii)
- Color: Yellow
- Temperature: 6,000K
- Core: Energy is created in the core by nuclear fusion
- Radiation Zone: Energy from the core moves through this layer by radiation wave.
- Convection Zone: Energy moves through this layer by convection.

2. Properties of stars
- Brightness of a star is affected by temperature, distance, and size.
- Color is affected by temperature.
- Red-Coolest star Blue- Hottest star

QUESTIONS:

1) Compared to the surface temperature and luminosity of massive stars in the Main Sequence, the smaller stars in the Main Sequence are:

A. Hotter and less luminous  
B. Hotter and more luminous  
C. Cooler and more luminous  
D. Cooler and less luminous

2) The Hertzsprung-Russell diagram classifies stars based on temperature and brightness. If two stars have the same size, but different temperatures, then the hotter star will be:

A. Bluer and brighter  
B. Bluer and fainter  
C. Redder and brighter  
D. Redder and fainter

3) Two stars have the same apparent magnitude as seen from Earth. Star A is 45 light years away, Star B is 322 light years away. Which of the following statements is true?
A. Star B is larger than Star A
B. Star B is brighter than Star A
C. The stars have the same absolute magnitude
D. Star A has a smaller absolute magnitude
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.

**The Law of Universal Gravitation**

The law says that:
- Gravity increases as the mass of an object increases
- Gravity decreases as the distance between objects increases

**Properties of the Solar System**

<table>
<thead>
<tr>
<th>Planet</th>
<th>Average Distance from Sun (kilometers)</th>
<th>Surface Characteristics</th>
<th>Moons/Rings</th>
<th>Mass Compared to Earth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mercury</td>
<td>58,000,000</td>
<td>Rocky</td>
<td>No/No</td>
<td>0.055 x Earth</td>
</tr>
<tr>
<td>Venus</td>
<td>108,000,000</td>
<td>Rocky</td>
<td>No/No</td>
<td>0.815 x Earth</td>
</tr>
<tr>
<td>Earth</td>
<td>150,000,000</td>
<td>Rocky</td>
<td>Yes/No</td>
<td>1 x Earth</td>
</tr>
<tr>
<td>Mars</td>
<td>228,000,000</td>
<td>Rocky</td>
<td>Yes/No</td>
<td>0.10744 x Earth</td>
</tr>
<tr>
<td>Jupiter</td>
<td>778,000,000</td>
<td>Gaseous</td>
<td>Yes/Yes</td>
<td>317.82 x Earth</td>
</tr>
<tr>
<td>Saturn</td>
<td>1,427,000,000</td>
<td>Gaseous</td>
<td>Yes/Yes</td>
<td>95.16 x Earth</td>
</tr>
<tr>
<td>Uranus</td>
<td>2,871,000,000</td>
<td>Gaseous</td>
<td>Yes/Yes</td>
<td>14.371 x Earth</td>
</tr>
<tr>
<td>Neptune</td>
<td>4,498,000,000</td>
<td>Gaseous</td>
<td>Yes/Yes</td>
<td>17.147 x Earth</td>
</tr>
</tbody>
</table>

**QUESTIONS:**

1) If the average distance between Earth and the Sun were doubled, what changes would occur in the Sun’s gravitational pull on Earth and Earth’s period of revolution?
   A. Gravitational pull would decrease and period of revolution would increase.
   B. Gravitational pull would decrease and period of revolution would decrease.
   C. Gravitational pull would increase and period of revolution would increase.
   D. Gravitational pull would increase and period of revolution would decrease.

2) Temperatures on Mars reach as high as 20 °C and fall as low as –140 °C. That temperature is colder than any place on Earth. Temperatures on Earth vary, but they stay within a range of –89 °C to 58 °C. Which of these physical properties is responsible for the greater range of temperatures on Mars as compared to those on Earth?
   A. Period of revolution
   B. Thin atmosphere
   C. Mass
   D. Axial tilt

3) The diagram to the right shows several objects in space. Which of these choices best identifies what the diagram shows?
   A. Location of comets
   B. Galaxy that is nearest to Earth
   C. Heliocentric solar system
   D. Geocentric solar system
SC.8.E.5.9: Explain the impact of objects in space on each other including:
- The Sun on the Earth including seasons and gravitational attraction
- The Moon on the Earth, including phases, tides, and eclipses, and the relative position of each body.

1. Seasons:  
   Seasons: Caused by the tilt of Earth on its axis.

2. Tides:  
   Tides: Caused by the moon.

3. Eclipses:

QUESTIONS:

1. The gravitational pull of the Moon has the greatest influence on the water levels of Earth’s ocean tides. If the distance between the Moon and Earth were to decrease steadily for one week, which water-level changes would be expected to occur?
   A. High tides would get higher and low tides would get lower.
   B. Both high tides and low tides would get higher.
   C. Both high tides and low tides would get lower.
   D. High tides would get lower and low tides would get higher.
2) Which diagram below shows the possible orientation of the Earth (E), the Sun and the Moon (M) so that an observer on Earth would see a full moon?

