

2004

FCAT

Florida Comprehensive Assessment Test

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**matter**



**SCIENCE**  
SAMPLE ANSWER KEY

GRADE

**8**

FC0000157

## FCAT Sample Test Materials

These sample test materials are designed to help students prepare to answer FCAT questions. These materials introduce them to the kinds of questions they will answer when they take FCAT and include hints for responding to the different kinds of questions. The FCAT Science sample test materials for Grade 8 are composed of the books described below:

- Sample Test and Answer Book**  
Includes a science sample test, a sample answer book, and instructions for completing the sample test. (Copies are available for all students in the tested grade.)
- Sample Answer Key**  
Includes answers and explanations for the questions in the sample test. (Copies are available for classroom teachers only.)

= This book

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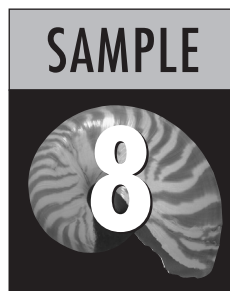
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# FCAT Science

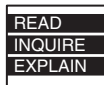
## Sample Answer Key



This book contains answers to the FCAT Science sample test questions. It also gives the *Sunshine State Standards* benchmark assessed by each item on the sample test. In addition, one or more possible approaches to solving the questions are provided. Students may use approaches other than these and still receive credit if they also obtain a correct answer. For multiple-choice items, the reason an answer choice is incorrect (distractor rationale) is also provided.

Multiple-choice and gridded-response items are scored by awarding one point for each correct answer. The “Read, Inquire, Explain” questions allow for partial credit for some answers, even if they are not 100% correct. Answers will be scored and points will be given based on the completeness and correctness of the answers. If a portion of an answer is correct, a portion of the points may be awarded.

The scoring rubrics for the short-response questions and the extended-response questions are shown below:



### Rubric for Short-Response Questions

- |          |  |
|----------|--|
| 2 points | A score of two indicates that the student has demonstrated a thorough understanding of the scientific concepts and/or procedures embodied in the task. The student has completed the task correctly, in a scientifically sound manner. When required, student explanations and/or interpretations are clear and complete. The response may contain minor flaws that do not detract from the demonstration of a thorough understanding.   |
| 1 point  | A score of one indicates that the student has provided a response that is only partially correct. For example, the student may arrive at an acceptable conclusion or provide an adequate interpretation, but may demonstrate some misunderstanding of the underlying scientific concepts and/or procedures. Conversely, a student may arrive at an unacceptable conclusion or provide a faulty interpretation, but could have applied appropriate and scientifically sound concepts and/or procedures. |
| 0 points | A score of zero indicates that the student has provided a completely incorrect solution or uninterpretable response, or no response at all.  |



### Rubric for Extended-Response Questions

- 4 points** A score of four indicates that the student has demonstrated a thorough understanding of the scientific concepts and/or procedures embodied in the task. The student has completed the task correctly, used scientifically sound procedures, and provided clear and complete explanations and interpretations.
- The response may contain minor flaws that do not detract from a demonstration of a thorough understanding.
- 3 points** A score of three indicates that the student has demonstrated an understanding of the scientific concepts and/or procedures embodied in the task. The student's response to the task is essentially correct, but the scientific procedures, explanations, and/or interpretations provided are not thorough.
- The response may contain minor flaws that reflect inattentiveness or indicate some misunderstanding of the underlying scientific concepts and/or procedures.
- 2 points** A score of two indicates that the student has demonstrated only a partial understanding of the scientific concepts and/or procedures embodied in the task. Although the student may have arrived at an acceptable conclusion or provided an adequate interpretation of the task, the student's work lacks an essential understanding of the underlying scientific concepts and/or procedures.
- The response may contain errors related to misunderstanding important aspects of the task, misuse of scientific procedures/processes, or faulty interpretations of results.
- 1 point** A score of one indicates that the student has demonstrated a very limited understanding of the scientific concepts and/or procedures embodied in the task. The student's response is incomplete and exhibits many flaws. Although the student's response has addressed some of the conditions of the task, the student has reached an inadequate conclusion and/or provided reasoning that is faulty or incomplete.
- The response exhibits many flaws or may be incomplete.
- 0 points** A score of zero indicates that the student has provided a completely incorrect solution or uninterpretable response, or no response at all.

- 1 The correct answer is C (0.16 g/cm<sup>3</sup>).

