

# RELEASED TEST ITEMS

Sample Student Work  
Illustrating LEAP Achievement Levels

Fall 2009

**Science**



Grade

**8**

Louisiana Department of  
**EDUCATION**

**Paul G. Pastorek**  
State Superintendent of Education

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**Louisiana Educational Assessment Program (LEAP)**  
**GRADE 8 SAMPLE ITEMS AND STUDENT WORK**  
**2008–2009**

LEAP is an integral part of the Louisiana school and district accountability system passed by the state legislature and signed into law in 1997. The primary purposes of the accountability system are to raise expectations for achievement for all Louisiana public school students and to improve public education in the state.

In April 2009, grade 8 students took LEAP English Language Arts, Mathematics, Science, and Social Studies tests. The test scores are combined with other relevant data to create school and district accountability scores, which serve as a means of measuring educational quality and improvement in educational programs over time.

**LEAP Reports**

Louisiana’s grade 8 students are tested each year in the spring. Individual student, school, district, and state test results are released in phases in May and July. School and district accountability results are reported in the fall.

For LEAP, student scores are reported at five achievement levels: *Advanced*, *Mastery*, *Basic*, *Approaching Basic*, and *Unsatisfactory*. The percentage of students scoring at each level is reported for individual schools, districts, and the state. General definitions for achievement levels are on page 2. Achievement level descriptors for all content areas can be found on the Louisiana Department of Education Web site, [www.louisianaschools.net](http://www.louisianaschools.net), from the Testing Information link.

## LEAP

### General Achievement Level Definitions

Achievement Level	Definition
<b>Advanced</b>	A student at this level has demonstrated superior performance beyond the level of mastery.
<b>Mastery</b>	A student at this level has demonstrated competency over challenging subject matter and is well prepared for the next level of schooling.
<b>Basic</b>	A student at this level has demonstrated only the fundamental knowledge and skills needed for the next level of schooling.
<b>Approaching Basic</b>	A student at this level has only partially demonstrated the fundamental knowledge and skills needed for the next level of schooling.
<b>Unsatisfactory</b>	A student at this level has not demonstrated the fundamental knowledge and skills needed for the next level of schooling.

#### **Purpose of This Document**

This document is part of a series of materials meant to promote understanding of the knowledge and skills students must have and the kinds of work they must produce to be successful on the LEAP. Other documents providing background and further information on the LEAP tests can be found on the Louisiana Department of Education Web site at [www.louisianaschools.net](http://www.louisianaschools.net).

**NOTE: Teachers are encouraged to use the test items presented in this document as part of a practice test or study guide and doing so is not a violation of test security.**

This document presents student work in a Science test, which was completed as part of a LEAP assessment. The document includes multiple-choice and short-answer items that exemplify what students scoring at specified achievement levels should know and be able to do. A discussion of each item highlights the knowledge and skills it is intended to measure.

As you review the items, it is important to remember that a student's achievement level is based on his or her total test score (cumulative score for all questions in the test) in a content area, not on one particular item or section, and that the sample items included represent a small portion of the body of knowledge and skills measured by the LEAP tests.

## Science

The grade 8 LEAP Science test is composed of forty multiple-choice items, four independent short-answer items, and one comprehensive science task. The science task consists of three inquiry-based short-answer items and one extended constructed-response item, all based on a given problem or scenario. A student earns 1 point for each correct answer to a multiple-choice item, from 0 to 2 points for the answer and work shown for each short-answer item, and from 0 to 4 points for the answer and work shown for the extended constructed-response item.

The short-answer items are scored using the following rubric:

Score	Description
<b>2</b>	<ul style="list-style-type: none"> <li>• The student’s response provides a complete and correct answer.</li> </ul>
<b>1</b>	<ul style="list-style-type: none"> <li>• The student’s response is partially correct.</li> <li>• The student’s response demonstrates limited awareness or contains errors.</li> </ul>
<b>0</b>	<ul style="list-style-type: none"> <li>• The student’s response is incorrect, irrelevant, too brief to evaluate, or blank.</li> </ul>

The extended constructed-response item is scored using the following rubric:

Score	Description
<b>4</b>	<ul style="list-style-type: none"> <li>• The student’s response demonstrates in-depth understanding of the relevant content and/or procedures.</li> <li>• The student completes all important components of the task accurately and communicates ideas effectively.</li> <li>• Where appropriate, the student offers insightful interpretations and/or extensions.</li> <li>• Where appropriate, the student uses more sophisticated reasoning and/or efficient procedures.</li> </ul>
<b>3</b>	<ul style="list-style-type: none"> <li>• The student completes most important aspects of the task accurately and communicates clearly.</li> <li>• The student’s response demonstrates an understanding of major concepts and/or processes, although less important ideas or details may be overlooked or misunderstood.</li> <li>• The student’s logic and reasoning may contain minor flaws.</li> </ul>
<b>2</b>	<ul style="list-style-type: none"> <li>• The student completes some parts of the task successfully.</li> <li>• The student’s response demonstrates gaps in conceptual understanding.</li> </ul>
<b>1</b>	<ul style="list-style-type: none"> <li>• The student completes only a small portion of the task and/or shows minimal understanding of the concepts and/or processes.</li> </ul>
<b>0</b>	<ul style="list-style-type: none"> <li>• The student’s response is incorrect, irrelevant, too brief to evaluate, or blank.</li> </ul>

It is important to recognize that score points for constructed-response items and LEAP achievement levels do not share a one-to-one correspondence. For example, it should not be assumed that a student who scores at the *Advanced* level in the assessment has earned a score of 4 on the extended constructed-response item.

It is possible for a grade 8 student to earn a total of 58 points on the LEAP Science test. The number of raw score points a student would have to achieve to reach each achievement level may change slightly from year to year given the difficulty of that particular form of the test. The spring 2009 raw score range for each achievement level is shown below.

**Spring 2009 Science Test, Grade 8**

<b>Achievement Level</b>	<b>Raw Score Range</b>
Advanced	50 – 58 points
Mastery	43 – 49 points
Basic	33 – 42 points
Approaching Basic	23 – 32 points
Unsatisfactory	0 – 22 points

The following section of this document presents four multiple-choice items, each taken from four of the five science strands: **Science as Inquiry, Physical Science, Earth and Space Science,** and **Science and the Environment.**

The items were selected because they illustrate results from four of the five achievement levels used to report LEAP results—*Advanced, Mastery, Basic,* and *Approaching Basic*. Examples of *Unsatisfactory* work are not included; by definition, work classified as *Unsatisfactory* exhibits a narrower range of knowledge and skills than work classified as *Approaching Basic*. Information shown for each item includes

- the strand and benchmark each item measures,
- the achievement level or score point,
- the correct answer, and
- commentary on the skills/knowledge measured by the item.

## Grade 8—Science Multiple-Choice Items

**Strand:** Earth and Space Science

**Benchmark ESS-M-C6:** modeling and describing how radiant energy from the sun affects phenomena on the earth’s surface, such as winds, ocean currents, and the water cycle

**Achievement Level:** *Advanced*

Which factor causes global wind patterns?

- A. changes in the distance between Earth and the Moon
- \* B. unequal heating of Earth’s surface by the Sun
- C. daily changes in the tilt of Earth’s axis
- D. rapid rotation of the Sun on its axis

\* *correct answer*

This item would most likely be answered correctly by students who score at the *Advanced* level. The item requires students to recognize the physical processes that cause global wind patterns. Students who choose option A are incorrectly associating a feature of the Moon/Earth relationship with the effect that the heating of Earth’s surface has on wind patterns. Students who choose option C may be confusing the effect that the tilt of Earth’s axis has on the seasons with the effect the students believe the tilt may have on global wind patterns. Students may also recall that there is a slight wobble in the movement of Earth’s axis but incorrectly associate it with wind patterns. Students who choose option D have picked a characteristic of the Sun that has no measurable effect on global wind patterns. Students may also recall that the Coriolis effect caused by Earth’s rotation is a factor that effects global wind patterns, but option D refers to the Sun’s rotation, not Earth’s. Students who choose the correct answer, option B, understand that the unequal heating of Earth’s surface causes global wind patterns.

**Strand:** Physical Science

**Benchmark PS-M-C4:** observing and describing the interactions of light and matter (reflection, refraction, absorption, transmission, scattering)

**Achievement Level:** *Mastery*

Which diagram below illustrates the absorption of light energy?

