

Alabama Science Assessment: Grade Seven

Item Specifications



Dr. Joseph B. Morton
State Superintendent of Education
Alabama State Department of Education
Montgomery, Alabama

December 2007

No person shall be denied employment, be excluded from participation in, be denied the benefits of, or be subjected to discrimination in any program or activity on the basis of disability, sex, race, religion, national origin, color, or age. Ref: Sec. 1983, Civil Rights Act, 42 U.S.C.; Title VI and VII, Civil Rights Act of 1964; Rehabilitation Act of 1973, Sec. 504; Age Discrimination in Employment Act; Equal Pay Act of 1963; Title IX of the Education Amendment of 1972: Title IX Coordinator, P.O. Box 302101, Montgomery, Alabama 36130-2101 or call (334) 242-8444.

Published by Data Recognition Corporation

Copyright © 2007 by the Alabama State Department of Education.

All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information storage and retrieval system, without permission in writing from the Alabama State Department of Education, except for the printing of complete pages, with the copyright notice, for instructional use and not for resale.

Produced in the United States of America.

ALABAMA STATE BOARD OF EDUCATION

Governor Bob Riley – President
Randy McKinney – District 1
Betty Peters – District 2
Stephanie W. Bell – District 3
Dr. Ethel H. Hall – District 4
Ella B. Bell – District 5
David F. Byers, Jr. – District 6
Sandra Ray – District 7
Dr. Mary Jane Caylor – District 8

ALABAMA STATE DEPARTMENT OF EDUCATION

Dr. Joseph B. Morton
State Superintendent of Education

Dr. Ruth C. Ash
Deputy State Superintendent of Education

Feagin Johnson, Jr.
Assistant State Superintendent of Education

Student Assessment

Dr. Gloria Turner, Director
Miriam Byers, Education Administrator
Cathy Poage, Education Administrator
Renée Callen, Education Specialist
Dorothy DeMars, Education Specialist
Kanetra Germany, Education Specialist
Margaret Moore, Education Specialist
Rhonda Patton, Education Specialist
Nannette Pence, Education Specialist
Judy Pugh, Education Specialist
Mark Ward, Education Specialist
Shanthia Washington, Education Specialist

TABLE OF CONTENTS

INTRODUCTION	1
CONTENT STANDARDS	2
CONTENT STANDARD 1	3
CONTENT STANDARD 2	7
CONTENT STANDARD 3	10
CONTENT STANDARD 4	14
CONTENT STANDARD 5	17
CONTENT STANDARD 6	20
CONTENT STANDARD 7	23
CONTENT STANDARD 8	26
CONTENT STANDARD 9	29
CONTENT STANDARD 10	31
CONTENT STANDARD 11	34

INTRODUCTION

This bulletin provides specific information about the *Alabama Science Assessment: Grade Seven*. Educators representing each state school board district, as well as both city and county school systems, served on the committees that determined the eligible content for the *Alabama Science Assessment: Grade Seven* and reviewed, revised, and approved the actual items.

The content standards for the *Alabama Science Assessment: Grade Seven* are found in the *Alabama Course of Study: Science*, Bulletin 2005, No. 20, pages 39–42. The content standards for the *Alabama Science Assessment: Grade Seven* are specifically referenced in this document.

Teachers must be familiar with this document if they teach content that relates to the standards measured on *Alabama Science Assessment: Grade Seven*. Furthermore, teachers must use this document in focusing instruction on content standards.

An item specification has a distinct purpose and provides essential information concerning the testing of a content standard. Item specifications will follow this order:

CONTENT STANDARD	Broad area of content to be assessed
ITEM TYPE	All multiple-choice
ELIGIBLE CONTENT	Clarification and elaboration of a content standard (where applicable)
SAMPLE ITEMS	Item formats to test each content standard

The sample items in this bulletin will **not** be found on the *Alabama Science Assessment: Grade Seven*. The number of sample items in this bulletin does not necessarily reflect the weight of the content on the test. The correct answer for each item is indicated by an asterisk (*). In order to identify the weight of the content, the chart on page 2 shows the number of items for each *Alabama Science Assessment: Grade Seven* content standard.

**CONTENT STANDARDS
GRADE 7**

CONTENT STANDARDS	POINTS POSSIBLE
Life Science	
1. Describe characteristics common to living things, including growth and development, reproduction, cellular organization, use of energy, exchange of gases, and response to the environment.	6
2. Identify functions of organelles found in eukaryotic cells, including the nucleus, cell membrane, cell wall, mitochondria, chloroplasts, and vacuoles.	6
3. Relate major tissues and organs of the skeletal, circulatory, reproductive, muscular, respiratory, nervous, and digestive systems to their functions.	9
4. Describe organisms in the six-kingdom classification system by their characteristics.	8
5. Identify major differences between plants and animals, including internal structures, external structures, methods of locomotion, methods of reproduction, and stages of development.	6
6. Describe evidence of species variation due to climate, changing landforms, interspecies interaction, and genetic mutation.	6
7. Describe biotic and abiotic factors in the environment.	6
8. Describe the function of chromosomes.	6
9. Identify the process of chromosome reduction in the production of sperm and egg cells during meiosis.	4
10. Identify differences between deoxyribonucleic acid (DNA) and ribonucleic acid (RNA).	6
11. Identify Mendel's laws of genetics.	3
TOTAL POINTS POSSIBLE	66

LIFE SCIENCE

Content Standard 1

Describe characteristics common to living things, including growth and development, reproduction, cellular organization, use of energy, exchange of gases, and response to the environment.

Item Type

Multiple-choice

Eligible Content

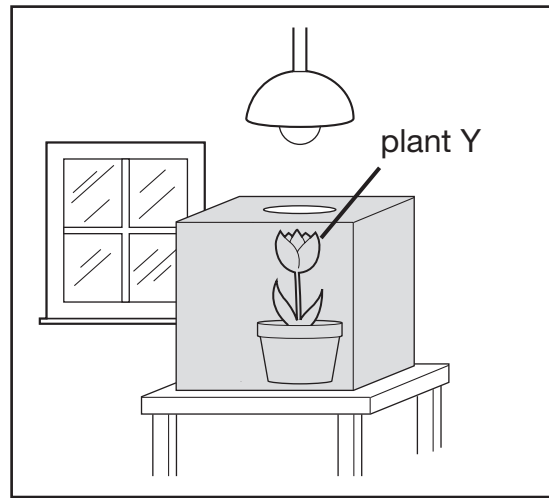
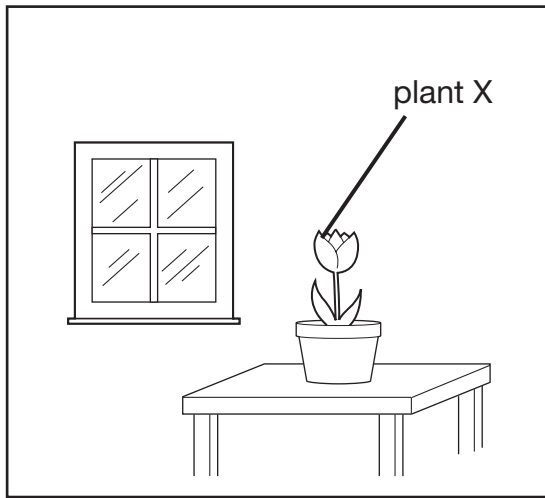
- Describe how organisms grow and develop, as can be reflected by changes in size and maturity.
- Describe how organisms reproduce using sexual and/or asexual methods.
- Describe how organisms are comprised of at least one cell.
- Describe how organisms use energy to undergo life processes.
- Describe how organisms exchange gases such as oxygen, carbon dioxide, and nitrogen.
- Describe how organisms respond to environmental stimuli.

