

FCAT Mathematics Sample Test

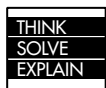
Scoring Guide and Answer Key: Grade



Scoring the “Think, Solve, and Explain” Questions

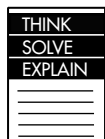
The “Think, Solve, and Explain” questions allow you to receive partial credit for your answers, even if they are not 100% correct. Your answers will be read and points will be given based on the correctness and completeness of your answers. If you get half of an answer correct, you will get half the points. Your answers to the “Think, Solve, and Explain” questions will be scored by two people who have been trained to read student answers. The final score for an answer will be the average of both scores.

Your answer to a “Think, Solve, and Explain” question may be slightly different from another student’s answer, and that is okay. The people who read your answers will use a scoring guide, called a *rubric*, to score your answer. This makes scoring fair for all students. The scoring rubrics for the short-answer questions and the long-answer questions are shown below:



Rubric for Short-Answer Questions

- | | |
|----------|--|
| 2 points | A score of two indicates that the student has demonstrated a thorough understanding of the mathematics concepts and/or procedures embodied in the task. The student has completed the task correctly, in a mathematically 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 provide a correct solution, but may demonstrate some misunderstanding of the underlying mathematical concepts or procedures. Conversely, a student may provide a computationally incorrect solution but could have applied appropriate and mathematically sound procedures, or the student’s explanation could indicate an understanding of the task, even in light of the error. |
| 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 Long-Answer Questions

- 4 points** A score of four is a response in which the student demonstrates a thorough understanding of the mathematics concepts and/or procedures embodied in the task. The student has responded correctly to the task, used mathematically sound procedures, and provided clear and complete explanations and interpretations.
- The response may contain minor flaws that do not detract from the demonstration of a thorough understanding.
- 3 points** A score of three is a response in which the student demonstrates an understanding of the mathematics concepts and/or procedures embodied in the task. The student's response to the task is essentially correct with the mathematical procedures used and the explanations and interpretations provided demonstrating an essential but less than thorough understanding.
- The response may contain minor errors that reflect inattentive execution of mathematical procedures or indications of some misunderstanding of the underlying mathematics concepts and/or procedures.
- 2 points** A score of two indicates that the student has demonstrated only a partial understanding of the mathematics concepts and/or procedures embodied in the task. Although the student may have used the correct approach to obtaining a solution or may have provided a correct solution, the student's work lacks an essential understanding of the underlying mathematical concepts.
- The response contains errors related to misunderstanding important aspects of the task, misuse of mathematical procedures, or faulty interpretations of results.
- 1 point** A score of one indicates that the student has demonstrated a very limited understanding of the mathematics 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 reached an inadequate conclusion and/or provided reasoning that was faulty or incomplete.
- The response exhibits many errors 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 teddy bear (C).

Strand: A — Number Sense, Concepts, and Operations

Benchmark MA.A.1.2.2 The student understands the relative size of whole numbers, commonly used fractions, decimals, and percents.

You may have solved this problem using the strategy shown below or another one you know.

To solve this problem, you want to find the date in the table that is the smallest number. One of the ways you can do this is to put the dates in order from the least to the greatest.
1902, 1909, 1929, 1945

Now choose the smallest number, which is 1902. The teddy bear was invented in 1902.

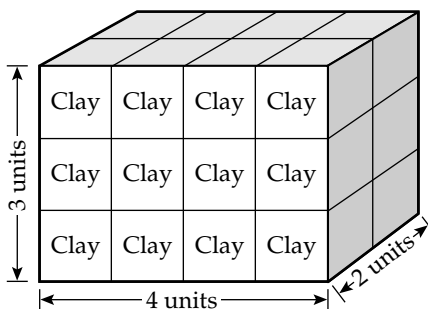
2 The correct answer is 24 cubic units (I).

Strand: B — Measurement

Benchmark MA.B.1.2.2 The student solves real-world problems involving length, weight, perimeter, area, capacity, volume, time, temperature, and angles.