The image contains four diagrams labeled A, B, C, and D, each illustrating a different interaction of light with matter. Diagram A shows three parallel rays of light hitting a smooth horizontal surface and reflecting away at an angle. Diagram B shows three parallel rays of light entering a triangular prism from the left and emerging on the right, with the rays bending and spreading out. The emerging rays are labeled 'red light', 'green light', and 'blue light'. Diagram C shows three parallel rays of light hitting a rough, irregular surface and reflecting away in various directions. Diagram D shows a vertical rectangular block labeled 'blue glass'. Three parallel rays of light enter from the right: 'red light' (top), 'green light' (middle), and 'blue light' (bottom). The 'red light' and 'green light' rays have arrows pointing to the right, indicating they pass through the glass. The 'blue light' ray has an arrow pointing to the left, indicating it is reflected back, while the rest of the ray is absorbed by the glass.

\* correct answer

This item would most likely be answered correctly by students who score at the *Mastery* level and above. The item requires students to recognize the interactions of light and matter (reflection, refraction, absorption, transmission, scattering). Students who choose option A may have the misconception that the reflection of light off a smooth surface is absorption. Students who choose option B may have the misconception that refraction (bending) of light as it is transmitted through a prism is absorption. Students who choose option C have the misconception that the reflection and scattering of light off of a rough surface is absorption. Students who choose the correct answer, option D, recognize that the figure shows absorption: some light is passing through the glass (arrow) while other light is being absorbed by the glass (no arrow).



**Strand:** Science and the Environment

**Benchmark SE-M-A8:** investigating and analyzing how technology affects the physical, chemical, and biological factors in an ecosystem

**Achievement Level:** *Basic*

How does no-till farming help the environment?

- \* A. It decreases soil erosion.
- B. It increases soil removal.
- C. It increases fertilizer use.
- D. It decreases crop yield.

\* *correct answer*

This item would most likely be answered correctly by students who score at the *Basic* level and above. The item requires students to recognize how no-till farming, a way of growing crops from year to year without disturbing the soil through tillage (plowing, ripping, or turning the soil), helps the environment. Students who choose option B may not recognize that the concept of no-till farming promotes the idea of less soil being disturbed, and therefore, less soil is removed from the field by erosion. Students who choose option C may incorrectly believe that no-till farming causes an increased need for fertilizers or that an increase in fertilizer use is a positive action for the environment. Students who choose option D may not recognize that no-till farming conserves top soil and improves its organic characteristics, which actually increases long-term crop yields. Students who choose the correct answer, option A, recognize that not disturbing the soil and retaining plant residue left after harvest decreases soil erosion.

**Strand:** Science as Inquiry  
**Benchmark SI-M-A2:** designing and conducting a scientific investigation  
**Achievement Level:** *Approaching Basic*

Which procedure **best** determines whether water temperature affects the time it will take a sugar cube to dissolve?

- \* A. Test three sugar cubes, one each in three different water temperatures.
- B. Test three sugar cubes in one water temperature.
- C. Test one crushed sugar cube and one whole sugar cube in water.
- D. Test three sugar cubes, one each in an acid, a base, and water.

\* *correct answer*

This item would most likely be answered correctly by students who score at the *Approaching Basic* level and above. The item requires students to recognize the best procedures to use in a scientific investigation. The item addresses the following testable question: How does water temperature affect the rate at which sugar dissolves in water? The amount of sugar should be controlled, the temperature of the water (independent variable) should be varied, and the time it takes the sugar cube to dissolve (the dependent variable) is expected to change. Students who choose option B recognize that this procedure correctly describes the controlled samples (sugar cubes), but they do not realize that the independent variable (temperature) in this investigation is never changed. Students who choose option C may not recognize that this procedure uses an independent variable that addresses a different testable question: How does particle size affect the dissolution of sugar in water? Students who choose option D may not recognize that this procedure uses an independent variable that addresses a different testable question: Does the pH of a liquid affect how fast sugar dissolves? Students who choose the correct answer, option A, recognize that this procedure correctly tests the question by using equal amounts of sugar in the form of three sugar cubes (controlled variable) and three different water temperatures (independent variable), which will determine whether the time it takes for a sugar cube to dissolve (dependent variable) is affected by the independent variable.

## **Grade 8—Science Short-Answer Item**

A science short-answer item for a LEAP test may require students to reflect on an idea, demonstrate understanding of the unifying concepts and processes of science, make meaning of a given set of data, or critique the design or interpretation of results from an experiment. Frequently, the short-answer items have more than one part. In addition to writing, students may be asked to work with graphics, tables, or other materials.