Note: Plants have tropism responses.

Sample Multiple-Choice Items

1. Which statement describes the process of growth within an organism?
 - *A A green vine uses energy from the Sun to produce more cells.
 - B A fire produces more heat as additional fuel is added.
 - C An oak tree drops its leaves when the seasons change.
 - D An animal's fur is raised when it senses danger.
2. Which pair of characteristics is common to all living things?
 - A having lungs to breathe and using wings to move
 - B having a vascular system and producing cells during growth
 - *C having one or more cells and having the ability to reproduce
 - D having a digestive system and responding to certain environmental factors

3. Plant X and plant Y are the same species. Plant X is placed on a table. Plant Y is placed inside a cardboard box with only a hole at the top to allow light to enter. How will these plants respond to these environmental conditions?

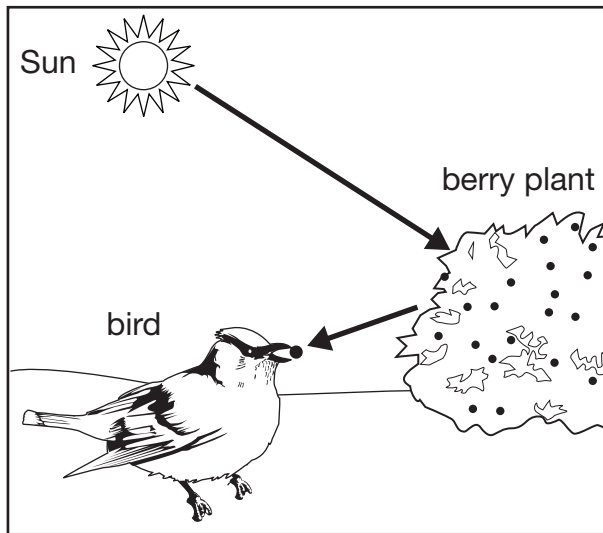


- A Plant X and plant Y will both grow upright.
- B Plant X and plant Y will both bend toward the window.
- *C Plant X will bend toward the window, and plant Y will grow upright.
- D Plant X will bend away from the window, and plant Y will grow upright.

4. Which statement correctly describes *all* living things?
- A They reproduce sexually.
 - B Their cells have a nucleus.
 - *C They are made up of at least one cell.
 - D They can change energy from the Sun into food.

5. The ability to respond to environmental stimuli is observed in
- A rocks.
 - *B plants.
 - C rain drops.
 - D sugar crystals.

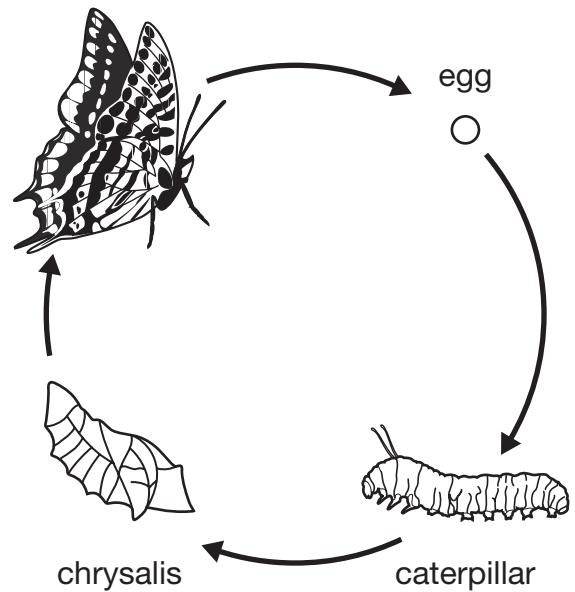
6. Which characteristic of living things does this picture *best* represent?



- A All living things grow, develop, and mature.
- *B All living things require energy in order to survive.
- C All living things exchange gases with the environment.
- D All living things carry out the process of reproduction.
7. A student puts soil in the bottom of a jar, plants a seed, adds water, and puts a lid on the jar. The seed sprouts, but the plant soon dies. Which characteristic of life is *most* limited by the closed lid of the jar?
- *A exchange of gases
- B asexual reproduction
- C absorption of light energy
- D response to changes in the environment

8. Study the diagram below.

adult butterfly



Which characteristic common to living things is evidenced by the formation of the egg in the butterfly life cycle?

- *A production of new offspring
- B development of intelligence
- C response to an environmental stimulus
- D exchange of oxygen and carbon dioxide

9. Study the figures below.

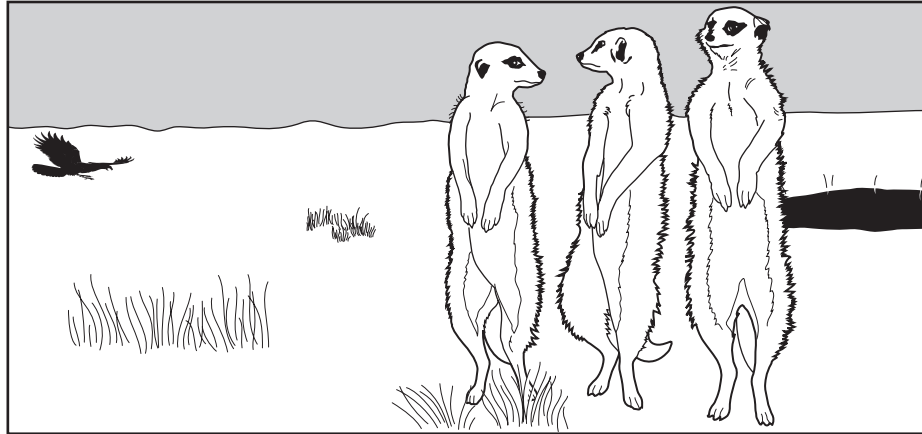


Figure 1

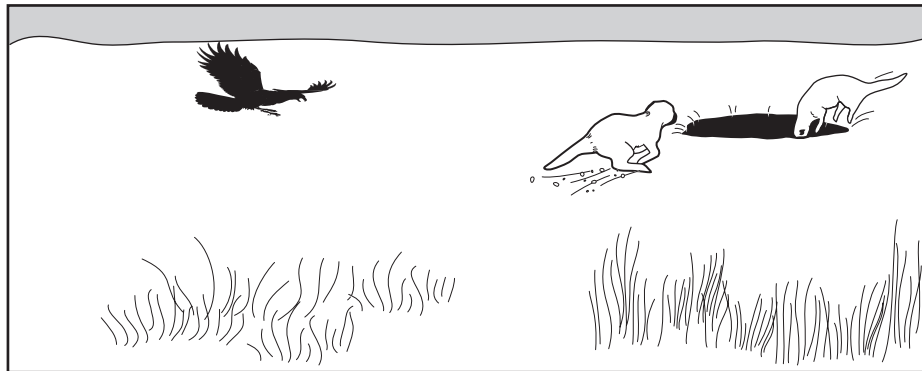


Figure 2

Which characteristic of living things is *best* described in the figures?

