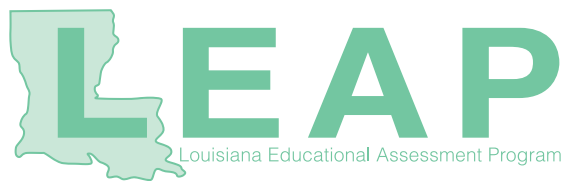


RELEASED TEST ITEMS

Sample Student Work
Illustrating LEAP Achievement Levels

August 2007

Science



Grade

8



Paul G. Pastorek
State Superintendent of Education



Louisiana State Board of Elementary and Secondary Education

Ms. Linda Johnson

President
Eighth District

Ms. Leslie Jacobs

Vice President
Member-at-Large

Mr. Dale Bayard

Secretary-Treasurer
Seventh District

Ms. Penny Dastugue

First District

Ms. Louella Givens

Second District

Ms. Glenny Lee Buquet

Third District

Mr. Walter Lee

Fourth District

Dr. James Stafford

Fifth District

Ms. Polly Broussard

Sixth District

Mr. Edgar Chase

Member-at-Large

Ms. Mary Washington

Member-at-Large

Ms. Weegie Peabody

Executive Director

For further information, contact
Scott Norton or Claudia Davis
Division of Standards, Assessments, and Accountability
225-342-3406, scott.norton@la.gov
225-342-3393, claudia.davis@la.gov

The Louisiana Department of Education (LDE) does not discriminate on the basis of sex in any of the education programs or activities that it operates, including employment and admission related to such programs and activities. The LDE is required by Title IX of the Education Amendments of 1972 (Title IX) and its implementing regulations not to engage in such discrimination. LDE's Title IX Coord. is Patrick D. Weaver, Deputy Undersecretary, LDE, Exec. Office of the Supt.; PO Box 94064, Baton Rouge, LA 70804-9064; 877-453-2721 or customerservice@la.gov. All inquiries pertaining to LDE's policy prohibiting discrimination based on sex or to the requirements of Title IX and its implementing regulations can be directed to Patrick D. Weaver or to the USDE, Asst. Sec. for Civil Rights.

This public document was published at a cost of \$157. One hundred and fifty (150) copies of this document were printed in this first printing at a cost of \$157. The total cost for the printing of this document, including reprints, was \$157. This document was published for the Louisiana Department of Education, Office of Student and School Performance, Division of Standards, Assessments, and Accountability, PO Box 94064, Baton Rouge, Louisiana 70804-9064, by Data Recognition Corporation, 13490 Bass Lake Road, Maple Grove, Minnesota 55311. This material was printed in accordance with the standards for printing by State Agencies established pursuant to R.S. 43:31.

Louisiana Educational Assessment Program (LEAP)
Grade 8 Sample Items and Student Work
2006–2007

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 March 2007, 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.

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.

LEAP 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, 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. Achievement level descriptors for all content areas can be found on the Louisiana Department of Education Web site at www.louisianaschools.net. Click the “Testing” at the top of the page and then on “Achievement Level Descriptors” in the drop-down menu under LEAP.

LEAP

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 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 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 tests. Additional items will be released in future years of the LEAP.

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 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
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 extended constructed-response item 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 extended constructed response and the 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* achievement 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 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 2007 raw score range for each achievement level is listed below.

Spring 2007 Science Test, Grade 8

Achievement Level	Raw Score Range
Advanced	51 – 58 points
Mastery	43 – 50 points
Basic	32 – 42 points
Approaching Basic	23 – 31 points
Unsatisfactory	0 – 22 points

This document presents four multiple-choice items, one taken from each of the four science strands, as detailed in the grade 8 LEAP *Assessment Guide: Life Science, Science as Inquiry, Science and the Environment, and Physical Science*. In addition, two short-answer items are included, with scoring guides for each. 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 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 assessments is typically 12 points.

Grade 8—Science Multiple-Choice Items

Reporting Strand: Life Science

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

Achievement Level: *Advanced*

In pea plants, the trait for round seeds is dominant over the trait for wrinkled seeds. If a pure dominant plant with round seeds is crossed with a plant with wrinkled seeds, what can be predicted about the offspring plants?

- * A. They will always produce round seeds.
- B. They will only produce wrinkled seeds.
- C. Each offspring plant will have some round and some wrinkled seeds.
- D. Unless the plant with wrinkled seeds was pure recessive, no prediction can be made.

