
XVI. Science and Technology/Engineering,
Grade 5

Grade 5 Science and Technology/Engineering Test

The spring 2009 grade 5 MCAS Science and Technology/Engineering test was based on learning standards in the Massachusetts *Science and Technology/Engineering Curriculum Framework* (2006). The *Framework* identifies four major content strands, listed below. Page numbers for the grades 3–5 learning standards appear in parentheses.

- Earth and Space Science (*Framework*, pages 26–29)
- Life Science (Biology) (*Framework*, pages 46–49)
- Physical Sciences (Chemistry and Physics) (*Framework*, pages 64–66)
- Technology/Engineering (*Framework*, page 86)

The *Science and Technology/Engineering Curriculum Framework* is available on the Department website at www.doe.mass.edu/frameworks/current.html.

In test item analysis reports and on the Subject Area Subscore pages of the MCAS *School Reports* and *District Reports*, Science and Technology/Engineering test results are reported under four MCAS reporting categories, which are identical to the four *Curriculum Framework* content strands listed above.

Test Sessions

The MCAS grade 5 Science and Technology/Engineering test included two separate test sessions. Each session included multiple-choice and open-response questions. Approximately half of the common test items are shown on the following pages as they appeared in test booklets.

Reference Materials and Tools

The use of bilingual word-to-word dictionaries was allowed for current and former limited English proficient students only, during both Science and Technology/Engineering test sessions. No other reference tools or materials were allowed.

Cross-Reference Information

The table at the conclusion of this chapter indicates each released item's reporting category and the *Framework* learning standard it assesses. The correct answers for released multiple-choice questions are also displayed in the table.

Science and Technology/Engineering

SESSION 1

DIRECTIONS

This session contains seven multiple-choice questions. Mark your answers to these questions in the spaces provided in your Student Answer Booklet.

- 1 A tuna is an ocean fish that is well adapted to catching small, fast-moving prey. Which of the following adaptations **most** helps a tuna swim fast to catch its prey?

A. large fins
B. sharp teeth
C. small gills
D. tough scales

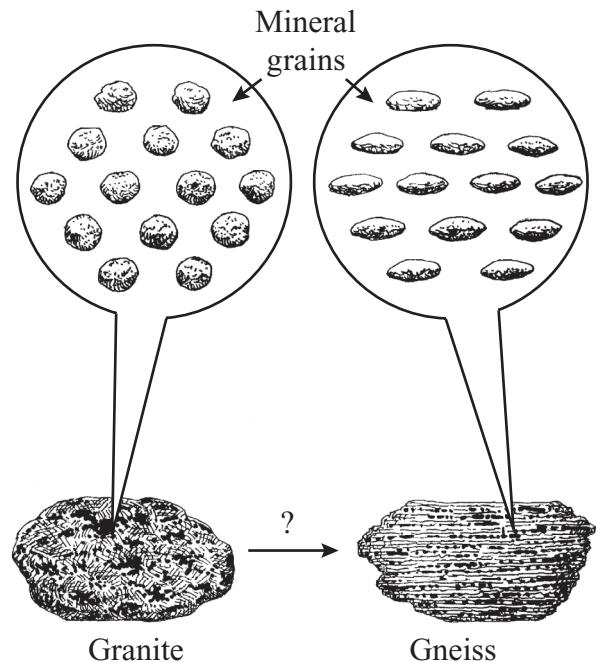
- 2 A student hears the sound of a bell. Which of the following carries the sound of the bell to the student?

A. electrical currents
B. magnetic signals
C. radio waves
D. vibrating air

- 3 A student sorted mineral samples into two groups: dull and shiny. Which of the following properties did the student use to sort the mineral samples into groups?

A. cleavage
B. color
C. luster
D. streak

- 4 Various processes are involved in the formation of different types of rocks. The diagram below illustrates changes in rock as granite forms gneiss.



In addition to heat, which of the following changes granite to gneiss?

A. acid
B. erosion
C. pressure
D. water

- 5 The picture below shows an island that was formed in an ocean.



Which of the following **most likely** caused the formation of this island?