- A Living things are composed of cells.
- B Living things live in complex communities.
- C Living things require energy to undergo processes.
- *D Living things respond to stimuli in their environment.

Content Standard 2

Identify functions of organelles found in eukaryotic cells, including the nucleus, cell membrane, cell wall, mitochondria, chloroplasts, and vacuoles.

Item Type

Multiple-choice

Eligible Content

- Identify and describe the function of the nucleus.
- Identify and describe the function of the cell membrane.
- Identify and describe the function of the cell wall.
- Identify and describe the function of mitochondria.
- Identify and describe the function of chloroplasts.
- Identify and describe the function of vacuoles.

Note: Items may require knowledge of the term eukaryote.

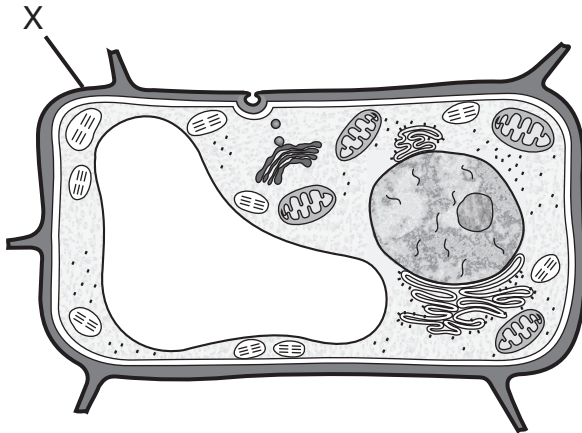
Note: Items will not ask students to define the term prokaryote or compare prokaryotic cells with eukaryotic cells.

Note: Knowledge of ATP will not be assessed.

Sample Multiple-Choice Items

1. Even on a windy day, most plants can remain upright. Which structure plays the greatest role in providing a plant with this type of support?
 - A nucleus
 - B mitochondrion
 - *C cell wall
 - D skeleton
2. Which statement correctly identifies a function of a chloroplast in eukaryotic cells?
 - A It contains cellulose, which helps a plant conduct respiration.
 - B It contains cellulose, which helps an animal conduct respiration.
 - *C It contains a green pigment, which helps a plant capture energy from sunlight.
 - D It contains a green pigment, which helps an animal capture energy from sunlight.

3. Study the cell below.



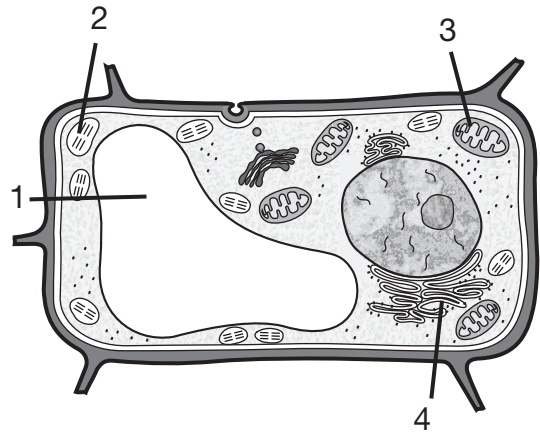
What is the *primary* function of cell structure X?

- *A maintaining the cell's shape
- B providing energy for the cell
- C storing the cell's food, water, and wastes
- D monitoring what materials enter and exit the cell

4. A scientist examines a structure within a cell that contains a large amount of genetic material. Which statement *best* identifies this structure's function?

- *A It controls cellular activities.
- B It stores food, water, and wastes.
- C It gives the cell shape and support.
- D It uses light energy to make sugars.

5. Which organelle provides evidence that this cell can produce its own food from sunlight?



- A organelle 1
- *B organelle 2
- C organelle 3
- D organelle 4

6. Which student correctly identifies the cell structure responsible for producing food and the cell structure responsible for storing materials in a plant cell?

Food Production and Storage

Student	Cell Structure			
	Mitochondrion	Chloroplast	Cell Membrane	Vacuole
1	x		x	
2	x			x
3		x	x	
4		x		x

- A student 1
- B student 2
- C student 3
- *D student 4

7. Which statement describes how a plant cell's functions would change in the absence of a vacuole?
- A The cell would not be able to produce proteins.
 - B The cell would lack energy to destroy foreign objects.
 - *C Fluid and wastes would not be stored within the cell.
 - D Materials would not be transported between the nucleus and cell membrane.

8. A scientist wanted to study a cell which lacked the structure that contains the materials needed to control cell activities. Which structure would need to be missing from the cell for this study to take place?
- *A nucleus
 - B vacuole
 - C lysosome
 - D mitochondrion

Content Standard 3

Relate major tissues and organs of the skeletal, circulatory, reproductive, muscular, respiratory, nervous, and digestive systems to their functions.

Item Type

Multiple-choice

Eligible Content

- Recognize the skeletal system and describe its functions.
Include:
 - bones
 - cartilage
 - joints

- Recognize that the circulatory system carries oxygen, carbon dioxide, wastes, and nutrients throughout the body.
Include:
 - the heart
 - the arteries
 - the veins
 - the capillaries
 - the blood
 - the red blood cells
 - the white blood cells
 - the plasma

- Recognize that the reproductive system allows for production of offspring and the continuation of life.
Include:
 - the testes
 - the ovaries
 - the uterus

- Recognize that the muscular system supports and enables the body to move, produces heat, and gives the body shape.
Include:
 - skeletal muscle tissue
 - cardiac muscle tissue
 - smooth muscle tissue

- Recognize that the respiratory system provides the body with oxygen and removes carbon dioxide from the blood.

Include:

- the lungs
- the trachea
- the alveoli
- the diaphragm muscle
- the nose

- Recognize that the nervous system gathers and interprets information and responds to that information.

Include:

- the brain
- the spinal cord
- the nerves

- Recognize that the digestive system breaks down food, either chemically or physically (mechanically), processes it for use by the body, and excretes waste products.

Include:

- the mouth
- the esophagus
- the stomach
- the small intestine
- the large intestine

Sample Multiple-Choice Items

1. Which tissue in the skeletal system cushions the area where two bones meet?

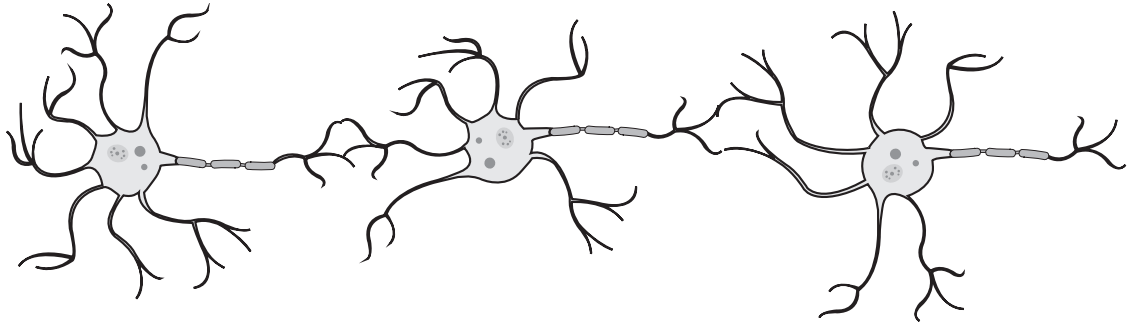
- A** tendon
- B** marrow
- C** ligament
- *D** cartilage

2. Many particles, such as dust, are inhaled when people breathe. Which part of the respiratory system filters out the majority of these particles?

