



Released Test Items:

Sample Student Work Illustrating LEAP 21
Achievement Levels

July 2002

Grade 8



Science

reaching for
results 

LOUISIANA DEPARTMENT OF EDUCATION

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**Louisiana Educational Assessment Program
for the 21st Century (LEAP 21)**

**GRADE 8 SAMPLE ITEMS AND STUDENT WORK
2001–2002**

LEAP 21 is an integral part of the Louisiana school and district accountability system passed by the state legislature and signed into law by Governor Mike Foster 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 the school year 2001–2002, students in grade 8 took LEAP 21 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.

This document is part of a series 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 21 tests. A list of other documents providing background and further information on the LEAP 21 can be found on the Louisiana Department of Education Web site at www.louisianaschools.net.

LEAP 21 Reports

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

For LEAP 21, student scores are reported at five achievement levels: *Advanced*, *Proficient*, *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 given on page 2. Specific definitions of achievement levels for the Science tests have been published in the 2000 Released Items documents.

LEAP 21
General Achievement Level Definitions

| Achievement Level | Definition |
|--------------------------|---|
| Advanced | A student at this level has demonstrated superior performance beyond the proficient level of mastery. |
| Proficient | A student at this level has demonstrated competency over challenging subject matter and is well prepared for the next level of schooling. |
| Basic | A student at this level has demonstrated only the fundamental knowledge and skills needed for the next level of schooling. |
| Approaching Basic | A student at this level has only partially demonstrated the fundamental knowledge and skills needed for the next level of schooling. |
| Unsatisfactory | 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 presents student work in a Science test that was completed as part of a LEAP 21 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 well as strengths and weaknesses in the student work on the item.

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 in this report represent a small portion of the body of knowledge and skills measured by the LEAP 21 tests. Additional items were released in 2000 and 2001 and will continue to be released in future years of the LEAP 21.

Science

The grade 8 LEAP 21 Science test is made up of forty multiple-choice items, four independent short-answer items, and one comprehensive science task. The science task consists of three short-answer items and one essay, all of which are based on a given problem or scenario. A student earns one 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 essay.

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

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

The essay is scored using the following rubric:

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

Note: It is important to recognize that the score points for the essay and the LEAP 21 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* achievement level in the assessment has earned a score of 4 on the essay.

It is possible for an 8th-grade student to earn a total of 58 points on the LEAP 21 Science test. The number of raw score points that 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 raw score range for each achievement level is listed on the following page.

Spring 2002 Science Test, Grade 8

| Achievement Level | Raw Score Range |
|-------------------|-----------------|
| Advanced | 51–58 points |
| Proficient | 42–50 points |
| Basic | 32–41 points |
| Approaching Basic | 24–31 points |
| Unsatisfactory | 0–23 points |

This document presents four multiple-choice items, one taken from each of the four strands in the *Teacher’s Guide to Statewide Assessment—Science: Life Science, Physical Science, Science as Inquiry, and Science and the Environment*. In addition, two short-answer items are included, with scoring guides for each item. Student work at each score point (0 to 2 for the short answer) are included. Each student response is annotated to explain how the score was derived and the strengths and weaknesses of the response.

The multiple-choice items were selected because they illustrate results from four of the five achievement levels used to report LEAP 21 results—*Approaching Basic, Basic, Proficient, and Advanced*. 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*. The information shown for each item includes

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

Note: Test items may have been reduced in size for this document. Font size on the LEAP 21 assessments is typically 12 point.

**Grade 8—Science
Multiple-Choice Items**

Reporting Category: Life Science

Benchmark LS-M-D2: Explaining how some members of a species survive under changed environmental conditions

Achievement Level: *Advanced*

Over a long period of time, some flowering plants have become dependent on honeybees to fertilize their seeds. In recent years, a form of mite has infected and killed the honeybees in many areas of the country. Since this has happened, the once bee-dependent plants with the best chance of surviving are those that

- A. grow taller so that the few remaining honeybees will find them.
- B. change their flowers so that wind will fertilize them.
- * C. have always attracted many other insects as well as honeybees.
- D. have seeds that stay alive for a long time in the environment.

* correct answer

This Life Science item would most likely be answered correctly by students scoring at the *Advanced* achievement level. It requires students to use a high level of scientific knowledge and to think logically about the Life Science concept of adaptations of organisms. Students must apply the theory of natural selection to different characteristics of the flowering plants and decide which characteristic gives the plants the best chance of survival under changing circumstances. Time is a crucial factor when comparing sudden environmental change to adaptive responses. Students scoring at the *Advanced* achievement level can evaluate circumstances whereby “some members of a species survive under changed environmental conditions.”

