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**Benchmarks Tested on Grade 8 Science FCAT**

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<td><strong>STRAND A: THE NATURE OF MATTER</strong></td>
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<td>SC.A.1.3.1</td>
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<td><strong>STRAND B: ENERGY</strong></td>
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</table>
| SC.B.1.3.6 | The student knows the properties of waves (e.g., frequency, wavelength, and amplitude); that each wave consists of a number of crests and troughs; and the effects of different media on waves. AA; MC, GR, SR  
**Also covers C.1.3.2** |
| SC.B.2.3.1 | The student knows that most events in the universe (e.g., weather changes, moving cars, and the transfer of a nervous impulse in the human body) involve some form of energy transfer and that these changes almost always increase the total disorder of the system and its surroundings, reducing the amount of useful energy. AA; MC |
| SC.B.2.3.2 | The student knows that most of the energy used today is derived from burning stored energy collected by organisms millions of years ago (i.e., nonrenewable fossil fuels). Covered as G.2.3.1 |

**STRAND C: FORCE AND MOTION**

| SC.C.1.3.1 | The student knows that the motion of an object can be described by its position, direction of motion, and speed. CS; MC, GR |
| SC.C.1.3.2 | The student knows that vibrations in materials set up wave disturbances that spread away from the source (e.g., sound and earthquake waves). Covered as B.1.3.6 |
| SC.C.2.3.1 | The student knows that many forces (e.g., gravitational, electrical, and magnetic) act at a distance (i.e., without contact). CS; MC |
| SC.C.2.3.2 | The student knows common contact forces. Covered as C.2.3.6 |
| SC.C.2.3.3 | The student knows that if more than one force acts on an object, then the forces can reinforce or cancel each other, depending on their direction and magnitude. Covered as C.2.3.6 |
| SC.C.2.3.4 | The student knows that simple machines can be used to change the direction or size of a force. CS; MC, GR |
| SC.C.2.3.5 | The student understands that an object in motion will continue at a constant speed and in a straight line until acted upon by a force and that an object at rest will remain at rest until acted upon by a force. Covered as C.2.3.6 |
| SC.C.2.3.6 | The student explains and shows the ways in which a net force (i.e., the sum of all acting forces) can act on an object (e.g., speeding up an object traveling in the same direction as the net force, slowing down an object traveling in the direction opposite of the net force). AA; MC, GR, SR  
**Also covers C.2.3.2, C.2.3.3, C.2.3.5** |
| SC.C.2.3.7 | The student knows that gravity is a universal force that every mass exerts on every other mass. CS; MC |

**STRAND D: PROCESSES THAT SHAPE THE EARTH**

| SCD.1.3.1 | The student knows that mechanical and chemical activities shape and reshape the Earth’s land surface by eroding rock and soil in some areas and depositing them in other areas, sometimes in seasonal layers. CS; MC |
| SCD.1.3.2 | The student knows that over the whole Earth, organisms are growing, dying, and decaying as new organisms are produced by the old ones. Covered as D.1.3.4 |
| SC.D.1.3.3 | The student knows how conditions that exist in one system influence the conditions that exist in other systems. CS; MC |
| SC.D.1.3.4 | The student knows the ways in which plants and animals reshape the landscape (e.g., bacteria, fungi, worms, rodents, and other organisms add organic matter to the soil, increasing soil fertility, encouraging plant growth, and strengthening resistance to erosion). AA; MC  
**Also covers D.1.3.2** |
| SC.D.1.3.5 | The student understands concepts of time and size relating to the interaction of Earth’s processes (e.g., lightning striking in a split second as opposed to the shifting of the Earth’s plates altering the landscape, distance between atoms measured in Angstrom units as opposed to distance between stars measured in light-years). CS; MC, GR |
| SC.D.2.3.1 | The student understands that quality of life is relevant to personal experience.  
**Not covered** |
| SC.D.2.3.2 | The student knows the positive and negative consequences of human action on the Earth’s systems. **Covered as G.2.3.4** |

**STRAND E: EARTH AND SPACE**

| SC.E.1.3.1 | The student understands the vast size of our Solar System and the relationship of the planets and their satellites. AA; MC, GR, SR  
**Also covers E.1.3.2** |
| SC.E.1.3.2 | The student knows that available data from various satellite probes show the similarities and differences among planets and their moons in the Solar System.  
**Covered as E.1.3.1** |
| SC.E.1.3.3 | The student understands that our sun is one of many stars in our galaxy.  
**Covered as E.2.3.1** |
| SC.E.1.3.4 | The student knows that stars appear to be made of similar chemical elements, although they differ in age, size, temperature, and distance. CS; MC |
| SC.E.2.3.1 | The student knows that thousands of other galaxies appear to have the same elements, forces, and forms of energy found in our Solar System. CS; MC  
**Also covers E.1.3.3** |

**STRAND F: PROCESSES OF LIFE**

<p>| SC.F.1.3.1 | The student understands that living things are composed of major systems that function in reproduction, growth, maintenance, and regulation. AA; MC, SR |
| SC.F.1.3.2 | The student knows that the structural basis of most organisms is the cell and most organisms are single cells, while some, including humans, are multicellular. CS; MC |
| SC.F.1.3.3 | The student knows that in multicellular organisms cells grow and divide to make more cells in order to form and repair various organs and tissues. CS; MC |
| SC.F.1.3.4 | The student knows that the levels of structural organization for function in living things include cells, tissues, organs, systems, and organisms. CS; MC |</p>
<table>
<thead>
<tr>
<th>SC.F.1.3.5</th>
<th>The student explains how the life functions of organisms are related to what occurs within the cell. CS; MC</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC.F.1.3.6</td>
<td>The student knows that the cells with similar functions have similar structures, whereas those with different structures have different functions. CS; MC</td>
</tr>
<tr>
<td>SC.F.1.3.7</td>
<td>The student knows that behavior is a response to the environment and influences growth, development, maintenance, and reproduction. CS; MC</td>
</tr>
<tr>
<td>SC.F.2.3.1</td>
<td>The student knows the patterns and advantages of sexual and asexual reproduction in plants and animals. CS; MC</td>
</tr>
<tr>
<td>SC.F.2.3.2</td>
<td>The student knows that the variation in each species is due to the exchange and interaction of genetic information as it is passed from parent to offspring. AA; MC, SR</td>
</tr>
<tr>
<td>SC.F.2.3.3</td>
<td>The student knows that generally organisms in a population live long enough to reproduce because they have survival characteristics. CS; MC</td>
</tr>
<tr>
<td>SC.F.2.3.4</td>
<td>The student knows that the fossil record provides evidence that changes in the kinds of plants and animals in the environment have been occurring over time. CS; MC</td>
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**STRAND G: HOW LIVING THINGS INTERACT WITH THEIR ENVIRONMENT**

<table>
<thead>
<tr>
<th>SC.G.1.3.1</th>
<th>The student knows that viruses depend on other living things. Covered as G.1.3.4</th>
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</thead>
<tbody>
<tr>
<td>SC.G.1.3.2</td>
<td>The student knows that biological adaptations include changes in structures, behaviors, or physiology that enhance reproductive success in a particular environment. CS; MC</td>
</tr>
<tr>
<td>SC.G.1.3.3</td>
<td>The student understands that the classification of living things is based on a given set of criteria and is a tool for understanding biodiversity and interrelationships. CS; MC</td>
</tr>
<tr>
<td>SC.G.1.3.4</td>
<td>The student knows that the interactions of organisms with each other and with the nonliving parts of their environments result in the flow of energy and the cycling of matter throughout the system. AA; MC, SR Also covers G.1.3.1, G.1.3.5</td>
</tr>
<tr>
<td>SC.G.1.3.5</td>
<td>The student knows that life is maintained by a continuous input of energy from the sun and by the recycling of the atoms that make up the molecules of living organisms. Covered as G.1.3.4</td>
</tr>
<tr>
<td>SC.G.2.3.1</td>
<td>The student knows that some resources are renewable and others are nonrenewable. CS; MC Also covers B.2.3.2</td>
</tr>
<tr>
<td>SC.G.2.3.2</td>
<td>The student knows that all biotic and abiotic factors are interrelated and that if one factor is changed or removed, it impacts the availability of other resources within the system. CS; MC, GR</td>
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<tr>
<td>SC.G.2.3.3</td>
<td>The student knows that a brief change in the limited resources of an ecosystem may alter the size of a population or the average size of individual organisms and that long-term change may result in the elimination of animal and plant populations inhabiting the Earth. CS; MC, GR</td>
</tr>
</tbody>
</table>
| SC.G.2.3.4 | The student understands that humans are a part of an ecosystem and their activities may deliberately or inadvertently alter the equilibrium in ecosystems. AA; MC, SR  
**Also covers D.2.3.2** |
| STRAND H: THE NATURE OF SCIENCE |
| SC.H.1.3.1 | The student knows that scientific knowledge is subject to modification as new information challenges prevailing theories and as a new theory leads to looking at old observations in a new way. AA; MC, SR |
| SC.H.1.3.2 | The student knows that the study of the events that led scientists to discoveries can provide information about the inquiry process and its effects. CS; MC |
| SC.H.1.3.3 | The student knows that science disciplines differ from one another in topic, techniques, and outcomes, but that they share a common purpose, philosophy, and enterprise. CS; MC |
| SC.H.1.3.4 | The student knows that accurate record keeping, openness, and replication are essential to maintaining an investigator’s credibility with other scientists and society. AA; MC, SR  
**Also covers H.1.3.7** |
| SC.H.1.3.5 | The student knows that a change in one or more variables may alter the outcome of an investigation. AA; MC, GR, SR, ER |
| SC.H.1.3.6 | The student recognizes the scientific contributions that are made by individuals of diverse backgrounds, interests, talents, and motivations. *Not covered* |
| SC.H.1.3.7 | The student knows that when similar investigations give different results, the scientific challenge is to verify whether the differences are significant by further study. *Covered as H.1.3.4* |
| SC.H.2.3.1 | The student recognizes that patterns exist within and across systems. CS; MC |
| SC.H.3.3.1 | The student knows that science ethics demand that scientists must not knowingly subject coworkers, students, the neighborhood, or the community to health or property risks. CS; MC  
**Also covers H.3.3.2, H.3.3.3** |
| SC.H.3.3.2 | The student knows that special care must be taken in using animals in scientific research. *Covered as H.3.3.1* |
| SC.H.3.3.3 | The student knows that in research involving human subjects, the ethics of science require that potential subjects be fully informed about the risks and benefits associated with the research and of their right to refuse to participate. *Covered as H.3.3.1* |
| SC.H.3.3.4 | The student knows that technological design should require taking into account constraints such as natural laws, the properties of the materials used, and economic, political, social, ethical, and aesthetic values. CS; MC  
**Also covers H.3.3.6, H.3.3.7** |
| SC.H.3.3.5 | The student understands that contributions to the advancement of science, mathematics, and technology have been made by different kinds of people, in different cultures, at different times, and are an intrinsic part of the development of human culture. *Not covered* |
| SC.H.3.3.6 | The student knows that no matter who does science and mathematics or invents things, or when or where they do it, the knowledge and technology that result can eventually become available to everyone. *Covered as H.3.3.4* |
| SC.H.3.3.7 | The student knows that computers speed up and extend people’s ability to collect, sort, and analyze data; prepare research reports; and share data and ideas with others. *Covered as H.3.3.4* |
# Student Recording Chart

