DESCRIPTION OF TEST FORMAT AND ORGANIZATION

The Grade 7 Science EOG assessment has a total of 75 selected-response (multiple-choice) items.

The test will be given in two sections.

- You may have up to 70 minutes per section to complete Sections 1 and 2.
- The total estimated testing time for the Grade 7 Science EOG assessment ranges from approximately 90 to 140 minutes.

CONTENT

The Grade 7 Science EOG assessment will measure the Grade 7 Science standards that are described at www.georgiastandards.org. The science items also relate to a Characteristics of Science standard. Because science consists of a way of thinking and investigating and includes a growing body of knowledge about the natural world, you will need to understand the Characteristics of Science standards and the Content standards for Science. The Characteristics of Science and Nature of Science standards can also be found at www.georgiastandards.org.

The content of the assessment covers standards that are reported under these domains:

- Cells, Human Body, and Genetics
- Evolution
- Interdependence of Life

ITEM TYPES

The science portion of the Grade 7 EOG assessment consists of selected-response (multiple-choice) items only.
SCIENCE DEPTH OF KNOWLEDGE EXAMPLE ITEMS

Example items that represent applicable DOK levels of the Science assessment are provided for you on the following pages. The items and explanations of what is expected of you to answer them will help you prepare for the test.

All example and sample items contained in this guide are the property of the Georgia Department of Education.

Example Item 1

DOK Level 1: This is a DOK level 1 item because the question requires the student to recall information concerning a known relationship between scientific quantities.

Science Grade 7 Domain: Cells, Human Body, and Genetics

Standard: S7L2. Students will describe the structure and function of cells, tissues, organs, and organ systems. c. Explain that cells are organized into tissues, tissues into organs, organs into systems, and systems into organisms.

Standard: S7SSa. Observe and explain how parts can be related to other parts in a system such as predator/prey relationships in a community/ecosystem.

Which of these correctly lists the four levels of organization for a multi-cellular organism in order, from smallest to largest?

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

Correct Answer: D

Explanation of Correct Answer: The correct answer is choice (D) cells, tissues, organs, organ systems, organism. The smallest unit of life is the cell. Specialized cells group together to form tissues. Tissues that work together to perform a specific activity form an organ. Groups of two or more organs combine to create an organ system. Organisms are made up of multiple organ systems. Choice (A) is incorrect because it puts “organ systems” before “organs.” Choice (B) is incorrect because “tissues” should be placed immediately after “cells,” not “organ systems.” Choice (C) is incorrect because although all the levels are present, they are not in the correct order.
Example Item 2

DOK Level 2: This is a DOK level 2 item because the question requires the student to apply learned information to abstract and real-life situations.

Science Grade 7 Domain: Evolution

Standard: S7L5. Students will examine the evolution of living organisms through inherited characteristics that promote survival of organisms and the survival of successive generations of their offspring. c. Trace evidence that the fossil record found in sedimentary rock provides evidence for the long history of changing life forms.

Standard: S7CS8c. As prevailing theories are challenged by new information, scientific knowledge may change.

Scientists find a fossil (Fossil A) in a deep layer of sedimentary rock. They determine that Fossil A is the remains of a species never seen before. A few years later, other scientists discover a similar fossil (Fossil B) in a layer of sedimentary rock closer to Earth’s surface. Fossil A and Fossil B share some characteristics, but it is determined that they are not closely related and that Fossil B is a different species. One hundred years later, scientists discover another similar fossil (Fossil C) in a layer of sedimentary rock between those in which Fossils A and B were found. Upon examining all three fossils, scientists reach the conclusion that all three fossils represent the same species. They determine that Fossil B (found in the shallowest rock layer) evolved from Fossil C (found in an intermediary layer), which evolved from Fossil A (found in the deepest rock layer).

Which statement BEST describes this scenario?

A. Very little can be learned about the evolution of a species by examining the fossil record.
B. Early fossil researchers did not understand the information provided by the fossil record.
C. The fossil record provides trace evidence for the long history of changing life forms.
D. Theories about the fossil record do not change based on finding new evidence.

Correct Answer: C

Explanation of Correct Answer: The correct answer is choice (C) The fossil record provides trace evidence for the long history of changing life forms. Scientists have learned a lot about the evolution of living things by studying fossils and where they appear in sedimentary rock layers. Choice (A) is incorrect because the fossil record has revealed significant evidence about the evolution of species. Choice (B) is incorrect. Early fossil researchers understood the fossil record as well as possible, given the information they had at the time. Scientific knowledge changes when new information is discovered. Choice (D) is incorrect because our understanding of the fossil record has changed a lot based on examination of new evidence.
Example Item 3

**DOK Level 3:** This is a DOK level 3 item because the question requires the student to make choices based on a reasoned argument.

**Science Grade 7 Domain:** Interdependence of Life

**Standard:** S7L4. Students will examine the dependence of organisms on one another and their environments. b. Explain in a food web that sunlight is the source of energy and that this energy moves from organism to organism.

**Standard:** S7CS5a. Observe and explain how parts can be related to other parts in a system such as predator/prey relationships in a community/ecosystem.

A 1,000-pound cow needs to eat about 25 pounds of feed per day just to maintain its body weight. Which statement provides the BEST explanation of why a cow might not gain weight when fed 35 pounds of food per day?

A. A lot of the energy the cow gets from its feed is used to produce milk.
B. Energy is gained in the food web as the cow stores it for later use.
C. The cow gets additional energy directly from the Sun.
D. Energy is lost as it moves from the cow to the feed.

**Correct Answer:** A

**Explanation of Correct Answer:** The correct answer is choice (A) A lot of the energy the cow gets from its feed is used to produce milk. A great deal of energy is used in maintaining bodily functions, including milk production. Therefore, extra feed does not necessarily mean an increase of the cow’s weight. Choice (B) is incorrect. Some energy is always lost as it moves through a food web. Choice (C) is incorrect because cows are heterotrophic herbivores and cannot convert the Sun’s energy into food. Choice (D) is incorrect because energy is transferred from the feed to the cow, not from the cow to the feed.
SCIENCE CONTENT DESCRIPTION AND ADDITIONAL SAMPLE ITEMS

In this section, you will find information about what to study in order to prepare for the Grade 7 Science EOG assessment. This includes main ideas and important vocabulary words. This section also contains practice questions, with an explanation of the correct answers, and activities that you can do with your classmates or family to prepare for the test.

All example and sample items contained in this guide are the property of the Georgia Department of Education.

CONTENT DESCRIPTION

• Construct and use dichotomous keys based on physical characteristics in order to classify organisms
• Classify living organisms into different kingdoms according to physical characteristics
• Identify different cell structures and their functions
• Use ecosystems to explain the cycling of matter and energy
• Explain how changes in environmental conditions can affect the survival of both individuals and entire species
• Identify different relations among organisms that are competitive or mutually beneficial
• Describe concepts of natural selection and fossil evidence
• Describe the characteristics of Earth’s major biomes and aquatic communities
• Use the concept of natural selection to explain how different species have evolved
• Understand how the fossil record provides evidence for how different life forms have changed through time
• Explain how the physical characteristics of organisms have changed over successive generations
• Describe the function of the major organ systems in the human body
• Describe the role of genes and chromosomes in the process of inheriting specific traits
• Compare and contrast organisms by their way of reproducing, i.e., sexually or asexually
• Explain the process of selective breeding and its consequences for organisms and humans

CHARACTERISTICS OF SCIENCE STANDARDS

• Develop a hypothesis that can be tested by experimentation
• Use safety procedures and appropriate practices in all laboratory situations and with all laboratory instruments
• Collect and analyze data, interpret results, draw conclusions, and communicate information in oral and written forms
• Use appropriate tools and instruments to observe and measure objects and phenomena
• Develop and use models to represent systems or phenomena, make predictions and inferences, test hypotheses, and support explanations
• Organize scientific information in tables, charts, and graphs, as appropriate
• Formulate scientific claims and arguments based on evidence
• Understand how science knowledge grows and changes

Unit 1: Ecology

In this unit, you will study the interdependence of life on Earth. You will demonstrate the development and use of dichotomous keys to classify organisms based on defining characteristics. You will describe major biomes and communities in which organisms live and learn to recognize the effects of changes in environmental conditions. You will begin to learn about relationships between organisms and examine the dependence of organisms on their environments.