Strand: A—The Nature of Matter

Benchmark: SC.A.1.3.1 The student identifies various ways in which substances differ (e.g., mass, volume, shape, density, texture, and reaction to temperature and light). (Also assesses SC.A.1.3.2 understands the difference between weight and mass, and SC.A.1.3.6 knows that equal volumes of different substances may have different masses.)

**Answer Strategy:**

Use the formula for density to solve this problem.

$$\text{Density} = \text{mass}/\text{Volume}$$

Use the values in the table to determine the density of each liquid.

Subtract the number reflecting the least density from the number reflecting the greatest density. Corn syrup has the greatest density (1.08 g/cm<sup>3</sup>). The least dense liquid is salad oil (0.920 g/cm<sup>3</sup>).

$$1.08 \text{ g/cm}^3 - 0.920 \text{ g/cm}^3 = 0.16 \text{ g/cm}^3$$

**Distractor Rationale:**

- A. The density of the least dense liquid was subtracted from the density of the vinegar (1.01 g/cm<sup>3</sup> - 0.920 g/cm<sup>3</sup> = 0.09 g/cm<sup>3</sup>).
- B. The formula for density was incorrectly used to reach this answer.
- D. The density of corn syrup is 1.08 g/cm<sup>3</sup>.

- 2 The correct answer is F (The energy converts into thermal energy and is released into the atmosphere).

Strand: B—Energy

Benchmark: SC.B. 2.3.1 The student knows that most events in the universe (e.g., weather changes, moving cars, and the transfer of a nervous impulse in the human body) involve some form of energy transfer and that these changes almost always increase the total disorder of the system and its surroundings, reducing the amount of useful energy.

**Answer Strategy:**

An understanding of Ohm's Law is helpful in answering this question.

$V = IR$ , where  $V$  is the voltage,  $I$  is the current, and  $R$  is the resistance.

Resistance slows the flow of electricity so the electrical force must be strong enough to overcome this. The resistance of the wires causes the electrical energy to be converted into heat as it travels through the power lines.

**Distractor Rationale:**

- G. The energy traveling through power lines is not released as microwaves.
- H. Power lines are not usually grounded. Although they are insulated, the electricity they carry is live.
- I. Energy is not transferred from the power lines to the air as light energy.

3 The correct answer is 1/5.



Strand: B—Energy

Benchmark: SC.B.1.3.6 The student knows the properties of waves (e.g., frequency, wavelength, and amplitude); that each wave consists of a number of crests and troughs; and the effects of different media on waves. [Also assesses SC.C.1.3.2 knows that vibrations in materials set up wave disturbances that spread away from the source (e.g., sound and earthquake waves).]

**Answer Strategy:**

Use the formula for frequency to solve this problem.

$$f = \text{number of events (waves)}/\text{time (sec)}$$

$$f = 6 \text{ waves}/30 \text{ seconds} = 1/5 \text{ waves/second}$$

Other acceptable answers are 6/30 or 0.2.

1	/	5		
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<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
0	0	0	0	0
<input checked="" type="radio"/>	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	<input checked="" type="radio"/>	5	5
6	6	6	6	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9