**Directions** Mark an × by each question from the Pretest and Posttest that you answered incorrectly. If there are one or two ×'s marked for a benchmark, write Yes in the *Need Practice?* box. Then complete the practice pages for that benchmark.

## Strand A: The Nature of Matter

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>SC.A. 1.3.1</th>
<th>SC.A. 1.3.3</th>
<th>SC.A. 1.3.4</th>
<th>SC.A. 1.3.5</th>
<th>SC.A. 2.3.1</th>
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## Strand B: Energy

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## Strand C: Force and Motion

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## Strand D: Processes that Shape the Earth

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### Strand F: Processes of Life

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### Strand G: How Living Things Interact with Their Environment

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### Strand H: The Nature of Science

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</table>
How to Complete the Response Grids

Science test questions that have the gridded response symbol require you to fill in the grid to the right of the question. Sometimes there is more than one way to complete the response grid. In this section, you will learn the different ways the grids can be filled in.

**Directions**

1. Read the question and work the problem. For gridded response questions, your answer will always be a number.

2. Once you have your answer, write it in the answer boxes.
   - Write your answer with the first digit in the left box OR with the last digit in the right box.
   - Use only one digit or symbol in each box. Do NOT leave a blank answer box in the middle of an answer.
   - If your answer is a decimal or fraction, be sure to include the decimal point or the fraction bar in the correct answer box.
3. Under each answer box, fill in the correct bubble for the number you wrote.
   • Fill in one bubble for each answer box. Do NOT fill in a bubble under an unused answer box.
   • Each bubble must be filled in completely.
   • You MUST correctly fill in the bubbles for your answer in order to receive credit.

Examples

Whole Number
95 – 15 =

Decimal
Show the decimal equivalent of $\frac{8}{100}$.
Fraction

NOTE: You cannot have a mixed number as an answer. If you have a mixed number, you must convert your answer to an improper fraction or a decimal number. For example, if you fill in $17\frac{1}{2}$, it would be read as $\frac{171}{2}$. This is not a correct answer, and you will not receive credit.

INCORRECT

CORRECT

$17\frac{1}{2}$
Decimal or Fraction

Many answers may be shown as either a decimal or a fraction.

<table>
<thead>
<tr>
<th>.175</th>
<th>.175</th>
<th>7/40</th>
<th>7/40</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

OR

OR

OR
Taking the FCAT Science Test

Hints for Taking the FCAT Science Test

✔ There are four kinds of questions on the FCAT Science Test. These are: multiple choice, gridded response, short response, and extended response. Learn how to recognize and answer these different types of questions.

✔ Read each question and answer choice carefully.

✔ Make sure that when choosing an answer choice, your answer is the one that is correct.

✔ If you come to a question that seems too difficult, move on to the next question. You can come back to the question later.

✔ When answering multiple choice and gridded response questions, make sure you have completely and correctly filled in the bubbles. Avoid any stray marks, and if you accidentally make one, be sure to erase it.

✔ After answering a question, double-check to make sure that your answer choice answers the question.

✔ Get a good night’s sleep the night before test day. On test day, just relax and do your best.
How to Answer "Read, Inquire, Explain" Questions

You can receive full or partial credit for your answers to short response and extended response questions. Even if you do not feel that you can find the complete answer for these types of questions, you should write as much as you can and show all your work. This way, you may receive credit for a portion that is correct.

When you see this symbol next to a question, it signals a short response question. For these types of questions, you should use about five minutes to write your answers.

You will receive 2 points for an answer that is completely correct and 1 point for an answer that is partially correct.

When you see this symbol next to a question, it signals an extended response question. The answers for these questions will be longer than those for short response. You will see questions with a Part A and a Part B. You should use about 10–15 minutes to answer extended response questions.

You will receive 4 points for an answer that is completely correct and 1, 2, or 3 points for an answer that is partially correct.

When you see this symbol next to a question, it signals a gridded response question. For this type of question you will need to fill in a grid. There is more than one correct way to record your answer on the grid. You MUST write your numerical answer in the answer boxes and then fill in the correct bubbles for all of the digits and symbols.

You will receive 1 point for a correct answer. There are no partial points for incomplete gridded response questions.
### FCAT Science Reference Sheet

#### Equations

<table>
<thead>
<tr>
<th>Equation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Acceleration</strong> ($\bar{a}$)</td>
<td>$\frac{\text{change in velocity (m/s)}}{\text{time taken for this change (s)}}$</td>
</tr>
<tr>
<td><strong>Average speed</strong> ($\bar{v}$)</td>
<td>$\frac{\text{distance}}{\text{time}}$</td>
</tr>
<tr>
<td><strong>Density</strong> ($D$)</td>
<td>$\frac{\text{mass (g)}}{\text{volume (cm}^3\text{)}}$</td>
</tr>
<tr>
<td><strong>Percent efficiency</strong> ($e$)</td>
<td>$\frac{\text{Work out (J)}}{\text{Work in (J)}} \times 100$</td>
</tr>
<tr>
<td><strong>Force in newtons</strong> ($F$)</td>
<td>$\text{mass (kg)} \times \text{acceleration (m/s}^2\text{)}$</td>
</tr>
<tr>
<td><strong>Frequency in hertz</strong> ($f$)</td>
<td>$\frac{\text{number of events (waves)}}{\text{time (s)}}$</td>
</tr>
<tr>
<td><strong>Momentum</strong> ($p$)</td>
<td>$\text{mass (kg)} \times \text{velocity (m/s}^2\text{)}$</td>
</tr>
<tr>
<td><strong>Wavelength</strong> ($\lambda$)</td>
<td>$\frac{\text{velocity (m/s)}}{\text{frequency (Hz)}}$</td>
</tr>
<tr>
<td><strong>Work</strong> ($W$)</td>
<td>$\text{Force (N)} \times \text{distance (m)}$</td>
</tr>
</tbody>
</table>

#### Units of Measure

- cm = centimeter
- Hz = hertz
- g = gram
- J = joule (newton-meter)
- kg = kilogram
- m = meter
- N = newton
- s = second
Using a Calculator

This is a diagram of a generic calculator and its parts.

Helpful Hints for Using a Calculator on the FCAT Science Test
1. Decide if you need a calculator to solve the problem by reading the question very carefully.
2. Always clear your calculator by pressing the clear key before starting a new problem.
3. If you see an \( E \) in the display, clear the error before you begin.
4. If you see an an \( M \) in the display, clear the memory before you begin.
5. If you get an answer that does not match an answer choice or seems unreasonable, check your work and re-enter the problem into the calculator.
6. Remember to enter your problem into the calculator using the correct order of operations. The calculator will NOT do this automatically.
7. Take your time when using the calculator. Make sure you are pressing the correct keys.
8. Always check your answer and your work before writing or selecting your final answer.
### Periodic Table of the Elements
(based on $^{12}_6$C = 12.0000)

<table>
<thead>
<tr>
<th>Group</th>
<th>Period</th>
<th>Symbol</th>
<th>Name</th>
<th>Atomic Number</th>
<th>Atomic Mass</th>
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<tr>
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<td>H</td>
<td>Hydrogen</td>
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<tr>
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<td>2</td>
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<tr>
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<td>Sodium</td>
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<td>4</td>
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<tr>
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<td>5</td>
<td>Rb</td>
<td>Rubidium</td>
<td>37</td>
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<td>Cesium</td>
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<td>3</td>
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<td>15</td>
<td>5</td>
<td>P</td>
<td>Phosphorus</td>
<td>15</td>
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<tr>
<td>16</td>
<td>6</td>
<td>S</td>
<td>Sulfur</td>
<td>16</td>
<td>32.06</td>
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<td>17</td>
<td>7</td>
<td>Cl</td>
<td>Chlorine</td>
<td>17</td>
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<td>Argon</td>
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<td>3</td>
<td>K</td>
<td>Potassium</td>
<td>19</td>
<td>39.102</td>
</tr>
</tbody>
</table>

**Transition Metals**

- Groups 3A to 7A
- Groups 8A and 18A

**Representative Elements**

- Groups 1A and 2A
- Groups 13A to 17A

**Inner Transition Metals**

- Lanthanide Series
- Actinide Series

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Jacob is testing the effect of light on the movement of amoebas. He divides the same type of amoebas into three groups and gives them the same food. He places group A under a 40-watt light for 15 minutes, group B under a 60-watt light for 10 minutes, and group C under a 100-watt light for 5 minutes. After the time for each group has past, Jacob records his observations of the amoebas’ movement. Which of the following describes the problem with Jacob’s experiment?