A) D  
B) C  
C) B  
D) A

3) Occasionally, one space object travels through the shadow of another object in space. When the moon moves between the Sun and Earth casting a shadow on Earth, which solar system event is taking place?

A) A full moon  
B) A crescent moon  
C) A solar eclipse  
D) A lunar eclipse
8th grade Physical Science Standards Summary and Practice Questions

SC.6.P.13.1 Investigate and describe types of forces including contact forces and forces acting at a distance, such as electrical, magnetic, and gravitational.

1. Contact forces are forces that require objects to be in direct contact (touching). Examples of contact forces would include:
   a. Friction- force that occurs when objects rub together as one object attempts to move past another
   b. Tension- force transmitted by a cable, rope, string, or wire when it is pulled tight by forces acting from opposite ends
   c. Applied- force that is applied to an object by a person or another object
   d. Normal- the support force exerted upon an object that is in contact with another stable object (relates to Newton’s 3rd law of motion)
   e. Air resistance (drag)- type of frictional force that acts upon objects as they travel through the air

2. Non-contact forces are forces that do not require objects to touch in order to affect the object. Non-contact forces act using a “field” of influence. Examples of non-contact forces would be:
   a. Magnetism- a force of attraction or repulsion that acts at a distance due to a magnetic field, caused by moving electrically charged particles
   b. Gravity- force with which the earth, moon, or other massively large object attracts another object towards itself
   c. Electrical forces (such as static electricity)- the attractive or repulsive interaction between any two charged objects

3. Gravitational force on an object depends upon the masses of the objects and the distance between the objects.
   a. The more mass an object has, the greater the gravitational force exerted by it. This is how the Sun, which has over 99% of all of the solar system’s mass in it, is able to attract the planets and other solar system objects to it.
   b. The greater the distance between the objects, the weaker the gravitational attraction is. This explains why space objects in the outer solar system are less attracted to our sun than the inner solar system objects.

4. Weight is a measurement of the force (pull) of gravity acting on the mass of an object. As gravitational force changes in strength, the weight of an object can change. The mass of the object is unaffected by gravitational force.

QUESTIONS:

1. Luis rubbed a balloon on his hair and held the balloon next to a faucet trickling water. He observed that as the balloon was placed close to the water, the stream of water appeared to “bend” to move out of the way. Which of the following forces is responsible for the stream of water moving away from the balloon?

   A. Gravity
   B. Magnetism
   C. Friction
   D. Electric
2. If a spring is attached to two boards with one board at each end of the spring, and the two boards are pulled far apart to stretch the spring, what force will the spring exert in response?

A. It will sag between the two boards.
B. It will pull the boards toward each other.
C. It will hold the boards steady in one place.
D. It will spin the boards in opposite directions.

3. Imagine two planets, Planet A and Planet B, in a distant galaxy. Both planets have the same size, but Planet A has more mass than Planet B. Suppose two identical alien space vehicles land on each planet. Which of the following statements is true?

A. The weight of the space vehicle is greater on Planet A, but the vehicle’s masses are the same on both planets.
B. The mass of the space vehicle is greater on Planet A, but the vehicle’s weights are the same on both planets.
C. Both the mass and weight of the space vehicle are greater on Planet A.
D. Both the mass and weight of the space vehicle are the same on both planets.

4. A ball rolls down from the top of a grassy hill, reaches the bottom of the hill, continues to roll, and then starts to slow down and comes to a stop. What forces caused this ball's motion?

A. Frictional force caused the ball to roll down the hill, but air resistance caused the ball to slow down and stop.
B. Magnetic force caused the ball to roll down the hill, but gravity caused the ball to slow down and stop.
C. The force of the hill caused the ball to roll down it, but gravity caused the ball to slow down and stop.
D. Gravity caused the ball to roll down the hill, but frictional force caused the ball to slow down and stop.
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.

1. **Unbalanced forces** cause an object to change speed and/or direction.
2. When an object has **balanced forces** the object will not move or will move at a constant speed in the same direction.
3. An object will have a maximum of two sets of parallel forces acting on it.
4. The net force of an object is the sum of all the forces acting on the object.
5. When the forward force is greater than the backward force the object speeds up. When the backward force is greater than the forward force the object slows down.
6. Friction is to be included as a force in both sliding and stationary situations.

**QUESTIONS:**

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

![Diagram of forces acting on a model airplane]

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) A box that is sitting against a wall has a mass of 5 kg. The box is pushed with a force of 10 N to the left, but the box does not move. Calculate the net force acting on the box.

A. The net force acting on the box is 10 Newtons.
B. The net force acting on the box is 50 Newtons.
C. The net force acting on the box is 40 Newtons.
D. The net force acting on the box is 0 Newtons.
SC.6.P.12.1 Measure and graph distance versus time for an object moving at a constant speed. Interpret this relationship.