- A. wave erosion
 - B. sand deposits
 - C. wind movement
 - D. volcanic eruptions
- 6 Approximately how long does Earth take to complete its orbit around the Sun?
- A. one day
 - B. one month
 - C. one year
 - D. one century

- 7 Which of the following statements **best** explains why magnets usually stick to a refrigerator door?

- A. The refrigerator door is smooth.
- B. The refrigerator door contains iron.
- C. The refrigerator door is a good conductor.
- D. The refrigerator door has electric wires in it.

Science and Technology/Engineering

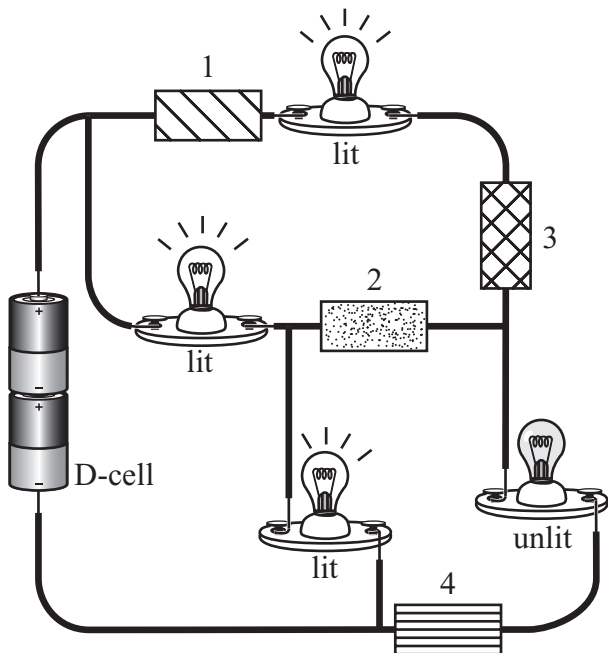
SESSION 2

DIRECTIONS

This session contains ten multiple-choice questions and two open-response questions. Mark your answers to these questions in the spaces provided in your Student Answer Booklet.

- 8 A squid is an animal that lives in the ocean. It pumps a stream of water out of its body, causing it to move rapidly. Which of the following mechanical systems moves in a way **most** similar to the squid?
- A. a bus
 - B. a helicopter
 - C. a rocket
 - D. a train
- 9 Which of the following changes is caused by removing heat?
- A. A solid changes to a gas.
 - B. A liquid changes to a gas.
 - C. A solid changes to a liquid.
 - D. A liquid changes to a solid.
- 10 Naomi has a pet dog. Which of the following characteristics did the dog **most likely** inherit from its parents?
- A. its weight
 - B. its favorite food
 - C. the color of its fur
 - D. the place where it lives

- 11 The circuit diagram below shows D-cells connected to four light bulbs and four different materials labeled 1, 2, 3, and 4.



Which of the four materials is acting as an insulator rather than a conductor?