A. Too many sets of amoebas are used in this investigation.
B. The type of amoebas is not listed, which may affect the movement.
C. Using the same food may affect the movement of amoebas with larger appetites, changing the results of the investigation.
D. Using different light wattages and times for exposure adds a variable, making it unclear what caused the results of the experiment.

Fossils provide scientists with valuable information about organisms. Which of the following is true about fossils?

F. Fossils show how organisms will look in the future.
G. Fossils show how organisms have changed over time.
H. Fossils show how the behavior of organisms developed.
I. Fossils show similarities in the chemical makeups of organisms.

If you were to compare molecules of ice, ice water, room temperature water, and boiling water, in which state would the molecules have the greatest kinetic energy?

A. ice
B. ice water
C. room temperature water
D. boiling water
Most incandescent lightbulbs are five percent efficient. This means that if it takes 100 units of energy to generate light, 95 units are lost to heat. An average fluorescent lightbulb is 20 percent efficient. If 100 units of energy are used to generate light, how many units are lost to heat when using the fluorescent lightbulb?

Dorothy and her brother are cycling from Destin to Fort Walton Beach. When she and her brother make this trip, they usually travel at an average speed of 15 kilometers per hour (km/hr) and usually complete their trip in about 45 minutes. Today, they are riding into a headwind that is blowing at 8 km/hr. What effect will the wind have on Dorothy and her brother’s arrival in Fort Walton Beach?

F. The headwind will have no effect on their trip.
G. Dorothy and her brother will arrive later than usual.
H. Dorothy and her brother will arrive earlier than usual.
I. The wind will be too strong and they will not finish their trip.

Aramis is making a salad. First, he mixes vinegar, olive oil, and seasoning together. Afterward, he prepares his vegetables for the salad. When he is ready to pour the dressing, he notices that the seasoning is at the bottom, the vinegar forms a middle layer, and the oil is at the top. Explain why the salad dressing ingredients form layers in the container.
Which of the following are formed from the process of deposition?  

A. mountains  
B. potholes  
C. sandbars  
D. underground caves

According to the table, how many times does Mercury orbit the Sun in the time it takes Earth to complete one revolution? (Round your answer to the nearest whole number.)

Which of the following describes the major role of producers in the carbon cycle?  

F. They take in carbon dioxide for respiration.  
G. They use carbon dioxide to produce sugars.  
H. They make carbon dioxide using sunlight and water.  
I. They release carbon dioxide when they produce sugars.
10. Approximately 42 million acres of tropical forest are lost each year due to human activities. Describe two effects this has on the environment.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

11. In the late 1800s, the experiments of Louis Pasteur, Joseph Lister, and Robert Koch helped develop the germ theory, which states that disease is caused by microorganisms that can spread between individuals. Prior to this finding, many thought that things such as the odor from decaying organisms caused diseases. Describe one way in which the germ theory affected medicine.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

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________________________________________________________________________

________________________________________________________________________
A drug company experimenting with a new medicine discovers that it may control high blood pressure. Why is it important that the drug company carefully and completely records its research on the medicine?

A. Accurate records make sure the information remains secret.
B. Accurate records allow others to test by repeating the experiment.
C. Accurate records prove that other medicines for blood pressure don’t work.
D. Accurate records allow the company to ship the drug to doctors immediately.

For a certain note played on a guitar string there is a frequency of 400 hertz. If the wavelength of this particular string is 1.6 meters, what is the speed of the wave in meters per second?

While researching a report on rosebushes, snails, and bacteria, Ahmed realizes that each of the organisms shares which common structural unit?

F. cell
G. chlorophyll
H. nucleus
I. organ
During a year, a coastal town experienced an intense low-pressure system. Based on the graph of the town’s annual rainfall the same year, in which month did the low-pressure system begin?

A. April
B. May
C. June
D. December

Two stars have the same diameter and distance from Earth, but one appears much brighter than the other. Which of the following is true about the stars?

F. The brighter star has less mass.
G. The brighter star has a greater mass.
H. The mass of a star does not affect the star’s brightness.
I. The diameter of a star does not affect the star’s brightness.

The body is organized into systems that control specific functions. Which of the following pairs of organs work in the same system?

A. heart, thyroid
B. liver, eye
C. spinal cord, stomach
D. spinal cord, brain
Figure 1 and Figure 2 illustrate two types of collisions between molecules. Which of the following correctly describes the atomic changes as a result of each collision?

F. Both Figure 1 and 2 show how magnetic energy works.
G. Figure 1 shows a chemical change, Figure 2 shows a change in mass.
H. Figure 1 shows a chemical change, Figure 2 shows a collision without change.
I. Figure 1 shows atoms in a solid state, Figure 2 shows the atoms in a liquid state.

A scientist discovers a new species of hummingbird in a rain forest. The new species is similar to another type of hummingbird, but it has a longer beak and nests in taller trees. What can the scientist learn from studying the differences between the two species?

A. the purpose of hummingbird mating rituals
B. how hummingbird traits differ in different habitats
C. how adaptations in all birds relate to the hummingbird
D. why short-beaked hummingbirds are poor nest-builders

Jason pulls an empty wagon to the store. After shopping, his wagon is full of groceries. If he pulls the full wagon home using the same amount of force he used to pull the empty wagon, how would this affect the time it will take him to get home?

________________________________________
________________________________________
________________________________________
________________________________________
________________________________________
Pretest

21. Louisa kicks a soccer ball during a game. The ball travels through the air, bounces, and rolls to a stop on the sideline. What happens to the mechanical energy in the ball?
   F. It is converted into light energy.
   G. It is converted into thermal energy
   H. It is converted into electrical energy.
   I. It is converted into chemical energy.

22. A litter of puppies is born to a yellow-colored mother and a black-colored father. One puppy is yellow, two are black, and three are brown. Which of the following explains why the puppies have different-colored coats?
   A. The different coat colors are a product of the environment.
   B. The different colors are due to the differences in the mother’s eggs.
   C. The male of the species always determines the traits of the offspring.
   D. Coat color is a trait which is determined by both parents’ genetic makeup.

23. Two children are riding bicycles. One is about to go down the hill, and the other has almost reached the bottom. Which of the following describes the types of energy of the two children?
   F. Child A has more potential energy and less kinetic energy.
   G. Child B has less kinetic energy and more potential energy.
   H. Child A and Child B have the same amount of both types of energy.
   I. Child A and Child B have kinetic energy but do not have potential energy.
24. Which of the following types of waves are listed in order of increasing energy?

A. X rays, visible light, radio waves  
B. visible light, gamma rays, X rays  
C. radio waves, visible light, X rays  
D. infrared rays, visible light, radio waves

25. A runner is training for a race on a straight track. Her trainer records her distance each minute for 1000 meters. After 4 minutes, what is the runner’s average speed in meters per second?

<table>
<thead>
<tr>
<th>Time (minutes)</th>
<th>Distance (meters)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>200</td>
</tr>
<tr>
<td>2</td>
<td>340</td>
</tr>
<tr>
<td>3</td>
<td>580</td>
</tr>
<tr>
<td>4</td>
<td>720</td>
</tr>
<tr>
<td>5</td>
<td>1000</td>
</tr>
</tbody>
</table>

26. Which kind of heat transfer occurs when one substance is touching another substance?

F. conduction  
G. convection  
H. ignition  
I. radiation

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27. Which of the following techniques harvests energy from a nonrenewable resource?

A. solar panels  
B. oil rig  
C. water wheel  
D. windmill

28. Corey wants to know which of three popular brands of plant food will cause roses to grow fastest. Which process should Corey follow to find the best plant food?

F. compare the labels on the containers  
G. apply all three types of plant foods to a single rose plant  
H. in a controlled experiment, apply each plant food to separate roses  
I. in a controlled experiment, apply one type of plant food to different species of plants

29. There are many fields of science, such as biology, physics, and geology. Which statement below is a common purpose that all scientists share?