KEY TERMS

An organism is any life form. All animals, plants, and single-celled life forms are organisms. Organisms are also known as living things. Living things can breathe, move, grow, reproduce, and—owing to this—require energy to continue living. (S7L1)

Nonliving things include dead organisms as well as objects such as minerals that never were alive. Dead organisms are still considered to be organic material, while other nonliving things are often inorganic. Nonliving things do not respond to stimuli, they cannot adapt to their environment, and they cannot evolve. Generally, if a thing does not contain cells, it would be nonliving. Nonliving things also do not show any of the characteristics of living things, such as breathing and growing. (S7L1)

The environment is all the living and nonliving things that surround an organism. All the factors that influence the survival, development, and evolution of an organism are also part of an environment. A change in the environment can affect the survival of the individuals or species that live in that environment. (S7L4e)

When people refer to an ecosystem, they are referring to the community of living and nonliving things that make up a system in an environment. The key idea is that an ecosystem is a system located within an environment. A pond with producers, consumers, and decomposers in it that is located on a mountain is an example of an ecosystem. In this model, the mountain could be considered the environment. Environmental changes in an ecosystem can affect the survival of individual animals and species within an ecosystem. (S7L4c, e)

A general type of an ecosystem is known as a biome. A biome is defined by local climate patterns and types of plants that can be found in the biome. A savanna in Africa is warm, is dry, and has a lot of grasslands. A stream on your way to school is a freshwater biome. The water is warm, flows, and contains algae as a producer. (S7L4e)

Terrestrial biomes are those biomes that are on land. Rain forests, savannas, deserts, tundras, and mountains are examples of terrestrial biomes. (S7L4e)
Aquatic communities are biomes found in water. Scientists divide aquatic communities into two regions: freshwater and marine. Freshwater aquatic communities are areas that have water with low salt levels, such as ponds, lakes, streams, rivers, and wetlands. Marine aquatic communities have higher salt levels and include oceans, coral reefs, and estuaries. (S7L4d)

The populations and interactions of two or more species in a geographical area are known as a community. In a community, separate populations impact each other’s behavior and survival. (S7L4d)

Interdependency describes how species rely on each other to meet their needs. Consumers are dependent on producers as a source of energy. In some cases, being dependent can be mutually beneficial. Some birds eat berries whole. They are dependent on the berry plant as a source of energy. The berry plant benefits from this relationship because the birds will release some of the berry seeds into other areas, so the berry plant as a species can reproduce. (S7L4d)

When organisms or species interact and one of those organisms or species has some aspect of its ability to survive impacted, they are said to be competitive. Ants and beetles compete for the same types of food. Sparrows will compete for living space with martins by stealing the martins’ nests. (S7L4d)

You classify things when you organize them into groups based on characteristics they share. Scientists classify things so they can study ways those things are similar or different. A classification system can be used to identify and study that species. (S7L1b)

Living things are classified using a six-kingdom system. The six kingdoms are animals, plants, fungi, protists, archaeabacteria, and eubacteria. The earliest method to classify living things used a two-kingdom system of animals and plants. As scientists started studying organisms with microscopes, they realized that some organisms did not fit their classification as either an animal or a plant. This gave rise to the additional four kingdoms. (S7L1a)

A dichotomous key is a tool that helps identify organisms based on making a choice between two characteristics. People develop dichotomous keys by starting at a characteristic that two organisms have in common, such as flying. Bats, wasps, and robins fly. The next step would be to find some common characteristic that at least two of those flying animals share. This step is repeated until the dichotomous key leads to clearly identifying a species by separating it from the others based on traits. Dichotomous keys are often revised as they are developed. (S7L1a)

**Important Tip**

The way scientists have classified organisms has changed over the years. In the earliest systems, organisms were either a plant or an animal. Scientists have learned to base their classification on similar body structures rather than functions. For example, dolphins and sharks both live in the water, swim, and are gray. However, dolphins are mammals and have lungs, and sharks are fish and have gills. Scientists classify based on similar genetic backgrounds that have led to having similar body structures. When you work on classifying organisms, keep in mind that you should look for similar traits and that new information may require you to modify your classification system. (S7L1a)
Sample Items 1–2

Item 1

A science class develops its own dichotomous key for identifying animals with hooves.

<table>
<thead>
<tr>
<th>Step</th>
<th>Option</th>
<th>Description</th>
<th>Order</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>1a</td>
<td>Has long trunk</td>
<td>Proboscidea</td>
</tr>
<tr>
<td></td>
<td>1b</td>
<td>Does not have long trunk</td>
<td>Go to Step 2</td>
</tr>
<tr>
<td>Step 2</td>
<td>2a</td>
<td>Has limbs with fingers and toes</td>
<td>Primate</td>
</tr>
<tr>
<td></td>
<td>2b</td>
<td>Does not have limbs with fingers and toes</td>
<td>Go to Step 3</td>
</tr>
<tr>
<td>Step 3</td>
<td>3a</td>
<td>Has limbs with sharp claws, not hooves</td>
<td>Go to Step 4</td>
</tr>
<tr>
<td></td>
<td>3b</td>
<td>Has limbs with hooves, not claws or nails</td>
<td>Go to Step 5</td>
</tr>
<tr>
<td>Step 4</td>
<td>4a</td>
<td>Has sharp teeth and eats meat</td>
<td>Carnivore</td>
</tr>
<tr>
<td></td>
<td>4b</td>
<td>Eats insects</td>
<td>Insectivore</td>
</tr>
<tr>
<td>Step 5</td>
<td>5a</td>
<td>Has limbs with even-toed hooves</td>
<td>Artiodactyla</td>
</tr>
<tr>
<td></td>
<td>5b</td>
<td>Has limbs with odd-toed hooves</td>
<td>Perissodactyla</td>
</tr>
</tbody>
</table>

Using the dichotomous key, to which order does the zebra belong?

A. Artiodactyla  
B. Carnivore  
C. Perissodactyla  
D. Proboscidea
Item 2

Four different biomes are described in a table.

<table>
<thead>
<tr>
<th>Biome</th>
<th>Type of Organisms</th>
<th>Humidity Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biome 1</td>
<td>Trees and lichen</td>
<td>Relatively dry</td>
</tr>
<tr>
<td>Biome 2</td>
<td>Grasses and shrubs</td>
<td>Very dry</td>
</tr>
<tr>
<td>Biome 3</td>
<td>Evergreen trees</td>
<td>Relatively humid</td>
</tr>
<tr>
<td>Biome 4</td>
<td>Mangrove trees</td>
<td>Very humid</td>
</tr>
</tbody>
</table>

Which biome represents the type of ecosystem of a desert?

A. Biome 1
B. Biome 2
C. Biome 3
D. Biome 4
Unit 2: Energy Flow and Nutrient Cycling

In this unit, you will recognize the source of energy in ecosystems and learn how energy and matter are transferred through organisms in a food web and recycled by organisms and their environment. You will identify roles that different types of organisms play within communities and study ways that organisms can affect each other and their environment.

KEY TERMS

When you look at more than one food chain in an ecosystem, you are looking at a **food web**. Food chains show how a specific combination of organisms obtain the matter and energy they need from each other. A food web is all the food chains put together. It looks like a web because it shows how all the different organisms in all the combined food chains interact to obtain the matter and energy they need. The only thing in a food web that is not an organism is the Sun. (S7L4a, b)

There are three categories of organisms in a food web. **Producers** are organisms that make their own food by converting energy from sunlight into glucose, which is then used to make energy for growth and survival. **Consumers** are organisms that feed on other organisms to get the energy they need to grow and survive. They cannot make their own food using energy from sunlight. **Decomposers** are organisms that feed on dead organisms and decaying matter to get the energy they need for growth and survival. They help break down matter into nutrients and release it back into the environment to be recycled.

The **primary source of energy** in all food webs is the Sun. The Sun provides the energy that plants (producers) use to make their own energy. When plants are eaten by animals (consumers), the animals receive some of the energy from the plant that the plant received from the Sun. When other animals eat those animals, they receive some of the energy that the first animal received when they ate the plants. Energy in a food web is passed from one organism to another. (S7L4a)

As **energy transfer** occurs through a food web, energy is lost as it moves from one organism to another. When an animal eats a plant, most of the energy received from the plant is used by the animal’s life functions, such as growing and reproducing. Roughly 10% of the energy from one organism is passed on to the next organism. (S7L4 b)

When an organism eats another organism, there is a **matter transfer**. The animal that takes in matter breaks down that matter for use by its cells for repairing and growing its own body. In a food web, no matter is lost. Matter recycles through food webs. For example, a deer eats hay. Some of that hay is converted into muscle and other organs in the deer. Decomposers in turn break down the hay that the deer doesn’t digest. When the deer dies, other animals might eat some of the deer. Decomposers will also break down parts of the deer that animals will not. None of the matter is lost; it is simply converted into other forms of matter. (S7L4a)

Decomposers are responsible for the largest share of matter transfer in a food web because they break down all organisms. Decomposers are processing matter and releasing the energy, in the form of heat, trapped inside the matter. Steam can be seen rising from compost piles. That steam is water that is heated to a vapor by the heat being released by the decomposers in the compost pile. (S7L4a, b)
In a food web, both matter and energy are transferred from organism to organism. Because of this, organisms have a **dependence** on each other. Animals that eat plants depend on some plants to provide the animals with energy. Sometimes animals depend on plants to provide shelter for their survival. (S7L4d)

Some organisms have relationships that are said to be **mutually beneficial**. A mutually beneficial relationship is one where each organism receives a benefit from the other organism. For example, a flower provides nectar for a butterfly. The butterfly benefits by receiving energy from the nectar. Because the nectar is near the pollen of the flower, the butterfly gets some of the pollen on its legs and wings. When the butterfly gets nectar from another flower, the pollen rubs off onto the other flower. This benefits the flower because it helps the flower reproduce. (S7L4d)

Another type of relationship two organisms can have is a **competitive** relationship. In some environments, organisms will compete for the same resources. Competition can occur between two animals of the same species, such as when two red-tailed hawks compete for a hunting territory. Competition can also occur between two different species. Red-tailed hawks compete with great horned owls for prey. Both species hunt at twilight so they are competing with each other to get the same prey. (S7L4d)

**Important Tip**

- Every food web requires a balance between all the organisms within the food web. If one species is removed or reduced below a certain point, the food web can become unbalanced. This can happen due to natural causes or man-made causes. Europeans brought rabbits and red foxes to Australia so they could be hunted for sport. However, it turns out that neither species have direct competition. The rabbits eat large amounts of vegetation and are prolific breeders. Foxes are prolific hunters. Because both species have little competition in the food webs in Australia, both are considered high to extremely high threat levels to the balance of the food webs they inhabit in Australia. (S7L4d)
Sample Items 3–8

Item 3

A food web from a meadow ecosystem is represented in the diagram.