You may have solved this problem using the strategy shown below or another one you know.

To find the volume of the stack of clay, you find the length, the width, and the height of the stack. Each cube measures 1 unit on each side. There are 4 cubes across the front, so the length is 4 units. There are 2 cubes from front to back, so the width is 2 units. The stack is 3 cubes tall, so the height is 3 units.



Volume of a cube = length × width × height
--

Multiply the length, width, and height to find the volume of the stack.

$$\begin{aligned}
 \text{Volume} &= 4 \times 2 \times 3 \\
 &= 8 \times 3 \\
 &= 24 \text{ (cubic units)}
 \end{aligned}$$

**3 The correct answer is 9,518 feet (B).**

Strand: A — Number Sense, Concepts, and Operations

Benchmark MA.A.3.2.3 The student adds, subtracts, and multiplies whole numbers, decimals, and fractions, including mixed numbers, and divides whole numbers to solve real-world problems, using appropriate methods of computing, such as mental mathematics, paper and pencil, and calculator.

You may have solved this problem using the strategy shown below or another one you know.

To solve this problem, you must first find the largest number, which would be the average depth of the deepest ocean, and the smallest number, which would be the average depth of the shallowest ocean. The largest number is 12,925, and the smallest number is 3,407.

The difference is the answer you get when you subtract the smallest number from the largest number.

$$\begin{array}{r} 12,925 \\ -3,407 \\ \hline 9,518 \text{ (feet)} \end{array}$$

4 The correct answer is 4 centimeters (G).

Strand: B — Measurement

Benchmark MA.B.2.2.2 The student selects and uses appropriate standard and nonstandard units of measurement, according to type and size.

You may have solved this problem using the strategy shown below or another one you know.

In order to decide which measurement would be best, you need to think about how big or small the different units are.

A meter and a kilometer are both much bigger than a caterpillar. A millimeter is very small, and 4 of them would still be quite a bit smaller than a caterpillar.

The only measurement that is close to the size of a caterpillar is 4 centimeters.



5 The correct answer is 12.

Strand: D — Algebraic Thinking

Benchmark MA.D.1.2.1 The student describes a wide variety of patterns and relationships through models, such as manipulatives, tables, graphs, and rules using algebraic symbols.

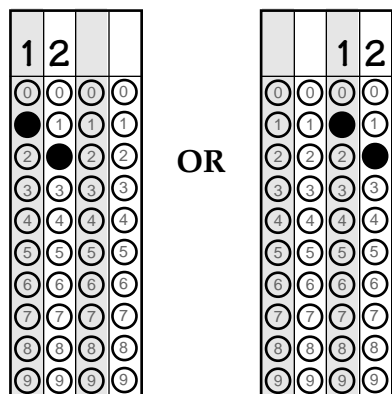
You may have solved this problem using the strategy shown below or another one you know.

To solve this problem, you find the pattern. You are told in the problem that:

- Row 1 has 2 people.
- Row 2 has 4 people.
- Row 3 has 6 people.

If you continue the same pattern, you will add 2 more people to each row.

- Row 4 has 8 people.
- Row 5 has 10 people.
- Row 6 has 12 people.





6 The correct answer is 60%.

Strand: E — Data Analysis and Probability

Benchmark MA.E.1.2.1 The student solves problems by generating, collecting, organizing, displaying, and analyzing data using histograms, bar graphs, circle graphs, line graphs, pictographs, and charts. (Incorporate MA.E.1.2.3: Analyzes real-world data to recognize patterns and relationships of the measures of central tendency using tables, charts, histograms, bar graphs, line graphs, pictographs, and circle graphs generated by appropriate technology, including calculators and computers.)