- *A** nose
- B** alveoli
- C** trachea
- D** diaphragm

3. Which statement correctly identifies a difference between the function of *most* arteries and veins?
- A Arteries carry red blood cells, whereas veins carry white blood cells.
 - B Veins carry red blood cells, whereas arteries carry white blood cells.
 - C Arteries carry blood to the heart, whereas veins carry blood away from the heart.
 - *D Veins carry blood to the heart, whereas arteries carry blood away from the heart.
4. Which statement *best* describes how the nervous system helps a person react quickly after stepping on something sharp?
- A Electrical impulses are created by the muscles to move the foot away.
 - B Each skin cell has pain receptors that directly cause muscle movement in the foot.
 - C The muscles conduct pain impulses to the brain, which directs nerves to pull the foot away.
 - *D Signals travel on nerves to the spinal cord, which causes a reflex that pulls the foot away.
5. Which organ is *not* functioning properly if an individual is unable to compact waste or reabsorb liquid from undigested food?
- A stomach
 - B esophagus
 - C small intestine
 - *D large intestine
6. As blood flows to the heart from the toes and fingers, it travels mainly through tissue called
- *A veins.
 - B alveoli.
 - C arteries.
 - D capillaries.
7. Sometimes when people eat, the food accidentally enters a tube near the beginning of the respiratory system instead of the digestive system. This causes a person to cough. In which part of the respiratory system can food sometimes get stuck and cause difficulty in breathing?
- A lung
 - B alveoli
 - *C trachea
 - D diaphragm

8. Examine the tissue below.



A scientist studying the brain examines the above tissue under a microscope. Which statement *best* identifies a function of this tissue type?

- A It breaks down food and processes it for use in the body.
- *B It conducts information from one part of the body to another.
- C It moves oxygen and carbon dioxide throughout the body.
- D It provides a basic framework and support system in the body.

9. A patient is having trouble reabsorbing excess water from the digestive system. The first organ the doctor will *most likely* examine is the

- A stomach.
- B esophagus.
- C small intestine.
- *D large intestine.

10. Which organ contains smooth muscle tissue?

- A liver
- B brain
- C heart
- *D stomach

11. Redness and swelling may develop in an area near a wound. This reaction by the body means that white blood cells are being carried to that area by which of the following?

- *A circulatory system
- B nervous system
- C muscular system
- D skeletal system

12. The birth of a baby indicates that a fertilized egg developed in which of these structures?

- A ovary
- B testis
- *C uterus
- D alveolus

Content Standard 4

Describe organisms in the six-kingdom classification system by their characteristics.

Item Type

Multiple-choice

Eligible Content

- Identify characteristics of each kingdom and provide examples.

Sample Multiple-Choice Items

1. Which characteristic describes *all* members of the kingdom Plantae and *some* members of the kingdom Protista?

- A They contain leaves.
- *B They contain chloroplasts.
- C They are able to decompose nonliving organisms.
- D They are able to obtain energy from other organisms.

2. Which kingdom contains an organism with all of these characteristics?

Organism Characteristics

- is eukaryotic
- has a cell wall
- is multicellular
- depends completely on other organisms for nutrition

- *A Fungi
- B Protista
- C Animalia
- D Eubacteria

3. Study the table below.

Fungi Characteristics

Characteristic	Present in Fungi?
cell walls	yes
nuclei	yes
eggs	no
?	?

Which row of information correctly completes this table?

- A

mitochondria	no
--------------	----
- B

organs	yes
--------	-----
- *C

multi-celled	yes
--------------	-----
- D

chlorophyll	yes
-------------	-----

4. A teacher asked students to identify characteristics of organisms in the kingdom Eubacteria. Which student correctly identified two characteristics of Eubacteria?

Characteristics of Eubacteria

Student	Cell Organization	Nucleus Present
1	single-celled	no
2	single-celled	yes
3	multicellular	yes
4	multicellular	no

- *A student 1
 B student 2
 C student 3
 D student 4
5. Which student correctly identified characteristics of organisms found in the kingdom Protista?

Protist Characteristics

Student	Nucleus Present	Cell Organization
1	no	multi-celled
2	yes	single-celled
3	no	single-celled
4	yes	multi-celled

- A student 1
 *B student 2
 C student 3
 D student 4

6. Which kingdom includes some organisms that have no nucleus and can live in an environment with extremely high salt content?

- A Fungi
 B Protista
 C Eubacteria
 *D Archaeobacteria

7. Which statement describes a characteristic shared by organisms classified within the Protista, Plantae, and Fungi kingdoms?

- A Their cells have cell walls.
 B Their cells have chloroplasts.
 *C Each of their cells has a nucleus.
 D Each of their cells has a large vacuole.

8. A walking stick is an insect that looks like a twig from a tree. Which characteristics are *best* used to classify the walking stick as an animal, and *not* a plant?

- *A It is mobile, and it is a consumer.
 B It is multicellular and eukaryotic.
 C Its cells have nuclei and a cell membrane.
 D It reproduces and makes energy using sex cells.

9. In which kingdom does organism X belong?

Characteristics of Organism X

Organism	Characteristics				
	Nucleus	Cell Wall	Chloroplasts	Consumer	Multicellular
X	Yes	No	No	Yes	Yes

- A Fungi
- B Plantae
- *C Animalia
- D Eubacteria

10. Which statement *best* describes a characteristic of the organisms in kingdom Animalia?

- A They are classified by how they move and obtain food.
- B They thrive in extreme environments and lack a nucleus.
- *C They contain cells that have a nucleus and lack a cell wall.
- D They are multicellular and use chlorophyll to manufacture food.

Content Standard 5

Identify major differences between plants and animals, including internal structures, external structures, methods of locomotion, methods of reproduction, and stages of development.

Item Type

Multiple-choice

Eligible Content

- Identify differences in internal cellular structures like chloroplasts and cell walls, external structures, methods of locomotion, sexual and asexual methods of reproduction, and stages of development.
- Identify animals as interdependent and plants as nonmobile.

Sample Multiple-Choice Items

1. Which statement correctly describes a difference between plant cells and animal cells?
 - A Animal cells have cell membranes, but plant cells do not.
 - B Plant cells have cell membranes, but animal cells do not.
 - C Animal cells have chloroplasts, but plant cells do not.
 - *D Plant cells have chloroplasts, but animal cells do not.
2. Which statement explains why, in a *food chain*, plants are called producers and animals are called consumers?
 - A Plants make oxygen, and animals use it.
 - B Plants use carbon dioxide, and animals give it off.
 - *C Plants make their own food, and animals eat other organisms.
 - D Plants use energy from the soil, and animals make their own food.
3. Which statement identifies a characteristic of plants, but *not* animals?
 - *A They are producers.
 - B They need mitochondria.
 - C They conduct cellular respiration.
 - D They have internal vascular structures.
4. Which statement describes a major reproductive difference between plants and animals?
 - A Plants are producers and animals are consumers.
 - B Most plants are dormant in winter; most animals are not.
 - C Plants have special cell structures that animals do not have.
 - *D Most plants have both male and female structures; most animals do not.