Which pathway correctly shows how the hawk receives energy?

A. Sun $\rightarrow$ hawk
B. Sun $\rightarrow$ grass $\rightarrow$ hawk
C. Sun $\rightarrow$ wildflowers $\rightarrow$ snake $\rightarrow$ hawk
D. Sun $\rightarrow$ grass $\rightarrow$ mouse $\rightarrow$ snake $\rightarrow$ hawk
Item 4

In a marine ecosystem, clownfish often hide in the tentacles of the poisonous sea anemone. The clownfish are covered with a thick mucus layer, which protects them from the sea anemones’ poison. Uneaten scraps of clownfish meals provide the sea anemone with food.

Which of these BEST describes the relationship between the clownfish and sea anemone in this ecosystem?

A. competitive  
B. mutualism  
C. parasitic  
D. predator–prey

Item 5

Matter is transferred from one organism to another in food webs. Which of these describes one of the ways in which matter transfer happens?

A. The Sun provides energy to decomposers.  
B. The Sun provides energy to consumers.  
C. Consumers provide nutrients to producers.  
D. Producers provide nutrients to consumers.
**Item 6**

The European green crab is native to European coasts. It was introduced to American coasts in the middle of the 18th century. The green crab feeds on shore crab, green algae, clams, and oysters.

What effect does the introduction of the European green crab into this food web have on the transfer of matter from one organism to another?

A. The European green crab will reduce the amount of matter transferred to green algae.
B. The European green crab will increase the amount of matter transferred from the shore crab to the clam.
C. The European green crab will decrease the amount of matter transferred from the shore crab to the clam.
D. The European green crab will reduce the amount of matter transferred from the clams to the shore crab.
Item 7

A fire destroys all the grasses in a prairie ecosystem. The field mice living in the prairie no longer have the protection of dense vegetation in their habitat. Over the course of a year, the grasses do not grow back.

Which of these is the MOST LIKELY effect on the population of field mice?

A. The population will move or die out.
B. The population will increase in number or diversity.
C. The population will develop new behaviors and remain there.
D. The population will change color to blend in with the new habitat.
**Item 8**

The food web shows the transfer of energy in a salt marsh ecosystem.

This diagram shows the movement of energy from organism to organism in an aquatic food web. Which pathway shows the correct flow of energy in the food web?

A. alligator → terrapin → snail → cordgrass → Sun

B. Sun → cordgrass → snail → blue crab → alligator

C. Sun → cordgrass → snail → terrapin → blue crab → alligator

D. cordgrass → snail → terrapin → alligator → cordgrass → Sun
Unit 3: Structure and Function of Cells

In this unit, you will study the organization of individual cells. You will identify the different parts of cells and explain their functions. You will study the processes carried out by cells in order for organisms to survive and reproduce.

KEY TERMS

Cells are the smallest unit of life and make up all living things. Cells perform basic life functions such as the breakdown of molecules that serve as sources of energy, obtaining and transporting substances necessary for growth, getting rid of waste, and reproduction. Cells can look different and perform different roles in an organism. There are many different types of cells including, but not limited to, animal, plant, and bacterial. All cells come from other cells. (S7L2a)

Organelles are the specialized elements that form a cell. Organelles are to cells as organs are to the body. (S7L2a)

Cells are made up of many different organelles. This table shows where you will find some cell structures. Some of the functions of these cell structures are also listed. (S7L2a, b)

<table>
<thead>
<tr>
<th>Animal Cell</th>
<th>Plant Cell</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cell Membrane</strong></td>
<td>separates the cell wall from everything inside the cell</td>
</tr>
<tr>
<td><strong>Nucleus</strong></td>
<td>the part that controls all the activity in a cell</td>
</tr>
<tr>
<td><strong>Chloroplast</strong></td>
<td>• found in plant cells</td>
</tr>
<tr>
<td></td>
<td>• produces sugar for the plant to use and to store</td>
</tr>
<tr>
<td><strong>Cytoplasm</strong></td>
<td>• the fluid and cell organelles found within the cell</td>
</tr>
<tr>
<td></td>
<td>• all cell activity happens in the cytoplasm</td>
</tr>
<tr>
<td><strong>Mitochondria</strong></td>
<td>• the fluid and cell organelles found within the cell</td>
</tr>
<tr>
<td></td>
<td>• all cell activity happens in the cytoplasm</td>
</tr>
<tr>
<td><strong>Cell Wall</strong></td>
<td>produces the energy supply for the cell</td>
</tr>
<tr>
<td>not found in animal cells</td>
<td>• outer layer of a cell</td>
</tr>
<tr>
<td></td>
<td>• provides support and structure to cell</td>
</tr>
<tr>
<td></td>
<td>• most plant cell walls are rigid</td>
</tr>
</tbody>
</table>

Cells are involved in many processes including osmosis, diffusion, and photosynthesis. They use a cell part or parts in these processes. (S7L2a)

Cell membranes act as a filter that allows nutrients and other materials in and out of cells. In animal cells, the cell membrane is the outermost layer of the cell. Animal cells do not have a definite shape. In plant cells, the cell membrane is contained within the cell. The cell wall in plants is the outermost layer of the cell. (S7L2a, b)

The cell wall is the outermost layer of plant cells. It is mostly rigid and accounts for the rectangular shape of plant cells. Animal cells do not have cell walls. (S7L2a, b)
The **nucleus** of a cell is the organelle that controls the activities of the cell. The nucleus also contains the genetic material for the cell. (S7L2a, b)

**Mitochondria** are the organelles that produce most of the energy for the cell. Mitochondria are also responsible for maintaining the life cycle of a cell and cellular differentiation. The number of mitochondria within a cell depends on the type of tissue the cell makes up. Organs that require more energy, such as most muscle tissue and the liver, contain more mitochondria. (S7L2a, b)

Cell differentiation is the process that produces cells that are **specialized** to certain functions. Muscle cells are designed to process energy in and out very rapidly. The cells that make up bone marrow tissue are specialized to produce blood cells. (S7L2a, b)

**Chloroplasts** are organelles found only in plants. The chloroplasts use the energy from sunlight to combine oxygen and carbon dioxide to produce sugars for use in the plant and for storage. (S7L2a, b)

**Cytoplasm** is made up of a gel known as cytosol and the organelles that are found within a cell. Cytoplasm helps move nutrients in and out of the cell by acting as a pump that controls the movement of those nutrients. (S7L2a, b)

**Sample Items 9–11**

**Item 9**

**What will happen to a cell if it CANNOT take in nutrients?**

A. The cell will recycle waste products to use in place of the nutrients.
B. The cell will speed up cell division to obtain more energy.
C. The cell will be unable to obtain energy for cell division.
D. The cell will start producing nutrients internally.
**Item 10**

In cells, different parts interact to provide needed energy. Animal cells and plant cells have many similar structures that perform similar functions.

![Animal Cell and Plant Cell Diagram]

What is the relationship between the two cell structures?

A. Chloroplasts use glucose to make energy, and mitochondria use energy to make glucose.
B. Chloroplasts use energy to make glucose, and mitochondria use glucose to make energy.
C. Chloroplasts and mitochondria transform solar energy into chemical energy for the cell.
D. Chloroplasts and mitochondria both make and store chemical energy in their structures.

**Item 11**

If the mitochondria in a cell stop functioning correctly, what effect does this have on the whole cell?

A. Cellular division would increase.
B. The cell would not have enough energy to function.
C. The cell would organize itself into tissues more quickly.
D. The nucleus would take over the functions of the mitochondria.
Unit 4: Organization of Life

In this unit, you will study the levels of organization within organisms, from the simplest functional units to the most complex. You will distinguish between tissues, organs, and organ systems and identify how they serve the needs of cells. You will explain the function of organ systems and how these systems work together to maintain balance within the human body.