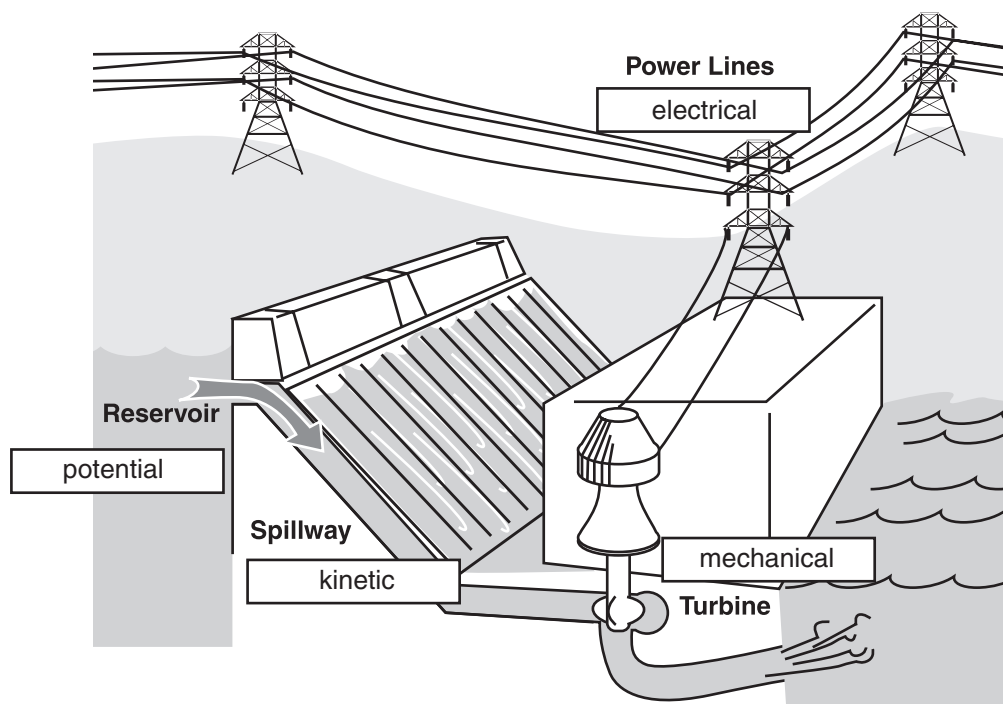
4

The correct answer is shown below.

READ
INQUIRE
EXPLAIN

Strand: B—Energy

Benchmark: SC.B.1.3.1 The student identifies forms of energy and explains that they can be measured and compared. [Also assesses SC.A.2.3.3 knows that radiation, light, and heat are forms of energy used to cook food, treat diseases, and provide energy, SC.B.1.3.2 knows that energy cannot be created or destroyed, but only changed from one form to another, and SC.B.1.3.3 knows the various forms in which energy comes to Earth from the Sun (e.g., visible light, infrared, and microwave).]

**Answer Strategy:****Part A**



**Part B**

Potential energy is stored with the water behind the dam in the reservoir. The potential energy changes to kinetic energy when the water is released over the spillway and is allowed to flow into the turbine. As the water passes through the turbine its kinetic energy changes into mechanical energy. The generator, which is connected to the turbine, changes the mechanical energy into electrical energy, which is carried through the power lines.

To receive full credit (4 points) for this question, the diagram in Part A must be completely and correctly filled in and an explanation must be provided of how the energy is converted from one form to another and how these conversions result in the production of electricity. References to the power lines, the reservoir, the spillway, and the turbine should be included for full credit.

Partially correct answers will receive a score of 1, 2, or 3 points.

**5** The correct answer is 37.8 km/hr.



Strand: C—Force and Motion

Benchmark: SC.C.2.3.6 The student explains and shows the ways in which a net force (i.e., the sum of all acting forces) can act on an object (e.g., speeding up an object traveling in the same direction as the net force, slowing down an object traveling in the direction opposite of the net force). (Also assesses SC.C.2.3.2 knows common contact forces, SC.C.2.3.3 knows that if more than one force acts on an object, then the forces can reinforce or cancel each other, depending on their direction and magnitude, and SC.C.2.3.5 understands that an object in motion will continue at a constant speed and in a straight line until acted upon by a force and that an object at rest will remain at rest until acted upon by a force.)

**Answer Strategy:**

An understanding of net forces is necessary to answer this question. As the train moves forward, Lisa is moving backwards. Therefore, relative to the ground, the direction of Lisa’s travel and the direction of the train’s travel are opposite. The smaller velocity should be subtracted from the larger velocity to get Lisa’s speed relative to the ground.

$$40.2 \text{ km/hr} - 2.4 \text{ km/hr} = 37.8 \text{ km/hr}$$

Another acceptable response is 189/5.

	3	7	.	8
	⊗	⊗	⊗	
⊙	⊙	⊙	●	⊙
0	0	0	0	0
1	1	1	1	1
2	2	2	2	2
3	●	3	3	3
4	4	4	4	4
5	5	5	5	5
6	6	6	6	6
7	7	●	7	7
8	8	8	8	●
9	9	9	9	9

- 6** The correct answer is C (a need to fertilize the lawn area with plant nutrients).

Strand: D—Processes that Shape the Earth

Benchmark: SC.D.1.3.4 The student knows the ways in which plants and animals reshape the landscape (e.g., bacteria, fungi, worms, rodents, and other organisms add organic matter to the soil, increasing soil fertility, encouraging plant growth, and strengthening resistance to erosion). (Also assesses SC.D.1.3.2 knows that over the whole Earth, organisms are growing, dying, and decaying as new organisms are produced by the old ones.)

**Answer Strategy:**

The role of bacteria needs to be understood to answer this question. Bacteria are among the organisms that decompose dead plants or animals. The soil fertility is increased when organic matter is added. If the bacteria were absent, fertilizer would have to be added to the soil to replenish its nutrients.

**Distractor Rationale:**

- A. The elimination of bacteria would not result in an increase of nests in the lawn area.
- B. Fewer weeds would result from an elimination of the bacteria. Weeds also require nutrients from the soil.
- D. The number of rodents in a lawn area is not directly dependent on the nutrients in the soil.