* correct answer

This Life Science item would most likely be answered correctly by students who score at the *Advanced* level. This item requires students to use their knowledge of Mendelian genetics to predict which genetic trait will be expressed in the offspring of particular pea plant crosses. In this case, a pea plant with round seeds carries the dominant allele (R) for seed type on both chromosomes (RR) of the chromosome pair carrying the gene for seed type. The other pea plant in the example cross has wrinkled seeds, which means it has the recessive allele (r) for seed type on both chromosomes (rr) of the chromosome pair carrying the gene for seed type. During reproduction, the plant with round seeds contributes only one dominant allele (R) and the plant with wrinkled seeds contributes only one recessive allele (r) to their offspring; the resulting plants having a genotype of Rr. Since the allele for round seeds is dominant, it hides the expression of the recessive trait. Consequently, the offspring (Rr) will all have round seeds. Students who understand this relationship will know that only one prediction is possible and will select option A. Students who select option C may understand that the offspring will receive genes for seed type from each parent, but they have the misconception that both alleles can be independently expressed on the same plant. Students who select option D do not understand the nature of genetic

dominance, since the expression of wrinkled seeds requires the absence of the dominant allele altogether. Students who select option B do not understand that offspring of a parent that is pure dominant cannot express the recessive trait since their genotype will contain a dominant gene, which hides the expression of the recessive gene.

Reporting Strand: Science as Inquiry

Benchmark SI-M-B3: Understanding that mathematics, technology, and scientific techniques used in an experiment can limit or enhance the accuracy of scientific knowledge

Achievement Level: *Mastery*

Students want to compare the size of microorganism communities in 500-milliliter water samples from each of two ponds. Which factor **most likely** will affect the accuracy of their observations?

- A. the average temperature of the water samples
- B. the brand of microscope slide used
- * C. the magnifying power of the microscope
- D. the proper identification of each microorganism

* correct answer

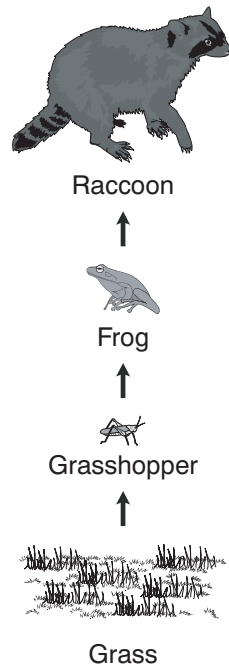
This Science as Inquiry item would most likely be answered correctly by students who score at the *Mastery* level and above. This item requires students to recognize how different factors can affect the accuracy of experimental results. Students who choose option A do not understand that the average temperature of the water samples will not significantly affect the quantity of organisms present in the samples or the ability to observe and count them. Students who choose option B do not recognize that all microscope slides have similar physical characteristics, which have negligible impact on the accuracy of their observations. Students who choose option D do not recognize that the total quantity of organisms in each sample (community) is being measured, not the distribution of organisms by kind (populations), where proper identification becomes a critical factor. Students who choose option C recognize that the magnifying power of a microscope has a significant impact on an investigator's ability to observe and count microorganisms in samples.

Reporting Strand: 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: *Basic*

Use the food chain below to answer the following question.



What do the arrows in the food chain indicate about the flow of energy in an ecosystem?

- A. Energy is continuously recycled by the organisms in an ecosystem.
- * B. Energy flows in one direction in an ecosystem, from producers to consumers.
- C. More of the available energy in an ecosystem is given to large animals than to small animals.
- D. Organisms at the end of the food chain receive more energy than those at the beginning.

* correct answer

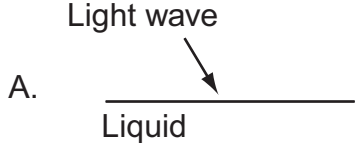
This Science and the Environment item would most likely be answered correctly by students who score at the *Basic* level and above. This item requires students to know the patterns of energy flowing through ecosystems and the relationship between producer and consumer organisms. Students who choose option B understand that energy flows in one direction in ecosystems—from producers, such as grass, to consumers, such as grasshoppers, frogs, and raccoons. Students who choose option A do not understand that energy isn't recycled in ecosystems; energy enters ecosystems as sunlight, is converted to chemical energy (plant or animal tissue) and heat, and eventually leaves the ecosystem as heat. Students who choose option C do not understand that most of the available chemical energy in this ecosystem is stored in the grass, so it is most available to grasshoppers, which eat the grass, rather than to raccoons, which eat the frogs. When the grass is consumed by the grasshoppers, some of the available chemical energy in this system is converted into grasshopper body tissue, but most is released as heat during the conversion. This leaves less net energy available to the next trophic level, the frogs. Less and less energy is available to the next levels as energy is converted to body tissue and released as heat. Students who choose option D do not understand that organisms at the highest trophic level receive less energy than producer organisms, because as energy is consumed and converted at each trophic level in the food chain, most of that energy becomes unavailable to organisms at the next level of the food chain.

