XVI. Science and Technology/Engineering, Grade 5
Grade 5 Science and Technology/Engineering Test


- 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 Massachusetts 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.

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.

Test Sessions

The 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 ELL students only, during both Science and Technology/Engineering test sessions. No other reference tools or materials were allowed.
A large population of birds lives in the grassland area along a slow-moving river. This species of bird feeds on plant seeds. One spring, the river floods most of the surrounding grassland area for a period of several months.

Which of the following statements describes how the birds in the population will most likely respond to this change in the environment?

A. The birds will become extinct.
B. The birds will learn to eat insects.
C. The birds will start to hibernate early.
D. The birds will move to a different location.
2 Adele wants to fasten two pieces of wood together, as shown below.

Which of the following tools would be best for Adele to use to turn the fastener?

A. 
B. 
C. 
D. 

Which of the following tools would be best for Adele to use to turn the fastener?
The picture below shows a full moon that a student observed in the night sky on March 1.

Which of the following pictures shows the appearance of the Moon approximately one month later?

A.  

B.  

C.  

D.  

Every year, green sea turtles migrate approximately 2000 km to reproduce. This migration is an example of

A. a learned behavior.
B. an instinctive behavior.
C. a response to crowding.
D. an escape from predators.

The students in a class are making a scale model. They need a material that they can easily bend into a circle.

Which of the following objects is best for the students to use?

A. copper wire
B. glass rod
C. lead pipe
D. wooden stick
A scientist is using a special camera to take pictures of animals that visit a pond at night. The camera is very expensive and is easily damaged by water. The camera will be left at the pond for a month to take pictures.

Which of the following describes the best way to protect the camera while it is taking pictures at the pond?

A. attach the camera to a floating raft on the pond
B. put the camera inside a solid, metal box on the shore
C. place the camera in a sealed, clear plastic container on a pole
D. hang the camera by a rope from a high tree limb over the pond

A type of small mammal from the mountain regions of the western United States makes its home out of piles of rock. During summer months, the mammal places grasses and seeds in protected places in the rock piles.

Which of the following is the most likely reason for this behavior?

A. to prepare for migration before winter
B. to provide warmth during the cold winter months
C. to store food that will be eaten over the winter months
D. to protect the grasses and seeds from decay before winter
The picture below shows a turtle living in a container. This turtle is kept in a classroom.

The students in the class want to build a new container to hold five more turtles. Which of the following changes is **most important** to make when they build a new container for all six turtles to live in?

A. use a larger base  
B. use a taller frame  
C. use thicker glass walls  
D. use a stronger screen lid
Questions 9 and 10 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 9 in the space provided in your Student Answer Booklet.

**9** Mark built an incomplete circuit with a light bulb, as shown below.

![Incomplete Circuit Diagram](288173-5439-eps)

He wants to test whether objects are conductors or insulators of electricity. Mark is going to test the objects listed below:

- copper nail
- glass lens
- steel spring
- wooden block

a. Identify each object from the list as a conductor or insulator of electricity.

b. Identify what will happen to the light bulb when each of the objects is placed in the circuit.

c. Explain why conductors and insulators produce the results you identified in part (b).
Write your answer to question 10 in the space provided in your Student Answer Booklet.

10 In parts of India, the spring season is typically hot and dry. As spring changes to summer, strong winds blow moist air over the land. The map below shows the direction of these strong summer winds.

![Map showing the direction of summer winds in India](image)

a. Based on the map, identify the source of the moisture in the wind.

b. Identify and describe the water cycle process that moves water from the source you identified in part (a) into the atmosphere. Be sure to include states of matter in your description.

c. Describe how the moisture in the air causes clouds to form and rain to fall in India.
A student thinks that two trees in the woods have grown from seeds produced by the same parent tree. Which of the following observations provides the best evidence to support the student's idea?

A. Both trees have broken branches.
B. Both trees have grass growing beneath them.
C. Both trees have white flowers with five petals.
D. Both trees have holes made in their bark by birds.

