

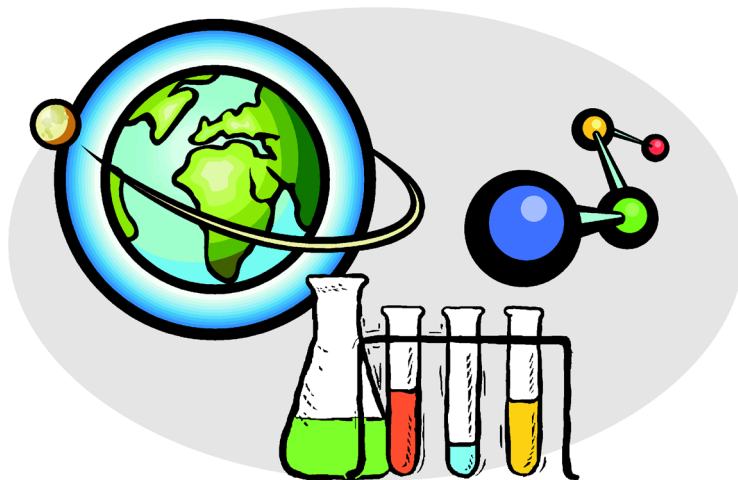


Released Test Items:

Sample Student Work Illustrating LEAP 21
Achievement Levels

July 2003

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
2002–2003**

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 March 2003, 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. A list of other documents providing background and further information on the LEAP 21 tests 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, Mastery* (formerly *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 test have been published in the 2000 Released Items documents and on the Louisiana Department of Education Web site at www.louisianaschools.net. Click on The Tests, Achievement Levels, Content-specific Definitions.

LEAP 21
General Achievement Level Definitions

Achievement Level	Definition
Advanced	A student at this level has demonstrated superior performance beyond the level of mastery.
Mastery (formerly 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 will 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 page 4.

Spring 2003 Science Test, Grade 8

Achievement Level	Raw Score Range
Advanced	53 - 58 points
Mastery	43 - 52 points
Basic	32 - 42 points
Approaching Basic	22 - 31 points
Unsatisfactory	0 - 21 points

This document presents four multiple-choice items, one taken from each of the four strands in the *Teachers Guide to Statewide Assessment—Science: Physical Science, Earth and Space Science, Life Science, and Science and the Environment*. In addition, two short-answer items are included for Life Science and Earth and Space Science, with scoring guides for each item. Student work at each score point (0 to 2 for the short-answer items) 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, Mastery* (formerly *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*. 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: Physical

Benchmark PS-M-C3: Understanding that the Sun is a major source of energy and that energy arrives at Earth’s surface as light with a range of wavelengths

Achievement Level: *Advanced*

Denise was driving east over a hill in the afternoon, shortly after a rain shower. Suddenly the sun broke through the clouds, and she saw a rainbow ahead of her. Which of the following made the rainbow possible?

- * A. Sunlight can be separated into all the colors of the rainbow.
- B. Water reflects sunlight like a mirror to make it look colored.
- C. Overhead black clouds reflect in puddles to cause a mirage.
- D. Air pollution causes the sky to look colored under these conditions.

* correct answer

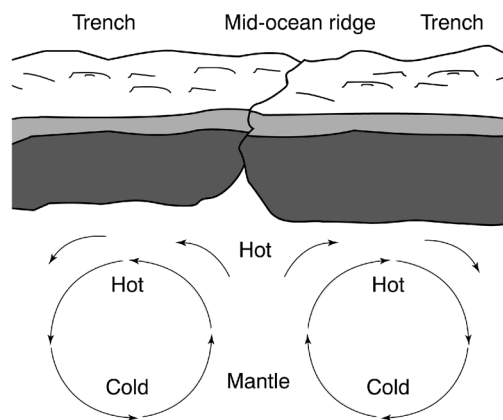
This Physical Science item would most likely be answered correctly by students who score at the *Advanced* level and above. It requires students to understand the Sun’s energy in the form of light with a range of wavelengths. To answer the question correctly, students must know that water droplets refract sunlight like a prism, which separates the light into all the colors of the rainbow. Students must also understand how reflection and absorption affect light and how these effects differ from refraction. Reflection does not change, separate, or filter the different wavelengths of light. Absorption filters out a portion of the light spectrum. In the case of air pollution, the lower wavelength light is sometimes absorbed, allowing a greater proportion of higher wavelength light, resulting in brilliant red-orange sunsets. Students who score at the *Advanced* level understand “that energy arrives at Earth’s surface as light with a range of wavelengths.”

Reporting Category: Earth and Space Science

Benchmark ESS-M-A2: Understanding that Earth's crust and solid upper mantle are dividing plates that move in response to convection currents (energy transfers) in the mantle

Achievement Level: **Mastery (formerly Proficient)**

Use the diagram below to answer question X.