1. **Motion** is when an object changes position.
2. Speed is the how long it takes for an object to travel a certain distance.
3. In order to find the speed of an object you must have the distance it traveled and the time it took.
4. **Constant speed** - object travels the same speed the entire distance. The graph will be linear on a distance vs. time graph.
5. **Acceleration** - changing speed. If speed is increasing then it has positive acceleration. If the speed is decreasing then it has negative acceleration. The graph will be a curved line on a distance vs. time graph.

1) The displacement-time graph below represents the motion of a cart initially moving forward along a straight line.
During which interval is the cart moving forward at constant speed?

A. AB  
B. DE  
C. CD  
D. BC

2) A scientist created the graph below of the motion of three objects.

Which of the following is correct about the motion of the objects?

A. Object Q is not moving at all.
B. Object S is traveling at a faster speed than Object R.
C. Object R is increasing in speed by 2 m/s.
D. Object R is traveling at a slower speed than Object S.
SC.7.P.10.1 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.

A. Radiation is the transfer of energy as electromagnetic waves.
B. Electromagnetic waves are measured by frequency or wavelength. Electromagnetic spectrum is a range of frequencies or wavelengths that an electromagnetic wave can have.
C. There are two parts of the spectrum: Visible and invisible. Gamma rays, X-ray, Ultraviolet, Infrared, microwaves, and radio waves are invisible radiations. Sunlight is the visible spectrum.
D. The shorter the wavelength, the higher the frequency and the energy.
E. Gamma, X-rays, and Ultraviolet are very energetic while Infrared, microwaves, and radio waves are less energetic.

QUESTIONS:

1) Electromagnetic radiation is energy that travels in waves. Some examples of electromagnetic radiation are visible light, radio waves, and x-rays. Which statement is true for all forms of electromagnetic radiation?

A. All forms of electromagnetic radiation travel at the same speed in a vacuum.
B. All forms of electromagnetic radiation have the same frequency.
C. All forms of electromagnetic radiation have the same wavelength
D. All forms of electromagnetic radiation have the same amount of energy in a vacuum.

2) Which of the following colors of the Visible Light Spectrum has the lowest amount of energy?

A. Yellow
B. Green
C. Blue
D. Orange
SC.7.P.10.3 Recognize that light waves, sound waves, and other waves move at different speeds in different materials.

1. Mediums are substances through which a wave can travel. Mediums can be solids, liquids, or gases. Some examples of mediums could be ocean water for ocean waves or air for sound waves. Light waves, also known as electromagnetic waves, do not need a medium. They can travel through the vacuum of space to the Earth from the sun. Waves that require a medium are called mechanical waves. Sound is an example of a mechanical wave because it passes vibrations through a substance from the sound source to the sound receiver.

2. Electromagnetic and mechanical waves travel at different speeds through different materials. Light waves travel the fastest through the vacuum of space since there are no particles to interfere with the way the light is traveling. Light waves begin to slow down as they enter the Earth’s atmosphere due to encountering gas particles. As particles become denser in liquids and then in solids, the light waves are slowed down even more.

3. Mechanical waves, which require a medium, are made faster by having more densely packed particles. Sound, a type of mechanical wave, travels the slowest through gases where the particles are the most spaced out and the fastest through solids where they are tightly packed together. Mechanical waves are unable to travel in a vacuum, such as outer space, due to the absence of any particles to carry the vibrations.

4. Though sound waves travel faster in solids, more energy is lost and they cannot travel as far.

5. Pitch is how high or low the sound is. Pitch is related to frequency. The higher the pitch the higher the frequency and the lower the pitch, the lower is the frequency.

QUESTIONS:

1) A light wave from the sun shines through the atmosphere, into the window of a house, and through a plastic fish tank. In which of the following mediums would the light waves travel the fastest?

   A. The air in the atmosphere
   B. The glass in the window
   C. The water in the fish tank
   D. The plastic fish tank

2) While watching a popular space-based science fiction movie, space vehicles loudly shoot each other with lasers and explode with a booming sound. Students of science know that sound does not travel through space and these movie scenes showing space sounds are factually incorrect. Why are there no sounds in space?

   A. Sound waves travel as transverse waves.
   B. Sound waves require a medium.
   C. Sound waves can only travel through air particles.
   D. Sound waves have high frequencies.
SC.7.P.11.2 Investigate and describe the transformation of energy from one form to another.

A. Energy can come in many different forms such as mechanical, sound, electromagnetic, chemical, thermal, and nuclear energy.
B. One form of energy can transform into another form of energy.
C. No energy transformation can ever be 100% efficient.
D. A common form of unwanted energy in an energy transformation is heat, which is a result of friction.

QUESTIONS:
  1) Emma constructed a simple motor. When connected correctly, the coil of copper wire spins. Which of the following best describes the energy transformation that takes place between the paper clips and the spinning coil?