5. Which student correctly identified characteristics that are specific to animals?

**Students' Identification
of Animal Characteristics**

Student	Characteristics	
	Cell Wall Present	Conducts Photosynthesis
1	yes	yes
2	yes	no
3	no	no
4	no	yes

- A student 1
- B student 2
- *C student 3
- D student 4

6. Plant and animal cells share many processes, but there are major differences in their cell structures. Which cell structures exist in plant cells, but *not* in animal cells?

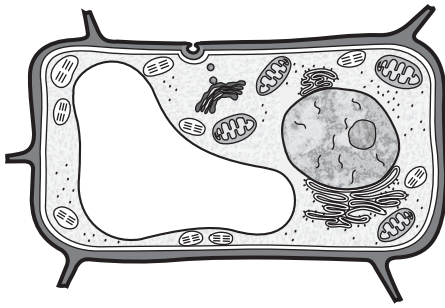
- A vacuoles and cell wall
- *B cell wall and chloroplasts
- C chloroplasts and vacuoles
- D cell membrane and mitochondria

7. Which statement correctly describes a difference between prairie dogs and strawberry plants?

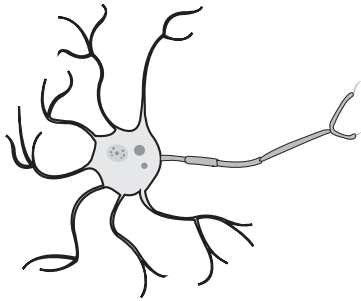
- A Prairie dogs can reproduce sexually and asexually; strawberry plants can only reproduce sexually.
- B Prairie dogs can reproduce sexually and asexually; strawberry plants can only reproduce asexually.
- C Prairie dogs can only reproduce asexually; strawberry plants can reproduce both sexually and asexually.
- *D Prairie dogs can only reproduce sexually; strawberry plants can reproduce both sexually and asexually.

8. Based on the differences between plant and animal cells, which cell is *most likely* from a plant?

*A



B



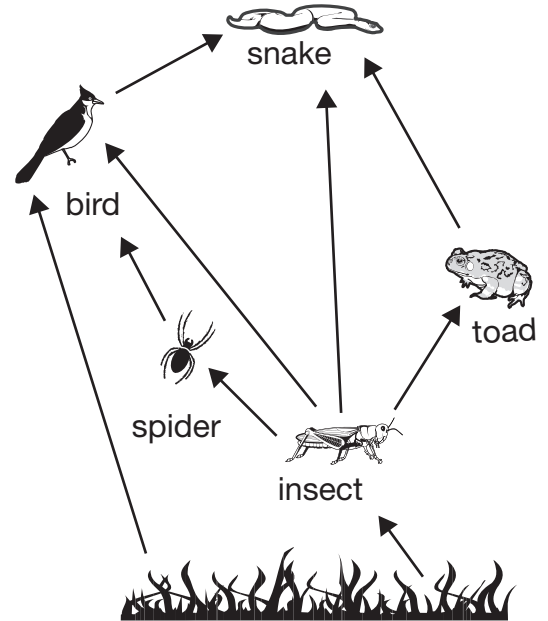
C



D



9. Which difference between plants and animals is illustrated by the food web?



A Animals only consume other animals.

*B Only plants produce their own energy.

C Animals are only dependent on plants for energy.

D Only animals pass on energy to other organisms.

Content Standard 6

Describe evidence of species variation due to climate, changing landforms, interspecies interaction, and genetic mutation.

Item Type

Multiple-choice

Eligible Content

- Describe evidence of species variation due to climate in the cases of the snowshoe rabbit and the arctic fox.
- Describe evidence of species variation due to geographic isolations such as a population becoming separated by a mountain range, an island breaking off from a mainland as in the case of Australia, or when a river separates a population as in the case of the Grand Canyon squirrel populations.
- Describe evidence of species variation due to interspecies interaction by recognizing the roles of parasitism, mutualism, and commensalism.
- Recognize that genetic mutation leads to diversity within a species which can lead to speciation.

Sample Multiple-Choice Items

- | | |
|--|--|
| <p>1. Snowshoe hares experience a change in fur color from brown in the summer to white in the winter. Which statement <i>best</i> describes how the appearance of a particular snowshoe hare may change after it lives in a warm climate, year-round, for many generations?</p> <p>A It would have white fur all year long.</p> <p>* B It would have brown fur all year long.</p> <p>C It would have white fur in summer and brown fur in winter.</p> <p>D It would have brown fur in summer and white fur in winter.</p> | <p>2. Some scientists believe that leopard frogs in North America came from a common species. Today, leopard frogs from different parts of the continent can no longer interbreed. Which statement describes the <i>best</i> explanation for this change?</p> <p>A Mating with another species of frogs causes genetic mutations.</p> <p>B Mating with different populations throughout North America causes unique species to form.</p> <p>* C Geographic isolation from other populations can result in unique species.</p> <p>D Climate changes over time cause species extinction, which can result in a very small gene pool.</p> |
|--|--|

3. Less than ten thousand years ago, environmental changes separated some individuals of a squirrel population to one side of the Grand Canyon. Today, these squirrels now show a white tail and black belly. Their ancestors exhibited gray tails and white bellies. This difference in fur coloring *most likely*

- *A is evidence of speciation due to geographical isolation.
- B results from speciation due to interspecies competition.
- C shows that the two populations had different food sources.
- D represents mutations that occur more frequently in one population.

4. In Australia, there are many species of organisms found nowhere else on Earth. Which reason *best* explains why there is a large number of unique organisms in Australia?

- A Australia has a high level of biodiversity.
- B Australia is located close to the equator.
- *C Australia is isolated because it is an island.
- D Australia has many miles of coastal habitat.

5. Which characteristic of snowshoe hares *best* describes evidence of species variation due to climate?

- A They are herbivores.
- B They have flat front teeth.
- *C They have large, furry hind legs.
- D They are most active at dusk and dawn.