The item, scoring rubric, and sample student work are shown on the following pages. The student responses at each score point (0 to 2) are annotated to explain how each score was derived and to identify the strengths and weaknesses of the responses.

**Strand:**

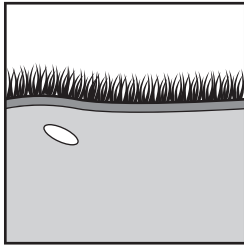
Life Science

**Benchmark LS-M-A3:**

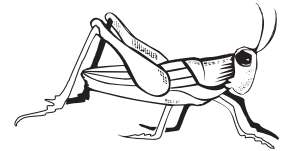
observing and analyzing the growth and development of selected organisms, including a seed plant, an insect with complete metamorphosis, and an amphibian

Use the pictures below to answer question XX.

### Grasshopper Life Cycle



egg



adult

### Butterfly Life Cycle



egg



adult

Describe **two** differences between the life cycle of a grasshopper and the life cycle of a butterfly.

1. \_\_\_\_\_  
\_\_\_\_\_
2. \_\_\_\_\_  
\_\_\_\_\_

### Scoring Rubric

<b>Score</b>	<b>Description</b>
<b>2</b>	The student correctly describes two differences. There are no errors.
<b>1</b>	The student correctly describes only one difference. There are one or more errors.
<b>0</b>	The student's response is incorrect, irrelevant, too brief to evaluate, or blank.

### Scoring Notes

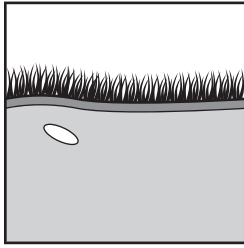
Many possible differences are present:

<b>Grasshopper</b>	<b>Butterfly</b>
eggs laid underground	eggs laid on plant
incomplete metamorphosis—body shape stays basically the same	complete metamorphosis—body shape changes dramatically
no cocoon or chrysalis/pupa	pupa/chrysalis stage

**Score Point 2**

Use the pictures below to answer question XX.

**Grasshopper Life Cycle**



egg



adult

**Butterfly Life Cycle**



egg



adult

Describe **two** differences between the life cycle of a grasshopper and the life cycle of a butterfly.

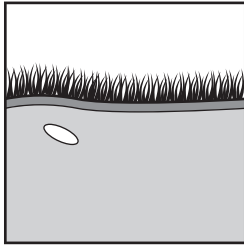
1. The grasshopper is born in the ground, and  
butterfly is on a leaf.
2. The butterfly goes catapillar to butterfly.  
The grasshopper Just gets bigger.

The student earns 1 point for correctly describing the difference between the location of birth of a butterfly (leaf) and the location of birth of a grasshopper (in the ground). The student also earns 1 point for correctly describing the difference between the incomplete metamorphosis of the grasshopper and the complete metamorphosis of the butterfly.

**Score Point 1**

Use the pictures below to answer question XX.

**Grasshopper Life Cycle**



egg



adult

**Butterfly Life Cycle**



egg



adult

Describe **two** differences between the life cycle of a grasshopper and the life cycle of a butterfly.

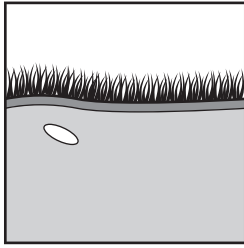
1. the first difference is that the Grasshopper egg  
is under ground and the Butterfly egg is on  
a tree
2. the second difference is that the grasshopper  
dosent fly and the Butterfly does.

The student earns 1 point for correctly describing the difference between the location of birth of a butterfly and the location of birth of a grasshopper. The student earns zero points for the second part of the response because the fact that grasshoppers leap and butterflies fly is not a difference that relates to the life cycles.

Score Point 0

Use the pictures below to answer question XX.

Grasshopper Life Cycle



egg



adult

Butterfly Life Cycle



egg



adult

Describe **two** differences between the life cycle of a grasshopper and the life cycle of a butterfly.

1. The grasshopper and butterfly grow up  
Differant
2. The grasshopper get older faster

The student receives no credit. The first part of the student’s response (“the grasshopper and butterfly grow up [different]”) is a general observation, and the student’s second part of the response (“the grasshopper get[s] older faster”) is incorrect.





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