MATHEMATICS DEPTH OF KNOWLEDGE EXAMPLE ITEMS

Example items that represent the applicable DOK levels across various Grade 6 Mathematics content domains are provided.

All example and sample items contained in this guide are the property of the Georgia Department of Education.

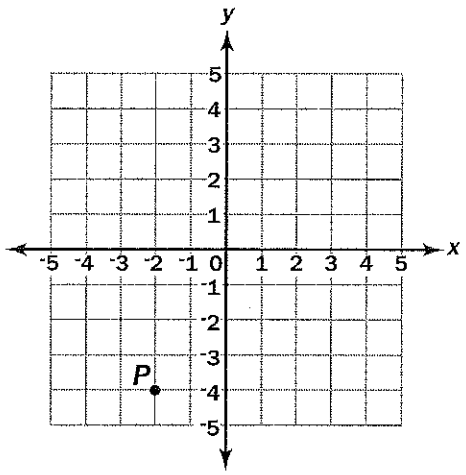
Example Item 1

DOK Level 1:

Mathematics Grade 6 Content Domain: The Number System

Standard: MGSE6.NS.6. Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.

Look at point *P* on the coordinate grid.



What are the coordinates of point *P*?

A. (2, 4)
B. (4, 2)
C. (–2, –4)
D. (–4, –2)

Correct Answer: C

Explanation of Correct Answer: The correct answer is choice (C) (–2, –4). Point *P* is located 2 units to the left of the origin, which gives us a value of –2 for *x*, and 4 units down, which gives us a value of –4 for *y*. Choice (A) is incorrect because the signs of the numbers are ignored. Choice (B) is incorrect because the coordinates are interchanged and the signs are ignored. Choice (D) is incorrect because it interchanges the coordinates.

Example Item 2

DOK Level 2:

Mathematics Grade 6 Content Domain: Ratios and Proportional Relationships

Standard: MGSE6.RP.3. Use ratio and rate reasoning to solve real-world and mathematical problems utilizing strategies such as tables of equivalent ratios, tape diagrams (bar models), double number line diagrams, and/or equations. b. Solve unit rate problems including those involving unit pricing and constant speed. *For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?*

John orders 25 prints from a photo store for $13.00.

What is the cost per print?

A. $0.12
B. $0.38
C. $0.52
D. $1.92

Correct Answer: C

Explanation of Correct Answer: The correct answer is choice (C) $0.52. The cost per print is equal to the total cost divided by the number of prints: $\frac{\$13.00}{25} = \$0.52$. Choice (A) is incorrect because it is the result of subtracting 0.13 from 0.25. Choice (B) is incorrect because it is the result of adding 0.13 and 0.25. Choice (D) is incorrect because it is the result of dividing 25 by 13.

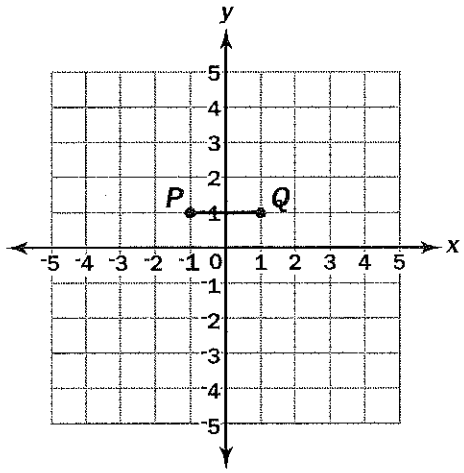
Example Item 3

DOK Level 3:

Mathematics Grade 6 Content Domain: Geometry

Standard: MGSE6.G.3. Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.

Harry is drawing trapezoid *PQRS*. He plots vertices *P* and *Q* on the coordinate grid as shown.



Harry wants the trapezoid to have a height of 3 units.

Which of these could be the coordinates of vertices *R* and *S* of trapezoid *PQRS*?