- 7** The correct answer is H (The trees act as a windbreak, reducing soil erosion caused by blowing wind).

Strand: D—Processes that Shape the Earth

Benchmark: SC.D.1.3.4 The student knows the ways in which plants and animals reshape the landscape (e.g., bacteria, fungi, worms, rodents, and other organisms add organic matter to the soil, increasing soil fertility, encouraging plant growth, and strengthening resistance to erosion). (Also assesses SC.D.1.3.2 knows that over the whole Earth, organisms are growing, dying, and decaying as new organisms are produced by the old ones.)

**Answer Strategy:**

An understanding of erosion and its prevention is required to answer this question. Farmers create rows of trees, called windbreaks, to slow down the wind. Less wind or slower wind decreases the amount of topsoil that is carried away.

**Distractor Rationale:**

- F. Shade does not help conserve soil.
- G. Acid rain is not a factor in soil conservation.
- I. Fertilizer is not a factor in soil erosion.

- 8** The correct answer is A (The Sun’s gravity is the primary influence on Pluto).

Strand: E—Earth and Space

Benchmark: SC.E.1.3.1 The student understands the vast size of our Solar System and the relationship of the planets and their satellites. (Also assesses SC.E.1.3.2 knows that available data from various satellite probes show the similarities and differences among planets and their moons in the Solar System.)

**Answer Strategy:**

An understanding of gravity is required to answer this question. All objects in the universe are attracted to each other through gravitational force. The gravitational force between objects depends on the masses of the objects and the square of the distance between the objects. Because the Sun is so massive, its gravitational force has a greater effect on Pluto than Neptune’s smaller gravitational force has on Pluto. It is because of this that Pluto revolves around the Sun and not Neptune.

**Distractor Rationale:**

- B. The Sun’s gravitational force has a greater effect on Pluto than Neptune’s gravitational force.
- C. Gravity cannot be “neutralized.” The presence of its satellites has no effect on Neptune’s gravity.
- D. Pluto and its satellite are gravitationally bound to each other, but the satellite has little or no effect on the shape, size, or orientation of Pluto’s orbit.

**9** The correct answer is shown below.



Strand: E—Earth and Space

Benchmark: SC.E.1.3.1 The student understands the vast size of our Solar System and the relationship of the planets and their satellites. (Also assesses SC.E.1.3.2 knows that available data from various satellite probes show the similarities and differences among planets and their moons in the Solar System.)

**Answer Strategy:**

Knowledge of the lunar cycle is required to answer this question. Each lunar month, the Moon revolves once around Earth and rotates once on its axis. The Moon rotates on its axis and revolves around Earth at the same rate. This is the reason why the same side of the Moon is always observed.

To receive full credit (2 points) for this question, the response should include an explanation of lunar revolution and rotation. Partially correct answers will receive a score of 1 point.

**10** The correct answer is H (They work together to maintain the chemical balance of blood).

Strand: F—Processes of Life

Benchmark: SC.F.1.3.1 The student understands that living things are composed of major systems that function in reproduction, growth, maintenance, and regulation.

**Answer Strategy:**

An understanding of body system function and interaction is required to answer this question. The main function of the excretory system is to remove wastes from the blood, thereby maintaining blood chemistry. The components, although performing different functions, are part of a system and work together to cleanse the blood and remove the nitrogen-containing waste products of cellular metabolism.

**Distractor Rationale:**

- F. These organs are not part of the circulatory system, which transports blood.
- G. Organs within a system work together rather than independently of each other.
- I. The kidney and ureters are not storage organs. The bladder stores waste urine until it can be voided.

- 11** The correct answer is A (Both parent guinea pigs carry the recessive gene).

Strand: F—The Processes of Life

Benchmark: SC.F.2.3.2 The student knows that the variation in each species is due to the exchange and interaction of genetic information as it is passed from parent to offspring.

**Answer Strategy:**

An understanding of basic genetics (principle of dominance) is required to answer this question. Two organisms exhibiting a dominant trait can produce an offspring exhibiting the recessive trait if both parents carry the recessive allele for that trait. In this question, the guinea pigs have black fur, the dominant trait. The brown fur of the offspring would occur if both parent guinea pigs had the recessive gene.

**Distractor Rationale:**

- B. The female parent must also carry the recessive trait for brown fur.
- C. The male parent must also carry the recessive trait for brown fur.
- D. The brown fur was a result of the recessive gene from both parents. A spontaneous mutation could have caused the brown fur, but the presence of recessive genes in both parents is much more likely.