A. Chemical energy transforms into electrical energy.  
B. Mechanical energy transforms into electrical energy.  
C. Electrical energy transforms into mechanical energy.  
D. Mechanical energy transforms into chemical energy.

2) A television is a device that converts electrical energy into light and sound energy. Not all the energy that enters a television is converted into light and sound, however. What happens to the energy that enters a television but is not converted into light or sound?

A. The energy returns to the electrical socket.  
B. The energy is stored in the wires in the television.  
C. The energy is lost as heat.  
D. The energy is destroyed in the conversion process.

3) Ms. Simpson's science students were observing a demonstration with Newton's cradle, as shown in the
They noticed that when the ball was raised and released on the left side, it hit the stationary balls, and its kinetic energy was transferred all the way to the last ball on the right, causing it to be propelled up. This action continued for a while, but as time went on, the balls did not go as high and eventually stopped.

**Why did the balls stop moving?**
A. The combined mass of the balls could not be overcome by the force of one moving ball.
B. Due to the force of gravity pulling the balls down, energy was continually lost to the surrounding environment.
C. Due to air resistance and friction between the string and the frame, some of the energy was transferred to the surroundings.
D. The three middle balls blocked the energy from getting to the outside balls, so they could not rise as much.

4. **A group of students are eating in the cafeteria. As they eat, the students break down the molecules in the food, which releases energy. Which form of energy is stored in the food?**

A. Chemical energy
B. Elastic energy
C. Nuclear energy
D. Thermal energy

5. **Mary throws a tennis ball into the air. It rises, stops momentarily when it reaches its greatest height, and then falls back to the ground. At what point does kinetic energy converted to potential energy?**

A. When the tennis ball is rising
B. When the tennis ball is falling
C. Just after the tennis ball hits the ground
D. While the tennis ball is at the highest point
Observe and describe that heat flows in predictable ways, moving from warmer objects to cooler ones until they reach the same temperature.

1. Energy can be transferred in three different ways: conduction, convection, and radiation. Conduction is the transfer of energy as heat from one substance to another through direct contact. Convection is the transfer of energy as heat by the movement of a liquid or a gas. Radiation is the transfer of energy by electromagnetic waves.

2. When two objects of different temperature come in contact, energy is always transferred from the object at warmer temperature to the object at a lower temperature. For example, if a warm bottle of soda is placed into a cooler of ice, the heat energy from the warm soda will move into the cooler of ice. This movement of heat energy causes the soda to cool down and the cooler of ice to heat up. This energy transfer will continue until the two objects attain the same temperature.

3. As an object is heated, the state of matter may change. Solids have the most tightly packed particles which are moving slowly. The particles in a liquid are less tightly packed, move faster than in a solid, and take the shape of their container. A gas contains the fastest moving particles that spread out to fill their container.

4. As an object is cooled, the particles that make up the object begin to move more slowly and contract (pull together). If the object was in the gaseous state of matter, this contraction will cause the gas to become a liquid. With further cooling, this contraction of particles will cause the substance to become a solid.

QUESTIONS:

1) What happens when a solid melts?

A. Its molecules move farther apart.
B. Its molecules move closer together.
C. The speed of its molecules decreases.
D. The temperature decreases although heat is added.

2) Some ice cubes are added to a pot of boiling water. After a few moments, the water stops boiling. Which of the following explains why the water stopped boiling?

A. Heat energy from the water melted the ice.
B. Particles from the boiling water moved into the ice and melted the ice.
C. Cold energy from the ice transferred into the water, lowering the temperature of the water.
D. Cold energy leaving the ice caused it to melt.

3) Roberto is a musician playing in a band. At the end of a song, he plucks a single guitar string. The string moves rapidly back and forth. Which of these statements explains what happens to the kinetic energy of the moving string?

A. The kinetic energy is changed into potential energy and stored.
B. The kinetic energy is converted to sound energy and thermal energy.
C. The kinetic energy is slowly destroyed until no energy remains.
D. Some of the energy is converted to sound energy, but the rest is destroyed.
SC.8.P.8.4: 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.

A. The density of a substance is determined by dividing the mass of the substance by its volume.
B. A characteristic of a substance that can be observed and measured without changing its identity is called physical property of a substance.
C. Common physical properties are magnetic, density, thermal conductivity, malleability, luster, boiling point, melting point, solubility, and electrical conductivity.
D. Physical properties are properties used to describe a substance.