Reporting Category: Physical Science

Benchmark PS-M-A1: Investigating, measuring, and communicating the properties of different substances which are independent of the amount of the substance

Achievement Level: *Proficient*

Joyce put 200 milliliters of water in a beaker, put a thermometer in it, and heated it until it started to boil. She recorded a temperature of 100°C when it started to boil. She repeated the process with 400 milliliters of water. What would be the temperature when this second sample started to boil?

- A. twice as high as the first sample's
- B. slightly higher than the first sample's
- C. half as high as the first sample's
- * D. the same as the first sample's

*correct answer

This Physical Science item would most likely be answered correctly by students scoring at the *Proficient* achievement level and above. It requires students to understand and use scientific knowledge about Physical Science concepts. Students must know the essential parts of a controlled experiment; physical properties of matter, specifically the boiling point of water; and factors that affect the boiling point of water. Students must use this fundamental knowledge to determine which of the various factors influence the outcome of the investigation of the experiment and which do not. Students must know that water volume is not a factor that affects its boiling point under the experimental conditions presented. Students who score at the *Proficient* achievement level can distinguish “properties of different substances that are independent of the amount of the substance.”

Reporting Category: Science as Inquiry

Benchmark SI-M-B4: Using data and logical arguments to propose, modify, or elaborate on principles and models

Achievement Level: *Basic*

Use the information and table below to answer question XX.

Mabel read that regular, heavy watering promotes growth in sunflower plants. She planted 6 plots of sunflowers with 5 plants each and watered each plot with a different amount of water. The table shows her results.

| Plot Number | Daily Amount of Water per Plant | Average Final Height |
|-------------|---------------------------------|----------------------|
| 1 | 1 liter | 122 centimeters |
| 2 | 2 liters | 155 centimeters |
| 3 | 3 liters | 190 centimeters |
| 4 | 4 liters | 216 centimeters |
| 5 | 5 liters | 206 centimeters |
| 6 | 6 liters | 168 centimeters |

Which of these statements represents Mabel's revised understanding of sunflower growth?

- A. Heavy watering on a regular schedule promotes sunflower growth.
- B. Some plants respond better to watering, while others respond better to light.
- * C. Water promotes growth up to a point, beyond which it stunts growth.
- D. Some sunflower plants need less water than others.

*correct answer

This Science as Inquiry item would probably be answered correctly by students who score at the *Basic* achievement level and above. It requires students to use scientific knowledge and to think logically about Science as Inquiry. Students are required to understand experimental design, identify the experimental data in a table, interpret the data, and test a hypothesis. Only one set of data with few variables needs to be studied to correctly answer the question. Students who score at the *Basic* achievement level can “use data and logical arguments to propose, modify, or elaborate on principles and models.”

Reporting Category: Science and the Environment

Benchmark SE-M-A5: Tracing the flow of energy through an ecosystem and demonstrating a knowledge of the roles of producers, consumers, and decomposers in the ecosystem

Achievement Level: *Approaching Basic*

In an ecosystem, which list of organisms is in the correct order from producer to top-level consumer?

- A. field mouse, grass, hawk, snake
- B. snake, field mouse, hawk, grass
- * C. grass, field mouse, snake, hawk
- D. snake, grass, field mouse, hawk

*correct answer

This Science and the Environment item would most likely be answered correctly by students who score at the *Approaching Basic* achievement level and above. It requires students to use scientific knowledge about concepts in Science and the Environment. Students must be familiar with the basic components of a food chain, from producer to top-level consumer, and common organisms that are representative of each component. Students must also understand the interactions between organisms in ecosystems as they pertain to energy flows. Since only one option has a producer organism (grass) listed first, the question can be answered by just knowing which of the organisms listed is a producer. Students scoring at the *Approaching Basic* achievement level can “demonstrate a knowledge of the roles of producers, consumers, and decomposers in an ecosystem.”

Grade 8—Science Short-Answer Items

A science short-answer item for a LEAP 21 test may require students to reflect on an idea, demonstrate their 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 are multipart items; in addition to writing, students are asked to work with graphics, tables, or other materials.