Based on the diagram, which process explains why less dense, hot magma rises to the surface to displace more dense, cooler magma?

- A. conduction
- B. diffusion
- C. radiation
- * D. convection

* correct answer

This Earth Science item would most likely be answered correctly by students who score at the *Mastery* level and above. It requires students to understand that Earth's crust and solid upper mantle are dividing plates that move in response to convection currents (energy transfers) in the mantle. In conduction, heat energy is transferred from a warmer substance to a cooler one by colliding particles. Heat moves through Earth's crust by conduction. In convection, heat energy is transferred by currents in a liquid or gas. Portions of the mantle are semiliquid, and the transfer of energy from the core through the mantle causes the hotter, less dense material to rise and the cooler, more dense material to fall. This movement produces convection currents in the mantle upon which the upper mantle and crustal plates ride. Radiation is heat transfer by infrared rays; it travels in waves that do not affect the medium through which it passes. Diffusion is the gradual movement of molecules from an area of greater concentration to one of lesser concentration; it is not a form of energy transfer. Students who score at the *Mastery* level understand the different kinds of heat transfer and recognize "that plates move in response to convection currents (energy transfers) in the mantle."

Reporting Category: Life Science

Benchmark LS-M-A2: Comparing and contrasting the basic structures and functions of different plant and animal cells

Achievement Level: *Basic*

The process of cellular respiration occurs in

- * A. both plant and animal cells.
- B. plant cells only.
- C. animal cells only.
- D. neither plant nor animal cells.

* correct answer

This Life Science item would most likely be answered correctly by students who score at the *Basic* level and above. It requires students to compare and contrast the basic structures and functions of different plant and animal cells. Cellular respiration is a biochemical process that occurs within the cells of all organisms to break down food molecules to release energy. The misconception that cellular respiration occurs only in animals and that plants only use photosynthesis to get energy results from a misunderstanding of these energy conversion processes. Both photosynthesis and cellular respiration occur in plant cells. Students who score at the *Basic* level understand this basic function of plant and animal cells.

Reporting Category: Science and the Environment

Benchmark SE-M-A3: Defining the concept of pollutant and describing the effects of various pollutants on ecosystems

Achievement Level: ***Approaching Basic***

Which activity is **most likely** to add pollutants to the environment?

- A. watering a garden
- B. pulling weeds from a lawn
- C. installing a wooden fence
- * D. burning leaves

* correct answer

This Science and the Environment item would most likely be answered correctly by students who score at the *Approaching Basic* level and above. It requires students to define the concept of a pollutant. To correctly answer this item, students must understand the concept of a pollutant and activities that result in a pollutant's production. While all of the activities presented can affect the environment, only the act of burning leaves results in the direct production of air pollution—particulates, carbon monoxide, and others. Watering a garden does not directly contaminate the environment, nor do pulling weeds or installing a fence. Students who score at the *Approaching Basic* level should possess a minimal level of understanding of pollution and activities that cause it.

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.

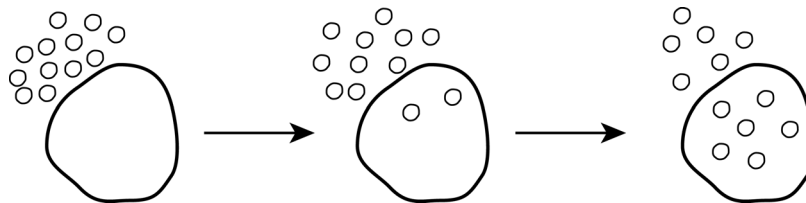
The items, scoring rubrics, and sample student work are shown on the following pages. The student responses at each score point (0 to 2) are annotated to explain how each score was derived and the strengths and weaknesses of the responses.

Sample 1

Reporting Category: Life Science

Benchmark LS-M-A1: Describing the observable components and functions of a cell, such as the cell membrane, nucleus, and movement of molecules into and out of cells

The diagram below shows water molecules moving through the cell membrane into a body cell.



- A. What is the name of this process?
- B. Explain what causes the molecules to move into the cell.

Scoring Rubric

Score	Description
2	The student names the process AND explains what causes the molecules to move into the cell. Response contains no errors.
1	The student names the process or explains what causes the molecules to move into the cell OR the student completes parts (a) and (b) with minor errors.
0	Response is incorrect, irrelevant, too brief to evaluate, or blank.