A. to classify living things  
B. to discover knowledge about the natural world  
C. to communicate only with scientists in their own subject areas  
D. to use the same scientific equipment to answer different questions

30. Which type of wave moves the particles of a medium at a right angle to the direction of the wave?

F. longitudinal wave  
G. mechanical wave  
H. standing wave  
I. transverse wave
Pretest

31. What holds the atoms of hydrogen and oxygen together in a water molecule?
   A. chemical bond
   B. convection
   C. gravity
   D. magnetic force

32. Which force work keeps Earth in its orbit around the Sun?
   F. gravity
   G. inertia
   H. magnetic
   I. radiation

33. Animals have adaptations that allow them to get food, keep their internal conditions stable, and reproduce in their specific environment. A species of lizard that lives in a desert environment is adapted to survive high temperatures during the day. For which purpose is this adaptation primarily useful?
   A. to obtain food
   B. to attract mates
   C. to protect itself from predators
   D. to keep a stable internal body temperature

34. Which is the correct sequence of structural organization for the human skeletal system shown?
   F. A, B, C, D
   G. C, B, A, D
   H. D, A, C, B
   I. D, C, B, A
The diagram below shows the detail of the structure of a bat wing.

Based on the diagram, the hands and arms of the bat are adaptations for which function?
A. capturing prey
B. fighting
C. movement
D. reproduction

Ocean tides are the rise and fall of the ocean’s water level, which usually occurs every 12 hours. What causes these regular, cyclical tides?
F. interactions of Earth, the Sun, and the Moon
G. wind from the ocean that blows in toward land
H. undersea landslides, earthquakes, or volcanoes
I. atmospheric changes in pressure due to *El Niño*
Sophia wants to compare the relative density of three different liquids to the density of wood. She uses three wood samples with the same volume, mass, and density. She then measures same volume of liquid for each of her samples and labels the beakers A, B, and C. Based on the information provided in the diagram below, Sophia concludes that liquid A has the greatest density.

**Part A**  What is the changing variable in Sophia’s experiment?

**Part B**  What are the controls in the experiment, and how do they affect Sophia’s conclusion?
The gravitational force of each planet in our solar system is different.
The diagram below shows four planets listed in order from least amount of relative gravity to greatest amount of relative gravity. A person would weigh the most standing on which planet? **SC.A.1.3.1**

- A. Mercury
- B. Venus
- C. Earth
- D. Jupiter

A liquid has a mass of 17 grams and a volume of 10 milliliters. In grams per milliliter, what is the density of the liquid? **SC.A.1.3.1**

When a wood block and a steel block of equal size and dimensions are placed in a container of water, the wood floats and the steel sinks. Explain the reason for this observation. **SC.A.1.3.1**
4 The table below represents the temperatures of four different liquids. In which of the liquids are the particles moving the slowest? **SC.A.1.3.3**

<table>
<thead>
<tr>
<th>Liquid</th>
<th>Temperature (in degrees Celsius)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquid F</td>
<td>75</td>
</tr>
<tr>
<td>Liquid G</td>
<td>95</td>
</tr>
<tr>
<td>Liquid H</td>
<td>115</td>
</tr>
<tr>
<td>Liquid I</td>
<td>135</td>
</tr>
</tbody>
</table>

**F.** Liquid F  **H.** Liquid H  **G.** Liquid G  **I.** Liquid I

5 Sarah heats room-temperature water in a microwave to make hot apple cider. The diagram below illustrates the water particles before they are heated. Which of the following correctly describes the effect of the microwave’s heat on the particles? **SC.A.1.3.4**

A. The particles will stop moving.  
B. The particles will remain at the same speed.  
C. The particles will begin to move faster and farther apart.  
D. The particles will begin to slow down and move closer together.

6 In a scientific experiment, Arash added liquid A to liquid B in a test tube. He then wrote the following observations in his lab notebook:

- When liquid A was added to liquid B, the test tube became warm.  
- Combining the liquids also caused liquid B to turn from clear to blue.

Which type of change do these observations represent? **SC.A.1.3.5**

**F.** chemical change  
**G.** physical change  
**H.** change in chemical energy  
**I.** change in mechanical energy
Benchmark Practice

Strand A: The Nature of Matter

7 Tuning forks A and B were both hit with a mallet. The diagram below shows the sound waves that the tuning forks produced. Which statement is a true comparison of the two sound waves? **SC.A.2.3.1**

A. The amplitude of tuning fork A is greater.
B. The amplitude of tuning fork B is greater.
C. The wavelength of tuning fork A is greater.
D. The wavelength of tuning fork B is greater.

8 Which wave characteristic describes the number of complete cycles per unit of time? **SC.A.2.3.1**

F. amplitude
G. frequency
H. medium
I. wavelength

9 Why are the electrons’ locations around an atom’s nucleus referred to as a cloud? **SC.A.2.3.2**

A. Electrons are the largest particles in an atom and take up the most space.
B. Electrons’ paths around the nucleus are so unpredictable they resemble a cloud.
C. The electron mass is so small that they float like clouds around the nucleus.
D. Orbiting electrons cause the nucleus to release a cloudlike material around the atom.
Benchmark Practice

Strand B: Energy

10. Many types of matter obtain energy directly or indirectly from the Sun. Which of the following types of matter does not obtain its energy from the Sun? SC.B.1.3.1
    F. iron
    G. grass
    H. chicken
    I. gasoline

11. Jill eats 150 grams of a banana. Jamal eats 150 grams of chicken nuggets. What is the difference, in kilojoules, of the energy in the food consumed by Jill and Jamal? SC.B.1.3.1

<table>
<thead>
<tr>
<th>Food</th>
<th>Kilojoules per gram of food</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chicken nuggets</td>
<td>10.5</td>
</tr>
<tr>
<td>Banana</td>
<td>4.2</td>
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</tbody>
</table>

12. Juan starts a campfire using wood and then sets a pot of water over the fire. Describe the major energy changes that take place in the wood, the pot, and the water. SC.B.1.3.1
Solar energy is used in many parts of the world that receive a lot of sunlight. This energy is converted into electricity for use in the home. The diagram shows how energy collected from the Sun is used to run home appliances. **SC.B.1.3.1**

**Part A** In the diagram above, each appliance converts electricity into another type of energy. Using the terms below only once, label each appliance with the type of energy that electricity has been converted to.

- light
- mechanical
- thermal

**Part B** Before any of the appliances can be used, the solar energy must change into another form of energy. Describe how the energy is converted for each of the appliances.
Maria is pedaling her bicycle around a flat track. When she stops pedaling, the bicycle slows down to a stop. Which statement correctly explains why the bicycle stops? **SC.B.1.3.4**

A. Gravity causes the bicycle tires to turn more slowly.
B. The bicycle has used up all of its potential mechanical energy.
C. Wind blowing in the opposite direction pushes the bicycle backward.
D. Friction of the tires with the track changes the bicycle’s kinetic energy to heat energy.

Motor A uses 1000 joules of energy to move 200 newtons of force a distance of 3 meters. Motor B uses 1200 joules of energy to do the same job. What is the difference in percent efficiency between Motor A and Motor B? **SC.B.1.3.4**

The diagram shows an insulated mug. When a hot liquid is placed in the mug, which part of the mug prevents heat from being lost from the liquid by convection? **SC.B.1.3.5**
The diagram shows a periscope used in submarines to see objects on the surface of water. How does the light from the ship reach the person’s eye?

**SC.B.1.3.6**

**A.** The light is reflected by the mirrors in the periscope.

**B.** The light is refracted through the tube of the periscope.

**C.** The light passes directly through the mirrors in a straight line.

**D.** The walls of the periscope reflect the light until it reaches the eye.

Three waves with frequencies of 1 hertz (Hz), 3 Hz, and 9 Hz travel at the same speed. Which of the following statements is correct? **SC.B.1.3.6**

**F.** The 1-Hz wave contains the most energy.

**G.** The 1-Hz wave has the longest wavelength.

**H.** The crests of all three waves are of equal height.

**I.** The wavelength of the 9-Hz wave is three times that of the 3-Hz wave.

Sound travels 340 meters per second (m/s). Manny yells his name while standing some distance away from a canyon wall. His voice takes 1.6 seconds to travel to the wall and back to him before he hears an echo. How far, in meters, is Manny from the canyon wall? **SC.B.1.3.6**
20 José sits at the end of a dock watching the waves roll by. How is it possible for him to use a watch with a second hand to measure the frequency of the waves? SC.B.1.3.6

21 In western movies, we see characters listening for hoofbeats by putting one ear to the ground in order to find out whether horses are approaching. Explain how it might be possible to hear hoofbeats in the distance by doing this. SC.B.1.3.6
Which choice represents the energy changes that occur when a hair dryer is used? **SC.B.2.3.1**

- A. kinetic $\rightarrow$ thermal + sound + wind
- B. electrical $\rightarrow$ mechanical + sound + thermal
- C. thermal $\rightarrow$ electrical + mechanical + sound
- D. chemical $\rightarrow$ electrical + mechanical + sound

People get energy from eating plants such as lettuce and carrots. The plants get their energy from the Sun. In what form is the Sun’s energy stored in plants? **SC.B.2.3.1**

- F. chemical energy
- G. light energy
- H. mechanical energy
- I. thermal energy

Which of the following design changes would NOT increase the energy efficiency of a car? **SC.B.2.3.1**

- A. having wider tires
- B. having fewer moving parts
- C. making the car body more streamlined
- D. reducing friction between the moving parts
A teacher drives between four different locations during a day. The table shows the distances between the locations and the time it took the teacher to drive each part of the trip. During which part was the teacher’s average speed the greatest? **SC.C.1.3.1**

**Distance/Time Table**

<table>
<thead>
<tr>
<th>Trip</th>
<th>Distance (kilometers)</th>
<th>Time (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home to school</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>School to store</td>
<td>16</td>
<td>9</td>
</tr>
<tr>
<td>Store to post office</td>
<td>11</td>
<td>15</td>
</tr>
<tr>
<td>Post office to home</td>
<td>14</td>
<td>12</td>
</tr>
</tbody>
</table>

F. home to school  
G. school to store  
H. store to post office  
I. post office to home

Alex learned about magnetism at school today. At home, he experimented further with magnets and a compass. What happened when he brought the compass close to a magnet? **SC.C.2.3.1**

A. The compass stopped working.  
B. The compass needle began to spin.  
C. The compass needle got hot from friction.  
D. The compass needle pointed at the magnet.