KEY TERMS

Multicellular organisms have levels of organization. Cells are organized into tissues. Tissues are organized into organs. Organs are organized into organ systems. Organ systems are organized into the organism. (S7L2c)

Tissues are made up of cells that are functionally similar and work together to perform specific activities. Blood, bone, and nerves are examples of tissues. (S7L2c)

Organs are made up of different types of tissues that work together to perform a specific function. The heart and brain are examples of organs. (S7L2c)

Organ systems are a group of organs that work together to perform a specific function. The respiratory system is an example of an organ system. It includes organs like the lungs, the diaphragm (the muscle that pulls on the lungs and draws air in), the windpipe and the bronchi, which are the tubes that air flows down to get into the lungs. (S7L2c)

An organism is the individual life form that is made up of the cells, tissues, organs, and organ system within its body. (S7L2c)

The functions of the major organ systems in the human body are to conduct the processes of digestion, respiration, reproduction, circulation, excretion, movement, control, coordination, and protection from disease. (S7L2e)

Digestion is the function that brings nutrients into the body. The digestive tract starts in the mouth where the organs such as the tongue, saliva glands, and teeth contribute to breaking the food down. After you swallow food, it goes down to the stomach where acid breaks the food down into smaller pieces. From there, the intestines absorb the nutrients and water. The digestive tract ends where your body expels the waste materials from eating and drinking. (S7L2e)

Respiration is the function that brings needed oxygen into the body and expels carbon dioxide as a waste product. The respiratory system is made up of the lungs, trachea, bronchi, and diaphragm. The diaphragm is a muscle that pulls down on the lungs. This causes air to move down through the trachea and bronchi into the lungs. Tissues within the lungs take oxygen into blood cells and remove the carbon dioxide. The carbon dioxide is removed from the lungs when you exhale. (S7L2e)

The reproductive system is differentiated by gender in humans. The male reproductive system’s sole function is to deposit sperm for reproduction. The female reproductive system has two purposes: the production and release of eggs for fertilization and the protection and nourishment of the offspring until birth. The purpose of the reproductive system is to ensure the continuation of a species. (S7L2e)

The circulatory system, also known as the cardiovascular system, permits blood to circulate. Blood moving through the body carries nutrients, oxygen, carbon dioxide, hormones, and blood cells. The movement of blood throughout the body helps the
body stay healthy. The circulatory system is made up of the heart, veins, and arteries. Humans have a heart with four chambers. (S7L2e)

**Excretion** is carried out in the human body by the kidneys, liver, large intestine, and skin. The excretory system removes waste products as well as excess and unnecessary materials from the body. The human body cannot stay healthy with waste products and excess materials inside the body. (S7L2e)

The skeletal and muscular systems along with connective tissues combine to control movement in humans. This allows the body to move, supports the body, and protects the organs in the body. (S7L2e)

**Control** of the human body is carried out by two major organ systems: the **nervous system** and the **endocrine system**. The nervous system is made up of the brain, spinal cord, retina, and other nerve systems that connect to it. The endocrine system is made up of eight organs that release hormones into the blood stream to control the metabolism and growth of the human body. (S7L2e)

Coordination in the human body is carried out by the nervous system. Voluntary and involuntary actions are transmitted and carried out throughout the body by the nervous system. Voluntary actions are actions that are carried out by choice. Running, sitting, and getting dressed are examples of voluntary actions. Involuntary actions are actions that occur without making a conscious choice. Coughing, sneezing, and hiccups are examples of involuntary actions. (S7L2e)

The immune system is the organ system used by the human body to get **protection from diseases**. Lymph nodes, bone marrow, the spleen, and white blood cells are part of this system. The lymph system distributes lymph, a clear fluid that contains white blood cells, to areas of the body. White blood cells help to fight diseases by producing antibodies that harm infections. White blood cells will also absorb infectious agents to control them. (S7L2e)

**Important Tips**

- Cell theory is the foundation of biology and has three central tenets:
  1. All living organisms are composed of one or more cells.
  2. The cell is the most basic unit of life.
  3. All cells arise from pre-existing living cells.

- Humans had always tried to identify the process that led to living things. Many hypotheses were suggested. The most common theory was that life arose due to spontaneous generation. People saw that maggots would come out of dead flesh and so they believed this was confirmation of the hypothesis. Our knowledge of cells and cell theory developed rapidly with the creation of the microscope. This tool allowed scientists to see what cells looked like. After scientists identified cells, they started creating hypotheses and theories to explain what they saw. Modern cell theory has added four additional tenets to the theory. As scientists expand our knowledge of cells, more tenets may follow. (S7L2)

- The different organ systems do not operate independently from one another. Often a few systems coordinate to maintain homeostasis, the process that keeps the internal conditions within a body stable. For example, the endocrine system will release hormones when you get hungry. The circulatory system will carry those hormones to the brain. Your brain sends a message along the nervous system to tell you that you are hungry. (S7L2d, e)
Sample Items 12–15

Item 12

Your body gets cold and you start to shiver. Which organ systems are responsible for your response to the cold?

A. skeletal, muscular, and immune  
B. skeletal, circulatory, and nervous  
C. immune, excretory, and circulatory  
D. circulatory, muscular, and nervous

Item 13

Which of these BEST describes the relationship between tissues and organs?

A. Tissues make up different types of cells.  
B. Organs make up different types of tissues.  
C. Cells are made of different types of organs.  
D. Organs are made of different types of tissues.

Item 14

Which of these correctly compares how systems remove wastes from the human body?

A. The respiratory system removes wastes from the heart and lungs, and the skin removes wastes from all other organs.  
B. The respiratory system removes wastes in the form of gases, and water and some salts are removed through the skin.  
C. Waste from the heart and lungs is removed through the skin, and the respiratory system removes wastes from other organs.  
D. Waste is removed through the skin in the form of gases, and the respiratory system removes wastes in the form of liquids.
Item 15

A loud noise startles you, causing you to jump out of your chair. How do your organ systems work together to produce your response?

A. Your immune system senses danger and sends a signal through your nervous system. That system sends a signal to your muscular system, and you jump out of your chair.

B. Your muscular system works with your skeletal system to move your body, causing your nervous system to speed up the circulatory and respiratory systems.

C. Your circulatory system speeds up your heart, making it beat faster. In response, your respiratory system makes you breathe harder.

D. Your nervous system responds to the sound. Your nervous system then sends a signal to your muscular system, and you jump out of your chair.
Unit 5: Biological Traits and Heredity

In this unit, you will study how biological traits are passed on through generations. You will explain the roles of genes and chromosomes in the process of inheritance. You will compare different methods of reproduction and learn how selective breeding can be used to produce desired traits in organisms.

**KEY TERMS**

In genetics, an **inherited trait** is a physical characteristic of an organism that is inherited from the parents. The color of your eyes is a trait. Your genes will determine your physical traits, such as the ability to roll your tongue, the presence of dimples, the presence of freckles, and hair color. Other traits, such as height and weight, might be affected by your genes but will not be completely determined by genes. (S7L3a)

**Selective breeding** is the process of breeding organisms with **desirable traits** for the purpose of producing offspring that also carry that desirable trait. For example, turkeys that have larger chests will carry more meat, so if you want turkeys with more meat, you breed the turkeys with larger chests. The advantage to selective breeding is that it can have good effects, such as producing plants that grow using less water or require less sunlight. The disadvantage is that it reduces genetic diversity. Crops such as bananas and potatoes can be struck down by a number of diseases because humans have used selective breeding to breed those crops to grow quickly rather than for their resistance to diseases. (S7L3a, c)

A **gene** is a biological structure that carries the instructions that a cell needs to make molecules called proteins and pass genetic traits to offspring. Multiple genes are grouped together to form structures that are called chromosomes, which are found in the nucleus of the cell. All cells, with the exception of the cells related to sexual reproduction, contain two copies of each gene. One paired gene comes from one parent, while the other paired gene comes from the other parent. Traits are the result of the mixing of the pairs of genes. Usually a number of gene pairs are involved in any one trait. Most genes have two or more variations, called **alleles**. Often one allele will be **dominant** and one will be **recessive**. A recessive allele is usually expressed only in the absence of a dominant allele. An organism may inherit two identical or two different alleles from its parents. Genes can contribute to the survival of a species when they produce traits that are more likely to keep that species alive, such as camouflage in animals. (S7L3a)

Gene **expression** happens when the instructions from a gene are carried out to give rise to the organism’s inherited characteristics. In most cases, the information carried in the genes is used in the formation of proteins and other molecules. (S7L3a)

**Chromosomes** are structures that carry groups of genes in bundled-up strands known as **DNA**. Every living thing has a set of chromosomes in every cell. The number of chromosomes in each species is different. Humans have 23 pairs of chromosomes, for a total of 46 chromosomes per cell. A change in the number of chromosomes can cause problems with growth, development, and function of the body’s systems. Goldfish have between 100 and 104 chromosomes. Cultivated tobacco has 48 chromosomes. (S7L3a)

**Sexual reproduction** is the process of creating a new organism by combining genetic material from two organisms. The genes the offspring inherit are a mix of the genes from the two parents. Of the six kingdoms, all animals, most plants, some fungi, some eubacteria, and some archaebacteria reproduce by sexual reproduction. (S7L3b)
Asexual reproduction is the process of creating a new organism from a single organism. The genes that the offspring have are identical to the genes of the parents. Of the six kingdoms, protists, eubacteria, some archaeabacteria, some fungi, and some plants reproduce by asexual reproduction. (S7L3b)

Important Tip

A mutation is a genetic error that occurs when the instructions contained in a gene are read incorrectly. There are processes within chromosomes that work to remove these errors. Sometimes a mutation can slip through the process to remove the errors. Most mutations end up having no effect on the cell or the organism. People often think that mutations are a bad thing. However, mutations create genetic variation within individuals in a species. This helps create genetic diversity within the species. Variations that increase the survival of a species can then be carried on to future generations. Mutation can be caused when errors are accidentally created from the instructions from the gene. Mutations can also be caused by agents in the environment, such as ultraviolet rays from the Sun, radiation, and chemicals.