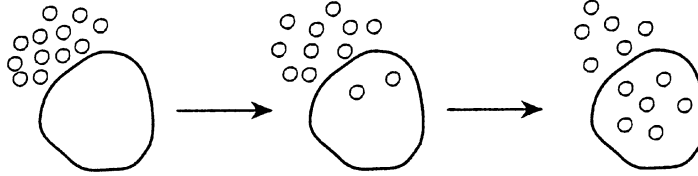
Scoring Information:

A. Osmosis, diffusion, passive transport

B. Initially, there is a higher **concentration** of molecules outside the cell, which creates a concentration **gradient**. To achieve **equilibrium**, molecules flow into the cell. This can also be expressed as the molecules spreading themselves equally/going where there are fewer of the same molecules. Also acceptable is: the molecules try to even out between the inside and outside of the cell.

Score Point 2

The diagram below shows water molecules moving through the cell membrane into a body cell.



A. What is the name of this process?

The name of this process is osmosis.

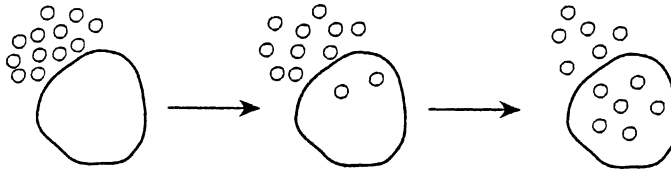
B. Explain what causes the molecules to move into the cell.

During osmosis, molecules go from an area of high concentration to an area of low concentration.

The student names osmosis in part a as the process shown in the drawing and correctly explains that the molecules go from a high to a low concentration area. The student gets full credit.

Score Point 1

The diagram below shows water molecules moving through the cell membrane into a body cell.



A. What is the name of this process?

The of this process is osmoses

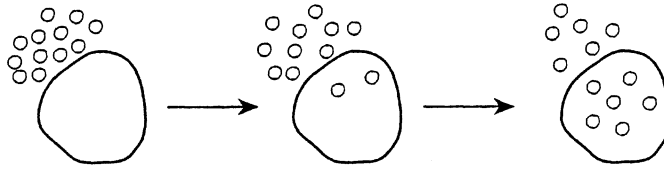
B. Explain what causes the molecules to move into the cell.

The molecules move into the cell because they separate good cells from bad cells

The student earns a point in part a for the correct identification of the process. Part b does not answer the question, therefore no credit is given.

Score Point 0

The diagram below shows water molecules moving through the cell membrane into a body cell.



A. What is the name of this process?

The process is name Cell movement

B. Explain what causes the molecules to move into the cell.

Their are moving far away.

The student gives wrong answers in both parts of the question, so he or she gets no credit.

Sample 2

Reporting Category: Earth and Space Science

Benchmark ESS-M-A1: Understanding that Earth is layered by density with an inner and outer core, a mantle, and a thin outer crust

The outer two layers of Earth are the crust and the mantle.

- A. Describe the difference between the density of the crust and of the mantle.
- B. Describe the difference between the thickness of the crust and of the mantle.

Scoring Rubric

Score	Description
2	The student correctly describes the differences in density and thickness between the crust and mantle. Response contains no errors.
1	The student describes the difference in either density OR thickness between the crust and mantle. Response may contain errors. OR The student correctly describes both differences but includes explanations that contain errors.
0	Response is incorrect, irrelevant, or too brief to evaluate, or blank.

Scoring Information:

- A. The crust is less dense than the mantle (density increases from outermost to innermost layer of Earth).
- B. The crust is a very thin layer while the mantle is very thick (the thickest layer, in fact).

Score Point 2

- A. Describe the difference between the density of the crust and of the mantle.

The crust is not as dense as the mantle. Layers of the Earth increase in density as they get closer to the core.

- B. Describe the difference between the thickness of the crust and of the mantle.

The Earth's crust is very thin compared to the mantle. The Earth's layers are thicker the closer they are to the core of the Earth.

The student correctly describes the difference in density and thickness between the crust and the mantle of the Earth, gaining two points.

Score Point 1

The outer two layers of Earth are the crust and the mantle.

- A. Describe the difference between the density of the crust and of the mantle.

The difference between the density of the crust and of the mantle, is the crust is more dense than the mantle.

- B. Describe the difference between the thickness of the crust and of the mantle.

The difference between the thickness of the crust and of the mantle is, the mantle is thicker than the crust.

The student does not get credit for part a because the difference in densities is reversed. Part b gets a point for stating that the mantle is thicker than the crust.

Score Point 0

The outer two layers of Earth are the crust and the mantle.

A. Describe the difference between the density of the crust and of the mantle.

The crust is the thickest part
of the Earth and the mantle is the
2nd thickest.

B. Describe the difference between the thickness of the crust and of the mantle.

The thickness between the crust &
the mantle is that the mantle
is thinner.

The student does not answer either of the two parts correctly; therefore, he or she does not get any points.


for the 21st Century

Spring 2003

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