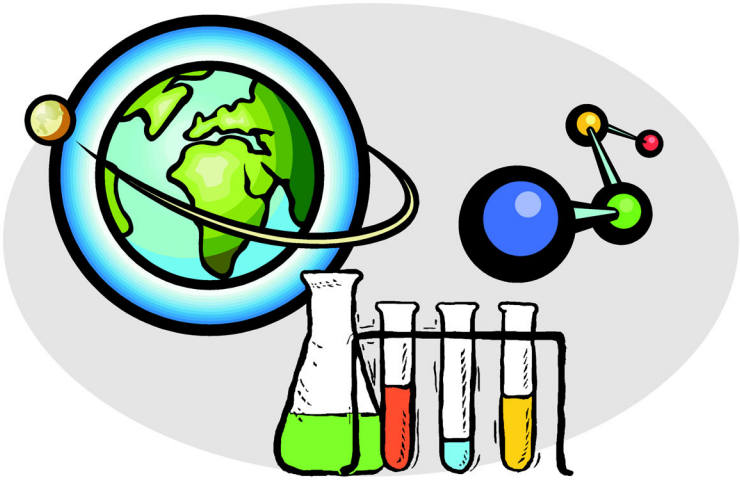
LEAP
for the 21st Century

Released Test Items:

Sample Student Work Illustrating LEAP 21
Achievement Levels

July 2004

Grade 8



Science

Reaching For Results

Louisiana Department of EDUCATION

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 2003–2004

LEAP 21 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 March 2004, 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 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 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 the fall.

For LEAP 21, 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 given on page 2. Specific definitions of achievement levels for the Science test were published in the 2000 Released Items documents. The achievement level definitions for all content areas can be found on the Louisiana Department of Education Web site at www.louisianaschools.net. Click on the "Testing" link below the tabs at the top of the page, then on the "Achievement Levels" link at the left of the page.

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	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 the Science test, which 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	• The student's response provides a complete and correct answer.
1	• The student's response is partially correct. • The student's response demonstrates limited awareness or contains errors.
0	• The student's response is incorrect, irrelevant, too brief to evaluate, or blank.

The essay is scored using the following rubric:

Score	Description
4	• 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	• 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	• The student completes some parts of the task successfully. • The student's response demonstrates gaps in conceptual understanding.
1	• The student completes only a small portion of the task and/or shows minimal understanding of the concepts and/or processes.
0	• 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 spring 2004 raw score range for each achievement level is listed on page 4.

Spring 2004 Science Test, Grade 8

Achievement Level	Raw Score Range
Advanced	53 – 58 points
Mastery	44 – 52 points
Basic	34 – 43 points
Approaching Basic	25 – 33 points
Unsatisfactory	0 – 24 points

This document presents four multiple-choice items, one taken from each of the four strands in the *Teachers Guide to Statewide Assessment—Science*: **Life Science, Physical Science, Science as Inquiry,** and **Earth and Space Science.** In addition, two short-answer items are included for Life Science and Science and the Environment, 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*, 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: Life Science

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

Achievement Level: ***Advanced***

Which statement about plant and animal cells is true?

A. Both have a cell wall to give them support.

B. Both have a large vacuole to store water.

* C. Both use mitochondria to produce energy.

D. Both use chloroplasts to store energy.

* correct answer

This Life Science item would most likely be answered correctly by students who score at the *Advanced* level. It requires students to recognize and compare the basic structures and functions of animal and plant cells. All organisms are made up of cells, the basic unit of structure and function of living things. Both plant and animal cells possess many common structures, including mitochondria that help transform the energy found in food to a form the cell can use to carry out its activities. Plant cells have some structures animal cells do not; some of these structures include a cell wall, chloroplasts, and larger vacuoles. The cell wall is an outer barrier that provides extra support for plants. Chloroplasts are the food-making structures found in plant cells. Plant cells contain larger vacuoles that usually make up more than 50 percent of the cell's volume, whereas animal cells usually possess multiple but smaller vacuoles. Students scoring at the *Advanced* level understand the major similarities and differences between animal and plant cells and that mitochondria are the only structures listed in this item that are found in both types of cells.