Sample Items 16–19

Item 16

Water fleas live in freshwater environments. In the spring, water fleas reproduce rapidly to ensure an adequate population of the species. In the fall, water fleas have more time to produce offspring that are more genetically diverse.

<table>
<thead>
<tr>
<th>Mode of Reproduction</th>
<th>Effect on Gene Pool</th>
<th>Energy Requirement</th>
<th>Occurs in...</th>
<th>Time to Reproduce</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asexual</td>
<td>One Parent</td>
<td>Genetically identical</td>
<td>Less</td>
<td>Simple and complex organisms</td>
</tr>
<tr>
<td>Sexual</td>
<td>Two Parent</td>
<td>Genetic variation</td>
<td>More</td>
<td>Simple and complex organisms</td>
</tr>
</tbody>
</table>

Based on the information in the table, which type of reproduction should water fleas use during each period?

A. asexual reproduction in the fall when more offspring are needed for winter; sexual reproduction in the spring when the offspring have less time to develop
B. asexual reproduction in the spring when offspring are needed to populate the species; sexual reproduction in the fall when offspring have time to develop
C. asexual reproduction throughout the year to increase the likelihood of offspring survival, regardless of environmental changes
D. sexual reproduction throughout the year to ensure diversity in the species,
regardless of environmental changes

**Item 17**

Genes are segments of DNA that contain “instructions” for the expression of traits. The presence of just one dominant gene in a chromosome pair results in expression of a certain trait. A recessive gene, on the other hand, will only result in the expression of a trait if the gene appears in both paired chromosomes.

In guinea pigs, the gene for black coat color is the dominant gene, and the gene for white coat color is the recessive gene.

A guinea pig has a black coat. Which of these provides the BEST explanation about the guinea pig’s parents?

A. The guinea pig received a recessive gene for white coat color from one parent and no gene for coat color from the other parent.
B. The guinea pig received a dominant gene for black coat color from one parent and no gene for coat color from the other parent.
C. The guinea pig received a dominant gene for black coat color from one parent and a recessive gene for white coat color from the other parent.
D. The guinea pig received a recessive gene for white coat color from one parent and a recessive gene for white coat color from the other parent.
A farmer wants to create a new breed of tomato that is sweet-tasting, has a very low quantity of seeds, and grows well in the hot and humid Georgia climate.

The table shows the traits of four tomato plant varieties.

<table>
<thead>
<tr>
<th>Plant</th>
<th>80 Seeds/Kg</th>
<th>40 Seeds/Kg</th>
<th>10 Seeds/Kg</th>
<th>High Sugar Content</th>
<th>Deep Red Color</th>
<th>Grows Best in Dry Climates</th>
<th>Long Ripening Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
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<td></td>
<td>x</td>
<td></td>
<td></td>
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<td>x</td>
</tr>
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<td>3</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>x</td>
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<tr>
<td>4</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>

Which plants should the farmer select as parents to have the highest chance of producing a tomato plant with the desired traits?

A. Plant 1 and Plant 2
B. Plant 2 and Plant 3
C. Plant 1 and Plant 4
D. Plant 2 and Plant 4
Item 19

A mare is a female horse. Mare A is a fast horse with moderate muscle mass. Mare B is a fast horse with large muscle mass. Both mares are bred with a fast, muscular male horse. After receiving identical training and diets, the two offspring run on a track and their runs are timed.

Using selective breeding, which mare should be used to breed horses for speed, and which mare should be used to breed horses that have the best chance of running for the longest time?

A. Mare A should be bred for speed, and Mare B should be bred for endurance.
B. Mare A should be bred for endurance, and Mare B should be bred for speed.
C. Both Mare A and Mare B should be bred for endurance as the desired trait.
D. Both Mare A and Mare B should be bred for speed as the desired trait.
Unit 6: Evidence of Evolution

In this unit, you will study the evolution of organisms. You will explain the process of natural selection by which the physical characteristics of organisms change over successive generations. You will trace changes in life forms through the fossil record and recognize that fossils provide evidence for a long history of change.

KEY TERMS

Inherited characteristics are the physical characteristics of an organism inherited from its parents. The color of your eyes is an inherited characteristic, also called a trait. The differences that are possible in a specific trait, such as eye color, are referred to as variation. The genes you inherit will determine your physical characteristics such as eye and hair color. Other characteristics, such as height and weight, might be affected by your genes but will not be completely determined by genes. (S7L5a)

Evolution is the modification of a species over successive generations. Evolution can also refer to the development of several species from one common ancestor species. Whales are a good example of evolution. Whales are mammals with some hair and lungs, but they live in aquatic environments like fish. Fossils of the earliest whales strongly resemble the fossils of a group of scavenging carnivorous land-based mammals. The most notable difference in the fossils are that the teeth of the whales look very much like the teeth of fossils from later generations of whales and not like the teeth of the mammals. Later whale fossils, roughly 20 million years younger than the earliest whales, have large hands and feet with webbing. The toes are hooved much like the older land-based mammals. Whale fossils from a few million years after that show modifications of the hand and feet into flippers. (S7L5a, b, c)

The fossil record shows the point where a species changed enough to be considered a different species but still shared the majority of its traits with a common ancestor. The whale fossil record, for example, also shows a clear change in the species over successive generations. One of the biggest challenges in following clear paths of evolution for a species is finding fossils of successive generations of a species. It is not always apparent when there are changes in a species. (S7L5c)

Natural selection is the process whereby nature selects which members of a species survive based on certain traits. Suppose there is a population of mice that live in a field that is full of tan-colored dry grass. There are black mice and tan mice. The predators in the area can see the black mice easier and eat more of the black mice because they are easier to locate. Over time, the mice that carry the genes for a tan coat survive more often than the mice with black coats. This increases the population of tan mice and increases the likelihood that the majority of future generations will be tan. (S7L5b)

Important Tip

It is important to understand that evolution does not necessarily result in “improvement” or greater complexity of organisms. Many fossil findings demonstrate that life does not always steadily evolve from simple to complex. For example, fossils in the Burgess Shale site in the Canadian Rocky Mountains have revealed that quite complex organisms existed more than 540 million years ago. Examples of most major groups of modern animals were discovered in this fossil deposit. (SL5b)
Sample Items 20–24

Item 20

Which of the following BEST describes the effect that natural selection might have on a species over time?

A. The fur color of a species will always change over time, because of natural selection.
B. Predator species will always increase due to natural selection, while prey species will always die out.
C. Members of a species with traits that allow them to survive and reproduce in an environment will increase in population, while those without those traits will die.
D. Bigger members of a species always have an advantage over smaller members. Therefore, over time, a species will eventually include larger organisms only.

Item 21

The walking catfish is a species of fish that walks on land using its pectoral fins. During drought conditions, when there is little water in its habitat, the walking catfish can use its pectoral fins to get to areas with water.

Which of these will MOST LIKELY happen to a population of walking catfish over time if all nearby aquatic environments dry up permanently?

A. Walking catfish with small pectoral fins are more likely to survive a trip to distant areas of water. The population is likely to evolve to have smaller pectoral fins.
B. Walking catfish with large pectoral fins are more likely to survive a trip to distant areas of water. The population is likely to evolve to have larger pectoral fins.
C. Walking catfish with large pectoral fins and those with small pectoral fins are equally likely to survive a trip to distant areas of water. Both types survive, so evolution is unlikely to occur.
D. Walking catfish with large pectoral fins and those with small pectoral fins are equally likely to not survive the trip to distant areas of water. Both types of catfish will then become extinct.
**Item 22**

Scientists find fish fossils in Rock Layers B and C of a canyon. The fossil found in Rock Layer B is similar to the fossil found in Rock Layer C.

![Fossils Found in Rock Layers](image)

Which conclusion is BEST supported by the order of the layers?