A construction worker used a single pulley to lift a load of bricks 12 meters. If she applied a constant force of 500 newtons, how much work, in newton-meters, did she do? **SC.C.2.3.4**

**Gridded Response**
Benchmark Practice

Strand C: Force and Motion

28 Which of the following statements cannot be true if a car is slowing down? SC.C.2.3.6
F. The forces on the car are balanced.
G. The driver is stepping on the brakes.
H. The forces acting on the car are changed.
I. The car experiences friction from the road.

29 If the hand in the diagram is exerting an upward force of 2.2 newtons to hold up the ball, what is the ball’s weight? SC.C.2.3.6

A. 2.2 newtons
B. 2.2 kilograms
C. more than 2.2 newtons
D. more than 2.2 kilograms

30 A car in a soap box derby is traveling at 10 kilometers per hour (km/hr). A 5 km/hr wind continuously blows directly against the car, in the opposite direction of the car’s motion. Assuming that the car is lightweight and boxy, what is the new speed of the car in km/hr? SC.C.2.3.6

Name: ____________________________ Date: ____________ Class: ______________
31. The plane shown in the diagram is flying steadily at 200 kilometers per hour in level flight. As the weather changes, the drag from wind increases. Describe what happens to the motion of the plane in terms of the forces acting on it. **SC.C.2.3.6**

```
Lift

Thrust

Drag

Gravity
```

----

32. Peggy is running around the school track at a constant speed. The track has two straight stretches on the sides and two curved stretches at either end. Where on the track does Peggy experience balanced and unbalanced forces? Explain your answer. **SC.C.2.3.6**

```
Lift

Thrust

Drag

Gravity
```

----
A spacecraft can orbit Earth at a very high speed, but does not fly away from the planet because of Earth’s gravity. Which statement correctly describes this force? **SC.C.2.3.7**

**F.** The attraction of the spacecraft on Earth, and that of Earth on the spacecraft, are equal.

**G.** The attraction of the spacecraft on Earth is greater than the attraction of Earth on the spacecraft.

**H.** The attraction of Earth on the spacecraft is greater than the attraction of the spacecraft on Earth.

**I.** The attraction between Earth and the spacecraft depends on how fast the spacecraft is traveling in orbit.

The gravitational force between two objects depends on the masses of the objects. What other factor affects the amount of gravitational force? **SC.C.2.3.7**

**A.** the density of the objects

**B.** the volume of the objects

**C.** the distance between the objects

**D.** the difference between the objects’ masses

Bella dropped two objects from the same height. The objects had the same mass but different sizes and shapes. Charles measured the time it took the objects to reach the ground. Which of the following is the question this experiment was designed to answer? **SC.C.2.3.7**

**F.** How does height affect the force of gravity?

**G.** How do mass and weight affect falling objects?

**H.** How does gravity affect objects of the same weight?

**I.** How do size and shape affect an object’s rate of fall?
Weathering by wind and water constantly shapes and reshapes Earth’s surface. Which of the following is primarily affected by wind erosion?

**SC.D.1.3.1**

- A. canyons
- B. mountains
- C. rain forests
- D. sand dunes

The table below describes the loss of sand at a local beach over four years. Which of the following could have caused the unusual level of sand loss in 2002?

**SC.D.1.3.1**

<table>
<thead>
<tr>
<th>Year</th>
<th>Erosion (in meters)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>2</td>
</tr>
<tr>
<td>2002</td>
<td>18</td>
</tr>
<tr>
<td>2003</td>
<td>7</td>
</tr>
<tr>
<td>2004</td>
<td>5</td>
</tr>
</tbody>
</table>

- F. lower than usual tides
- G. higher than usual tides
- H. lower than usual storm activity
- I. higher than usual storm activity

Tomás is planning a trip to the lake. The weather forecaster said a large cold air mass will settle over the water. What type of morning conditions should Tomás expect?

**SC.D.1.3.3**

- A. clear
- B. foggy
- C. rainy
- D. sunny
Benchmark Practice

Strand D: Processes that Shape the Earth

39. Jason’s family adds composted kitchen waste, like banana peels and eggshells, to their vegetable garden. Why is it useful to put these materials into the soil?  
   A. Compost slows wind erosion of the soil.  
   B. Adding decaying matter to soil makes it more fertile.  
   C. Compost attracts animals whose waste fertilizes the soil.  
   D. Putting compost in soil reduces the amount of harmful bacteria.  
   SC.D.1.3.4

40. A hillside above a neighborhood is weakened by erosion and threatens the houses below. The table shows the amount of soil lost from the hillside each year. Which of the following actions could have caused the pattern of erosion shown in the table below?  
   A. The city could have stopped activities on the hillside in 1997.  
   B. The city could have located houses too close to the hill in 1998.  
   C. The city could have brought in plants with spreading roots in 1999.  
   D. The city could have removed the grasses from the hillside in 2000.  
   SC.D.1.3.4

<table>
<thead>
<tr>
<th>Year</th>
<th>Erosion (meters)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>518</td>
</tr>
<tr>
<td>1998</td>
<td>784</td>
</tr>
<tr>
<td>1999</td>
<td>112</td>
</tr>
<tr>
<td>2000</td>
<td>83</td>
</tr>
</tbody>
</table>

41. Bacteria are important in shaping Earth’s biosphere. Which of the following is NOT a function of bacteria?  
   A. Bacteria influence regional weather patterns.  
   B. Bacteria aid plants in the process of photosynthesis.  
   C. Bacteria enrich legume crops through the nitrogen cycle.  
   D. Bacteria produce essential amino acids used by organisms.  
   SC.D.1.3.4
Some changes to Earth’s surface happen quickly. Others, such as the formation of the Colorado River, happen too slowly for us to notice. Which of the following activities takes the longest to change Earth’s appearance? SC.D.1.3.5

A. earthquake
B. glacial movement
C. hurricane
D. volcanic eruption

A light-year is a unit of distance that measures how far light can travel in one year. One light-year is equal to 9,500,000,000,000 kilometers. Why do scientists use light-years to measure distances in the universe? SC.D.1.3.5

F. Light-years determine the ages of planets and stars.
G. Light-years are more accurate than other measurements.
H. Light-years tell us about the brightness and distance of other objects.
I. Other units of distance, such as kilometers, are too small to be useful.

Angie reads in a book that the age of ancient limestone rock beds can be estimated by making one meter equal 10,000 years. How many years old is a limestone rock bed 6.5 meters high? SC.D.1.3.5

Go on
Europa is one of Jupiter’s moons. Why is Europa called a satellite of Jupiter? **SC.E.1.3.1**

- **A.** It revolves around Jupiter.
- **B.** It revolves around the Sun.
- **C.** It formed at the same time as Jupiter.
- **D.** It is made of the same material as Jupiter.

According to the table below, which of the planets listed revolves around the Sun in the shortest time? **SC.E.1.3.1**

<table>
<thead>
<tr>
<th>Planet</th>
<th>Length of Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earth</td>
<td>365 Earth days</td>
</tr>
<tr>
<td>Mars</td>
<td>687 Earth days</td>
</tr>
<tr>
<td>Jupiter</td>
<td>11.9 Earth years</td>
</tr>
<tr>
<td>Saturn</td>
<td>29.5 Earth years</td>
</tr>
</tbody>
</table>

- **F.** Earth
- **G.** Jupiter
- **H.** Mars
- **I.** Saturn

The length of each planet’s day is the amount of time it takes the planet to rotate completely on its axis. An Earth day takes 24 hours, while a day on Jupiter takes 9.6 Earth hours. How many times does Jupiter rotate during one Earth day? **SC.E.1.3.1**
The Moon does not create its own light. The moonlight we see is reflected sunlight. How does the position of Earth, the Sun and the Moon affect the shape of the reflected light we see on the Moon? **SC.E.1.3.1**

The planets pictured are all part of our solar system. Explain how the orbits and position of each planet, in relation to the Sun, make them a part of the same solar system. **SC.E.1.3.1**
The Sun is one of the stars in the Milky Way galaxy. In what way are the other stars in the Milky Way like the Sun? **SC.E.1.3.4**

A. The other stars have the same age as the Sun.
B. The other stars are about the same size as the Sun.
C. The other stars burn at the same temperature as the Sun.
D. The other stars are made of the same elements as the Sun.