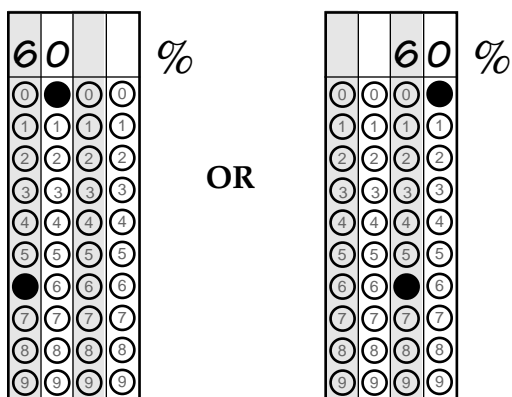
You may have solved this problem using the strategy shown below or another one you know.

To solve this problem, you know that the whole circle represents 100% and the popcorn used at home is what is left after all the other categories are subtracted from 100%. You look at the circle graph and find the percent of popcorn used at movies, ball games, etc. (30%) and add it to the percent of popcorn used for seed (10%).

$$\begin{array}{r} 30\% \\ +10\% \\ \hline 40\% \end{array}$$

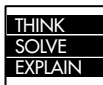
Then you subtract 40% from 100%.

$$\begin{array}{r} 100\% \\ -40\% \\ \hline 60\% \text{ (used at home)} \end{array}$$





7 The correct answer is shown below.



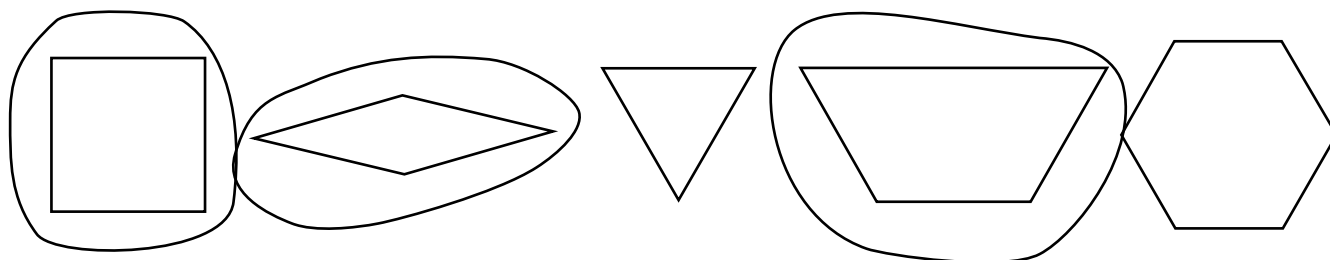
Strand: C — Geometry and Spatial Sense

Benchmark MA.C.1.2.1 The student, given a verbal description, draws and/or models two- and three-dimensional shapes and uses appropriate geometric vocabulary to write a description of a figure or a picture composed of geometric figures.

You may have solved this problem using the strategy shown below or another one you know.

To solve this problem, you must answer two parts of the question.

For the first part, draw a circle around each quadrilateral. A quadrilateral has 4 sides and 4 angles, so draw a circle around each shape with 4 sides and 4 angles. The correct answers are the square, the rhombus, and the trapezoid.



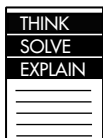
For the second part, explain what makes a shape a quadrilateral.

You might write: “All quadrilaterals have 4 sides and 4 angles.”

To receive full credit (2 points) for this problem, your answers should include three circled quadrilaterals and an explanation similar to the one shown. Partially correct answers will receive a score of 1 point.