6. Study the pictures of animal tracks below.



snowshoe hare
hind-foot track

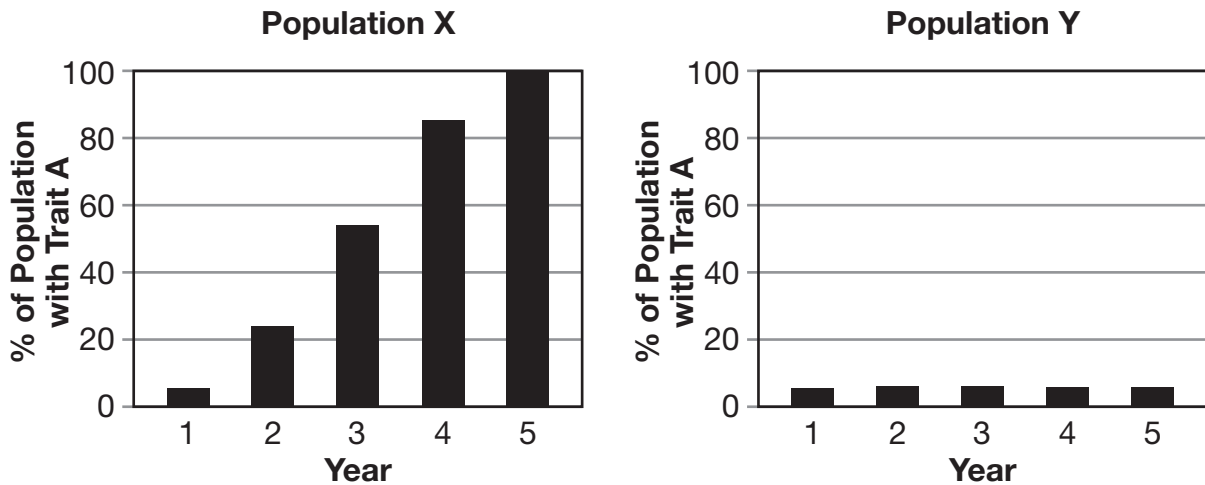


jackrabbit
hind-foot track

A student compared the hind foot of a snowshoe hare with the hind foot of a desert jackrabbit. Which evidence of species variation does the difference in their feet *best* represent?

- A Landforms can sometimes isolate animals in a population.
- *B Climates require different adaptations for animals to survive.
- C Mutualism involving the snowshoe hare caused the hind foot to change.
- D Parasites in the desert habitat caused the jackrabbit's hind foot to be smaller.

7. Populations X and Y are organisms of the same species that are isolated from one another. The graphs show the percentages of a genetic trait's presence in the two populations. The change in population X's genetic traits indicates that the population is *most likely*



- *A undergoing speciation.
- B losing an available habitat.
- C suffering from parasitism.
- D migrating to a new habitat.

8. Which statement describes a species variation that could be created by interspecies interactions?
- A An arctic fox has a thicker coat of fur than a desert fox.
 - B A gene mutates and produces an entirely new trait in an animal.
 - *C Ants protect acacia trees from grasshoppers that eat their leaves.
 - D Plants on one side of a mountain have a large root system to survive dry conditions.

Content Standard 7

Describe biotic and abiotic factors in the environment.

Item Type

Multiple-choice

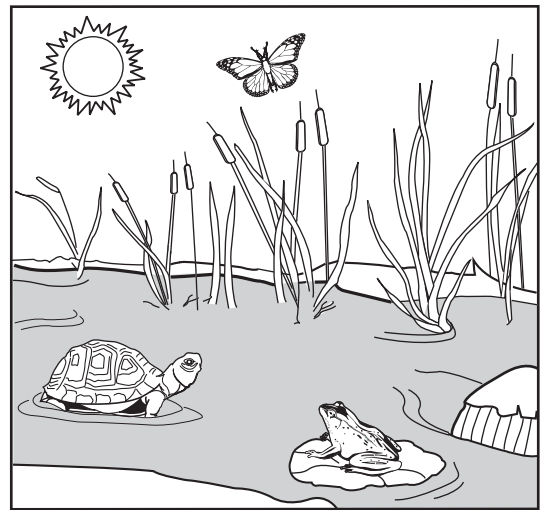
Eligible Content

- Describe biotic factors and recognize examples.
- Describe abiotic factors and recognize examples.

Sample Multiple-Choice Items

1. Which of these *best* identifies biotic factors in a forest environment?
- A** plants, animals, and their surroundings; including wildflowers, birds, rocks, and water
 - B** the features of the habitat and decaying material; including soil, air, dead trees, and bacteria
 - C** the things living plants and animals need; including air, water, soil, and nutrients
 - *D** producers, consumers, and decomposers; including wildflowers, deer, songbirds, and mushrooms

2. **Study the ecosystem below.**



Which statement describes an abiotic factor in this ecosystem?

- *A** The Sun is shining in the sky.
- B** The frog is sitting on a lily pad.
- C** The butterfly is searching for food.
- D** The plants are growing upright.

3. Which statement describes only biotic factors in a forest ecosystem?

- *A A bird and a squirrel are living in a tree.
- B Birds and clouds are moving in the wind.
- C Sunlight, air, and water are used by the grass.
- D A fish, rocks, and a turtle exist within a stream.

4. A group of students learned that there are many types of bacteria living inside their bodies. These bacteria are considered part of the biotic environment. Which statement *best* explains why?

- *A They are living organisms.
- B They provide nutrients to their host.
- C They exist within other living organisms.
- D They are dependent on other organisms.

5. Plants require moisture, oxygen, carbon dioxide, light, and minerals for growth. These requirements are *best* described as

- A biotic factors.
- *B abiotic factors.
- C climate factors.
- D respiratory factors.

6. Abiotic factors in an environment include all of the

- A plants, animals, fungi, and bacteria living in a habitat.
- B air, water, and food that living organisms use to stay alive.
- C organisms, including those currently alive and those that were once living.
- *D rocks, water, sunlight, nutrients, climates, and other nonliving characteristics.

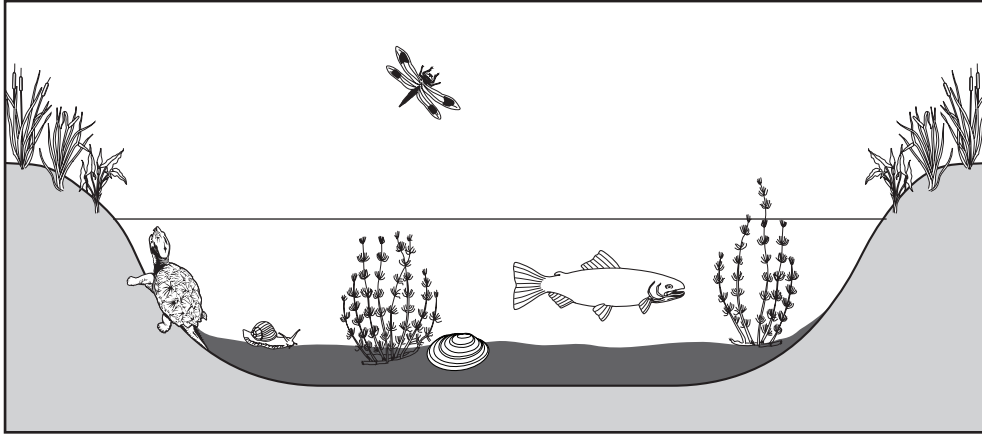
7. Which answer choice correctly identifies the abiotic items in a pond?

Items in a Pond

1. fish
2. water
3. dissolved gases
4. plants
5. parasites on the fish
6. rocks at the bottom

- A fish, plants, and parasites on the fish
- B plants, water, and rocks at the bottom
- C fish, dissolved gases, and parasites on the fish
- *D water, dissolved gases, and rocks at the bottom

8. Study the pond ecosystem below.



Which statement describes both biotic and abiotic factors in this pond ecosystem?