QUESTIONS:

1) In a lab, a scientist has a beaker of pure water and a battery at the bottom. When he places a light bulb in the water, the light bulb does nothing. He then adds salt to the water, and places the light bulb in the water with salt in it, and the light bulb lights up. What physical property was produced in the water when salt was added to the water?
   A. Solubility
   B. Flammability
   C. Malleability
   D. Conductivity

2) The table shows the properties of four unknown liquids. Each sample is in its own beaker. A student adds equal amounts of substance K to each beaker.

\[
D = \frac{M}{V}
\]

<table>
<thead>
<tr>
<th>Liquid</th>
<th>Volume (mL)</th>
<th>Mass (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>W</td>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td>X</td>
<td>16</td>
<td>100</td>
</tr>
<tr>
<td>Y</td>
<td>11</td>
<td>75</td>
</tr>
<tr>
<td>Z</td>
<td>23</td>
<td>150</td>
</tr>
</tbody>
</table>

If substance K has a known density of 6.4 g/mL, in which liquids would K sink?

A. W and X
B. X and Z
C. W and Y
D. Y and Z
3) A student determines the volume, density, and boiling point of three colorless liquids and lists them in the table below.

<table>
<thead>
<tr>
<th></th>
<th>Volume (mL)</th>
<th>Density (g/mL)</th>
<th>Boiling Point (°C)</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquid 1</td>
<td>10</td>
<td>0.79</td>
<td>56</td>
<td>colorless</td>
</tr>
<tr>
<td>Liquid 2</td>
<td>50</td>
<td>0.79</td>
<td>78</td>
<td>colorless</td>
</tr>
<tr>
<td>Liquid 3</td>
<td>10</td>
<td>1.0</td>
<td>100</td>
<td>colorless</td>
</tr>
</tbody>
</table>

Could any of the liquids be made of the same substance? Why?

a. Liquids 1 and 2 could be the same substance because they have the same density.
b. Liquids 1 and 3 could be the same substance because they have the same volume.
c. Liquids 1, 2, and 3 could be the same substance because they are all clear liquids.
d. None of the liquids could be the same substance because they have different combinations of density, and boiling points.

4) Matthew has six cubes of different materials. Each cube has a mass of 10 grams (g). Matthew sorts the cubes into two groups using one physical property.

Groups of Different Materials

<table>
<thead>
<tr>
<th>Group 1 Cubes</th>
<th>Group 2 Cubes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum</td>
<td>Glass</td>
</tr>
<tr>
<td>Copper</td>
<td>Plastic</td>
</tr>
<tr>
<td>Steel</td>
<td>Wood</td>
</tr>
</tbody>
</table>

Which physical property did Matthew most likely use to sort the cubes into two groups?

A. density  
B. magnetism  
C. melting point  
D. electrical conductivity
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. (Also embedded **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 - Periodic Table (grouped by 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.8.9: Students will differentiate among pure substances, mixtures, and solutions.)

1. **Matter** is made up of very small particles known as atoms. **Atoms** contain a positively charged **nucleus** surrounded by negatively charged **electron cloud**. The nucleus of an atom contains **protons** and **neutrons**. Atoms are characterized by their atomic number and mass number. The electron cloud contains **electrons**. Atoms are the smallest unit of an element that maintains the properties of an element. They can be combined in different ways to produce different substances. They are called the building blocks of matter. As you look at a leaf close up using a microscope, you can see that it’s made up of cells. If you could look even closer at cells, you could see that they are made up of billions and billions of smaller particles, called atoms.

2. An **element** is made up of one or more of the **same** kind of atom chemically combined. A **compound** is made of **different kinds** of atoms that are chemically combined. They have different properties from the elements that make them up. Water is a common substance. The formula for water is H2O. This means that a molecule of water is made up of 2 hydrogen atoms and 1 oxygen atom. Water can be found in any state: a liquid, a solid, and a gas. In every state of water, it’s still matter. Sometimes water can be a gas and even though you can’t always see it, it’s still matter because it’s made up of 2 hydrogen atoms and 1 oxygen atom and it has mass. Carbon atoms can bond to one another to form coal or diamonds. Carbon can also bond to other elements. One carbon atom will bond with two oxygen atoms to form carbon dioxide, a compound in auto exhaust.

3. Compounds can be classified by their pH as **acidic** (pH below 7), **basic** (pH above 7), or **neutral** (pH is 7). **Salts** formed when an acid and a base combine together to form a neutral substance.

4. Compounds can be **organic** such as sugar, starches, fats, and proteins. These compounds are made up by living organisms. Compounds can be **inorganic** such as rust and sand.

5. **Pure substances** are made up of one type of particle. They cannot be formed or broken down by physical changes. Compounds are pure substances such as water and carbon dioxide. Elements are pure substances made of only one type of atom such as gold. Pure gold is made up of only gold atoms. Copper wires are pure copper. This means they are made up of only copper atoms. The helium that is used to fill some balloons is another example of an element. Helium gas is made up of only helium atoms. These are just a few examples of elements and the atoms they are made of. Since there are so many elements, scientists needed some way to keep track of them.

6. Elements are organized into a table based on their characteristics. Scientists call it the **Periodic Table of Elements**. You can use the periodic table to get some basic information about the elements. There are 118 known elements. If you look at the information on the table, you will learn a little about the element. Carbon is one of the elements in the table and the symbol is C. It has an atomic number of 6 and a mass number of 12. Elements are arranged in the periodic table in horizontal rows /**periods** based on their increasing atomic number and in vertical columns /**families/groups** based on their properties.