A. The two fossils are different species, because they are in adjacent layers.
B. The two fossils are the same species, because they are in adjacent layers.
C. The species in Layer C may have evolved from the species in Layer B.
D. The species in Layer B may have evolved from the species in Layer C.

**Item 23**

A science class takes a field trip to a rock formation known for the many fossils it holds. A student finds a fossil that shows a plant with leaves similar to those of a plant that grows nearby. The student tells his classmates that the plants must be an ancient species that has not changed much over time.

Which statement BEST describes the student’s claim?

A. The claim is reasonable because plants do not change over time.
B. The claim is reasonable because fossils are records of things that lived long ago.
C. The claim is not reasonable because plants must change over time.
D. The claim is not reasonable because fossils can be made from recently living organisms.
Item 24

Fire ants in the southeastern United States were accidentally introduced over seventy years ago. Stings from fire ants can be deadly to the native fence lizard. Fence lizards that have lived in areas with fire ants for many generations have longer legs than fence lizards that have not lived in areas with fire ants until more recently.

Which statement BEST describes how the legs of the fence lizard changed over time?

A. Over time, fence lizards with longer legs were more likely to survive and passed this trait on to offspring.
B. Over time, fence lizards stretched their legs to increase leg length and passed this trait on to their offspring.
C. The lizards of each generation are born without longer legs. They then grow the longer legs to avoid stepping on the fire ants.
D. The lizards living in areas where fire ants were first introduced used the venom from fire ants to grow longer legs. The trait for longer legs was then passed on to offspring.
### SCIENCE ADDITIONAL SAMPLE ITEM KEYS