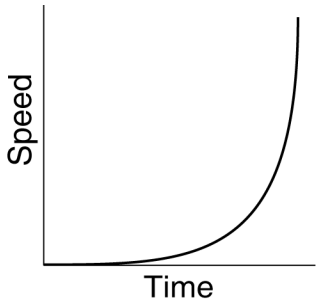
Reporting Category: Physical Science

Benchmark PS-M-B1: Describing and graphing the motions of objects

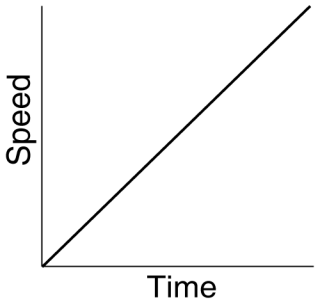
Achievement Level: ***Mastery***

A force acting on an object that is free to move will cause a change in the speed of the object. Which graph shows how the speed of an object would change if a single constant force were applied to the object over a period of time?

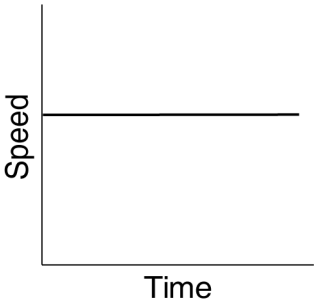
A.



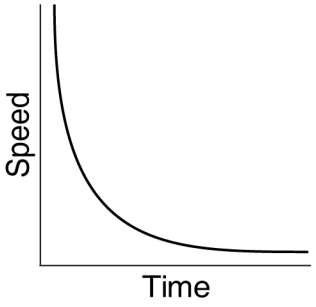
* B.



C.



D.



* correct answer

This Physical Science item would most likely be answered correctly by students who score at the *Mastery* level and above. It requires students to use their understanding of motion and how it is related to forces. If a single constant force is applied to an object over time, the object will accelerate at a constant rate. The acceleration of an object is equal to the slope of the graph of its speed versus time. Because the acceleration in this example has a constant, nonzero value, the speed-versus-time graph will be a straight line with a nonzero slope. Students who score at the *Mastery* level and above understand motion and how it is related to forces and can correctly identify an accurate graph of the motion described in this example.

Reporting Category: Science as Inquiry

Benchmark SI-M-A5: Developing models and predictions using the relationships between data and explanations

Achievement Level: ***Basic***

Use the information in the box below to answer question X.

Pierre wants to build a model of a ramp that would be safe for students who use wheelchairs. He knows that to be safe, a wheelchair ramp should not drop more than 10 centimeters for every 120 centimeters of ramp length. Pierre has the following materials:

- a ball that will roll the way a wheelchair rolls
- a stopwatch to time the ball as it rolls
- a board that can be used as a small ramp
- blocks of wood to prop up the board at different heights
- a meterstick to measure distance

Which items are necessary for Pierre to build a correct model of the ramp?

A. the stopwatch and the ball only
B. the meterstick and the board only
*C. the meterstick, the board, and the blocks of wood only
D. the board, the blocks of wood, and the ball only

* correct answer

This Science as Inquiry item would most likely be answered correctly by students who score at the *Basic* level and above. It requires students to use science process skills to construct a model. This model is used to predict how different variables will affect a wheelchair ramp. In this example, the variables are the rise and run of a ramp. In three of the options, materials such as a stopwatch or a ball are mentioned; these objects are not needed for the construction of a correct model. Students who score at the *Basic* level and above understand models can correctly identify the variables needed to construct an accurate model for the problem described.

Reporting Category: Earth and Space Science

Benchmark ESS-M-C3: Investigating the force of gravity and the ways gravity governs motion in the solar system and objects on Earth

Achievement Level: ***Approaching Basic***

When people walked on the Moon, they found that they could jump higher than they could back on Earth. Why is this true?

A. There is no atmosphere on the Moon.

* B. The Moon exerts less gravitational force than Earth.