7. **Mixtures** are not pure substances. They are made up of more than one type of particle. They can be
separated by physical changes. Mixtures can be **homogenous** or **heterogeneous**. **Solutions** are homogeneous mixtures. They are formed by dissolving a **solute** in a **solvent**. They can be gases such as air or liquids such as tea, or solids such as **alloys**. Examples of alloys are brass and steel. Suspensions are heterogeneous mixtures in which the particles of the material are spread throughout a liquid or gas but are too large to stayed mixed. These particles, if not disturbed, will settle out. An example is sand mixed with water. **Colloids** have smaller particles but do not settle. Examples of colloids are milk and gelatin.

8. There are three states of matter—**solid**, **liquid**, and **gas**. Particles in solid are packed due to great forces of attraction, move very little, and have little kinetic energy. This is why solids have definite shape and volume. Particles in gases are spread apart due to weak forces of attraction, move freely, and are very energetic. This is why gases have no definite shape or size. Particles in liquids are loose, slide past each other, and less energetic than gases.

**QUESTIONS:**

1) Lithium (Li), Sodium (Na), Potassium (K), Rubidium (Rb), Cesium (Cs), and Francium (Fr) are in the same column in the periodic table. Why are these elements in the same column in the periodic table?

A. They are the same size.
B. They react with each other.
C. They have similar properties.
D. They have the same number of protons.

**Directions:** The images below represent the atoms in a substance as it changes state. Use these images to answer the questions that follow.

![Figure 1](image1.png) ![Figure 2](image2.png) ![Figure 3](image3.png)

2) Which term **best** describes the substance represented by Figure 1?

A. compound
B. liquid
C. solid
D. element
3) Which statement is true about the subatomic particles that make up atoms?

   a. Subatomic particles can be classified as acids, bases, and salts.
   b. The same types of subatomic particles make up all of the elements.
   c. All subatomic particles have either a negative or positive charge.
   d. Subatomic particles retain the properties of elements.

4) Any atom that has 19 protons is a potassium (K) atom. Which statement best describes what would happen if a proton was added to potassium atom?

   a. The atom will lose electrons.
   b. The atom would have a negative charge.
   c. The atom would no longer be potassium.
   d. The atom would have a smaller atomic number.

5) John knows that the atomic number of the element Chlorine, Cl, is 17. He also knows that one particular isotope of chlorine has a mass of 35. How many neutrons can be found in the nucleus of this isotope of chlorine?

   a. 17  
   b. 18  
   c. 35  
   d. 70

6) Carbon is an element. What is the smallest particle of carbon that has the same chemical properties of carbon?

   a. an atom of carbon
   b. a proton from a carbon atom
   c. an electron from a carbon atom
   d. a molecule that contains carbon

7) Each element is made up of different atoms. The table below compares two elements.

<table>
<thead>
<tr>
<th></th>
<th>Element 1</th>
<th>Element 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Atomic number</strong></td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td><strong>Mass number</strong></td>
<td>20</td>
<td>19</td>
</tr>
</tbody>
</table>

What do the elements in the table have in common?

   a. Atoms in each element have 10 nuclei.
   b. Atoms in each element have 10 protons.
   c. Atoms in each element have 10 neutrons.
d. Atoms in each element have 10 electrons.

8) What do elements in the same group on the periodic table have in common?
   a. They have similar chemical symbols.
   b. They have the same atomic number.
   c. They have similar chemical properties.
   d. They have the same average atomic mass.

9) Which of the following could represent a chemical change?

Atoms are represented by circles, and molecules are represented by circles that are connected to each other. The different colored circles represent different kinds of atoms.

A. 

B. 

C. 

D. 

10) Mr. Carter has given his students a worksheet with the illustration shown below, and tells the students that the diagram on the left represents atoms in a liquid state. He asks the students to use the box on the right to draw their own diagram representing atoms in a solid state.
Which of the following best describes one way the students can fill in the second box to represent a solid?

a. The students should draw more circles in the second box since the atoms are closer together in solid form.
b. The students should not draw arrows in the second box because the atoms do not move at all in solid form.
c. The students should draw smaller circles in the second box because the electrons in the atoms are more tightly bound to the nuclei in solid form.
d. The students should draw lines connecting the circles in the second box since the atoms in a solid are joined by chemical bonds.

