XVII. Science and Technology/Engineering, Grade 8
Grade 8 Science and Technology/Engineering Test

The spring 2013 grade 8 Science and Technology/Engineering test was based on learning standards in the four major content strands in the Massachusetts Science and Technology/Engineering Curriculum Framework (2006) listed below. Page numbers for the grades 6–8 learning standards appear in parentheses.

- Earth and Space Science (Framework, pages 32–33)
- Life Science (Biology) (Framework, pages 51–53)
- Physical Sciences (Chemistry and Physics) (Framework, pages 67–68)
- Technology/Engineering (Framework, pages 87–89)

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

Science and Technology/Engineering test results are reported under four MCAS reporting categories, which are identical to the four framework content strands listed above.

Test Sessions

The grade 8 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 English language learner students only, during both Science and Technology/Engineering test sessions. No other reference tools or materials were allowed.

Cross-Reference Information

The tables at the conclusion of this chapter indicate each released and unreleased common item’s reporting category and the framework learning standard it assesses. The correct answers for released multiple-choice questions are also displayed in the released item table.
Grade 8 Science and Technology/Engineering
SESSION 1

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

1. Which of the following observations best supports the conclusion that two animal species evolved from a common ancestor in recent geological history?
   A. The species are both herbivores.
   B. The species have similar bone structure.
   C. The species live in the same environment.
   D. The species both obtain oxygen from the air.

2. Which of the following tools would give the most precise measurement of 15 milliliters of water?
   A. a 50 mL beaker
   B. a 50 mL graduated cylinder
   C. a 500 mL beaker
   D. a 500 mL graduated cylinder
A scientist wants to collect several bird eggs on an island. She needs a case that will protect the eggs she collects.

Which of the following cases would best protect the eggs?

A. a hard metal case with flexible foam lining
B. a flexible metal case with smooth plastic lining
C. a strong wooden case with lightweight plastic lining
D. a lightweight wooden case with strong aluminum lining

Which of the following do water (H$_2$O), rust (Fe$_2$O$_3$), and salt (NaCl) have in common?

A. Water, rust, and salt are atoms.
B. Water, rust, and salt are mixtures.
C. Water, rust, and salt are elements.
D. Water, rust, and salt are compounds.
Anya is observing an organism in the laboratory. The table below shows her observations.

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
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</thead>
<tbody>
<tr>
<td>Do the organism’s cells have chlorophyll?</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Can the organism move?</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Is the organism multi-cellular?</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Do the organism’s cells have a cell wall?</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

The organism Anya is observing most likely belongs to which kingdom?

A. Animalia  
B. Eubacteria  
C. Fungi  
D. Plantae
A cold can of juice is removed from the refrigerator and is placed outdoors on a warm day. After several minutes, moisture appears on the outside of the cold can.

Which of the following statements best explains why the moisture appears?

A. The warm air absorbs cold from the can and changes to a liquid.
B. Water vapor in the air condenses into a liquid on the cold can.
C. The warm air causes heat to flow out of the can and condense in the air.
D. Water vapor in the air absorbs heat from the can and changes to a liquid.

When a person’s sweat evaporates, the person feels cooler. Which of the following statements best describes why sweating helps the person feel cool?

A. Heat is absorbed by sweat when it evaporates.
B. Heat is absorbed by the body when sweat evaporates.
C. The temperature of the water in sweat goes down when it evaporates.
D. The temperature of the water in the body goes up when sweat evaporates.

The diagram below represents a portion of a contour map.

Which of the following best describes the physical feature represented by this contour map?