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

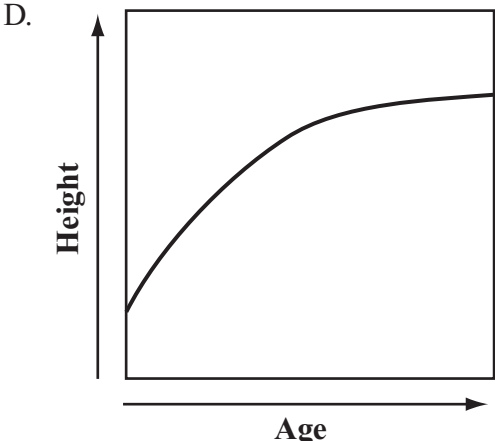
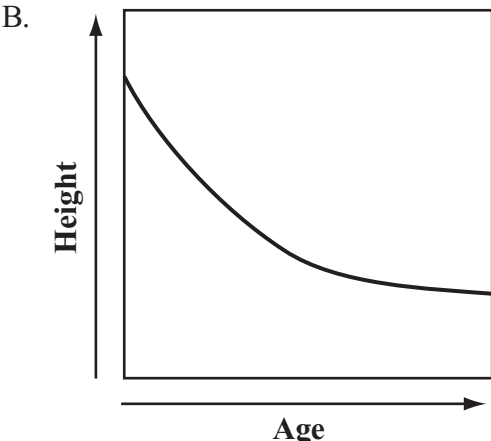
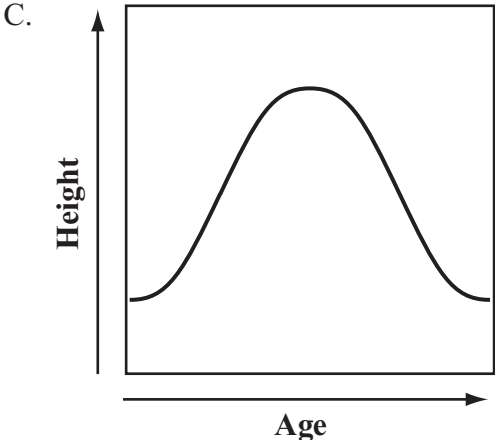
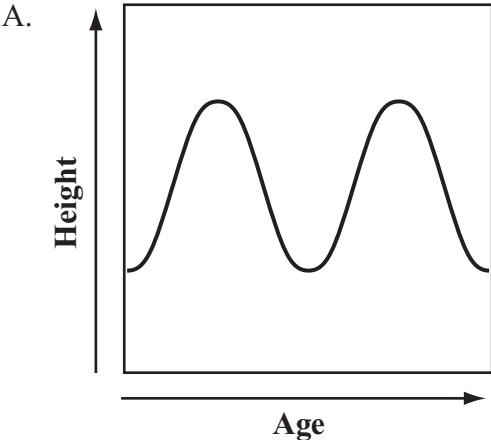
- 12 Sandra puts some pill bugs into an open box. She covers half the box with a piece of cardboard. She then places the box outside on a summer day, and all the pill bugs move under the cardboard. The pill bugs are **most likely** responding to which of the following?

- A. air pressure
- B. bright light
- C. wind
- D. fog

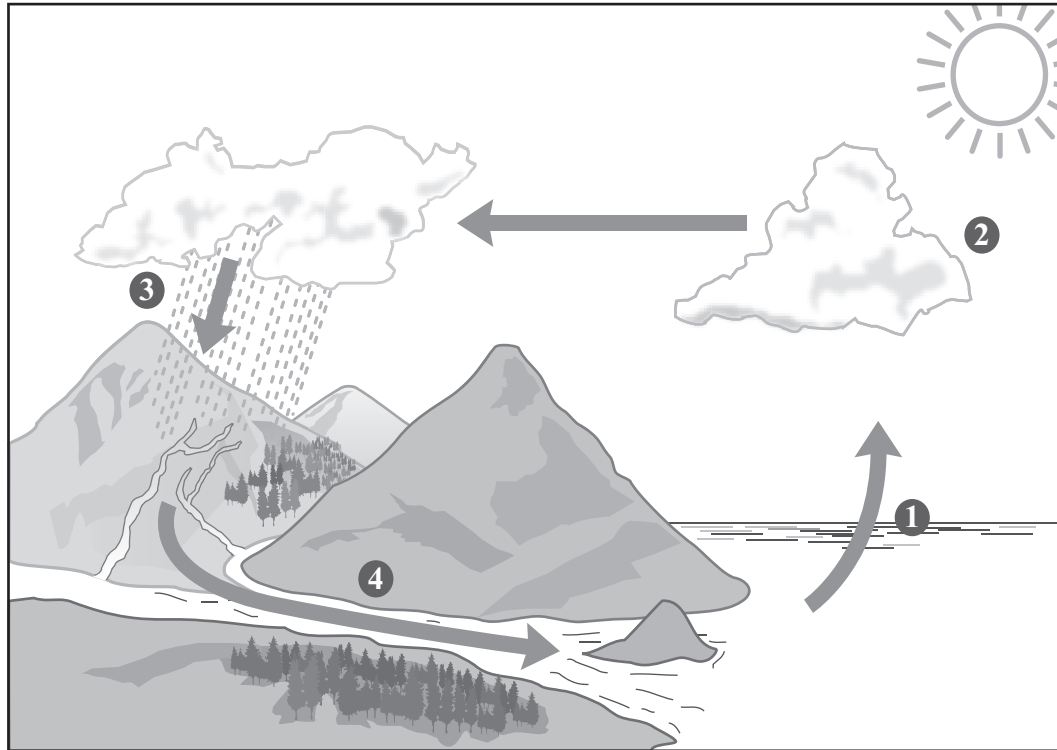
- 13 Heat, light, and sound are all different forms of

- A. fuel.
- B. energy.
- C. matter.
- D. electricity.

