

# FCAT 2.0 Mathematics Sample Answers

This booklet contains the answers to the FCAT 2.0 Mathematics sample questions, as well as explanations for the answers. It also gives the Next Generation Sunshine State Standards (NGSSS) benchmark assessed by each item. Although the Florida State Board of Education adopted the Common Core State Standards in the summer of 2010, these standards have not yet been implemented. For this reason, the FCAT 2.0 tests and sample questions and answers are based on the 2007 NGSSS. The benchmarks included in this booklet provide teachers with additional information. For more detailed information, follow this link to the Florida NGSSS website: <http://www.floridastandards.org/index.aspx>, or follow this link to the current benchmark language in the *FCAT 2.0 Mathematics Test Item Specifications*: <http://fcat.fldoe.org/fcat2/itemspecs.asp>.

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.

Multiple-choice and gridded-response items in FCAT 2.0 Mathematics tests are scored by awarding one point for each correct answer.

The intent of these sample test materials is to orient teachers and students to the types of questions on FCAT 2.0 tests. By using these materials, students will become familiar with the types of items and response formats they will see on the actual test. The sample questions and answers are not intended to demonstrate the length of the actual test, nor should student responses be used as an indicator of student performance on the actual test. Additional information about test items can be found in the *FCAT 2.0 Test Item Specifications* at <http://fcat.fldoe.org/fcat2/itemspecs.asp>.

The sample questions for students and the sample answers for teachers will only be available online, at <http://fcat.fldoe.org/fcat2/fcatitem.asp>.

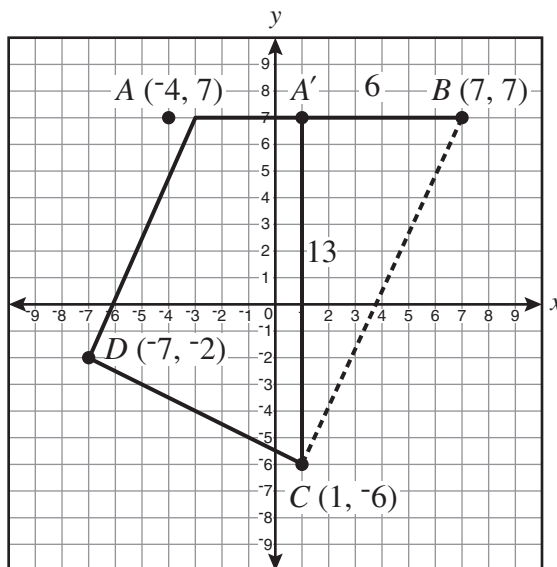
1 The correct answer is 72 feet.



Reporting Category: Geometry and Measurement

Benchmark: MA.8.G.2.4 Validate and apply Pythagorean Theorem to find distances in real-world situations or between points in the coordinate plane.

Apply the Pythagorean theorem to determine the length of  $BC$ . First, determine the length of the vertical line segment that extends from  $A'(1, 7)$ , to point  $C$ . Then, find the length on the horizontal line segment from  $A'(1, 7)$  to point  $B$  (see illustration below).



Length of  $A'C = 13$   
Length of  $A'B = 6$

Use the Pythagorean theorem (from the Grades 6–8 FCAT 2.0 Mathematics Reference Sheet) and substitute in measurements from the graph.

$$a^2 + b^2 = c^2$$

$$13^2 + 6^2 = BC^2$$

$$169 + 36 = BC^2$$

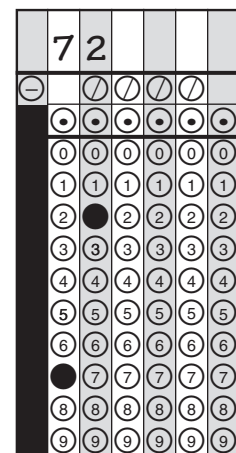
$$\sqrt{205} = BC$$

$$14.317821 \approx BC$$

Apply the given scale, each unit represents 5 feet, to determine the actual distance from  $B$  to  $C$ .

$$14.317821 \times 5 = 71.589105$$

The distance from point  $B$  to point  $C$  rounded to the nearest foot is 72 feet.



**2** The correct answer is 35.



Reporting Category: Number: Operations, Problems, and Statistics

Benchmark: MA.8.S.3.1 Select, organize, and construct appropriate data displays, including box-and-whisker-plots, scatter plots, and lines of best fit to convey information and make conjectures about possible relationships.

The median, the middle point of a set of rank-ordered numbers where half of the numbers are above the median and half are below it, is 35.