11) Human blood has a pH range from 7.34-7.45. Is human blood considered acid, basic, or neutral?
   a. acidic
   b. basic
   c. neutral
   d. between acidic and basic

12) Human blood looks like a single substance but it actually consist many different substances and particles like white blood cells, red blood cells, plasma, and platelets (help blood to clot), etc. All of these things are visible when blood is put under a microscope. Doctors can even separate the blood from the plasma by placing it in a centrifuge which spins the blood around and uses a force to cause separation. According to this evidence, human blood could be considered:
   a. A solution
   b. A suspension
   c. A colloid
   d. A compound

13) Which of the following statements best describes pure substances?
   a. Pure substances consist of substances that have been combined together through physical processes.
   b. Pure substances consist of substances that have been separated through physical processes.
   c. Pure substances are substances that are always made of one type of atoms.
   d. Pure substances consist of substances that have definite physical and chemical properties.
14) Compounds are substances in which two or more atoms are chemically combined to form a new, pure substance. Which of the following substances is NOT a compound?

a. H 2O (Water)  
b. CO 2 (Carbon Dioxide)  
c. NH 3 (Ammonia)  
d. H 2 (Hydrogen)

15) Which of these common substances is a pure substance?

a. Muddy water  
b. Table salt  
c. Whole milk  
d. Maple syrup

16) Salad dressing, gelatin, whipped cream, and apple juice were served at a dinner at Kim’s house. Each of the items is a mixture. Which of the mixtures is homogeneous mixture?

a. Salad dressing  
b. Gelatin  
c. Whipped cream  
d. Apple juice

SC.8.P.9.2 Differentiate between physical changes and chemical changes.

A. Matter can undergo a variety of changes.

B. When matter is changed physically, generally no changes occur in the structure of the atoms or molecules composing the matter.

C. When matter changes chemically, a rearrangement of bonds between the atoms occurs. This results in new substances with new properties.

QUESTIONS:

Krystal is exploring the properties of iron. She takes a large iron nail and finds that the nail does not attract other metal objects. Next, she uses a battery and copper wire to transform the nail into an electromagnet. When she connects the circuit, the nail becomes magnetic and can pick up small metal objects like paper clips. This is shown in the illustration below.
1) What best describes what has happened to the iron in the nail that causes it to become magnetic?

a. A physical change has occurred, because the chemical properties of the iron remain the same.
b. A physical change has occurred, because there is a chemical attraction between the iron and paper clips.
c. A chemical change has occurred, because there is a chemical attraction between the iron and paper clips.
d. A chemical change has occurred, because the chemical energy in the battery is transformed into magnetic energy in the iron.

Directions: The students in Ms. Ramirez's science class are classifying different types of reactions. They have divided the reactions into two columns as shown below. Use the table to answer the questions that follow.

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baking cupcakes</td>
<td>Dissolving salt in water</td>
</tr>
<tr>
<td>Burning a log</td>
<td>Boiling water</td>
</tr>
<tr>
<td>Frying an egg</td>
<td>Freezing juice</td>
</tr>
<tr>
<td>Iron rusting</td>
<td>Sawing a board in half</td>
</tr>
</tbody>
</table>

2) Why are the reactions listed in Column A classified as chemical reactions?

a. They form new substances.
b. They do not change the characteristics of the original substance.
c. They change the shape of the substance.
d. The product of the reaction can be changed back into the original products easily.

3) Carbon dioxide (CO₂) is a substance that is a gas at room temperature. At temperatures below 78°C, carbon dioxide condenses into a white solid known as dry ice. At normal atmospheric pressures, dry ice changes directly from a solid to a gas without passing through a liquid phase when its temperature increases. This process is called sublimation. Which of the following best describes the process of sublimation?
a. It is a chemical reaction, because the kinetic energy of the molecules is changing.
b. It is a physical reaction, because it is a change of state.
c. It is a physical reaction, because the density of the material increases.
d. It is a chemical reaction, because a new form of carbon dioxide is created.
Glossary

**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.

**F1 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).

**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.

**Theory (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.
## Appendix F: Periodic Table of the Elements

FCAT 2.0 Science
Grade 8 and Biology 1 End-of-Course Assessment

### Periodic Table of the Elements

| Group 1 | 1 | H | 1A | He | 2 | Li | 2A | Be | 3 | B | 3A | C | 3B | N | 4 | O | 5 | F | 6 | Ne | 7 | Na | 14 | Mg | 15 | Al | 13 | Si | 14 | P | 15 | S | 16 | Cl | 17 | Ar | 18 | 8A |
|--------|---|---|----|----|---|----|----|----|---|---|----|---|----|---|----|---|----|---|----|---|----|----|----|---|----|----|----|---|----|----|----|---|----|----|----|---|----|
| Period 2 | 2 | Ne | 15 | K | 19 | Ca | 20 | Sc | 21 | Ti | 22 | V | 23 | Cr | 24 | Mn | 25 | Fe | 26 | Co | 27 | Ni | 28 | Cu | 29 | Zn | 30 | Ga | 31 | Ge | 32 | As | 33 | Se | 34 | Br | 35 | Kr |
| 3 | Rb | 37 | Sr | 38 | Y | 39 | Zr | 40 | Nb | 41 | Mo | 42 | Tc | 43 | Ru | 44 | Rh | 45 | Pd | 46 | Ag | 47 | Cd | 48 | In | 49 | Sn | 50 | Sb | 51 | Te | 52 | I | 53 | Xe |
| 4 | Cs | 55 | Ba | 56 | La | 57 | Ce | 58 | Pr | 59 | Nd | 60 | Pm | 61 | Sm | 62 | Eu | 63 | Gd | 64 | Tb | 65 | Dy | 66 | Ho | 67 | Er | 68 | Tm | 69 | Yb | 70 | Lu | 71 | 71A |
| 5 | Gd | 64 | Tb | 65 | Dy | 66 | Ho | 67 | Er | 68 | Tm | 69 | Yb | 70 | Lu | 71 | 71A |
| 6 | Eu | 63 | Gd | 64 | Tb | 65 | Dy | 66 | Ho | 67 | Er | 68 | Tm | 69 | Yb | 70 | Lu | 71 | 71A |
| 7 | Tm | 69 | Yb | 70 | Lu | 71 | 71A |