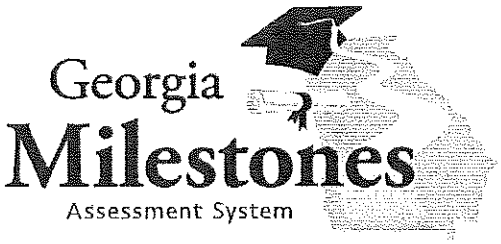
A. *R*(2, 3) and *S*(–3, 3)
B. *R*(3, –3) and *S*(–4, –3)
C. *R*(4, –2) and *S*(–2, –2)
D. *R*(–2, 4) and *S*(2, 2)

Correct Answer: C

Explanation of Correct Answer: The correct answer is choice (C) *R*(4, –2) and *S*(–2, –2). The given coordinates form a trapezoid. From –2 to 1 on the *y*-axis is a height of 3 units. While choices (A) and (B) do give coordinates that form trapezoids, the heights are not 3 units. In choice (A), the height is 2 units. In choice (B), the height is 4 units. Choice (D) is incorrect because the given coordinates do not form a trapezoid.

MATHEMATICS ADDITIONAL SAMPLE ITEMS

This section has two parts. The first part is a set of 10 sample items for the Mathematics portion of the EOG assessment. The second part contains a table that shows for each item the standard assessed, the DOK level, the correct answer (key), and a rationale/explanation about the key and distractors. The sample items can be utilized as a mini-test to familiarize students with the item formats found on the assessment.



Mathematics Formula Sheet

You can find mathematics formula sheets on the Georgia Milestones webpage at http://www.gadoe.org/Curriculum-Instruction-and-Assessment/Assessment/Pages/Georgia-Milestones-Assessment-System.aspx**.**

Look under "EOG Resources."

Item 1

Look at the expression.

$$25 + 45$$

Which of these is an equivalent expression?

A. 5(5 + 45)
B. 5(5 + 9)
C. 5(20 + 40)
D. 5(25 + 9)

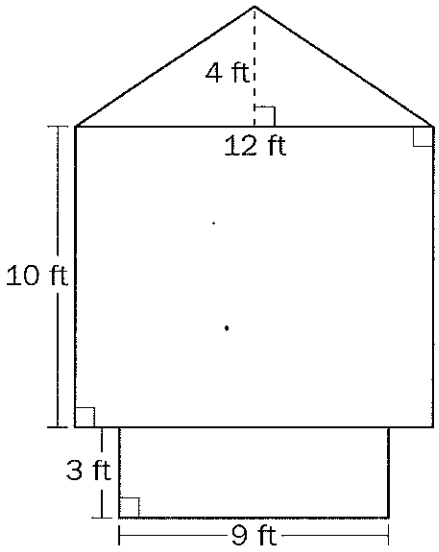
Item 2

Which inequality is true and why?

A. –1 > –4 because –1 is to the right of –4 on a horizontal number line oriented left to right
B. –4 > –5 because –4 is to the left of –5 on a horizontal number line oriented left to right
C. –8 > –7 because –8 is to the right of –7 on a horizontal number line oriented left to right
D. –9 > –6 because –9 is to the left of –6 on a horizontal number line oriented left to right

Item 3

Look at the figure.



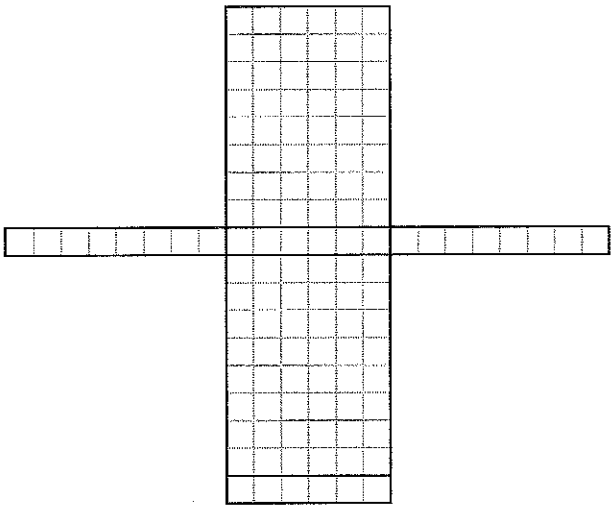
What is the total area of this figure?