	3	5				
⊖	⊘	⊘	⊘	⊘	⊘	⊘
⊙	⊙	⊙	⊙	⊙	⊙	⊙
0	0	0	0	0	0	0
1	1	1	1	1	1	1
2	2	2	2	2	2	2
3	●	3	3	3	3	3
4	4	4	4	4	4	4
5	5	●	5	5	5	5
6	6	6	6	6	6	6
7	7	7	7	7	7	7
8	8	8	8	8	8	8
9	9	9	9	9	9	9

**3** The correct answer is 2.5 feet.



Reporting Category: Geometry and Measurement

Benchmark: MA.8.G.2.1 Use similar triangles to solve problems that include height and distances.

To find the length, in feet, of segment  $EC$ , start by identifying the two similar triangles in the diagram. Then, identify the corresponding parts to set up a proportion:

$$\frac{EC}{2} = \frac{5}{4}$$

$$EC = \frac{5 \cdot 2}{4}$$

$$EC = \frac{10}{4}$$

$$EC = 2.5$$

The length, in feet, of segment  $EC$  is 2.5.

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

**4** The correct answer is A ( $h = \frac{2A}{b}$ ).

Reporting Category: Expressions, Equations, and Functions

Benchmark: MA.8.A.4.1 Solve literal equations for a specified variable.

To solve this problem, solve for  $h$  in terms of  $A$  and  $b$ .

$$\text{Given } A = \frac{1}{2}bh$$

$$2(A) = 2\left(\frac{1}{2}\right)bh$$

$$\frac{2A}{b} = \frac{bh}{b}$$

$$\frac{2A}{b} = h$$

The correct answer is A.

**5** The correct answer is I (36 inches).

Reporting Category: Expressions, Equations, and Functions

Benchmark: MA.8.A.1.1 Create and interpret tables, graphs, and models to represent, analyze, and solve problems related to linear equations, including analysis of domain, range, and the difference between discrete and continuous data.

To find the level for 2.25 inches of rain, interpret the information given in the table.

Use the given information that 0.5 inch of rainfall produces a rise of 8 inches in the storage tank.

- By doubling both given values, 1 inch of rainfall would produce a rise of 16 inches in the storage tank; therefore, 2 inches of rainfall would produce a rise of  $16 + 16$ , or 32 inches in the storage tank.
- By taking half of both given values, 0.25 inch of rainfall would produce a rise of 4 inches in the storage tank.

Therefore, 2.25 inches of rainfall would produce a rise of  $32 + 4$ , or 36 inches in the storage tank. Option I is the correct answer.

**6** The correct answer is C ( $25^\circ$ ).

Reporting Category: Geometry and Measurement

Benchmark: MA.8.G.2.2 Classify and determine the measure of angles, including angles created when parallel lines are cut by transversals.

To find the measure of  $\angle BHC$ , use complementary and vertical angles. If the measure of  $\angle FHA$  is  $65^\circ$ , then the measure of  $\angle FHE$  is  $25^\circ$ , since  $\angle FHA$  and  $\angle FHE$  are complementary angles. The measure of  $\angle BHC$  is  $25^\circ$  because  $\angle BHC$  and  $\angle FHE$  are vertical angles and must be congruent. Option C is the correct answer.

**7** The correct answer is I (Expression 4).

Reporting Category: Number: Operations, Problems, and Statistics

Benchmark: MA.8.A.6.4 Perform operations on real numbers (including integer exponents, radicals, percents, scientific notation, absolute value, rational numbers, and irrational numbers) using multi-step and real-world problems. Also assesses MA.8.A.6.3 Simplify real number expressions using the laws of exponents.

To find the expression with the least value, simplify all four expressions.

Expression 1:  $4.6507 - 5.196 = -0.5453$

Expression 2:  $\sqrt{45 - 9} = \sqrt{36} = \pm 6$

Expression 3:  $|-2 - 1| = |-3| = 3$

Expression 4:  $(-3)^3 = (-3)(-3)(-3) = -27$

Expression 4, which is option I, has the least value, -27.





**9** The correct answer is 31 cubic yards.



Reporting Category: Geometry and Measurement

Benchmark: MA.8.G.5.1 Compare, contrast, and convert units of measure between different measurement systems (US customary or metric (SI)) and dimensions including temperature, area, volume, and derived units to solve problems.

To find how many cubic yards are equivalent to 837 cubic feet, first determine how many cubic feet are in one cubic yard.

$$1 \text{ linear yard} = 3 \text{ linear feet} = 3^1$$

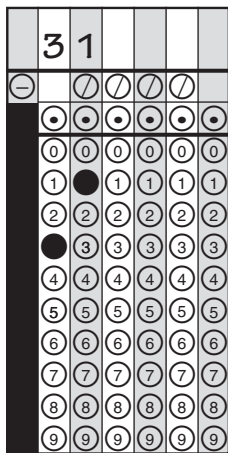
$$1 \text{ square yard} = 9 \text{ square feet} = 3^2$$

$$1 \text{ cubic yard} = 27 \text{ cubic feet} = 3^3$$

Then, divide 837 cubic feet by 27 cubic feet.

$$\frac{837}{27} = 31$$

The equivalent of 837 cubic feet is 31 cubic yards.