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard/Element</th>
<th>Characteristics of Science</th>
<th>DOK Level</th>
<th>Correct Answer</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>S7L1b</td>
<td>S7CS3d</td>
<td>2</td>
<td>C</td>
<td>The correct answer is choice (C) Perissodactyla. The zebra belongs to the order Perissodactyla because it has hooved limbs and odd-toed hooves. Choice (A) is incorrect because a zebra has odd-toed (1) hooves, and an Artiodactyla has even-toed (2) hooves. Choice (B) is incorrect because in order to get to Carnivore, an incorrect selection in Step 3 was made. Step 3a would have been answered as yes, when it should have been answered as no. Choice (D) is incorrect because the order Proboscidea applies only to animals with trunks, and the zebra does not have a trunk.</td>
</tr>
<tr>
<td>2</td>
<td>S7L4e</td>
<td>S7CS3d</td>
<td>2</td>
<td>B</td>
<td>The correct answer is choice (B) Biome 2. Deserts have low humidity. Choices (A), (C), and (D) describe biomes with higher humidity and show plants that do not grow in deserts.</td>
</tr>
<tr>
<td>3</td>
<td>S7L4b</td>
<td>S7CS5a</td>
<td>2</td>
<td>D</td>
<td>The correct answer is choice (D) Sun → grass → mouse → snake → hawk. Choice (A) is incorrect because hawks do not get energy directly from the Sun. Choice (B) is incorrect because hawks do not get energy directly from grass. Choice (C) is incorrect because snakes do not get energy directly from wildflowers.</td>
</tr>
<tr>
<td>Item</td>
<td>Standard/Element</td>
<td>Characteristics of Science</td>
<td>DOK Level</td>
<td>Correct Answer</td>
<td>Explanation</td>
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<tr>
<td>4</td>
<td>S7L4d</td>
<td>S7CS5a</td>
<td>2</td>
<td>B</td>
<td>The correct answer is choice (B) mutualism. Mutualism is a symbiotic relationship in which both species benefit. In this case, both the clownfish and the sea anemone benefit from the relationship. Choice (A) is incorrect because in a competitive relationship, there is a struggle between organisms to survive. Choice (C) is incorrect because a parasitic relationship involves one organism living in/on a host organism and causing it harm. This is not the case in this scenario. Choice (D) is incorrect because a predator–prey relationship is one in which one organism kills another organism for food.</td>
</tr>
<tr>
<td>5</td>
<td>S7L4a</td>
<td>S7CS5a</td>
<td>2</td>
<td>D</td>
<td>The correct answer is choice (D) Producers provide nutrients to consumers. Choices (A) and (B) are incorrect because the transfer of energy is not the transfer of matter. Choice (C) is incorrect because consumers do not provide nutrients to producers.</td>
</tr>
<tr>
<td>Item</td>
<td>Standard/Element</td>
<td>Characteristics of Science</td>
<td>DOK Level</td>
<td>Correct Answer</td>
<td>Explanation</td>
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<tr>
<td>6</td>
<td>S7L4a</td>
<td>S7CS5a</td>
<td>2</td>
<td>D</td>
<td>The correct answer is choice (D) The European green crab will reduce the amount of matter transferred from the clams to the shore crab. Both the green crab and the shore crab eat clams. The green crab will compete with the shore crab for clams, thus reducing the availability of this food to the shore crab. As a predator of the shore crab, the European green crab will also reduce the overall number of shore crabs available to eat the clams. Choice (A) is incorrect because matter is not transferred to green algae. As a producer, it transfers matter to other organisms in the web. Choices (B) and (C) are incorrect because matter is not transferred from the shore crab to the clams. Instead, clams are a food source for shore crab, so matter is transferred from the clams to the shore crab.</td>
</tr>
<tr>
<td>7</td>
<td>S7L4c</td>
<td>S7CS5a</td>
<td>2</td>
<td>A</td>
<td>The correct answer is choice (A) The population will move or die out. Short-term environmental changes, such as drought, floods, or pollution, don’t give populations time to adapt to change, and therefore force them to move or become extinct. Choice (B) is incorrect because the environmental change would be detrimental to the diversity of the population and would not allow for an increase in population. Choice (C) is incorrect because the development of new behaviors would not be able to offset the loss of habitat and food. Choice (D) is incorrect because the field mice could not change fur color to camouflage themselves.</td>
</tr>
<tr>
<td>Item</td>
<td>Standard/Element</td>
<td>Characteristics of Science</td>
<td>DOK Level</td>
<td>Correct Answer</td>
<td>Explanation</td>
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<tr>
<td>8</td>
<td>S7L4b S7L4b</td>
<td>S7CS6c</td>
<td>2</td>
<td>B</td>
<td>The correct answer is choice (B) Sun → cordgrass → snail → blue crab → alligator. Energy from the Sun is captured by plants and then passed through the food chain shown in B. Choice (A) is incorrect because the Sun is always the initial source of energy in a food chain. Choice (C) is incorrect because blue crabs do not eat terrapins; terrapins eat blue crabs. Choice (D) is incorrect because the Sun is always the initial source of energy in a food chain. In addition, alligators do not eat cordgrass.</td>
</tr>
<tr>
<td>9</td>
<td>S7L2a</td>
<td>S7CS5a</td>
<td>2</td>
<td>C</td>
<td>The correct answer is choice (C) The cell will be unable to obtain energy for cell division. Cells require nutrients to divide and reproduce. Cells also take in nutrients to perform functions such as regulating their internal environment, repairing damage, and removing wastes. Choice (A) is incorrect. Cells can recycle some waste products, but the accumulation of waste products will lead to cell death over time. Choice (B) is incorrect. Energy is required for cell division to happen, but cell division does not produce more energy. Choice (D) is incorrect because cells cannot produce the nutrients they need for energy.</td>
</tr>
<tr>
<td>10</td>
<td>S7L2b</td>
<td>S7CS5a</td>
<td>2</td>
<td>B</td>
<td>The correct answer is choice (B) Chloroplasts use energy to make glucose, and mitochondria use glucose to make energy. Choice (A) is incorrect because chloroplasts store glucose, and mitochondria make energy. Choice (C) is incorrect because only chloroplasts transform solar energy into chemical energy stored in glucose. Choice (D) is incorrect because chloroplasts make energy but do not store it in their structure.</td>
</tr>
<tr>
<td>Item</td>
<td>Standard/Element</td>
<td>Characteristics of Science</td>
<td>DOK Level</td>
<td>Correct Answer</td>
<td>Explanation</td>
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<tr>
<td>11</td>
<td>S7L2b</td>
<td>S7CS5a</td>
<td>2</td>
<td>B</td>
<td>The correct answer is choice (B) The cell would not have enough energy to function. Mitochondria supply most of a cell’s energy needs. Choice (A) is incorrect because cellular division would decrease, because the mitochondria would not release energy from food to allow division to happen. Choice (C) is incorrect because the mitochondria provide energy to the cell and have no effect on tissue formation. Choice (D) is incorrect because the nucleus is not able to take over the functions of other organelles.</td>
</tr>
<tr>
<td>12</td>
<td>S7L2e</td>
<td>S7CS5a</td>
<td>2</td>
<td>D</td>
<td>The correct answer is choice (D) circulatory, muscular, and nervous. When the nervous system detects a decrease in the temperature of the blood, it causes the muscular system to shiver. Choices (A) and (B) are incorrect because the skeletal and immune systems are not engaged in response to temperature change. Choice (C) is incorrect because the immune and excretory systems are not engaged in response to temperature change.</td>
</tr>
<tr>
<td>13</td>
<td>S7L2c</td>
<td>S7CS5a</td>
<td>1</td>
<td>D</td>
<td>The correct answer is choice (D) Organs are made of different types of tissues. Organs perform specific functions within the body and are made of different types of tissues. Tissues provide specific functions and structures for organs. Choice (A) is incorrect because tissues are made up of differentiated cells. Choice (B) is incorrect because organs are made up of different types of tissues performing specific functions. Choice (C) is incorrect because organs are made of different types of tissues that contain differentiated cells.</td>
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<tr>
<td>Item</td>
<td>Standard/Element</td>
<td>Characteristics of Science</td>
<td>DOK Level</td>
<td>Correct Answer</td>
<td>Explanation</td>
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<tr>
<td>14</td>
<td>S7L2d</td>
<td>S7CS5a</td>
<td>3</td>
<td>B</td>
<td>Choice (B) is correct. The respiratory system removes wastes in the form of gases, and water and some salts are removed through the skin. Water vapor and carbon dioxide are removed through the respiratory system, while the skin primarily removes wastes in the form of water and salts. Choices (A) and (C) are incorrect because the respiratory system removes wastes from all parts of the body, and that waste may be removed through the skin. Choice (D) is incorrect because the respiratory system is primarily responsible for removing gaseous wastes.</td>
</tr>
<tr>
<td>15</td>
<td>S7L2e</td>
<td>S7CS5a</td>
<td>2</td>
<td>D</td>
<td>The correct answer is choice (D). Your nervous system responds to the sound. Your nervous system then sends a signal to your muscular system, and you jump out of your chair. When the nervous system communicates with the muscular system, the body is able to move. Choice (A) is incorrect. The immune system works to protect the body from diseases inside the body structure. The sensing of danger is a response by the nervous system, which coordinates voluntary and involuntary actions and sends signals through the body. Choice (B) is incorrect because the body would have to first sense danger. Choice (C) is incorrect because your body’s first response is to sense danger and act on it. Only then will your circulatory and respiratory systems respond to the use of your muscles.</td>
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<tr>
<td>Item</td>
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<td>Characteristics of Science</td>
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<td>Correct Answer</td>
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<td>16</td>
<td>S7L3b</td>
<td>S7CS6c</td>
<td>2</td>
<td>B</td>
<td>The correct answer is choice (B) as sexual reproduction in the spring when offspring are needed to populate the species; sexual reproduction in the fall when offspring have time to develop. Water fleas need to reproduce as much offspring as possible in a short time in the spring to ensure the survival of its species, so they reproduce asexually. In the fall, more time is available to develop offspring, and reproducing sexually helps create genetic variation in the species. Choice (A) is incorrect because more water-flea offspring are needed in the spring, when environmental conditions are more extreme and likely to reduce the population. Choices (C) and (D) are incorrect because both forms of reproduction have advantages that benefit the water fleas, depending upon the time of year.</td>
</tr>
<tr>
<td>17</td>
<td>S7L3a</td>
<td>S7CS3d</td>
<td>3</td>
<td>C</td>
<td>The correct answer is choice (C) The guinea pig received a dominant gene for black coat color from one parent and a recessive gene for white coat color from the other parent. This is the only option presented that will result in a black coat. Choice (A) and (B) are both incorrect because the guinea pig received a gene for coat color from each parent. Choice (D) is incorrect because two recessive genes for coat color will result in a white coat, not black.</td>
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<tr>
<td>Item</td>
<td>Standard/Element</td>
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<td>DOK Level</td>
<td>Correct Answer</td>
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<tr>
<td>18</td>
<td>S7L3c</td>
<td>S7CS3d</td>
<td>2</td>
<td>D</td>
<td>The correct answer is choice (D) Plant 2 and Plant 4. Plant 2 provides genes for fewer seeds and Plant 4 provides genes for high sugar content and does not grow best in dry climates, suggesting that it would grow better in the humid climate of Georgia. Choice (A) is incorrect because both plants chosen have genes that allow them to grow best in dry climates, which are not found in Georgia. Choice (B) is incorrect because neither plant provides genes for high sugar content. Choice (C) is incorrect because neither plant provides genes for the lowest number of seeds possible.</td>
</tr>
<tr>
<td>19</td>
<td>S7L3c</td>
<td>S7CS3d</td>
<td>3</td>
<td>B</td>
<td>The correct answer is choice (B) Mare A should be bred for endurance, and Mare B should be bred for speed. Offspring A ran slower initial miles, but ran faster than Offspring B over a longer distance. Choice (A) is incorrect because Offspring A ran slower times than Offspring B, and Offspring B got slower over distance. Choices (C) and (D) are incorrect. The data show that the offspring of Mare A are more likely to handle endurance work, and the offspring of Mare B are likely to be faster.</td>
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<td>Item</td>
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<td>DOK Level</td>
<td>Correct Answer</td>
<td>Explanation</td>
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<tr>
<td>20</td>
<td>S7L5b</td>
<td>S7CS5a</td>
<td>2</td>
<td>C</td>
<td>The correct answer is choice (C). Members of a species with traits that allow them to survive and reproduce in an environment will increase in population, while those without those traits will die. Eventually, unsuitable traits will disappear from a species. This is how natural selection affects species. Choice (A) is incorrect because fur color will change only if it is an unsuitable trait for the environment and affects the organism’s survival and/or reproduction. Choice (D) is incorrect because larger organisms do not always have better survival chances, compared with smaller organisms. Choice (B) is incorrect because there are more factors that affect populations of predators and prey than natural selection alone.</td>
</tr>
<tr>
<td>21</td>
<td>S7L5b</td>
<td>S7CS5a</td>
<td>3</td>
<td>B</td>
<td>The correct answer is choice (B). Walking catfish with large pectoral fins are more likely to survive a trip to distant areas of water. The population is likely to evolve to have larger pectoral fins. Larger pectoral fins are an individual characteristic that make it more likely that a walking catfish will survive a trip to a distant body of water. Natural selection will favor the catfish with larger pectoral fins, as more of them survive. Choice (A) is incorrect because smaller pectoral fins make it less likely for the walking catfish to survive the trip to a distant body of water. Choice (C) is incorrect. A walking catfish with larger pectoral fins is more likely to travel farther to get to a distant body of water. Choice (D) is incorrect. A catfish with larger pectoral fins has an individual characteristic that makes it more likely to survive a trip to a distant body of water.</td>
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<td>Item</td>
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<td>DOK Level</td>
<td>Correct Answer</td>
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<tr>
<td>22</td>
<td>S7L5c</td>
<td>S7CS6c</td>
<td>3</td>
<td>C</td>
<td>The correct answer is choice (C) The species in Layer C may have evolved from the species in Layer B. These fossils demonstrate gradualism, the theory that states that species gradually change over time. Because the fossils are found in different layers of sedimentary rock, the newer layer contains species that may have evolved from older species found in the older layer below it. Choice (A) is incorrect because being in adjacent layers does not provide enough information to indicate that they are different species. Choice (B) is incorrect because there is not enough information about the fossils to know whether they are the same. Choice (D) is incorrect because fossils found in lower layers of sedimentary stone are usually older than the fossils found in upper layers.</td>
</tr>
<tr>
<td>23</td>
<td>S7L5c</td>
<td>S7CS7c</td>
<td>2</td>
<td>B</td>
<td>The correct answer is choice (B) The claim is reasonable because fossils are records of things that lived long ago. Since the fossil and the plant share similar features, it can be assumed that the species that formed the fossil has not changed greatly over time. Choice (A) is incorrect because the plant has changed over time but not greatly. Choice (C) is incorrect because the claim is reasonable, the plant has changed over time, just not much. Choice (D) is incorrect because the claim is reasonable, the fossil appears to belong to a species that lived long ago.</td>
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<td>Item</td>
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<td>Characteristics of Science</td>
<td>DOK Level</td>
<td>Correct Answer</td>
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<tr>
<td>24</td>
<td>S7L5a</td>
<td>S7CS5a</td>
<td>3</td>
<td>A</td>
<td>The correct answer is choice (A). Over time, fence lizards with longer legs were more likely to survive and passed this trait on to offspring. Choice (B) is incorrect because leg stretching is not an inherited trait and would not be passed on to offspring. Choice (C) is incorrect because trying to avoid stepping on ants would not cause the lizards’ legs to grow longer. Choice (D) is incorrect because the venom did not directly play a role in the change in leg length.</td>
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</tbody>
</table>
**ACTIVITY**

The following activity develops skills in Unit 3: Structure and Function of Cells.

**Standard:** S7L2

**Nutrient Uptake in Cells**

**Duration:** 1 week

**Materials:**
- Two eggs
- Two plastic cups
- Water
- Sugar
- Scale

- Dissolve the eggshells from the eggs by placing the eggs in vinegar to decalcify the shell and expose the membrane that lines the inside of the shell. After three days, the shells will be dissolved and the egg will be covered by the soft inner membrane alone.