Which of the following describes a galaxy? **SC.E.2.3.1**

F. planets that orbit a single star
G. stars, gas, and dust held together by gravity
H. a single ball of gas that gives off light and heat
I. ice or frozen gas that is clumped together and orbits the Sun

Astronomers observed a star with a similar color to that of our Sun. What can they conclude about the properties of the star observed? **SC.E.2.3.1**

A. It is as bright as the Sun.
B. It also has a planetary system.
C. It is very close to our solar system.
D. Its surface temperature is similar to that of the Sun.
The diagram below shows organs that enable humans to eat food and eliminate waste. What system is represented in the diagram? **SC.F.1.3.1**

- F. circulatory
- G. digestive
- H. endocrine
- I. nervous

Which of the following are responsible for transporting blood from the heart to the rest of the body? **SC.F.1.3.1**

- A. arteries
- B. capillaries
- C. lymphs
- D. veins

Fish require oxygen to live. The oxygen they need is dissolved in the water, and fish have specialized organs to absorb this oxygen. Which of the following organs of the fish shown below function like the lungs in humans? **SC.F.1.3.1**

- F. barbels
- G. fins
- H. gills
- I. liver
56. The diagram below shows a human sweat gland. Explain the function of sweat glands in the human body. **SC.F.1.3.1**

A hiker climbs to the top of a mountain, where oxygen levels are lower than at sea level. Explain how the amount of oxygen in the atmosphere affects respiration. **SC.F.1.3.1**
Both one-celled and many-celled organisms have to complete life processes such as respiration, digestion, and waste removal. Although they share similar processes, how do one-celled and many-celled organisms differ? SC.F.1.3.2

A. One-celled organisms have tissues.
B. One-celled organisms have organ systems.
C. Many-celled organisms have specialized cells.
D. Many-celled organisms always have smaller cells.

A tree and a bear are organisms with very different cellular structures. Which of the following choices is NOT a similarity between the two organisms? SC.F.1.3.2

F. Both reproduce.
G. Both have organelles.
H. Both are many-celled.
I. Both have chloroplasts.

A fertilized frog egg divides four times until there are 16 cells. If any one of the 16 cells were tested, it would have the same number of chromosomes as the parent cell. What process has the fertilized egg undergone? SC.F.1.3.3

A. binary fission
B. meiosis
C. mitosis
D. sexual reproduction
When some lizards lose their tails, they are able to grow a new tail. Which of the following describes the process of new tail growth? SC.F.1.3.3

F. Existing tail cells grow larger and longer.
G. Existing tail cells grow and divide through mitosis.
H. Existing tail cells grow and divide through meiosis.
I. Existing tail cells grow and divide through adaptation.

Which of the following organs would NOT be considered part of the excretory system? SC.F.1.3.4

A. kidneys
B. large intestine
C. pancreas
D. sweat glands

The respiratory and circulatory systems provide the tissues of your body with the oxygen they need to function. At which location is the oxygen used to make energy? SC.F.1.3.4

F. cells
G. capillaries
H. heart
I. lungs
A solution of water, red blood cells, and salts is mixed to have the composition of human blood. Over several hours the red blood cells gradually darken in color. When oxygen is bubbled into the solution, the cells turn a bright red. What happens when the red blood cells turn dark red? **SC.F.1.3.5**

A. The cells are losing salt to the solution.
B. The cells are losing oxygen to the solution.
C. The cells are losing hemoglobin to the solution.
D. The cells are losing carbon dioxide to the solution.

The diagram below shows a nerve cell. Which structure enables the nerve cell to collect information before sending it on to the brain? **SC.F.1.3.6**

A. axon
B. axon endings
C. cell body
D. dendrites

A plant grown indoors will often grow toward a light source. What is the name for this process? **SC.F.1.3.7**

A. gravitropism
B. hydrotropism
C. phototropism
D. thermotropism
Benchmark Practice

Strand F: Processes of Life

67. The following diagram shows a yeast reproducing by budding. Which of the following describes the offspring? SC.F.2.3.1

F. The offspring will contain new genetic material.
G. The offspring will contain half the parent cell’s genetic material.
H. The offspring will contain genetic material identical to the parent.
I. The offspring will contain genetic material from both parent cells.

68. Which of the following describes the difference between sexual and asexual reproduction? SC.F.2.3.1

A. Sexual reproduction occurs only in animals; only plants reproduce asexually.
B. Sexual reproduction requires two parents; asexual reproduction requires only one parent.
C. Sexual reproduction involves the division of a single cell; asexual reproduction involves two cells.
D. Sexual reproduction results in genetically identical offspring; offspring of asexual reproduction are not identical.

69. A white horse and a chestnut-brown horse produce an offspring that is a golden color. This is an example of what? SC.F.2.3.2

F. codominance
G. recessive alleles
H. dominant alleles
I. incomplete dominance
In chickens, a black chicken and a white chicken will produce offspring with a combination of black and white feathers. What inheritance pattern is this and how does it occur? **SC.F.2.3.2**

---

Albinism is an inherited trait that causes organisms to have little or no pigmentation, or coloring, in their hair or eyes. The table below shows the offspring of two rats that have mated. The parent rats are not albino.

<table>
<thead>
<tr>
<th>Offspring of the Two Rats</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Albino rats</td>
<td>2</td>
</tr>
<tr>
<td>Pigmented rats</td>
<td>6</td>
</tr>
<tr>
<td>Total offspring</td>
<td>8</td>
</tr>
</tbody>
</table>

Based on the characteristics of the offspring, what can be concluded about the traits for pigmentation and albinism? **SC.F.2.3.2**

---
Benchmark Practice

Strand F: Processes of Life

For a breed of cat, the allele for gold eyes (G) is dominant over the allele for blue eyes (g). The diagram below shows the alleles for two cats that will produce offspring. SC.F.2.3.2

When the sex cells from the two cats join, what percent of the offspring will have blue eyes?
A. 25 percent  
B. 50 percent  
C. 75 percent  
D. 100 percent

A lioness gives birth to three cubs. One of the cubs is smaller than the other two. During feedings it often is pushed away by its siblings and does not get enough to eat. Why will the two larger cubs be more likely to reproduce than the smaller one? SC.F.2.3.3
F. They are more likely to survive.  
G. They will have more mates to choose from.  
H. Their mother will ensure that they reproduce.  
I. Their size is similar to other lions within the pride.

Why do fossils of organisms usually show hard features, such as shells? SC.F.2.3.4
A. Animals always are eaten as soon as they die.  
B. Hard parts like bones and teeth fossilize, but soft material decays.  
C. At the time when most fossils formed, all animals had hard shells.  
D. The other parts of the fossil are not useful, and they are thrown away.
How might the false eyespots on this moth protect it from being eaten by a predator? **SC.G.1.3.2**

- **F.** They warn predators that the moth is poisonous.
- **G.** Predators might think they are eyes of a large animal.
- **H.** They help the moth quickly fly away to escape predators.
- **I.** The eyespots help the moth see predators during the night.

**Homo sapiens** is the scientific name for humans. Which two levels of classification does the name represent? **SC.G.1.3.3**

- **A.** order and family
- **B.** phylum and class
- **C.** genus and species
- **D.** domain and kingdom

What is the purpose of biological classification? **SC.G.1.3.3**

- **F.** to know where every organism lives
- **G.** to identify relationships between species
- **H.** to keep a proper count of all organisms that have lived
- **I.** to communicate with scientists in other fields of science
Which of the following is one reason why viruses are not classified as living things? SC.G.1.3.4

A. No virus requires energy or is capable of movement.
B. Viruses can only reproduce inside another living cell.
C. Some viruses only have RNA as their genetic material.
D. Most viruses only can infect mammals and make them sick.

In this woodland food web, which organisms eat the hawk? SC.G.1.3.4

F. bacteria and fungi
G. insects and snakes
H. songbirds and mice
I. mice and salamanders

What type of diagram shows the available energy at each feeding level in an environment? SC.G.1.3.4

A. a food web
B. a food chain
C. an energy pyramid
D. a predator/prey diagram
81 Explain why decomposition is necessary for life to continue on Earth.  
SC.G.1.3.4

82 Some species of plants called epiphytes, such as orchids, grow high in 
the branches of trees. The trees support the plants where they can collect 
more sunlight. The plants do not harm the tree, nor are they beneficial to 
the tree. Describe this type of symbiosis. SC.G.1.3.4
Benchmark Practice

Strand G: How Living Things Interact with Their Environment

According to the circle graph, where is most of Earth’s surface water contained? **SC.G.2.3.1**

Distribution of Earth’s Water Resources

- Oceans 97%
- Groundwater
- Ice caps
- Bodies of freshwater
- Soil
- Freshwater
- Groundwater
- Ice caps
- Oceans

What abiotic factor is necessary for reptiles to regulate body temperature? **SC.G.2.3.2**

- A. carbon dioxide
- B. food
- C. precipitation
- D. sunlight

For every 5 centimeters (cm) of rain in a desert area, the population of a particular plant **increases** by 30 plants. On January 1, 2004, there were 460 plants. Using the graph below, calculate how many plants there are on February 1, 2004 if none of the plants from January died. **SC.G.2.3.2**
A wildfire burns away all of the grass in an ecosystem. Which of the following explains the effect this will have on other organisms within the ecosystem? **SC.G.2.3.3**

F. Only the grass will be affected by the wildfire.
G. Only grass-eaters will be affected because their food source is gone.
H. Only grass-eaters and predators that eat these animals will be affected.
I. All organisms at each energy level within the ecosystem will be affected.

Due to changes in resources, a typically rainy ecosystem becomes a dry, sunny environment. How will the plant and animal populations change? **SC.G.2.3.3**

A. All the organisms will remain the same.
B. Organisms that adapt to the new weather will thrive.
C. All organisms will develop ways protect themselves from heat.
D. Any organisms in the environment during the change will move or die.

