Student Name: _____________________________________

Ohio Achievement Tests

Grade 8

Science

Student Test Booklet

May 2009

This test was originally administered to students in May 2009.

Not all items from the May 2009 administration will be released in this document. According to Ohio Revised Code (ORC) 3301.07.11:4(b) . . . not less than forty percent of the questions on the test that are used to compute a student’s score shall be a public record. The department (of education) shall determine which questions will be needed for reuse on a future test and those questions shall not be public records and shall be redacted from the test prior to its release as public record.

This publicly released material is appropriate for use by Ohio teachers in instructional settings. This test is aligned with Ohio’s Academic Content Standards for Science.

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Directions:

Today you will be taking the Ohio Grade 8 Science Achievement Test. Three different types of questions appear on this test: multiple choice, short answer and extended response.

There are several important things to remember:

1. Read each question carefully. Think about what is being asked. Look carefully at graphs or diagrams because they will help you understand the question.

2. For short-answer and extended-response questions, use a pencil to write your answers neatly and clearly in the space provided in the answer document. Any answers you write in the Student Test Booklet will not be scored.

3. Short-answer questions are worth two points. Extended-response questions are worth four points. Point values are printed near each question in your Student Test Booklet. The amount of space provided for your answer is the same for all two- and four-point questions.

4. For multiple-choice questions, shade in the circle next to your choice in the answer document for the test question. Mark only one choice for each question. Darken completely the circles on the answer document. If you change an answer, make sure that you erase your old answer completely.

5. Do not spend too much time on one question. Go on to the next question and return to the question skipped after answering the remaining questions.

6. Check over your work when you are finished.

7. When you finish the test, you may not go on to, or back to, any other section of the Student Test Booklet.
1. The food web shows the interactions between organisms in a meadow ecosystem.

Meadow Food Web

Which organism gets food energy directly from both plants and animals?

A. fox  
B. grass  
C. grasshopper  
D. snake
2. Planaria are flatworms that are found in shallow streams, often attached to the bottoms of rocks. A class is studying a population of planaria in a nearby shallow stream. The graph below shows data collected over 11 weeks.

The population started to decrease after 5 weeks. The students concluded that the stream did not have enough food to support a large population of planaria.

If this trend continues, how many planaria will be living in the stream by the 12th week?

A. 600
B. 500
C. 400
D. 300
3. An adult and a small child are at the playground. The child sits on the end of a seesaw, as shown. The adult weighs twice as much as the child.

At which point on the seesaw will the adult need to sit in order to balance the child’s weight?

A. point A  
B. point B  
C. point C  
D. point D  

Item 4 has not been slated for public release in 2009.
Local environmental scientists have collected evidence of the presence of insecticides in the river. Insecticides are used on crops to help prevent damage from insects.

According to the diagram, how might this insecticide have reached the river?

A. transpiration
B. precipitation
C. condensation
D. surface runoff
Use the following information to answer question 6.

6. The illustration below shows how a strawberry plant reproduces by asexual reproduction to form a new plant.

In your Answer Document, describe how the new plant compares genetically with the parent plant.

Describe one advantage that asexual reproduction might offer the strawberry plant. (2 points)
7. A student studying rock densities needs to measure the volume of a small rock sample to the nearest milliliter (mL). The student knows that the rock sample has a volume of at least 5 mL.

Which tool should the student use to get the most accurate measure of the volume of water displaced by the rock?

A. 
B. 
C. 
D. 

8. Which unit of measurement do astronomers use when measuring the distance between two stars found in the Milky Way?

A. meter
B. light-year
C. kilometer
D. astronomical unit
Use the following information and table to answer question 9.

9. Two students are studying the effect of insects on plant growth. They prevent insects from eating some plants by covering the plants with a transparent mesh cloth. The students leave the other plants uncovered. Both students use the same pots and the same type of soil for each plant. The table shows details of their investigations.

Investigative Design

<table>
<thead>
<tr>
<th></th>
<th>Student X</th>
<th>Student Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Plants</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Sunlight</td>
<td>Partial</td>
<td>Full</td>
</tr>
<tr>
<td>Data</td>
<td>Collected Every Third Day</td>
<td>Collected When It Rains</td>
</tr>
<tr>
<td>Plant Species</td>
<td>Alfalfa</td>
<td>Soybeans</td>
</tr>
</tbody>
</table>

Which statement describes a weakness in the investigations?

A. Student X used an equal number of plants.
B. Student X exposed the plants to varying sunlight.
C. Student Y covered half the plants with mesh cloth.
D. Student Y potted the plants in the same type of soil.
Use the information below to answer questions 10 and 11.

Block and Ramp

Students investigated the motion of wooden blocks on ramps. They used two boards, each two meters long, to create ramps. They set the ramps up at different heights, as shown in the diagram below. Next they took two identical blocks (I and II) and placed one at the top of each ramp. They placed the blocks so that the back edge of each block was even with the edge of the ramp (distance = 0 meters). The students held the blocks so that the blocks would not slide until the students released them. The students released the blocks at time = 0 seconds. They measured the total distance traveled by each block at 1-second intervals as the blocks slid down the ramps. The students recorded their results as shown below.