**Procedure:**

1. Determine the mass of each egg and record the results.

<table>
<thead>
<tr>
<th>Starting Mass (g)</th>
<th>Appearance</th>
<th>Final Mass (g)</th>
<th>Appearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Egg A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Egg B</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

2. Carefully place one egg in a cup and fill the cup with water. Mark the cup “Egg A.”
3. Fill the second cup with water. Add 10 grams of sugar and stir. Place the other egg in the sugar solution you just created. Mark the cup “Egg B.”
4. Place the cups in a safe area and return to them the next day.
5. After a day, remove each egg from the cup and determine the mass of the egg. Record any changes in appearance you may note.

Research the following questions after the activity:

- How did each egg change in the solution?
- Which egg would be more representative of a healthy cell? Explain your reasoning.
- What would happen to a cell if it received too much of a nutrient?
- Can you explain these results in terms of diffusion and osmosis?
ACTIVITY

The following activity develops skills in Unit 6: Evidence of Evolution.

Standard: S7L5

Survival and Coat Color

Work with 3 friends or family members if possible.

Materials:
- One large piece of white construction paper
- One large piece of brown construction paper
- Two data tables (use tables on page 164)
- Twenty-five small squares cut from white construction paper (gene cards)
- Twenty-five small squares cut from brown construction paper (gene cards)
- Five cards that say SURVIVES (incident cards)
- One card that says DISEASE (incident card)
- One card that says PREDATOR (incident card)
- Eighteen cards that say CONTRASTS (incident cards)

Procedure:
1. Mix up the 25 white and 25 brown construction-paper pieces (gene cards) and set them aside.
2. Mix up the incident cards and stack them in a pile.
3. The brown and white gene cards represent genes that a fox will inherit from its parents for coat color. Draw two gene cards to simulate an offspring receiving one coat-color gene from its father and one coat-color gene from its mother. This creates the color of one new fox. Lay the two gene cards on the white construction paper, which represents a snowy environment. The white coat color is dominant. If you draw a brown and a white card, your fox is white; if you draw two white cards, your fox is white; but if you draw two brown cards, your fox is brown. Record the new fox’s color in the snow-environment data table under “Births,” with a tally mark.
4. Next, draw an incident card to indicate what will happen to this fox.
   a. If you draw the card that says SURVIVES, the fox lives. Place the two gene cards in a “living” pile. Place the incident card at the bottom of the incident pile.
   b. If you draw the card that says DISEASE, the fox dies of a disease. Place the two gene cards in a “dead” pile. The incident card goes to the bottom of the incident pile. Record the death in the data table under “Deaths,” with a tally mark.
   c. If you draw the card that says PREDATOR, the fox dies from a predator. Place the two gene cards in the “dead” pile. The incident card goes to the bottom of the incident pile. Record the death in the data table under “Deaths,” with a tally mark.
d. If you draw the card that says CONTRASTS, the fox lives if it does not contrast with its environment. For the snowy environment, if the fox is white, it survives. Place the two gene cards in the “live” pile and the incident card at the bottom of the incident pile. If the fox is brown, it contrasts with its environment. Therefore, it will die. Place the two gene cards in the “dead” pile, and the incident card at the bottom of the incident pile. Record the death in the data table under “Deaths,” with a tally mark.

5. Repeat these steps until there are no more gene cards.

Generation 2

6. Take the live pile and mix up the gene cards. Mix up the incident cards. Ignore the dead pile for now.

7. Repeat Steps 3 and 4 for Generation 2. Create new live and new dead piles and record the births and deaths in the Generation 2 row on your data chart.

Generation 3

8. Repeat again for Generation 3.

Forest Environment

9. Now replace the white construction paper with the brown construction paper, which represents a forest environment. Look at the second data table, labelled “Forest Environment.” Gather all the gene cards together (both the live and dead piles) and mix them up. Place all incident cards together and mix them up. In the forest environment, the brown-coat gene is dominant. Draw two gene cards. If you draw a brown and a white card, your fox is brown; if you draw two white cards, your fox is white; but if you draw two brown cards, your fox is brown. Record the inherited coat color in the data table under “Births,” with a tally mark.

10. Play the game as before. If you draw the card that says CONTRASTS, the fox lives if it does not contrast with its environment. Now that the fox is in a forest environment, if it is brown, it survives—place the two gene cards in the live pile and the incident card at the bottom of the incident pile. If the fox is white, it contrasts with its environment. Therefore, it will die. Place the two gene cards in the dead pile and the incident card at the bottom of the incident pile. Record the death in the data table under “Deaths,” with a tally mark.

11. Continue with Generations 2 and 3, as in the snow-environment simulation.
Data Tables

<table>
<thead>
<tr>
<th>Snow Environment</th>
<th>Births</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>White Fox</td>
<td>Brown Fox</td>
</tr>
<tr>
<td></td>
<td>White Fox</td>
<td>Brown Fox</td>
</tr>
<tr>
<td>Generation</td>
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<td></td>
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<tr>
<td>1</td>
<td></td>
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<td>2</td>
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<td>3</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Forest Environment</th>
<th>Births</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>White Fox</td>
<td>Brown Fox</td>
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<tr>
<td></td>
<td>White Fox</td>
<td>Brown Fox</td>
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<tr>
<td>Generation</td>
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<td>3</td>
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</table>

Research the following questions after the activity:

- How did the environment affect the group over time?
- How did this activity model natural selection?
DESCRIPTION OF TEST FORMAT AND ORGANIZATION

The Grade 7 Social Studies EOG assessment has a total of 75 selected-response (multiple-choice) items.

The test will be given in two sections.

• You may have up to 70 minutes per section to complete Sections 1 and 2.
• You will have about 90 to 140 minutes for the complete Social Studies EOG assessment.

CONTENT

The Grade 7 Social Studies EOG assessment will measure the Grade 7 Social Studies standards that are described at www.georgiastandards.org.

The content of the assessment is organized into four groups, or domains.

• History
• Geography
• Government and Civics
• Economics

ITEM TYPES

The Social Studies portion of the Grade 7 EOG assessment consists of selected-response (multiple-choice) items only.
SOCIAL STUDIES DEPTH OF KNOWLEDGE EXAMPLE ITEMS

Example items that represent applicable DOK levels of the Social Studies assessment are provided on the following pages. The items and explanations of what is expected of you to answer them will help you prepare for the test.

All example and sample items contained in this guide are the property of the Georgia Department of Education.

Example Item 1

DOK Level 1: This is a DOK level 1 item because it requires the student to recall information.

Social Studies Grade 7 Content Domain: Geography

Standard: SS7G2. The student will discuss environmental issues across the continent of Africa. c. Explain the impact of desertification on the environment of Africa from the Sahel to the rainforest.

What is desertification?

A. the depletion of desert resources  
B. the reduction of oases in the desert  
C. the expansion of the desert into former grassland areas  
D. the migration of people to the desert from the rainforests

Correct Answer: C

Explanation of Correct Answer: The correct answer is choice (C) the expansion of the desert into former grassland areas. Choices (A), (B), and (D) are not correct because they are not the definition of desertification.
Example Item 2

DOK Level 2: This is a DOK Level 2 item because it requires reasoning and comparing.

Social Studies Grade 7 Content Domain: Geography

Standard: SS7G4. The student will describe the diverse cultures of the people who live in Africa. a. Explain the differences between an ethnic group and a religious group.

Which of these is an example of a religious group?

A. Zulu dancers practice with their troop.
B. Ashanti weavers make kente cloth for festivals.
C. Muslim men fast during the month of Ramadan.
D. Swahili women teach their children to make traditional food.

Correct Answer: C

Explanation of Correct Answer: The correct answer is choice (C) Muslim men fast during the month of Ramadan. Someone who is Muslim is a follower of the faith of Islam. Choices (A), (B), and (D) are all incorrect because they are examples of ethnic groups, not religious groups.
Example Item 3

DOK Level 3: This is a DOK Level 3 item because it requires analysis of the maps and integrating information.

Social Studies Grade 7 Content Domain: Geography

Standard: SS7G3. The student will explain the impact of location, climate, and physical characteristics on population distribution in Africa. a. Explain how the characteristics in the Sahara, Sahel, savanna, and tropical rainforests affect where people live, the type of work they do, and how they travel.

Look at the maps.

Which conclusion can be drawn from looking at the maps?

A. The Sahara has a high population density.
B. Central Africa has a low population density.
C. Areas of low elevation have the lowest population density.
D. Areas near bodies of water have the highest population density.
Correct Answer: D

Explanation of Correct Answer: The correct answer is choice (D) Areas near bodies of water have the highest population density. This is true of bodies of water such as the oceans, Lake Victoria, and the major rivers. Choice (A) is incorrect because the Sahara has the lowest population density. Choice (B) is incorrect because Central Africa contains some pockets of the highest population density on the continent. Choice (C) is incorrect because some areas of low elevation have high population densities.