The graph below shows that the United States uses 9750 kilograms of coal per person each year. How many more kilograms of coal per 1000 people does the United States use than Norway? **SC.G.2.3.3**

---

**Gridded Response**

<table>
<thead>
<tr>
<th>Country</th>
<th>Per Capita Energy Use (in thousands of kilograms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Norway</td>
<td>453</td>
</tr>
<tr>
<td>Switzerland</td>
<td>67</td>
</tr>
<tr>
<td>Sweden</td>
<td>86</td>
</tr>
<tr>
<td>United States</td>
<td>89</td>
</tr>
<tr>
<td>Canada</td>
<td>3</td>
</tr>
<tr>
<td>Japan</td>
<td>3</td>
</tr>
<tr>
<td>Australia</td>
<td>8</td>
</tr>
<tr>
<td>China</td>
<td>6</td>
</tr>
<tr>
<td>India</td>
<td>8</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>8</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>8</td>
</tr>
</tbody>
</table>

---

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Benchmark Practice

Strand G: How Living Things Interact with Their Environment

Look at the graph below to determine which cause of animal extinction had the greatest impact. Which of the following is an example of that cause? SC.G.2.3.4

F. animal poaching
G. predator attack
H. clear-cutting forest
I. species introduction

Based on the information in the table below, which action would have the greatest effect on reducing the amount of waste added to landfills? SC.G.2.3.4

<table>
<thead>
<tr>
<th>Landfill Waste Components (Percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper and cardboard</td>
</tr>
<tr>
<td>Yard wastes</td>
</tr>
<tr>
<td>Food wastes</td>
</tr>
<tr>
<td>Plastics</td>
</tr>
<tr>
<td>Metals</td>
</tr>
<tr>
<td>Glass</td>
</tr>
<tr>
<td>Other</td>
</tr>
</tbody>
</table>

A. recycling paper and cardboard
B. reducing use of metal products
C. composting yard and food wastes
D. reusing glass and plastic containers

Which of the following describes how humans can directly cause an imbalance within the carbon cycle? SC.G.2.3.4

F. by recycling plastics
G. by burning fossil fuels
H. by burying trash in landfills
I. by dumping used oil into lakes
One way to reduce the amount of solid waste added to our environment is to practice the “three Rs”: Reduce, Reuse, and Recycle. Explain what each step means in regard to solid-waste disposal. **SC.G.2.3.4**

Examine the illustration and explain how smoke and fumes produced by an industrial city can result in acid rain in a faraway location. **SC.G.2.3.4**

![Diagram showing urban waste, industrial waste, air pollutants, and acid rain affecting a farm scene]

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When people began to group similar organisms, they first classified ones that were easy to see. For example, early classifications included plants or animals. Now we can classify things into more specific groups such as flowering or nonflowering plants. How has the microscope contributed to making classification more detailed? **SC.H.1.3.1**

A. The microscope has given scientists a new way of looking at old observations.
B. Because of the microscope, scientists classify organisms strictly by their cell type.
C. A microscope’s complexity has led scientists to think that nature is also very complex.
D. To use a microscope, scientists must only use specifics when classifying organisms.

As we learn and discover new things, old theories are challenged and new theories are formed. Which of these would NOT usually contribute to new theories being formed? **SC.H.1.3.1**

F. retesting an old idea with new data
G. basing conclusions on untested observations
H. reading about other scientists’ theories and discoveries
I. discovering a new planet with ancient water formations

Figure A illustrates Aristotle’s theories about force and motion when applied to a cannonball shooting from a cannon. Galileo then made new observations about force and motion, which are illustrated in Figure B. **SC.H.1.3.1**

How are Aristotle’s and Galileo’s observations similar and different?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
Evan has a hypothesis about how stringed instruments make high and low sounds. What should Evan do to test his hypothesis? SC.H.1.3.2
A. Carefully listen to violin sounds to distinguish which are low and which are high.
B. Write a conclusion explaining that his hypothesis is correct because it seems logical.
C. Set up an experiment using different-sized cans, boxes, and jars as the control group.
D. Set up an experiment using a piano, violin, and guitar to determine how each one produces low and high sounds.

Ian created two ramps for his school science project. One ramp was 10 centimeters (cm) tall and the other was 20 centimeters (cm) tall. The base of both ramps was 10 centimeters (cm). Ian rolled a ball down each ramp once. Then he measured how far the ball rolled past the end of each ramp.

Ian wrote his conclusion and turned in his report. What should Ian have done differently for a more accurate conclusion? SC.H.1.3.2
F. Ian should have built the ramps with different-sized bases.
G. Ian should have taken pictures of the ball rolling down the ramps.
H. Ian should have rolled the ball down several times instead of just once.
I. Ian should have performed the experiment with other people observing.

Scientific hypotheses are proved or disproved through controlled scientific experiments. Which of these questions could NOT be answered through a proper scientific experiment? SC.H.1.3.3
A. How many calories are in a banana?
B. Are canines happier with male or female owners?
C. Do beans grow faster in salt water or freshwater?
D. Are sports drinks healthier to drink than water when exercising?
**Benchmark Practice**

**Strand H: The Nature of Science**

100 Multiple Choice

Logan is researching the effect of bright light on the tunneling process of earthworms. Which of the following would be an unethical practice in this experiment? **SC.H.1.3.4**

F. Because Logan is ahead of schedule, he takes a vacation day.
G. In order to save money, Logan uses less expensive, poor-quality soil.
H. Logan reads similar research to compare experimental processes and conclusions.
I. Logan leaves the bright light on for several days to reduce the number of earthworms.

101 Multiple Choice

Ruby is researching how the amount of water affects the growth of soybeans. She fills three pots with the same amount of soil, plants five seeds in each pot, and sets them on a windowsill. Ruby gives one plant 235 milliliters (mL), the second 300 mL, and the third 315 mL of water once a week. She also checks the temperature and growth when watering. Which of Ruby’s practices could be a reason her experiment is not valid? **SC.H.1.3.4**

A. Ruby planted only five seeds in each pot.
B. Ruby did not use equal watering amounts.
C. Ruby checked the soybeans’ growth only once a week.
D. Ruby didn’t control the amount of light the plants received.

102 A scientist published six reports in one year. Later it was revealed that four of these experiments never occurred and were made up. What result could this news have on the scientist’s other two published reports? **SC.H.1.3.4**

_________________________________________

_________________________________________

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_________________________________________
Cindy placed three beehives with the same mass into separate glass containers. Hive A was kept at 10 degrees Celsius (°C), Hive B was kept at 29°C, and Hive C was kept at 37°C. For the next month she measured the amount of honey each hive produced. Hive B produced more than the other two hives. What is the variable in her experiment? **SC.H.1.3.5**

F. the number of hives  
G. the mass of each hive  
H. the temperature of each hive  
I. the amount of honey produced

Marilyn is measuring how fast a candle can burn. Her results are shown in the table below. In kilometers per hour, how much does the variable change with each candle? Round your answer to the nearest whole number. **SC.H.1.3.5**

<table>
<thead>
<tr>
<th>Candle</th>
<th>Initial Height (centimeters)</th>
<th>Wind Speed (kilometers per hour)</th>
<th>Burn Time (minutes)</th>
<th>End Height (centimeters)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8</td>
<td>8.05</td>
<td>200</td>
<td>4.5</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
<td>16.09</td>
<td>200</td>
<td>4.25</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>24.14</td>
<td>200</td>
<td>3.8</td>
</tr>
</tbody>
</table>

Corrie sets up an experiment to see if detergent or glycerin, a syrupy liquid in soaps, makes bigger bubbles. She first pours a detergent on her desk and spreads it around, covering the whole surface. She then places one end of a straw on her desk at 90 degrees and blows through the other end to make a bubble. When the bubble pops, Corrie measures the diameter of the circle left on the desk. She then repeats her procedure with glycerin. Why is Corrie’s experiment NOT valid? **SC.H.1.3.5**

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Go on
Safia loves playing sports and always gets her uniforms dirty during each game. She decides to test three laundry soaps to see which one cleans her uniforms the best. Her results are recorded in the chart below.

**Part A** Based on the data provided in the chart, describe the variables Safia should control during her experiment.

**Part B** Explain how the variables in Part A will affect her results.

### Cleaning Efficiency

<table>
<thead>
<tr>
<th>Soap</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>specks of dirt remained</td>
</tr>
<tr>
<td>B</td>
<td>no change in grass stain</td>
</tr>
<tr>
<td>C</td>
<td>all stains removed</td>
</tr>
</tbody>
</table>

SC.H.1.3.5
Many people eat oranges from California. Which of the following allows California to produce so many oranges each year? **SC.H.2.3.1**

A. The weather patterns are ideal for growing oranges.
B. California is the most populated state in the country.
C. California farmers have access to salt water for the oranges.
D. California farmers have secret advanced ways of caring for orange trees.

Samantha decides to participate in a breakthrough study of a new cold medicine. She and the other volunteers gave information about their allergies and other medications they take before they started. Why is it important to obtain this information first? **SC.H.3.3.1**

F. to ensure that the medication being tested is better
G. to allow those on other medication to start right away
H. to avoid any harmful side effects and allergic reactions
I. it is only provided as background information for the study

Mr. Kodera owns an electronics store. He hypothesizes that compact disc (CD) sales are down this year because new technology made other forms of entertainment more attractive than listening to music. If his hypothesis is correct, which of the following might further decrease music sales next year? **SC.H.3.3.4**

A. a decrease in the price of blank CDs
B. the development of a new music format
C. the digital release of an exclusive Beatles album
D. the release of a video game with cutting-edge technology
The table below shows the results of an experiment testing to see if Pesticide X would stop mosquito egg production. What is the only independent variable that differed between the control group and the experimental groups?