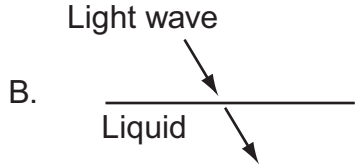
Reporting Strand: Physical Science

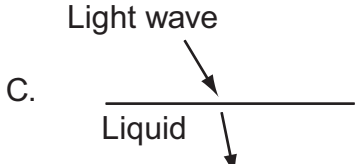
Benchmark PS-M-C4: Observing and describing the interactions of light and matter (reflection, refraction, absorption, transmission, scattering)

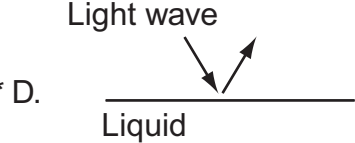
Achievement Level: *Approaching Basic*

A beam of light is shining on the surface of a liquid. Which diagram shows what happens when the light is **reflected** by the liquid?

A. 

B. 

C. 

* D. 

* correct answer

This Physical Science item would most likely be answered correctly by students who score at the *Approaching Basic* level and above. This item requires students to understand the meaning of *reflected* and know how light is affected by forces, in this case, by the surface of a liquid. Students who choose option A do not recognize that the diagram for this option shows light being absorbed by the liquid. Students who choose option B do not recognize that the diagram for this option shows light being transmitted through the liquid. Students who choose option C do not recognize that the diagram for this option shows light being refracted (bent) as it travels through the liquid. Students who choose option D understand that the diagram for this option shows light being reflected from (bounced off) the liquid's surface.

Grade 8—Science Short-Answer Items

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 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 Strand: Earth and Space Science

Benchmark ESS-M-C4: Modeling the motions of the Earth-Moon-Sun system to explain day and night, a year, eclipses, moon phases, and tides

Draw and label a diagram showing the interaction of Earth, the Moon, and the Sun during a total lunar eclipse. Be sure your diagram clearly shows both the alignment of Earth, the Moon, and the Sun **and** the area of shadow that together create the eclipse.

Scoring Rubric

Score	Description
2	The student provides a diagram showing both the correct alignment of Earth, Moon, and Sun and the correct area of shadow. Response contains no errors.
1	The student provides a diagram correctly showing the alignment of Earth, Moon, and Sun but does not correctly represent the shadow. Response contains errors, misconceptions, or omissions.
0	The student's response is incorrect, irrelevant, too brief to evaluate, or blank.

Score Point 2

Draw and label a diagram showing the interaction of Earth, the Moon, and the Sun during a total lunar eclipse. Be sure your diagram clearly shows both the alignment of Earth, the Moon, and the Sun and the area of shadow that together create the eclipse.

The diagram shows a large semi-circle on the left labeled 'Sun'. In the center is a circle labeled 'Earth' with continents drawn on it. To the right of Earth is a smaller circle labeled 'Moon'. Two lines extend from the Earth to the Moon, representing the umbra and penumbra shadows. The Moon is positioned within the Earth's shadow. The title 'Lunar Eclipse' is written and underlined in the top right corner.

The student earns 2 points for correctly drawing and labeling a diagram showing the interaction of the Earth, the Moon, and the Sun during a total lunar eclipse. The diagram shows alignment of the three bodies and the area of shadow that creates the eclipse.

Score Point 1

Draw and label a diagram showing the interaction of Earth, the Moon, and the Sun during a total lunar eclipse. Be sure your diagram clearly shows both the alignment of Earth, the Moon, and the Sun and the area of shadow that together create the eclipse.

The diagram shows three objects in a horizontal line. On the left is a circle with radiating lines labeled 'sun'. In the middle is a circle with continents labeled 'Earth'. On the right is a small solid black circle labeled 'moon'. No shadows are drawn.

The student earns 1 point for showing the correct alignment of the three bodies in the diagram but does not show the area of shadow.

Score Point 0

Draw and label a diagram showing the interaction of Earth, the Moon, and the Sun during a total lunar eclipse. Be sure your diagram clearly shows both the alignment of Earth, the Moon, and the Sun and the area of shadow that together create the eclipse.