- 12** The correct answer is H (to break down the remains of other living things).

Strand: G—How Living Things Interact with Their Environment

Benchmark: SC.G.1.3.4 The student knows that the interaction of organisms with each other and with the nonliving parts of their environments result in the flow of energy and the cycling of matter throughout the system. (Also assesses SC.G.1.3.1 knows that viruses depend on other living things, and SC.G.1.3.5 knows that life is maintained by a continuous input of energy from the Sun and by the recycling of the atoms that make up the molecules of living organisms.)

**Answer Strategy:**

An understanding of ecological relationships is required to answer this question. Decomposers are ecosystem consumers that break down organic matter. For example, dead plants are decomposed into simple inorganic matter.

**Distractor Rationale:**

- F. Decomposers replace minerals. Plants and other animals provide nitrogen for animals.
- G. Dissolved oxygen in the water is the result of the diffusion of atmospheric oxygen into water.
- I. The chlorophyll required for photosynthesis is produced by plants.



- 13** The correct answer is A (The ultraviolet radiation may result in damage to living organisms).

Strand: G—How Living Things Interact with Their Environment

Benchmark: SC.G.2.3.4 The student understands that humans are a part of an ecosystem and their activities may deliberately or inadvertently alter the equilibrium in ecosystems. (Also assesses SC.D.2.3.2 knows the positive and negative consequences of human action on the Earth's systems.)

**Answer Strategy:**

An understanding of the effects of ultraviolet (UV) radiation is required to answer this question. UV-B, high-energy light rays, deeply penetrate into water, leaves, and skin. These rays can harm the metabolism in cells.

**Distractor Rationale:**

- B. Overheating of an air conditioning system is a result of many things. Ultraviolet radiation is not involved.
- C. A rapid increase in water temperature of the Pacific Ocean would not occur. Any temperature changes resulting from the destruction of the ozone layer would be limited.
- D. Communication satellites are located above Earth's ozone layer.

- 14** The correct answer is I (His new theories increased scientific knowledge by looking at old observations in a new way).

Strand: H—The Nature of Science

Benchmark: SC.H.1.3.1 The student knows that scientific knowledge is subject to modification as new information challenges prevailing theories and as a new theory leads to looking at old observations in a new way.

**Answer Strategy:**

Knowledge of the scientific process is required to answer this question. Science is the process of gathering knowledge about the natural world, making observations, and asking questions about these observations. Newton's message is that his scientific accomplishments were based on the work of others who studied scientific phenomena before him.

**Distractor Rationale:**

- F. While Einstein would be considered a "giant," Newton lived long before Einstein and could not have worked on Einstein's theory of relativity.
- G. The invention of the telescope does not explain Newton's statement of using previous research to advance science. Galileo, not Newton, invented the telescope.
- H. Newton did not extend the Ptolemaic system of epicycles, which was based on the incorrect geocentric model of the Universe.

- 15** The correct answer is B (Accurate notes will help other scientists replicate and validate the results).

Strand: H—The Nature of Science

Benchmark: SC.H.1.3.4 The student knows that accurate record keeping, openness, and replication are essential to maintaining an investigator’s credibility with other scientists and society. (Also assesses SC.H.1.3.7 knows that when similar investigations give different results, the scientific challenge is to verify whether the differences are significant by further study.)

**Answer Strategy:**

An understanding of scientific methods, including communicating results, is required to answer this question. By keeping accurate notes, a scientist can share the knowledge gained and enable others to repeat the investigation to see if similar results are achieved. This record may also lead to other questions and experiments.

**Distractor Rationale:**

- A. The occurrence of predicted results is not dependent only on accurate notes.
- C. Regardless of the subjects, accurate notes should be taken in all experiments.
- D. The opposite of this is true. Replication of results and experimental methods is critical to science.

- 16** The correct answer is I (the space available for each seed).

Strand: H—The Nature of Science

Benchmark: SC.H.1.3.5 The student knows that a change in one or more variables may alter the outcome of an investigation.

**Answer Strategy:**

A variable is a factor that changes in an experiment to test the hypothesis. In this experiment, the only variable (factor changed) was the number of seeds placed in each pot. Since the pots and soil are identical, each seed would have a different amount of space to grow depending on the number of seeds planted in each pot.

**Distractor Rationale:**

- F. The soil was the same in each pot.
- G. Temperature data was not measured or recorded in this experiment.
- H. The mass of each plant was not manipulated in the experiment, but may have varied as a result of the changes made to the space available for each seed.









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