A volcano erupted in the Atlantic Ocean and formed a new island over time. The picture below shows the new island as it was forming.

The new island is mainly made of which type of rock?

A. igneous
B. limestone
C. metamorphic
D. sedimentary
13. In the life cycle of a frog, which of the following best describes what happens after the tadpole stage?

A. The tail grows and the gills disappear.
B. The gills develop and the front legs appear.
C. The rear legs grow and the lungs disappear.
D. The lungs develop and the tail becomes shorter.

14. Jamal wants to make an electrical circuit, but he only has the objects shown below.

![Wires and Light bulb](image)

Which of the following must Jamal also have to make an electrical circuit?

A. a motor
B. a switch
C. a bar magnet
D. a power source

15. Temperature changes along the coast are usually less extreme than temperature changes farther inland. Which of the following statements best explains why?

A. It is much windier at the coast than farther inland.
B. The temperature of the land remains fairly constant.
C. It is much less humid at the coast than farther inland.
D. The temperature of the ocean remains fairly constant.
Prairie dogs dig burrows beneath grasslands. The picture below shows a prairie dog near the opening to its burrow.

In which of the following ways do the burrows affect the grassland ecosystem?

A. The dirt from the burrows makes the grasslands drier.
B. The burrows provide shelter for other grassland animals.
C. The burrows cause the grasslands to flood more often.
D. The burrows cause more trees to grow in the grassland environment.

The picture below shows a dandelion plant.

Which of the following is an important function of the taproot of a dandelion plant?

A. to hold the plant in place
B. to take in air for the plant
C. to produce seeds for the plant
D. to protect the plant against insects
The diagram below shows a clock radio with four labeled parts.

Which part of the radio is designed to transform electrical energy into sound energy?

A. digital display
B. plastic case
C. speaker
D. tuner

Which of the following statements describes an important difference between mushrooms and plants?

A. Mushrooms can grow in wet areas, but plants grow only in dry soil.
B. Mushrooms can grow in cold areas, but plants grow only in hot areas.
C. Mushrooms reproduce by spreading roots, but plants need insects to reproduce.
D. Mushrooms get energy from decomposing matter, but plants produce their own food.
The table below shows the average high temperature and average relative humidity for a city in Massachusetts for the months of July, August, and September.

<table>
<thead>
<tr>
<th>Month</th>
<th>Average High Temperature (°F)</th>
<th>Average Relative Humidity (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>July</td>
<td>79</td>
<td>77</td>
</tr>
<tr>
<td>August</td>
<td>77</td>
<td>79</td>
</tr>
<tr>
<td>September</td>
<td>69</td>
<td>82</td>
</tr>
</tbody>
</table>

Which of the following statements describes how the average weather in this city changes from July to September?

A. The weather becomes cooler and less humid.
B. The weather becomes warmer and less humid.
C. The weather becomes cooler and more humid.
D. The weather becomes warmer and more humid.
Which of the following diagrams shows how two bar magnets will move when they are placed next to each other?

A. 

B. 

C. 

D. 
## Grade 5 Science and Technology/Engineering
### Spring 2014 Released Items:
### Reporting Categories, Standards, and Correct Answers*  