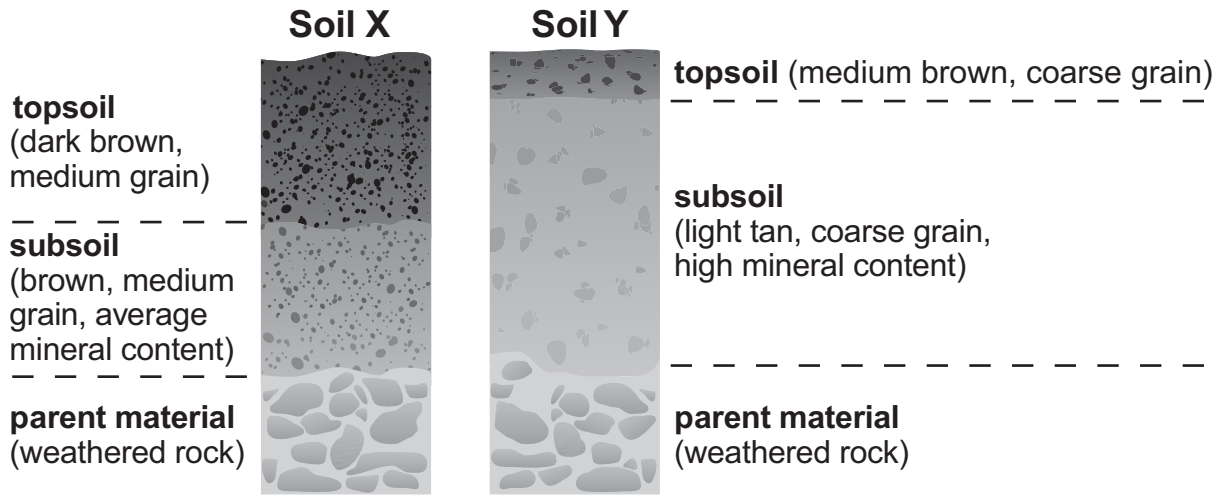
The student does not earn any points. The Earth and the Moon are in the wrong position in relation to the Sun, and the diagram does not show the area of shadow.

Sample 2

Reporting Strand: Science and the Environment

Benchmark SE-M-A9: Demonstrating relationships of characteristics of soil types to agricultural practices and productivity

Use the diagram to answer the following question.



The diagram gives information about two different types of soil, soil X and soil Y.

A. Which soil would be more productive for farming?

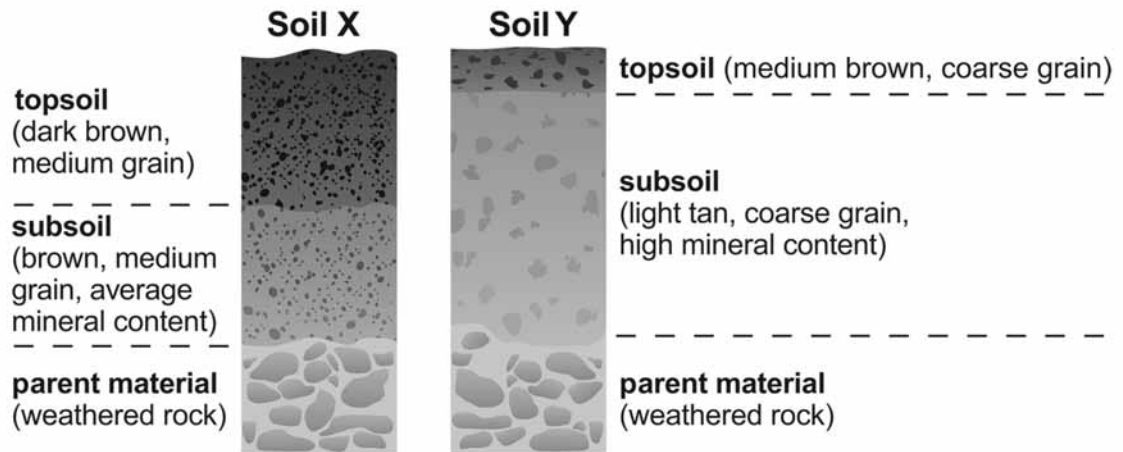
B. Using evidence from the soil profiles, give **one** reason why the soil you named in part A would be more productive.

Scoring Rubric

Score	Description
2	The student identifies the soil that would be more productive and gives one reason for this choice. Response contains no errors.
1	The student identifies the soil that would be more productive but cannot give a reason for this choice. Response contains errors, misconceptions, or omissions.
0	The student's response is incorrect, irrelevant, too brief to evaluate, or blank.

Score Point 2

Use the diagram to answer the following question.



The diagrams give information about two different types of soil, soil X and soil Y.