14 Which of the following graphs **best** shows how the height of a lion changes from birth through adulthood?



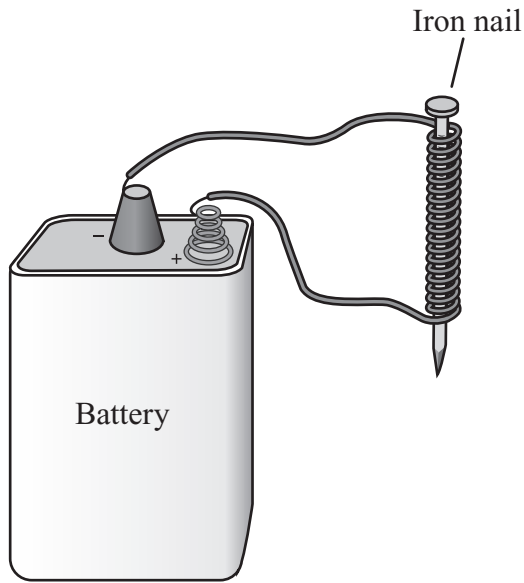
15 The diagram below shows four stages of the water cycle.



Which change is occurring at stage 1 in the diagram?

- A. Water is changing from a gas to a solid.
- B. Water is changing from a liquid to a gas.
- C. Water is changing from a liquid to a solid.
- D. Water is changing from a solid to a liquid.

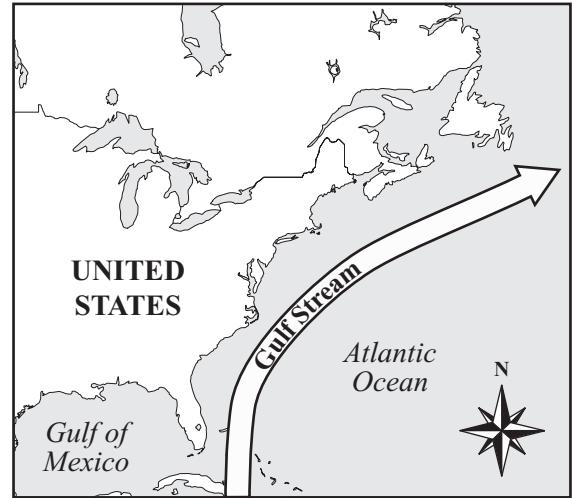
- 16 During a science investigation, a student made the device shown below.



This device can **best** be used as a

- A. heater.
- B. magnet.
- C. light source.
- D. simple radio.

- 17 The map below shows the location of the Gulf Stream, an ocean current that moves tropical water along the east coast of the United States.



Which of the following statements **best** describes how the Gulf Stream affects the weather along the east coast?

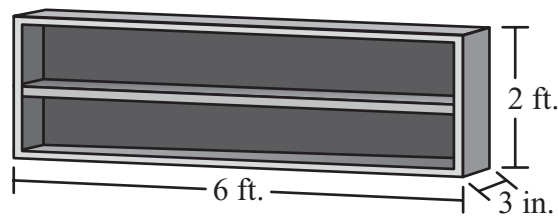
- A. It makes the air less humid and brings less rain to the area.
- B. It makes the air temperature cooler and the winds stronger.
- C. It makes the winds stronger and brings less rain to the area.
- D. It makes the air temperature warmer and the air more humid.

Questions 18 and 19 are open-response questions.

- **BE SURE TO ANSWER AND LABEL ALL PARTS OF EACH QUESTION.**
- **Show all your work (diagrams, tables, or computations) in your Student Answer Booklet.**
- **If you do the work in your head, explain in writing how you did the work.**

Write your answer to question 18 in the space provided in your Student Answer Booklet.