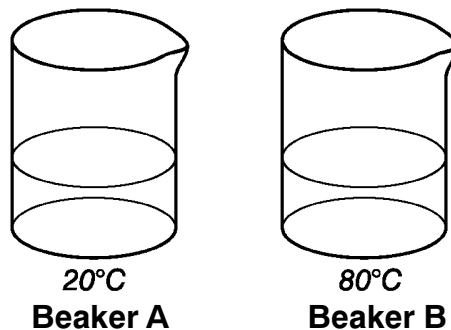
The items, scoring rubrics, and sample student work are shown on the following pages. The student responses at each score point (0 to 2) are annotated to explain how each score was derived and the strengths and weaknesses of the responses.

Sample 1

Reporting Category: Physical Science

Benchmark PS-M-A5: Investigating the relationships among temperature, molecular motion, phase changes, and physical properties of matter

Use the diagram below to answer question XX.



Two beakers were prepared with 150 milliliters of water at two different temperatures, as shown above. Two drops of food coloring were then added carefully at the surface of each beaker of water. In which beaker would the food coloring spread faster through the entire beaker? Explain your answer.

Scoring Rubric

| Score | Description |
|-------|---|
| 2 | Student chooses beaker B and gives a correct and clear explanation of why that is the correct choice. A clear explanation would mention diffusion or the hotter temperature in beaker B. There are no errors. |
| 1 | Student chooses beaker B but is wrong or unclear about the explanation or offers no explanation or chooses beaker A but shows some understanding in defending the choice, or has some concept of diffusion. |
| 0 | Response is incorrect or irrelevant to the skill or concept being measured or blank. |

Scoring Information:

The food coloring would spread, or diffuse, faster in the beaker with the hottest water. This is because the molecules of water that would collide with, and cause movement of, the food coloring molecules would have more energy and be moving faster through the volume of water.

Score Point 2

Beaker B, Because the beaker is hotter than Beaker A and the food coloring will spread faster.

The student gets a score of 2 points. The student chooses the correct beaker and offers a complete explanation of why the food coloring spreads faster: the temperature of the water in beaker B is hotter.

Score Point 1

Beaker B because it has more in it than beaker A so that why I will say the food coloring spread faster in beaker B.

The student gets a score of 1 point for choosing beaker B. The explanation does not get any credit, since both beakers have the same amount of water.

Score Point 0

The Food coloring will spread through beaker A because the temperature is low.

The student gets a score of 0. The student chose the wrong beaker and the explanation for choosing it is incorrect.

Sample 2

Reporting Category: Earth and Space Science

Benchmark ESS-M-C2: Comparing and contrasting the celestial bodies in our solar system

There are many differences between the planets, even though they are all part of the same solar system. For example, Earth and Jupiter are very different. Describe **two** ways Earth is different from Jupiter.

Scoring Rubric

| Score | Description |
|-------|---|
| 2 | Student correctly identifies two major differences in the two planets. Both planets need to be identified. Cannot contain errors or omissions. If both planets are named in one of the parts and only one is mentioned in the other part, it can be counted as correct. |
| 1 | Student identifies one difference or attempts two differences but makes errors or omissions, or two differences are mentioned but planets are not identified. |
| 0 | Response is incorrect or irrelevant to the skill or concept being measured or blank. |

Scoring Information:

The major differences are: Earth is rocky; Jupiter is gaseous (Earth is more dense than Jupiter). Earth has one moon, Jupiter has sixteen. An Earth day is 24 hours, a Jupiter day is 9.9 hours, Earth revolves around the sun in one year, Jupiter revolves around the sun in 12 years. Jupiter has rings; Earth does not. Earth has life; Jupiter does not. Jupiter's mass is 314 times the mass of Earth. There are other specific differences that might be given (Jupiter has a giant red spot, etc.). Students should be given credit for comparisons without specific quantitative values.

Score Point 2

Jupiter is much bigger than Earth. Jupiter has a big red spot or storm that is continually on it.

The student gets a score of 2 points. The student is describing two correct ways in which Jupiter and Earth are different: Jupiter is larger in size than the Earth, and Jupiter has a big red spot on it. The implication of the second statement is that the Earth does not have a red spot, which is acceptable for a complete answer.

Score Point 1

One is farther from the sun. One is a livable Environment

The student gets a score of 1 point. The student states two correct facts but fails to identify which planet is farther from the sun and which has a livable environment.

Score Point 0

Earth is different from Jupiter.

The student gets a score of 0. The student does not answer the question.


for the 21st Century

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