A. 141 ft^2
B. 171 ft^2
C. 180 ft^2
D. 195 ft^2

Item 4

Faye made a case for her electronic reading device using the net shown.

Faye's Case



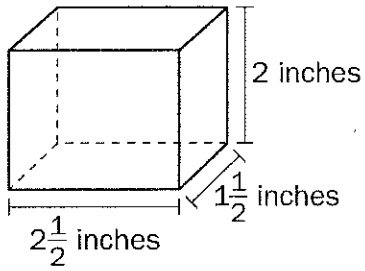
KEY
☐ = 1 square inch

What is the total surface area, in square inches, of Faye's case?

A. 62
B. 96
C. 108
D. 124

Item 5

Look at the box in the shape of a right rectangular prism.



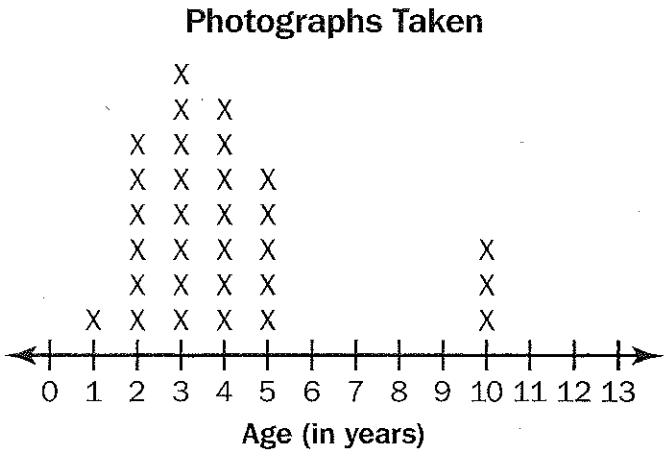
Lorraine plans to fill this box with cubes of the same size. Each cube has side lengths of $\frac{1}{2}$ inch.

How many cubes can fit inside this box without empty space?

A. 4
B. 5
C. 32
D. 60

Item 6

The line plot shows the ages of the children who had their photographs taken at a photography studio during a certain week.



Which statement about the children who had their photographs taken does the spread of the data describe?

A. The average age of the children was 3 years.
B. The most common age of the children was 10 years.
C. The ages of half of the children were 6 years or less.
D. The ages of the children ranged from 1 year to 10 years.

Item 7

Look at the inequality.

$$3y > 27$$

Which set of values for *y* will make this inequality true?

A. 4, 5, 8
B. 5, 7, 9
C. 9, 12, 14
D. 11, 13, 22

Item 8

Harriet has $25 in her savings account. She will add $5 each week and not take any money out of her account.

Which expression represents the amount of money in her savings account after *x* weeks?

A. $25x + 5$
B. $5x + 25$
C. $25(x + 5)$
D. $5(x + 25)$

Item 9

Mary has $\frac{2}{3}$ cup of chocolate chips. A cookie recipe calls for $\frac{1}{6}$ cup of chocolate chips per batch.

How many batches can Mary make using all of her chocolate chips? Show or explain your work and write your answer in the space provided.

_____ batches

Item 10

Mack's Market and Gary's Gardens each sell watermelons by the pound. At Gary's Gardens, a 3-pound watermelon costs $1.26. At Mack's Market, a 5-pound watermelon costs $2.25.

Part A: What is the cost per pound of a watermelon at Gary's Gardens?

Part B: Knowing that the unit price remains the same, how much would a 6-pound watermelon cost at Mack's Market?

Part C: Kate wants to buy a 12-pound watermelon for the lowest price.