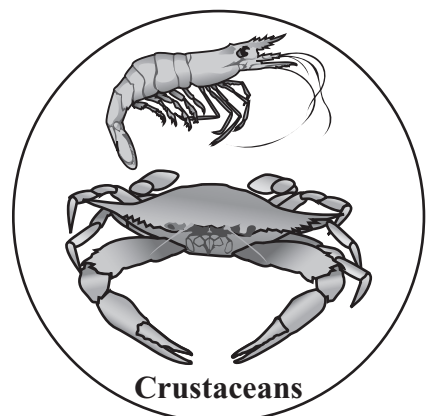
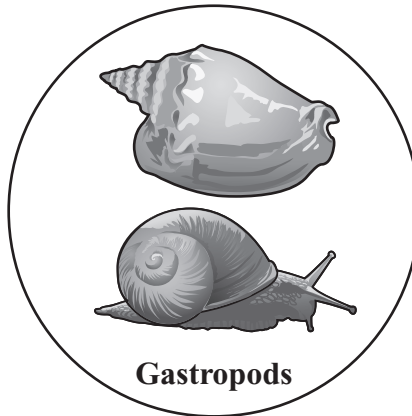
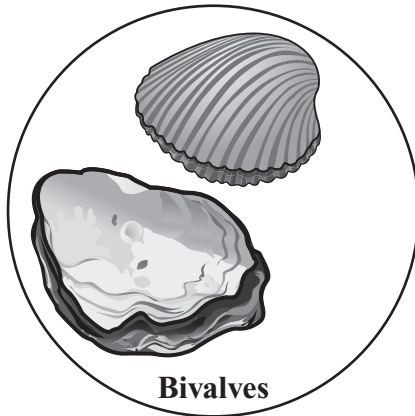
- 18** A school needs a new bookcase to hold a set of encyclopedias, dictionaries, and other large books. The bookcase will be moved to different classrooms each day. The picture below shows the bookcase the school plans to buy, but the teachers think the bookcase has some design problems that make it a poor choice to use.



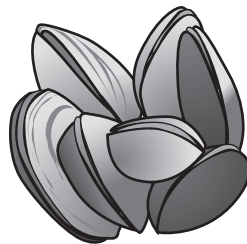
- Describe **two** design problems that make this bookcase a poor choice to use.
- Describe how the design could be changed to fix **each** of the problems you identified in part (a).

Write your answer to question 19 in the space provided in your Student Answer Booklet.

- 19 Janna’s class is on a field trip at the seashore. The students are classifying some of the animals they find into one of the three groups shown below.



Janna looked into a tide pool and observed the animals shown below.



- a. Classify the animals that Janna observed in the tide pool into one of the three groups.
- b. Describe the **main** characteristic used to classify the animals from the tide pool into the group you identified in part (a).
- c. Describe **two** differences between the animals from the tide pool and the animals in the other groups.

**Grade 5 Science and Technology/Engineering
Spring 2009 Released Items:
Reporting Categories, Standards, and Correct Answers***

Item No.	Page No.	Reporting Category	Standard	Correct Answer (MC)*
1	242	<i>Life Science (Biology)</i>	6	A
2	242	<i>Physical Sciences (Chemistry and Physics)</i>	11	D
3	242	<i>Earth and Space Science</i>	2	C
4	242	<i>Earth and Space Science</i>	3	C
5	243	<i>Earth and Space Science</i>	12	D
6	243	<i>Earth and Space Science</i>	14	C
7	243	<i>Physical Sciences (Chemistry and Physics)</i>	10	B
8	244	<i>Technology/Engineering</i>	2.4	C
9	244	<i>Physical Sciences (Chemistry and Physics)</i>	3	D
10	244	<i>Life Science (Biology)</i>	5	C
11	245	<i>Physical Sciences (Chemistry and Physics)</i>	7	D
12	245	<i>Life Science (Biology)</i>	8	B
13	245	<i>Physical Sciences (Chemistry and Physics)</i>	4	B
14	246	<i>Life Science (Biology)</i>	3	D
15	247	<i>Earth and Space Science</i>	10	B
16	248	<i>Physical Sciences (Chemistry and Physics)</i>	8	B
17	248	<i>Earth and Space Science</i>	8	D
18	249	<i>Technology/Engineering</i>	2.3	
19	250	<i>Life Science (Biology)</i>	1	

* Answers are provided here for multiple-choice items only. Sample responses and scoring guidelines for open-response items, which are indicated by shaded cells, will be posted to the Department's website later this year.