A. a flood plain with creeks and streams
B. a valley with two gently sloping sides
C. a hill with slopes that vary in steepness
D. a series of rivers flowing in concentric circles
Astronomers can predict when eclipses will occur using computer models that show the motions of the Sun, the Moon, and Earth. They use the phases of the Moon to help make these predictions.

a. Name **two** types of eclipses that involve the Sun, the Moon, and Earth.

b. Identify the phase of the Moon during **each** type of eclipse you named in part (a).

c. Choose **one** of the types of eclipses that you named in part (a) and describe (or draw a diagram that shows) the relative positions of the Sun, the Moon, and Earth that cause the type of eclipse you chose. Be sure to identify the type of eclipse you chose.
The diagram below shows how computers can record, store, and play back music.

a. Identify one step in this process where information is encoded.

b. Identify one step in this process where information is decoded.

c. Describe one reason why sound from the trumpet must be converted into electrical signals before the information can be stored in the computer's memory.

d. Describe one way that digital information stored on computer 1 can be transmitted to computer 2.
Grade 8 Science and Technology/Engineering

SESSION 2

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

11 Which of the following most likely causes Earth’s inner core to be a solid?
   A. The pressure at the core is very high.
   B. The metals in the core are very heavy.
   C. The temperature of the core is very low.
   D. The chemicals in the core are very reactive.

12 Which of the following has changed over the last 200 years primarily due to human activity?
   A. Earth’s magnetic field
   B. the frequency of earthquakes
   C. Earth’s tectonic plate activity
   D. the composition of the atmosphere
13 The diagram below shows the orbit of a comet around the Sun. The comet travels more quickly in its orbit when it is closer to the Sun.

Which of the following statements best explains why the comet travels more quickly when it is closer to the Sun?

A. The mass of the comet increases.
B. The temperature of the comet increases.
C. The frictional force on the comet increases.
D. The gravitational pull on the comet increases.

14 A ball will be rolled four times. In which of the following situations will some of the kinetic energy of the ball be converted into potential energy as the ball rolls?

A.  

B.  

C.  

D.  

15 Which of the following diagrams best represents the size relationships among galaxies, stars, and the universe?

A. Universe
   Stars
   Galaxies

B. Galaxies
   Stars
   Universe

C. Universe
   Galaxies
   Stars

D. Galaxies
   Universe
   Stars

16 The diagram below shows a partial food web for some of the organisms in an area.

If all the trees in the area were cut down, the energy supply of which population would be most directly affected?

A. aphid
B. grasshopper
C. oriole
D. rabbit
A student is comparing the composition of different samples of soil. She needs to find out how much gravel (small stones) is in each sample.

Which of the following tools would best separate the gravel from the rest of the soil in each sample?

A. Magnet

B. Scale

C. Sieve

D. Tongs

Which of the following parts of a plant cell has a function that is most similar to the function of an animal skeleton?

A. cell membrane
B. cell wall
C. chloroplast
D. nucleus
The diagram below shows the X chromosomes in a female fruit fly and the X and Y chromosomes in a male fruit fly.

The two fruit flies are crossed with each other. The female offspring of the fruit flies will receive which pair of chromosomes?

A.  
B.  
C.  
D.  

Muscle cells need to quickly convert energy from food molecules into a usable form. For this reason, which of the following do muscle cells have in greater numbers than most other types of cells?

A. chromosomes  
B. mitochondria  
C. nuclei  
D. vacuoles
21 Which of the following is the most efficient way to transport large amounts of coal from a mine in Kentucky to a power plant in Arizona?

A. by ship  
B. by train  
C. by truck  
D. by airplane

22 A student rolls a ball down the ramp shown in the picture below. The ramp is supported by four stacked books.

The student removes two books from the stack supporting the ramp and rolls the ball down the ramp again. Which of the following statements best describes how the ball’s motion is different after the books are removed?

A. The ball accelerates more quickly down the ramp.  
B. The ball has a higher speed at the top of the ramp.  
C. The ball takes more time to reach the bottom of the ramp.  
D. The ball has a higher average speed when it rolls off the ramp.
## Grade 8 Science and Technology/Engineering
### Spring 2013 Released Items:
#### Reporting Categories, Standards, and Correct Answers*

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* 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.
### Grade 8 Science and Technology/Engineering

#### Spring 2013 Unreleased Common Items:
**Reporting Categories and Standards**

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