- A The ecosystem contains aquatic plants and fish.
- B The ecosystem contains flying insects and land plants.
- *C The ecosystem contains sand on the pond bottom and plants on the shore.
- D The ecosystem contains the rocks on the pond bottom and oxygenated water.

Content Standard 8

Describe the function of chromosomes.

Item Type

Multiple-choice

Eligible Content

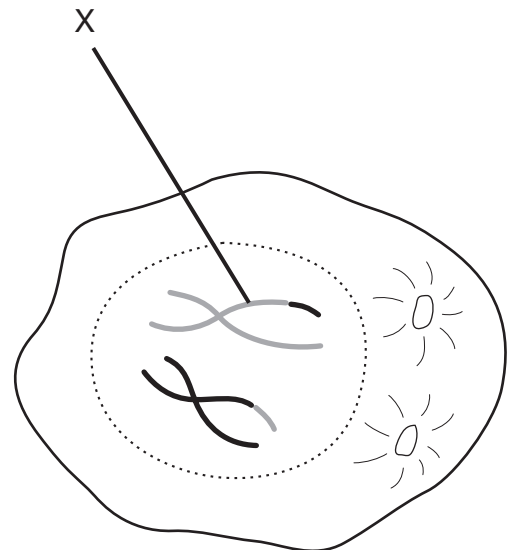
- Recognize that chromosomes control cell processes and determine traits of an entire organism.

Sample Multiple-Choice Items

1. Which statement does *not* describe a possible function of chromosomes?
 - A They regulate the proteins in a cell.
 - *B They provide a cell with energy.
 - C They determine the gender of an individual.
 - D They influence the traits of the entire organism.

2. Which trait is *not* determined by chromosomes?
 - A height
 - B gender
 - C eye color
 - *D hair length

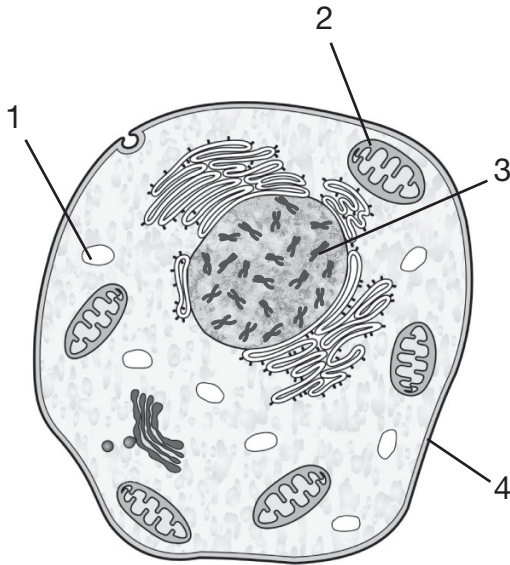
3. **Study the cell below.**



What is a function of the cell part labeled X?

- A It produces energy for the cell.
- B It assembles proteins for the cell.
- *C It contains the genetic instructions to control cell processes.
- D It synthesizes proteins used for chemical reactions in the cell.

4. Study the cell below.



An animal is growing old, and many of its cells need to be replaced. Which structure contains the instructions to form new cells?

- A structure 1
- B structure 2
- *C structure 3
- D structure 4

5. Which statement describes why an offspring and its mother share many common traits?

- A The mother and the offspring both have mitochondria.
- B The mother and the offspring both have identical nuclei.
- *C The mother provided half of the offspring's chromosomes.
- D The mother provided all of the offspring's chromosomes.

6. Which statement correctly describes how chromosomes function in an organism?

- A The chlorophyll in chromosomes helps produce sugars for energy.
- B The patterns of chromosomes are color-coded for different ribosomes.
- *C The codes in chromosomes determine what proteins the cells will produce.
- D The number of chromosome segments determines how proteins enter the cell.

7. Which student has identified correct functions of a chromosome?

Students' Identification of Chromosome Functions

Student	Absorbs Sunlight	Controls Cell Processes	Releases Energy	Determines Traits
1	X	X		
2	X		X	
3		X		X
4			X	X

- A student 1
- B student 2
- *C student 3
- D student 4

Content Standard 9

Identify the process of chromosome reduction in the production of sperm and egg cells during meiosis.

Item Type

Multiple-choice

Eligible Content

- Describe and identify the process of chromosome reduction in the production of sperm and egg cells during meiosis.

Note: Define haploid and/or diploid.

Sample Multiple-Choice Items

1. How does the number of chromosomes in egg and sperm cells at the end of meiosis compare with that in body cells?
 - *A They have half the number of chromosomes.
 - B They have twice the number of chromosomes.
 - C They have the same number of chromosomes.
 - D They have one-fourth the number of chromosomes.
2. A relative of the giraffe called an okapi has 44 chromosomes in its skin cells. How many chromosomes does a female okapi have in her egg cells?
 - A 11 chromosomes
 - *B 22 chromosomes
 - C 44 chromosomes
 - D 88 chromosomes
3. A scientist determines that a specific plant's reproductive cells have 20 chromosomes. How many chromosomes do its non-reproductive cells contain?
 - A 10 chromosomes
 - B 20 chromosomes
 - C 30 chromosomes
 - *D 40 chromosomes
4. Which statement describes the beginning and end products of meiosis?
 - A One diploid cell becomes two haploid cells.
 - B One haploid cell becomes two diploid cells.
 - *C One diploid cell becomes four haploid cells.
 - D One haploid cell becomes four diploid cells.

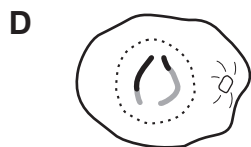
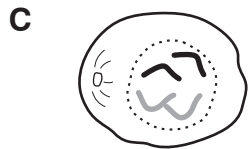
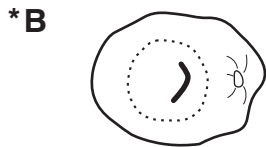
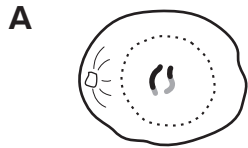
5. Which student has selected the appropriate descriptions for the cells produced during meiosis?

Students' Identification of Cells Produced During Meiosis

Student	2 Sex Cells	4 Sex Cells	Haploid Cells	Diploid Cells
1	X			X
2		X	X	
3	X		X	
4		X		X

- A student 1
 *B student 2
 C student 3
 D student 4

6. In a certain species of ant, the female's body cells have two chromosomes. Which picture represents an egg cell of this ant species?



7. The sperm cells of a squirrel have 20 chromosomes. How many chromosomes are found in a body cell of the same animal?

- A 10 chromosomes
 B 20 chromosomes
 *C 40 chromosomes
 D 80 chromosomes

8. A tomato plant has 24 chromosomes in its egg cells. How many chromosomes are found in a leaf cell from the same plant?

- A 6 chromosomes
 B 12 chromosomes
 C 24 chromosomes
 *D 48 chromosomes

Content Standard 10

Identify differences between deoxyribonucleic acid (DNA) and ribonucleic acid (RNA).