How much would she save by buying the watermelon at Gary's Gardens? Show or explain your work and write your answer in the space provided.

$_____

MATHEMATICS ADDITIONAL SAMPLE ITEM KEYS

Item	Standard/ Element	DOK Level	Correct Answer	Explanation
1	MGSE6.NS.4	2	B	The correct answer is choice (B) 5(5 + 9). A common factor of 25 and 45 is 5. $\frac{25}{5} = 5$ and $\frac{45}{5} = 9$. So, 25 + 45 = 5(5 + 9). Choices (A) and (D) are incorrect because they only factor one of the two terms. Choice (C) is incorrect because it is the result of subtracting 5 from each term instead of dividing by 5.
2	MGSE6.NS.7a	2	A	The correct answer is choice (A) $-1 > -4$ because -1 is to the right of -4 on a horizontal number line oriented left to right. Numbers increase in value moving from left to right along the number line. Since -1 is to the right of -4 on the number line, $-1 > -4$. Choices (B), (C), and (D) are incorrect because the location of the numbers was confused, the sign of the numbers was not considered, and the relative positions of the numbers on the number line was misstated.
3	MGSE6.G.1	2	B	The correct answer is choice (B) 171 ft^2. The area of the smaller rectangle is 3 x 9 = 27 square feet. The area of the larger rectangle is 10 x 12 = 120 square feet. The area of the triangle is $\left(\frac{1}{2}\right)(12 \times 4) = 24$ square feet. The total area is 27 + 120 + 24 = 171 square feet. Choice (A) is incorrect because it uses a width of 9 feet for the larger rectangle instead of 12 feet. Choice (C) is incorrect because it combines the two rectangles into one rectangle with dimensions 12 feet by 13 feet. Choice (D) is incorrect because it uses 4 x 12 as the area of the triangle instead of $\left(\frac{1}{2}\right)(12 \times 4)$.
4	MGSE6.G.4	2	D	The correct answer is choice (D) 124. The net is comprised of two rectangles each measuring 8 x 6 inches, two rectangles each measuring 1 x 8 inches, and two rectangles each measuring 1 x 6 inches. The total area is 2(8 x 6) + 2(1 x 8) + 2(1 x 6) = 124 square inches. Choices (A), (B), and (C) are incorrect because they do not include all of the faces of the net.

Item	Standard/ Element	DOK Level	Correct Answer	Explanation
5	MGSE6.G.2	2	D	The correct answer is choice (D) 60. Along the length of the box, 5 cubes will fit. Along the width, 3 cubes will fit. Therefore, 15 cubes will fill the base. The box will hold 4 layers of cubes. That makes the total number of cubes 60. Choices (A) and (B) are incorrect because they are based on the base holding 2 x 1 cubes and there being only 2 layers of cubes. Choice (B) then adds 1 more cube to account for the $\frac{1}{2}$ in the given length and width of the box. Choice (C) is incorrect because it is based on the box holding 4 x 2 cubes in the base or 32 cubes instead of 15.
6	MGSE6.SP.2	1	D	The correct answer is choice (D) The ages of the children ranged from 1 year to 10 years. The least number on the number line with Xs above it is 1. The greatest number on the number line with Xs above it is 10. The data values range from 1 to 10. Choices (A) and (B) are incorrect because they are statements about measures of center instead of a measure of spread. Choice (C) is incorrect because it assumes the spread of the data is the number of ages with Xs above them.
7	MGSE6.EE.5	2	D	The correct answer is choice (D) 11, 13, 22. The values of y that will make the inequality true are the values of y for which $3y$ is greater than 27. $3(11) = 33$; $3(13) = 39$; $3(22) = 66$. Choices (A) and (B) are incorrect because at least one value of y makes $3y$ less than 27. Choice (C) is incorrect because when y is 9, $3y$ is equal to 27.
8	MGSE6.EE.6	2	B	The correct answer is (B) $5x + 25$. Harriet starts with \$25, so the expression must have a value of 25 when $x = 0$. Each week, Harriet adds \$5, so the rate of change is \$5 per week. Choice (A) is incorrect because it interchanges the starting amount with the amount added each week. Choices (C) and (D) use the distributive property incorrectly for this situation.
9	MGSE6.NS.1	2	N/A	See scoring rubric and exemplar responses beginning on page 68.
10	MGSE6.RP.3b	3	N/A	See scoring rubric and exemplar responses beginning on page 69.