### Notes
- The periodic table is based on \( \frac{E\text{C}}{C} = 12.0000 \).
- Elements are classified into representative elements, transition metals, and inner transition metals.

### References
- F-1 | FCAT 2.0 Science Test Item Specifications Version 2, Grade 8
- Florida Department of Education
General Test Information

The Statewide Science Assessment is administered as a paper-best test (PBT). The test is administered in two 80-minute sessions with a stretch break in the middle of each session. Grade 8 Science is administered in one day. Students taking the Grade 8 Statewide Science Assessment will receive a handheld, four function calculator and a Periodic Table of the Elements for use during the assessment.

Item Types and Numbers
This table provides an approximate range for the number of items on each test. These ranges include both the operational and field-test items. All items are multiple choice (MC).

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Item Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>60–66</td>
</tr>
<tr>
<td>8</td>
<td>60–66</td>
</tr>
<tr>
<td>Biology 1</td>
<td>60–66</td>
</tr>
</tbody>
</table>

Duration of Tests
The table below displays the number of minutes allowed for regular test takers for FCAT 2.0 Science and Biology 1 End-of-Course Assessment.

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Duration (in minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>160</td>
</tr>
<tr>
<td>8</td>
<td>160</td>
</tr>
<tr>
<td>Biology 1</td>
<td>160</td>
</tr>
</tbody>
</table>
Reporting Categories
The following tables represent the content reporting categories for FCAT 2.0 Science and Biology 1 End-of-Course Assessment, along with the approximate percentage of raw-score points that will be derived from each content category.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Nature of Science</th>
<th>Earth and Space Science</th>
<th>Physical Science</th>
<th>Life Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>17%</td>
<td>29%</td>
<td>29%</td>
<td>25%</td>
</tr>
<tr>
<td>8</td>
<td>19%</td>
<td>27%</td>
<td>27%</td>
<td>27%</td>
</tr>
</tbody>
</table>

Percentage of Points by Cognitive-Complexity Level for FCAT 2.0 Science and Biology 1 EOC Assessment

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Low</th>
<th>Moderate</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>10%–20%</td>
<td>60%–80%</td>
<td>10%–20%</td>
</tr>
<tr>
<td>8</td>
<td>10%–20%</td>
<td>60%–80%</td>
<td>10%–20%</td>
</tr>
<tr>
<td>Biology 1</td>
<td>10%–20%</td>
<td>60%–80%</td>
<td>10%–20%</td>
</tr>
</tbody>
</table>
HELPFUL HINTS FOR USING A FOUR-FUNCTION CALCULATOR

1. Read the problem very carefully. Then decide whether or not you need the calculator to help you solve the problem.

2. When starting a new problem, always clear your calculator by pressing the on/clear key.

3. If you see an E in the display, clear the error before you begin.

4. If you see an M in the display, clear the memory and the calculator before you begin.

5. If the number in the display is not one of the answer choices, check your work. Remember that when computing with certain types of fractions, you may have to round the number in the display.

6. Remember, your calculator will NOT automatically perform the algebraic order of operations.

7. Calculators might display an incorrect answer if you press the keys too quickly. When working with calculators, use careful and deliberate keystrokes, and always remember to check your answer to make sure that it is reasonable.

8. The negative sign may appear either to the left or to the right of the number.

9. Always check your answer to make sure that you have completed all of the necessary steps.
Resources

General Resources

Grade 8 FCAT 2.0 Science Sample Questions -
http://www.fldoe.org/core/fileparse.php/3/urlt/fl538818_gr8_sci_stm_tb_wt_r1g.pdf

Grade 8 FCAT 2.0 Science Answer Key -
http://www.fldoe.org/core/fileparse.php/3/urlt/fl538819_gr8_sci_stm_ak_wt_r1g.pdf

Short Video Resources:
http://studyjams.scholastic.com/studyjams/

Florida Students:
http://www.floridastudents.org