Item Type

Multiple-choice

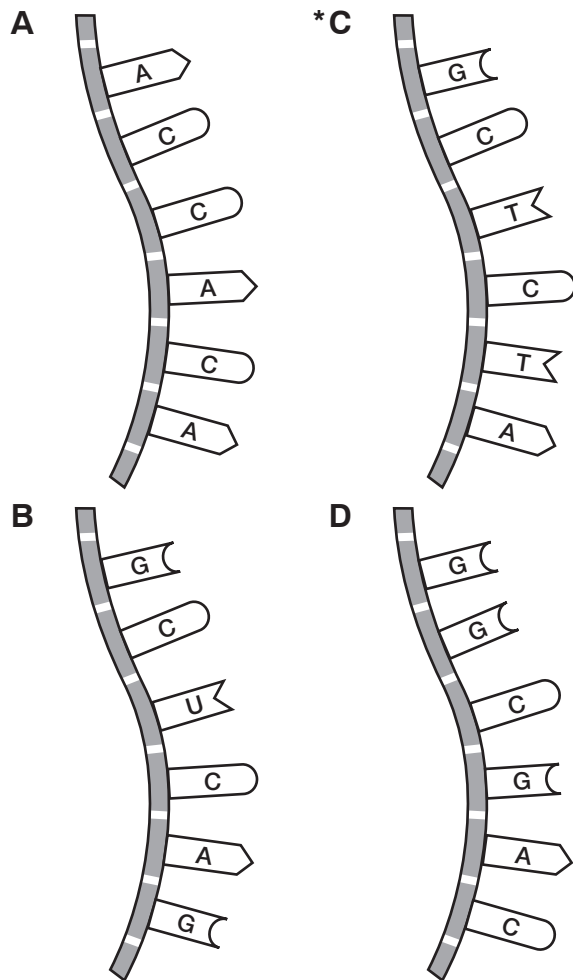
Eligible Content

- Identify the bases of DNA.
- Identify the bases of RNA.
- Differentiate between nucleic acid sugars found in DNA and RNA.
- Describe the structures of DNA and RNA.

Sample Multiple-Choice Items

1. Which nucleic acids are present in both DNA and RNA?
 - A guanine and uracil
 - B thymine and uracil
 - *C guanine and adenine
 - D thymine and adenine
2. A DNA molecule is being transcribed onto a RNA molecule. The next base to be transcribed on the DNA sequence is adenine. Which base will be the complement in the RNA molecule?
 - *A uracil
 - B adenine
 - C thymine
 - D guanine

3. Which strand *must* be DNA, and not RNA?



4. Study the genetic code below.

A T G C A C C A T G

In order for this code to represent a piece of RNA, which base must be replaced by uracil?

- A adenine
- *B thymine
- C guanine
- D cytosine

5. Study the figures below.



figure 1

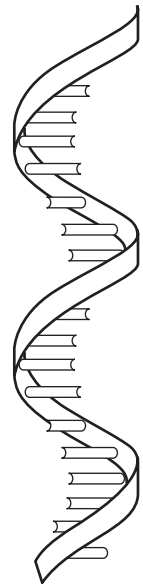


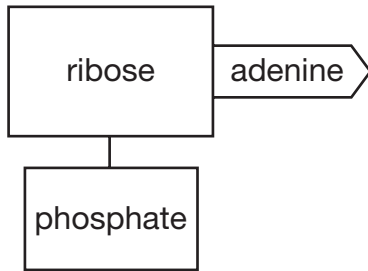
figure 2

Which components are part of figure 2, but *not* figure 1?

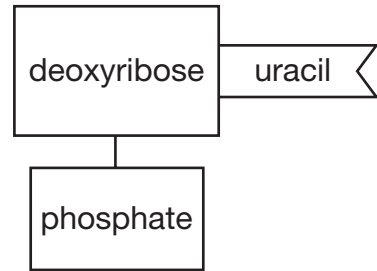
- A adenine, cytosine, thymine, guanine, and ribose sugar
- B adenine, cytosine, thymine, guanine, and deoxyribose sugar
- *C adenine, cytosine, uracil, guanine, and ribose sugar
- D adenine, cytosine, uracil, guanine, and deoxyribose sugar

6. A science student was asked to construct models of DNA and RNA sections. Which section is correctly constructed and should be placed into a DNA strand?

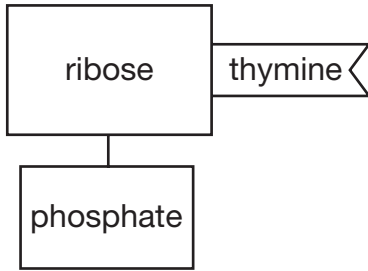
A



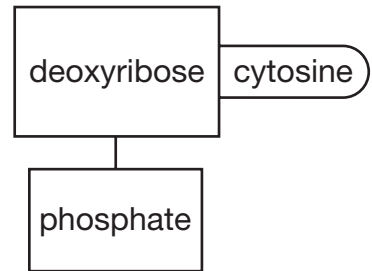
C



B



***D**



Content Standard 11

Identify Mendel's laws of genetics.

Item Type

Multiple-choice

Eligible Content

- Know and apply the Law of Dominance.
- Know and apply the Law of Segregation.
- Know and apply the Law of Independent Assortment.
- Define homozygous, heterozygous, genotype, phenotype, and alleles.

Sample Multiple-Choice Items

1. A pea plant's cells have one allele for tallness (T) and one for shortness (t). According to Mendel's law of segregation, which alleles could be passed on to the pea plant's sex cells?
 - *A T or t
 - B TT or tt
 - C T, t, or Tt
 - D TT, tt, or Tt

2. In a certain type of flowering plant, the b allele codes for white-flower color, and the B allele codes for blue-flower color. The flowering plant produces a sex cell which includes a b gene. Which of the following *best* represents a possible genotype present in the parent plant's cells?
 - A B
 - B b
 - *C Bb
 - D BB

3. One parent has blond hair and blue eyes. The other parent has brown hair and brown eyes. The couple has two children with brown hair and blue eyes. According to Mendel's law of independent assortment, which statement identifies how it is possible that the children's features do not match the features of either parent?
 - A The genes for one trait from one parent always stay together.
 - B The parents each give alleles for half of their traits to each child.
 - C Brown hair and blue eyes are dominant to blond hair and brown eyes.
 - *D The alleles for different traits are distributed separately to the children.

4. According to Mendel's law of dominance, which statement *best* describes the result of a cross between two parents with genotypes Ff and Ff?

Key	
F = free earlobes	
f = attached earlobes	

	F	f
F	FF	Ff
f	Ff	ff

- A** Offspring must have Ff to have free earlobes.
- B** Offspring must have FF to have attached earlobes.
- *C** Offspring with at least one F allele will have free earlobes.
- D** Offspring with at least one F allele will have attached earlobes.

5. Pea plants can have either purple or white flowers. According to Mendel's law of dominance, which factor determines the flower color in an offspring plant?

- A** the parent that contributed the color trait
- B** how useful each color is to the offspring plant
- *C** if the color trait received is dominant or recessive
- D** the location of the color trait on the chromosome

6. Which statement can be explained by Mendel's law of dominance?

- *A** Heterozygous offspring will exhibit the dominant trait in the phenotype.
- B** During gamete formation, the two alleles responsible for a trait separate.
- C** Alleles for different traits are not distributed to sex cells independently of one another.
- D** Alleles for a trait are recombined at fertilization producing the genotype for the offspring.



**Printed on
recycled paper**