<table>
<thead>
<tr>
<th>Time (seconds)</th>
<th>Total Distance Traveled (meters)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
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</tr>
<tr>
<td>1</td>
<td>0.05</td>
</tr>
<tr>
<td>2</td>
<td>0.20</td>
</tr>
<tr>
<td>3</td>
<td>0.45</td>
</tr>
<tr>
<td>4</td>
<td>0.80</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time (seconds)</th>
<th>Total Distance Traveled (meters)</th>
</tr>
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<tbody>
<tr>
<td>0</td>
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<tr>
<td>1</td>
<td>0.10</td>
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<tr>
<td>2</td>
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<tr>
<td>3</td>
<td>0.90</td>
</tr>
<tr>
<td>4</td>
<td>1.60</td>
</tr>
</tbody>
</table>
10. Which conclusion is supported by the results of this investigation as expressed in the data table?

A. As the travel time increases, the speed of the block decreases.

B. As the ramp steepness is increased, the travel time of the block increases.

C. As the distance traveled increases, the average speed of the block increases.

D. As the height of the ramp is increased, the average speed of the block decreases.

11. In your Answer Document, name two forces that acted on the blocks as they slid down the ramps. Describe or show how each force you listed affected the motion of the block. (4 points)

Items 12–14 have not been slated for public release in 2009.
15. The energy of blowing wind can be harnessed to create electricity.

Why is wind considered a renewable energy source?

A. Wind does not cause destruction of the environment.
B. Wind turns the blades of a windmill that creates electricity.
C. Wind provides only a very small amount of electricity to the United States.
D. Wind comes from atmospheric conditions that are available indefinitely.

Item 16 has not been slated for public release in 2009.

On the May 2009 Grade 8 Science Achievement Test, items 17–22 are field-test items, which are not released.
Fossils of the Coelacanth (sē’ le kanth’) fish occur in the fossil record from 410 to 65 million years ago. The lack of more recent fossils led scientists to conclude that the fish went extinct along with the dinosaurs. In 1938, a fisherman caught a living Coelacanth. More than 200 of them have been caught on the deep reefs in the Indian Ocean. This fish has been called a “living fossil” because its body plan is nearly identical to the 400-million-year-old fossils.

This structural similarity, as evidenced by the fossil record, supports which statement?

A. The environment of the deep sea has changed little over millions of years.
B. The amount of salt in the deep sea has varied greatly over millions of years.
C. The oceans have completely dried up multiple times during the past 400 million years.
D. The oceans have been continuously repopulated by freshwater fish species over millions of years.

Items 24–25 have not been slated for public release in 2009.
26. The following steps describe the process of generating electricity by burning coal in a power plant:

1. The coal fire converts liquid water to steam.
2. The steam rotates fanlike blades of a mechanical turbine.
3. The shaft of the turbine spins an electric generator.
4. The electric power is delivered to the consumer over long-distance power lines.

Which energy transformation occurs during this process?

A. Nuclear energy of the steam is converted to thermal energy of the turbine.
B. Mechanical energy from the turbine is converted to electric energy in the generator.
C. Electric energy from the generator is converted to chemical energy in the power lines.
D. Chemical energy from the generator is converted to electric energy in the power lines.
27. The instructions for an experiment direct the students to put a liquid into a beaker and use a hot plate to heat the liquid to 50°C.

In your Answer Document, describe two safety precautions the students need to take while heating the liquid. (2 points)

29. A tightly sealed glass box has a mass of 20,000 grams and contains a 5-gram cube of ice, making the total mass 20,005 grams. The box with the ice is placed in direct sunlight. After three hours, the box appears to be empty, with just small droplets along the sides of the box.

Which statement describes the mass of the sealed box after sitting in the sun?

A. The mass decreases because the ice melted into a liquid.
B. The mass remains the same as the ice melts and then evaporates.
C. The mass increases as the gases inside the box absorb energy and expand.
D. The mass increases as the water vapor condenses into small droplets on the glass.

Item 28 has not been slated for public release in 2009.

Items 30–31 have not been slated for public release in 2009.
Use the information below to answer questions 32 and 33.

Tectonic Plates

The map below shows some of the major tectonic plates on Earth.

![Map of Tectonic Plates](image)

Legend:
- Direction of plate movement
- Convergent plate boundary
- Divergent plate boundary
- Transform fault
32. What process is forming high nonvolcanic mountains at location 1 on the map?

A. One tectonic plate is splitting apart into two plates.
B. Two tectonic plates are colliding and pushing together.
C. One tectonic plate is sliding past another tectonic plate.
D. Two tectonic plates are colliding and one is sliding under the other.

33. A line of volcanoes occurs along the western coast of South America, near location 4. Based on the information about plate movement on the map, which process explains the formation of these volcanoes?

A. subducting of one plate under the other causing melting of the lower plate
B. sliding of one plate sideways past another resulting in friction and melting
C. melting of crust because of plate movement over a “hot spot”
D. rifting of a plate with lava filling in the resulting valley

34. What is the role of the mitochondrion in cells?

A. It converts sunlight to energy.
B. It controls all functions of the cell.
C. It transports water throughout the cell.
D. It breaks down sugar to release energy.
Item 35 has not been slated for public release in 2009.
36. Why are fossil fuels called nonrenewable resources?

A. They make waste products.
B. They are buried far underground.
C. They take a very long time to produce.
D. They are more expensive than nuclear fuels.

Items 37–44 have not been slated for public release in 2009.