C. Space suits helped them jump higher.

D. The Moon rotates faster than Earth does.

* correct answer

This Earth and Space Science item would most likely be answered by students who score at the *Approaching Basic* level and above. It requires students to understand that gravity is a force of attraction between two objects that have mass. The strength of the force of gravity depends upon the masses of the objects and the distance between them. Since the mass of the Moon is less than the mass of Earth, the Moon's gravity is weaker than Earth's gravity. Since the force of gravity is less on the Moon, a person can jump higher than on Earth. The Moon does not rotate faster than Earth, and rotation does not affect the force of gravity. Space suits are not normally equipped to help people jump higher. Students who score at the *Approaching Basic* level and above should possess a minimal level of understanding that the gravitational attraction between two masses depends on the masses of the objects and the distance between them.

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-B3: Describing how heredity allows parents to pass certain traits to offspring

The ability to roll the tongue is a dominant trait, designated by R.

Kathy's mother has a genotype of RR, and her father cannot roll his tongue.

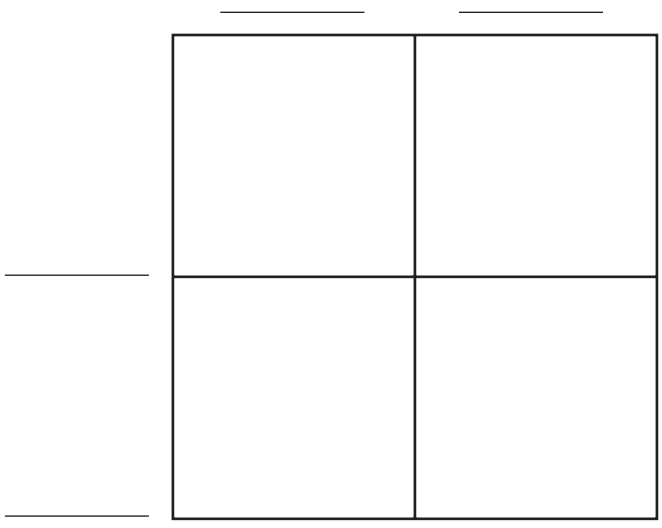
A. What is her father's genotype?

B. What is the probability that Kathy will be able to roll her tongue?

_____

Complete the Punnett square below to explain your answer.

_____



Scoring Rubric

Score	Description
2	The student correctly identifies the father's genotype and the probability that Kathy will be able to roll her tongue. Response contains no errors.
1	The student correctly identifies the father's genotype **or** the probability that Kathy will be able to roll her tongue.
0	Response is incorrect, irrelevant, too brief to evaluate, or blank.

Scoring Information:

A. The father's genotype would be rr. (Note that it is **not** OK to substitute other letters.) This genotype may be pulled from the Punnett Square if necessary.

B. There is a 100 percent likelihood that Kathy will be able to roll her tongue (probability=1, $\frac{4}{4}$).

SCORERS NOTE: The Punnett square is only a tool for students and <u>IS NOT TO BE SCORED</u>.

	r	r
R	Rr	Rr
R	Rr	Rr

Score Point 2

The ability to roll the tongue is a dominant trait, designated by R.
Kathy's mother has a genotype of RR, and her father cannot roll his tongue.

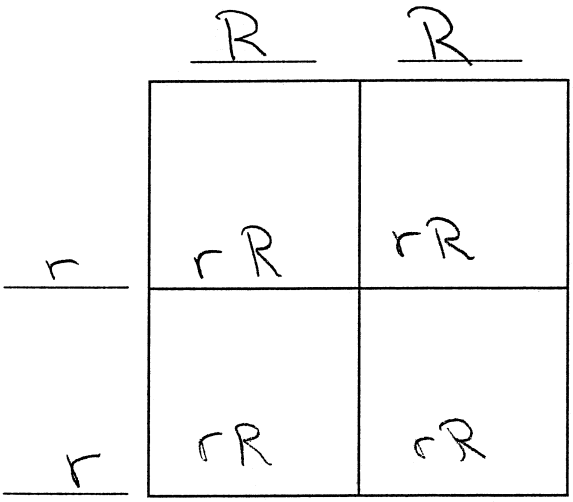
A. What is her father's genotype?

rr

B. What is the probability that Kathy will be able to roll her tongue?

4/4, or 4 out of 4 times

Complete the Punnett Square below to explain your answer.