A. Which soil would be more productive for farming?

Soil X

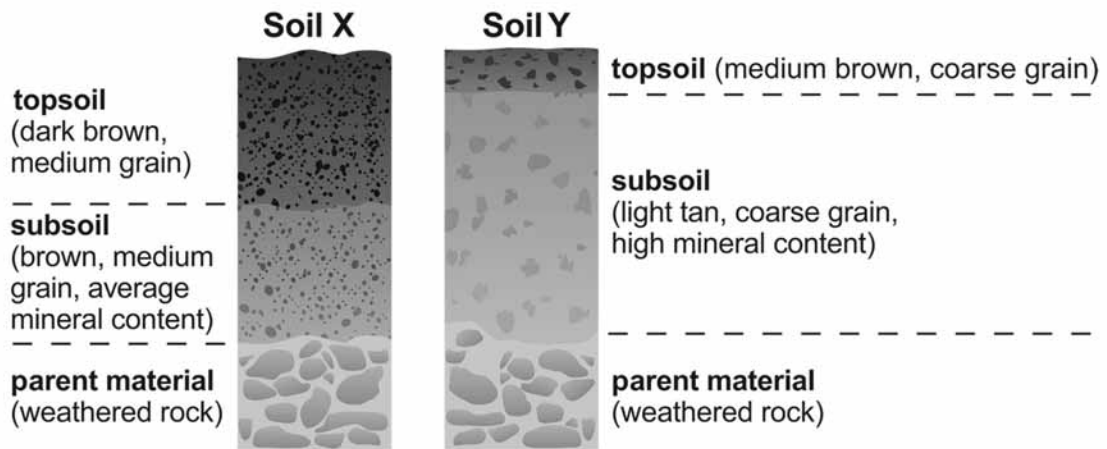
B. Using evidence from the soil profiles, give **one** reason why the soil you named in part A would be more productive.

Because you would have looser topsoil and more of it. Crops will grow better in ground like that.

The student earns 2 points for correctly answering both parts of the question: soil X in part A and stating that there is more soil in that layer.

Score Point 1

Use the diagram to answer the following question.



The diagrams give information about two different types of soil, soil X and soil Y.

A. Which soil would be more productive for farming?

Soil X would be more productive for farming.

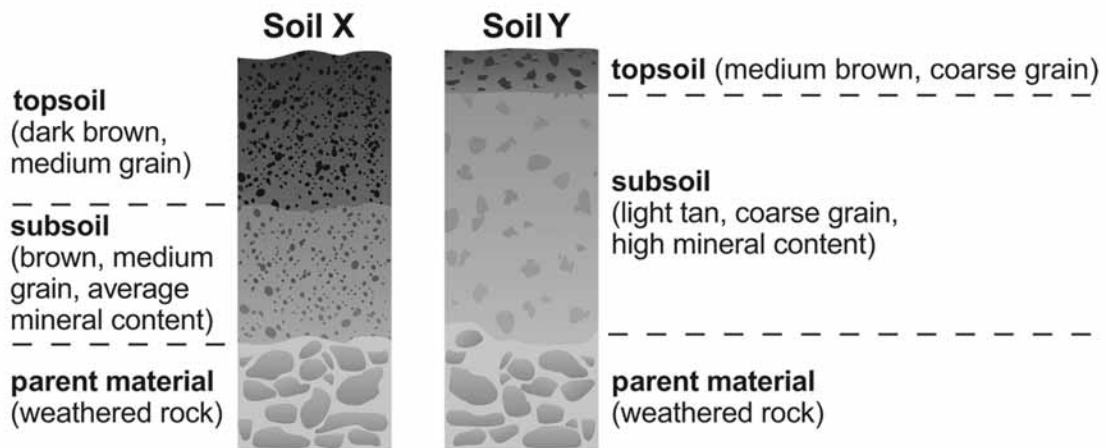
B. Using evidence from the soil profiles, give **one** reason why the soil you named in part A would be more productive.

Because Soil X has topsoil (dark, brown, medium grain) and subsoil (brown, medium grain, average mineral content). That's why it would be more productive for farming.

The student earns 1 point for correctly identifying soil X in part A. Part B is incorrect.

Score Point 0

Use the diagram to answer the following question.



The diagrams give information about two different types of soil, soil X and soil Y.

A. Which soil would be more productive for farming?

Soil Y

B. Using evidence from the soil profiles, give **one** reason why the soil you named in part A would be more productive.

The reasons I picked Soil Y is because it has more minerals, grain, and will have enough food to grow.

The student does not earn any points. Both parts are incorrectly answered.



Spring 2007

Louisiana Department of Education
Office of Student and School Performance
Division of Standards, Assessments, and Accountability