8 The correct answer is shown below.



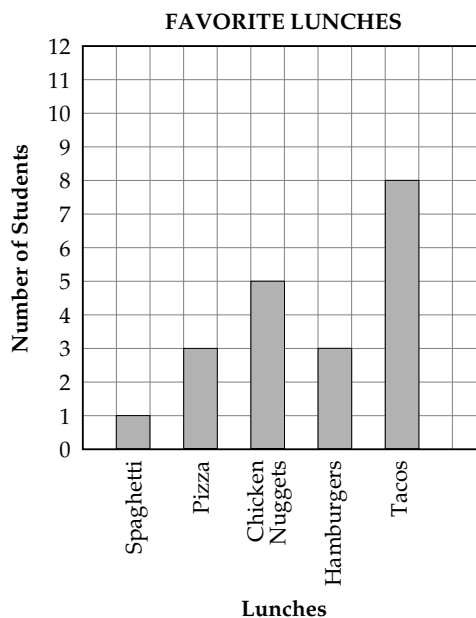
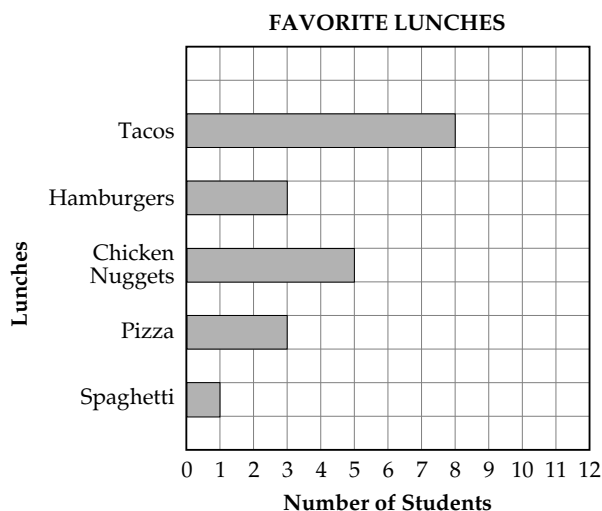
Strand: E — Data Analysis and Probability

Benchmark MA.E.1.2.1 The student solves problems by generating, collecting, organizing, displaying, and analyzing data using histograms, bar graphs, circle graphs, line graphs, pictographs, and charts. (Incorporate MA.E.1.2.3: Analyzes real-world data to recognize patterns and relationships of the measures of central tendency using tables, charts, histograms, bar graphs, line graphs, pictographs, and circle graphs generated by appropriate technology, including calculators and computers.)

You may have solved this problem using the strategy shown below or another one you know.

To solve this problem, you must answer two parts of the question.

First you count the number of students who chose each kind of lunch. Then you are ready to draw the bar graph. Your bar graph should look like one of the two examples shown below.



NOTE: Other bar graphs will be accepted as long as they display the data correctly.



To answer the next part of the problem, any two statements similar to those below would be correct answers.

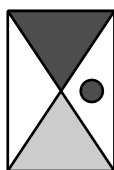
- More students like tacos than any other lunch.
- Equal numbers of students like pizza and hamburgers.
- Spaghetti is the least favorite lunch and tacos are the favorite.
- Chicken nuggets is the second favorite lunch.
- Eight students chose tacos, five students chose chicken nuggets, three students chose pizza, three students chose hamburgers, and one student chose spaghetti.

NOTE: These are not the only correct statements.

To receive full credit (4 points) for this problem, your answer should include a bar graph similar to one of the two graphs shown and two complete statements similar to the ones shown. Partially correct answers will receive a score of 3, 2, or 1.



9 The correct answer is (A).

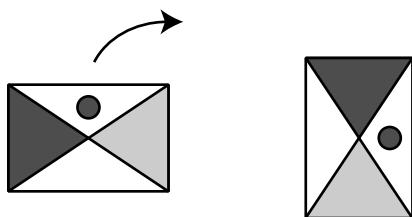


Strand: C— Geometry and Spatial Sense

Benchmark MA.C.2.2.2 The student predicts, illustrates, and verifies which figures could result from a flip, slide, or turn of a given figure.

You may have solved this problem using the strategy shown below or another one you know.

To solve this problem, you find the figure that has been rotated 90° clockwise. The figure should look as if it has been turned to the right $\frac{1}{4}$ turn.



10 The correct answer is $2n$ (I).

Strand: D — Algebraic Thinking

Benchmark MA.D.2.2.1 The student represents a given simple problem situation using diagrams, models, and symbolic expressions translated from verbal phrases, or verbal phrases translated from symbolic expressions, etc.

You may have solved this problem using the strategy shown below or another one you know.

To solve this problem, you know that n represents a one-way trip. A round trip from Brazil to the island and back to Brazil would be the distance n traveled 2 times, or $2 \times n$ or $2n$.