A. temperature  
B. mosquito species  
C. amount of pesticide  
D. number of eggs produced

There are three main types of galaxies: spiral, elliptical, and irregular. All galaxies, regardless of type, contain which of the following?

F. stars  
G. liquid water  
H. long, spiral arms  
I. a well-defined core

All molecules have a certain amount of kinetic energy. The molecules of which of the following celestial bodies have, on average, the most kinetic energy?

A. a comet  
B. Earth  
C. the Moon  
D. the Sun
4. As energy flows through an ecosystem, less energy is available to the ecosystem’s animals because heat energy is released as organisms perform life processes. Examine the diagram below, which shows energy flow through an ecosystem. How many kilojoules (kJ) of energy are available for the carnivores in the ecosystem?

Energy used by plants for photosynthesis = 20 810 kJ
Energy consumed by herbivores = 7613 kJ
Energy lost as heat and organic waste = 6116 kJ
Energy available for carnivores = ?

5. Gravity pulls everything toward Earth’s center. What factor affects the size of the force between Earth and an object?
   F. an object’s mass
   G. the diameter of an object
   H. the material from which an object is made
   I. the temperature of the air between Earth and an object

6. Rebecca has two necklaces, each with a mass of 20 grams. She is sure that one necklace is pure gold. How can Rebecca determine whether the second necklace is also pure gold?

   __________________________________________
   __________________________________________
   __________________________________________
   __________________________________________
   __________________________________________
   __________________________________________
Mesas, like the one shown below, are commonly found in the southwestern United States. What primary process shapes mesas?

A. glacial deposition  
B. volcanic eruptions  
C. water erosion  
D. wind deposition

Venus orbits the Sun in about 0.6 Earth years. About how many Earth days does it take Venus to complete its orbit around the Sun?

Elijah and Rob are working together to move a refrigerator. Based on the picture below, what is the net force applied by Elijah and Rob to the refrigerator?

F. 8 newtons to the left  
G. 8 newtons to the right  
H. 44 newtons to the left  
I. 44 newtons to the right
Stable ecosystems have a great amount of biodiversity with little change in the size of populations within the ecosystem. Human activities are capable of disrupting stable ecosystems, even those not inhabited by humans. In what ways can human activities alter the equilibrium of ocean ecosystems?

Graptolites are simple marine animals that became extinct around 400 million years ago. For many years scientists thought that *Cyrtograptus* was the oldest type of graptolite. A scientist then excavated the layers of soil illustrated below. Do the data obtained from the excavation challenge the idea that *Cyrtograptus* is the oldest type of graptolite? Explain your answer.

<table>
<thead>
<tr>
<th>Level 1 – 10 m deep</th>
<th>Level 2 – 20 m deep</th>
<th>Level 3 – 30 m deep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climacograptus</td>
<td>Bohemograptus</td>
<td>Rasnites</td>
</tr>
<tr>
<td>Rastrites</td>
<td></td>
<td>Cyrtograptus</td>
</tr>
</tbody>
</table>

Key
Below are the results of a microbiologist’s experiment with a species of bacterium. Based on proper scientific practices, what should the microbiologist do next?

**Genetic Mutations in Bacteria X**

<table>
<thead>
<tr>
<th>Group</th>
<th>Length of Ultraviolet Light Exposure</th>
<th>Number of Cases of Genetic Mutations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0 days</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>10 days</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>20 days</td>
<td>63</td>
</tr>
<tr>
<td>4</td>
<td>30 days</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>40 days</td>
<td>61</td>
</tr>
</tbody>
</table>

A. Repeat the experiment.
B. Form a new hypothesis.
C. Report that ultraviolet light causes mutations.
D. Report that ultraviolet light does not cause mutations.

Organisms interact in many different ways, such as competitive relationships and predator-prey relationships. These relationships affect the flow of energy between organisms. In which direction does energy flow in a parasite-host relationship?

F. from the host to the parasite
G. from the parasite to the host
H. from the host to decomposers
I. from the Sun to the parasite and host
An earthquake makes different kinds of waves that travel at different speeds. By measuring the difference in travel time between waves, you can tell how far away an earthquake is. For each 100 kilometers the waves travel, there is an 8-second time difference. Suppose you are in Centerville during an earthquake. You time 24 seconds between the different waves. How many kilometers away is the epicenter, the center of the earthquake?

The lymphatic system is one of the human body’s 12 major organ systems. Which of the following tasks is the lymphatic system’s primary function?

A. mineral storage
B. defense against disease
C. reproduction of offspring
D. delivery of nutrients to cells

Submarines often must travel far below the ocean’s surface. The technological design of a submarine must take into account which of the following constraints?

F. water salinity
G. oxygen levels
H. air temperature
I. water pressure
17. Earth’s atmosphere is influenced by many environmental conditions and natural processes. Which of the following processes directly connects Earth’s atmosphere to its oceans?
   A. cellular respiration
   B. nitrogen fixation
   C. seafloor spreading
   D. water cycle

18. The image below shows a light wave entering water. What type of wave interaction is occurring?
   F. absorption
   G. reflection
   H. refraction
   I. scattering

19. In multicellular organisms, cells with similar functions form tissue. What do tissues with similar functions form?
   A. organs
   B. organ systems
   C. other tissues
   D. tissue systems
20 The variation of petal color in a flower is an inherited trait. Assume that \( R \) is the dominant allele for red petals and \( r \) is the recessive allele for yellow petals. Using the Punnett square, what is the probability that a flower with the genotype \( Rr \) crossed with a flower \( rr \) will have offspring with the genotype \( rr \)?

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>Rr</td>
</tr>
<tr>
<td>r</td>
<td></td>
</tr>
<tr>
<td>r</td>
<td>r</td>
</tr>
</tbody>
</table>

F. 1:1  
G. 1:2  
H. 1:4  
I. 2:3

21 Neurons communicate by transmitting nerve impulses to body tissues and organs. How are these nerve impulses transmitted?

A. through ATP  
B. through body fluids  
C. through electrical energy  
D. through mechanical energy

22 Skiers use gravity and mechanical energy to move down ski slopes. Look at the illustration below. Which form of energy is decreasing as the skier travels downhill?

F. chemical energy  
G. kinetic energy  
H. mechanical energy  
I. potential energy
Robert got a new remote control car for his 11th birthday. He wanted to test it immediately and discovered that it can go from 0 to 5 meters per second in 2 seconds. What was the average acceleration of the car in meters per second squared?

Farmers often rotate their crops every few years. How does this activity provide benefits to the soil?

A. Crop rotation prevents fields from flooding.
B. Crop rotation keeps weeds from taking hold.
C. Crop rotation kills harmful bacteria that live in the soil.
D. Crop rotation allows the soil’s nutrients to be replenished.

Dominique decided to bring a picnic to the beach. She put warm bottles of water in an ice-filled cooler. In which direction is the thermal energy flowing in the cooler?

F. there is no flow of energy
G. from the ice to the outside air
H. from the ice to the bottles of water
I. from the bottles of water to the ice
26. Jay’s mother breeds miniature horses. She wants Jay to help her find the best mix of feed for the young horses. Which of the following observations will Jay NOT need to record about the horses?
   A. how fast the horses eat their grain ration
   B. the weight of hay given to each horse each day
   C. each horse’s weight and height measured weekly
   D. the amounts of oats, corn, and molasses mixed to make the daily grain

27. Sara lives on the coast. For the past several weeks, she has marked the points of highest and lowest tides during the day. She then makes a drawing of the average highest and lowest points, noting that the tides are easily predictable. She would like to find a way to produce energy from this tidal motion. Which of the following may cause problems with Sara’s idea?
   F. The tides are too unpredictable.
   G. The tides may not produce enough energy.
   H. Tidal energy is a polluting source of energy.
   I. The tides represent a non-renewable energy source.

28. Which term is best described as a large number of stars, gas, and dust held together by gravity?
   A. galaxy
   B. universe
   C. solar system
   D. planetary system
29. Based on the diagram below, which of the following correctly lists the types of stars in order of increasing surface temperature?

- F. white dwarfs, main sequence, giants, supergiants
- G. supergiants, giants, main sequence, white dwarfs
- H. white dwarfs, giants, supergiants, main sequence
- I. main sequence, giants, supergiants, white dwarfs

30. Which of the following cellular activities is shown in the diagram below?

- A. cell division
- B. cell regulation
- C. cell respiration
- D. cell locomotion

31. Scientists use various units of measure to study and relate information about Earth’s systems. In space, how do scientists calculate the distance between stars?

- F. in Angstroms
- G. in light-years
- H. in miles
- I. in millennia
Alysha wants to see if she can save money on her electricity bill by using more efficient lightbulbs in her house. On the first of the month, she replaces all of her incandescent bulbs with compact fluorescent bulbs. At the end of the month, Alysha’s electric bill is down by 5 percent from the previous month.

**Part A** What concern exists when trying to determine if the lightbulbs saved Alysha money on her electricity bill?

**Part B** How could Alysha change her experiment so that the effects of the lightbulb change on the electricity bill can be accurately measured?