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Page No.</th>
<th>Reporting Category</th>
<th>Standard</th>
<th>Correct Answer (MC)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>268</td>
<td>Life Science</td>
<td>7</td>
<td>D</td>
</tr>
<tr>
<td>2</td>
<td>269</td>
<td>Technology/Engineering</td>
<td>1.2</td>
<td>B</td>
</tr>
<tr>
<td>3</td>
<td>270</td>
<td>Earth and Space Science</td>
<td>15</td>
<td>C</td>
</tr>
<tr>
<td>4</td>
<td>270</td>
<td>Life Science</td>
<td>8</td>
<td>B</td>
</tr>
<tr>
<td>5</td>
<td>270</td>
<td>Technology/Engineering</td>
<td>1.1</td>
<td>A</td>
</tr>
<tr>
<td>6</td>
<td>271</td>
<td>Technology/Engineering</td>
<td>2.1</td>
<td>C</td>
</tr>
<tr>
<td>7</td>
<td>271</td>
<td>Life Science</td>
<td>9</td>
<td>C</td>
</tr>
<tr>
<td>8</td>
<td>272</td>
<td>Technology/Engineering</td>
<td>2.3</td>
<td>A</td>
</tr>
<tr>
<td>9</td>
<td>273</td>
<td>Physical Sciences</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>274</td>
<td>Earth and Space Science</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>275</td>
<td>Life Science</td>
<td>5</td>
<td>C</td>
</tr>
<tr>
<td>12</td>
<td>275</td>
<td>Earth and Space Science</td>
<td>3</td>
<td>A</td>
</tr>
<tr>
<td>13</td>
<td>276</td>
<td>Life Science</td>
<td>4</td>
<td>D</td>
</tr>
<tr>
<td>14</td>
<td>276</td>
<td>Physical Sciences</td>
<td>6</td>
<td>D</td>
</tr>
<tr>
<td>15</td>
<td>276</td>
<td>Earth and Space Science</td>
<td>8</td>
<td>D</td>
</tr>
<tr>
<td>16</td>
<td>277</td>
<td>Life Science</td>
<td>10</td>
<td>B</td>
</tr>
<tr>
<td>17</td>
<td>277</td>
<td>Life Science</td>
<td>2</td>
<td>A</td>
</tr>
<tr>
<td>18</td>
<td>278</td>
<td>Physical Sciences</td>
<td>5</td>
<td>C</td>
</tr>
<tr>
<td>19</td>
<td>278</td>
<td>Life Science</td>
<td>11</td>
<td>D</td>
</tr>
<tr>
<td>20</td>
<td>279</td>
<td>Earth and Space Science</td>
<td>6</td>
<td>C</td>
</tr>
<tr>
<td>21</td>
<td>280</td>
<td>Physical Sciences</td>
<td>9</td>
<td>B</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Reporting Category</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>Earth and Space Science</td>
<td>1</td>
</tr>
<tr>
<td>23</td>
<td>Physical Sciences</td>
<td>2</td>
</tr>
<tr>
<td>24</td>
<td>Physical Sciences</td>
<td>8</td>
</tr>
<tr>
<td>25</td>
<td>Life Science</td>
<td>11</td>
</tr>
<tr>
<td>26</td>
<td>Earth and Space Science</td>
<td>7</td>
</tr>
<tr>
<td>27</td>
<td>Physical Sciences</td>
<td>1</td>
</tr>
<tr>
<td>28</td>
<td>Life Science</td>
<td>1</td>
</tr>
<tr>
<td>29</td>
<td>Physical Sciences</td>
<td>3</td>
</tr>
<tr>
<td>30</td>
<td>Earth and Space Science</td>
<td>9</td>
</tr>
<tr>
<td>31</td>
<td>Earth and Space Science</td>
<td>5</td>
</tr>
<tr>
<td>32</td>
<td>Life Science</td>
<td>8</td>
</tr>
<tr>
<td>33</td>
<td>Physical Sciences</td>
<td>10</td>
</tr>
<tr>
<td>34</td>
<td>Physical Sciences</td>
<td>4</td>
</tr>
<tr>
<td>35</td>
<td>Earth and Space Science</td>
<td>2</td>
</tr>
<tr>
<td>36</td>
<td>Earth and Space Science</td>
<td>10</td>
</tr>
<tr>
<td>37</td>
<td>Physical Sciences</td>
<td>12</td>
</tr>
<tr>
<td>38</td>
<td>Life Science</td>
<td>3</td>
</tr>
<tr>
<td>39</td>
<td>Earth and Space Science</td>
<td>13</td>
</tr>
<tr>
<td>40</td>
<td>Earth and Space Science</td>
<td>12</td>
</tr>
<tr>
<td>41</td>
<td>Technology/Engineering</td>
<td>2.3</td>
</tr>
<tr>
<td>42</td>
<td>Life Science</td>
<td>6</td>
</tr>
</tbody>
</table>