**10** The correct answer is A ( $y = 0.88x$ ).

Reporting Category: Expressions, Equations, and Functions

Benchmark: MA.8.A.1.5 Translate among verbal, tabular, graphical, and algebraic representations of linear functions.

To find the equation that best represents the relationship shown in the graph, use the slope-intercept form of a linear equation (from the Grades 6–8 FCAT 2.0 Mathematics Reference Sheet),  $y = mx + b$ .

On the graph, the line appears to pass through the points (0, 0) and (10, 8.8).

Calculate the slope ( $m$ ) =  $\frac{8.8-0}{10-0} = 0.88$

Using the slope and the y-intercept ( $b = 0$ ), insert the values into the slope-intercept form of a linear equation. Therefore,  $y = 0.88x + 0$  or  $y = 0.88x$ . The equation that best represents the relationship shown in the graph is option A.

- 11** The correct answer is F (graphical representation of  $8 \leq 14 \leq 20$ ).

Reporting Category: Expressions, Equations, and Functions

Benchmark: MA.8.A.4.2 Solve and graph one- and two-step inequalities in one variable.

To determine which number line best displays the range of yearly rainfall for the past 10 years, start at 14. Then, subtract 6 to determine the lowest point and add 6 to 14 to determine the highest point. Thus,

$$14 - 6 \leq 14 \leq 14 + 6,$$

$$8 \leq 14 \leq 20$$

The best graphical representation of  $8 \leq 14 \leq 20$  would be option F because the yearly rainfall is greater than or equal to 8 inches and less than or equal to 20 inches.

**12** The correct answer is C (88 and 96).

Reporting Category: Number: Operations, Problems, and Statistics

Benchmark: MA.8.S.3.2 Determine and describe how changes in data values impact measures of central tendency.

To find the answer, list the data from least to greatest.

85, 85, 87, 89, 90, 90, 95

The median, the middle value of a set of rank-ordered numbers where half of the numbers are above and half are below it, is 89.

To keep the median at 89 when two additional quiz scores are added, one score must be below the median and one score must be above the median. Note: the two quiz scores could be equal to the median, but this is not a given answer choice.

The correct answer is C, 88 and 96, where 88 is below the median of 89 and 96 is above the median of 89.

- 13** The correct answer is I (The total amount of Carol's mortgage ( $x$ ) is one-half of Sam's rent ( $y$ )).

Reporting Category: Expressions, Equations, and Functions

Benchmark: MA.8.A.1.6 Compare the graphs of linear and nonlinear functions for real-world situations.

To find which of the following situations could best be represented by the function in the graph, choose a solution (ordered pair) to match each given situation and test it to see if it is a point on the line displayed.

For example:

Option F – If there are 4 girls ( $y$ ) in the class, there would be 8 boys ( $x$ ) in the class;  $(8, 4)$  is not on the line.

Option G – If 3 planes land ( $y$ ), 6 planes take off ( $x$ );  $(6, 3)$  is not on the line.

Option H – For each (1) raffle ticket ( $x$ ), the cost is \$1 ( $y$ );  $(1, 1)$  is not on the line.

Option I – If Carol's mortgage payment ( $x$ ) is \$10 (which is unrealistic, but it appears on the line), then Sam's rent ( $y$ ) would be twice as much, \$20;  $(10, 20)$  is shown on the line.

The situation that could be represented by the function shown in the graph is option I: the total amount of Carol's mortgage ( $x$ ) is one-half of Sam's rent ( $y$ ).

- 14** The correct answer is C (For every 8 chairs produced, the cost per chair decreases by \$1).

Reporting Category: Expressions, Equations, and Functions

Benchmark: MA.8.A.1.2 Interpret the slope and the  $x$ - and  $y$ -intercepts when graphing a linear equation for a real-world problem.

To find what the slope of the dashed line segment represents, analyze how  $(-\frac{1}{8})$  relates back to the graph. Slope is defined as the change in  $\frac{y}{x}$ . Based on the graph,  $y$  is the "cost per chair," or the numerator in the slope, and  $x$  is the "number of chairs," or the denominator in the slope. Determine if the slope is positive (increasing) or negative (decreasing). Because the slope is negative  $(-\frac{1}{8})$ , it must represent a decrease in the cost per chair (\$1) for every 8 chairs produced, or option C.



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