11 The correct answer is flip (B).

Strand: C — Geometry and Spatial Sense

Benchmark MA.C.2.2.1 The student understands the concepts of spatial relationships, symmetry, reflections, congruency, and similarity.

You may have solved this problem using the strategy shown below or another one you know.

To solve this problem, find how you must move the half of the medallion shown in order to make a symmetrical medallion.

In a symmetrical design, both sides match exactly along a line of symmetry (the dotted line in the design). If you flip the half of the medallion over the dotted line, you would see the entire medallion divided (split) by a line of symmetry.

12 The correct answer is 18 goals (I).

Strand: D — Algebraic Thinking

Benchmark MA.D.2.2.2 The student uses informal methods such as physical models and graphs to solve real-world problems involving equations and inequalities.

You may have solved this problem using the strategy shown below or another one you know.

To solve this problem, first find how many goals Denise and Nona scored together.

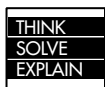
$$\begin{array}{r} 4 \\ +5 \\ \hline 9 \end{array}$$

The total, 9, is half of all the goals scored by the team last season. So if you multiply 2 times 9, you get the total number of goals the team scored last season.

$$2 \times 9 = 18 \quad \text{or} \quad \begin{array}{r} 9 \\ +9 \\ \hline 18 \text{ (goals)} \end{array}$$



13 The correct answer is shown below.



Strand: E — Data Analysis and Probability

Benchmark MA.E.2.2.1 The student uses models, such as tree diagrams, to display possible outcomes and to predict events.

You may have solved this problem using one of the strategies shown below or another one you know.

To solve this problem, find all the ways the three students can win 1st, 2nd, and 3rd place ribbons. There are a total of six ways the students could win the three ribbons.

There are different ways you can show all six of the possibilities.

First Strategy:

A correct answer could list all of the following in this way:

<u>1st</u>	<u>2nd</u>	<u>3rd</u>
K	J	R
K	R	J
J	K	R
J	R	K
R	J	K
R	K	J

Second Strategy:

A correct answer could list all of the following in this way:

<u>Krista</u>	<u>Juan</u>	<u>Rosie</u>
1	2	3
1	3	2
2	1	3
2	3	1
3	1	2
3	2	1

To receive full credit (2 points) for this problem, your answer should show six different ways the students can win 1st, 2nd, and 3rd place ribbons. Partially correct answers will receive a score of 1 point.



14 The correct answer is **86.30**.

Strand: A — Number Sense, Concepts, and Operations

Benchmark MA.A.2.2.1 The student uses place-value concepts of grouping based on powers of ten (thousandths, hundredths, tenths, ones, tens, hundreds, thousands) within the decimal number system.

You may have solved this problem using the strategy shown below or another one you know.

In order to get the greatest number, put the digit with the greatest value (8) in the place that has the greatest value, which is the tens place.

 8 .

Then put the next digit (6) in the place with the next largest value, which is the ones place. Continue until you have the digit with the least value in the last place.

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



15 The correct answer is **\$27.00**.

Strand: A — Number Sense, Concepts, and Operations

Benchmark MA.A.3.2.3 The student adds, subtracts, and multiplies whole numbers, decimals, and fractions, including mixed numbers, and divides whole numbers to solve real-world problems, using appropriate methods of computing, such as mental mathematics, paper and pencil, and calculator.

You may have solved this problem using the strategy shown below or another one you know.

To find the cost, multiply the cost per gallon of the gasoline (\$1.50) by the number of gallons of gasoline (18).

$$\begin{array}{r}
 1.50 \\
 \times 18 \\
 \hline
 1200 \\
 +150 \\
 \hline
 27.00
 \end{array}$$

\$	2	7	.	0	0
	0	0		●	●
	1	1		1	1
	●	2		2	2
	3	3		3	3
	4	4		4	4
	5	5		5	5
	6	6		6	6
	7	●		7	7
	8	8		8	8
	9	9		9	9