The student earns 2 points for identifying the father's genotype correctly (rr), and for the correct probability for Kathy being able to roll her tongue (4/4).

Score Point 1

The ability to roll the tongue is a dominant trait, designated by R.
Kathy's mother has a genotype of RR, and her father cannot roll his tongue.

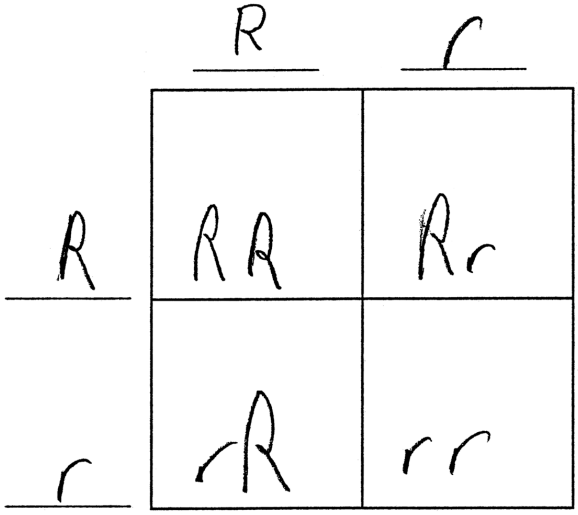
A. What is her father's genotype?

rr

B. What is the probability that Kathy will be able to roll her tongue?

75%

Complete the Punnett Square below to explain your answer.



The student earns 1 point for correctly identifying the father's genotype, (rr). The probability for Kathy being able to roll her tongue is incorrect.

Score Point 0

The ability to roll the tongue is a dominant trait, designated by R.
Kathy's mother has a genotype of RR, and her father cannot roll his tongue.

A. What is her father's genotype?

Her father's genotype is RR.

B. What is the probability that Kathy will be able to roll her tongue?

None

Complete the Punnett Square below to explain your answer.

Grand Mother Grand Father

mother	RR	RR
	RR	RR
Father		

The student does not earn any points because both answers are incorrect.

Sample 2

Reporting Category: Science and the Environment

Benchmark SE-M-A4: Understanding that human actions can create risks and consequences in the environment

Suzanne helped her dad change the motor oil in his car. Suzanne poured the old motor oil onto the grass by the fence. Describe **two** ways this could eventually affect the water supply.

Scoring Rubric

Score	Description
2	The student describes two key ways Suzanne's action could affect the water supply. Response contains no errors.
1	The student describes one key way Suzanne's action could affect the water supply.
0	Response is incorrect, irrelevant, too brief to evaluate, or blank.

Scoring Information:

The motor oil could enter the soil, then enter the groundwater (by rain, moisture leaking through the landfill liner, etc.). The water could run off from the surface, carrying the oil into rivers, lakes, or streams. Either way, groundwater and runoff water flows into the rivers, lakes, bayous, and coastal waters.

No credit is to be given for the oil clogging pipes.

Score Point 2

Suzanne helped her dad change the motor oil in his car. Suzanne poured the old motor oil onto the grass by the fence. Describe **two** ways this could eventually affect the water supply.

Two ways that could eventually affect the water supply is the ground water could push the oil into a nearby stream and it could rain and the oil will flow to a stream with the rain.

The student earns 2 points for correctly describing two ways the water supply could be affected: groundwater and runoff flowing into a stream.

Score Point 1

Suzanne helped her dad change the motor oil in his car. Suzanne poured the old motor oil onto the grass by the fence. Describe **two** ways this could eventually affect the water supply.

It Could drain into a Canal after it rains then flows into a river and into the ocean, or it Could evaporate into the Clouds after it rain, and cause acid rain.

The student earns 1 point for stating that after a rain the runoff water will flow into a river. The second statement is incorrect and does not receive credit.

Score Point 0

Suzanne helped her dad change the motor oil in his car. Suzanne poured the old motor oil onto the grass by the fence. Describe **two** ways this could eventually affect the water supply.

It will affect the water supply because the oil is oil.

The student fails to answer the question correctly and therefore does not receive credit.

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