MATHEMATICS EXAMPLE SCORING RUBRICS AND EXEMPLAR RESPONSES

Item 9

Scoring Rubric

Points	Description

2	The response achieves the following:
	• The response demonstrates a complete understanding of interpreting and computing quotients of fractions and solving word problems involving division of fractions by fractions.
	• Give 2 points for a correct process AND the correct answer.
	  • Response is correct and complete.
	  • Response shows application of a reasonable and relevant strategy.
	• Mathematical ideas are expressed coherently through a complete, logical, and fully developed response using words, calculations, and/or symbols as appropriate.

1	The response achieves the following:
	• The response demonstrates a partial understanding of interpreting and computing quotients of fractions and solving word problems involving division of fractions by fractions.
	• Give 1 point for a correct process OR a correct answer with no work shown.
	  • Response is only partially correct.
	  • Response shows application of a relevant strategy, though it may be only partially applied or remain unexplained.
	• Mathematical ideas are expressed only partially using words, calculations, and/or symbols as appropriate.

0	The response achieves the following: • The response demonstrates no understanding of interpreting and computing quotients of fractions and solving word problems involving division of fractions by fractions. • Response shows no application of a strategy or application of an irrelevant strategy. • Mathematical ideas cannot be interpreted or lack sufficient evidence to support even a limited understanding.

Exemplar Response

Points Awarded	Sample Response
2	$\frac{2}{3} \div \frac{1}{6} = \frac{2}{3} \times \frac{2}{1} = \frac{4}{3} = 1\frac{1}{3}$ 4 batches
1	4 batches
0	Response is irrelevant, inappropriate, or not provided.

Item 10

Scoring Rubric

Points	Description

4	The response achieves the following:
	• The response demonstrates a complete understanding of using ratio and rate reasoning to solve real-world and mathematical problems.
	• Give 4 points for Part A and Part B and Part C completely correct.
	  ◦ Response is correct and complete.
	  ◦ Response shows application of a reasonable and relevant strategy.
	• Mathematical ideas are expressed coherently through a clear, complete, logical, and fully developed response using words, calculations, and/or symbols as appropriate.

3	The response achieves the following:
	• The response demonstrates a good understanding of using ratio and rate reasoning to solve real-world and mathematical problems.
	• Give 3 points for Part A and Part B correct and Part C partially correct OR Part A or Part B correct and Part C correct based on an error in a previous part.
	  ◦ Response is mostly correct, but contains either a computation error or an unclear or incomplete explanation.
	  ◦ Response shows application of a relevant strategy, though it may be only partially applied or remain unexplained.
	• Mathematical ideas are expressed only partially using words, calculations, and/or symbols as appropriate.

2	The response achieves the following:
	• The response demonstrates a partial understanding of using ratio and rate reasoning to solve real-world and mathematical problems.
	• Give 2 points for Part A and Part B correct OR for Part C correct based on incorrect answers given in Part A and Part B.
	  ◦ Response is only partially correct.
	  ◦ Response shows application of a relevant strategy, though it may be only partially applied or remain unexplained.
	• Mathematical ideas are expressed only partially using words, calculations, and/or symbols as appropriate.

Points	Description

1	The response achieves the following:
	• The response demonstrates a limited understanding of using ratio and rate reasoning to solve real-world and mathematical problems.
	• Give 1 point for Part A correct OR Part B correct OR Part C partially correct.
	  ◦ Response is only partially correct.
	  ◦ Response shows incomplete or inaccurate application of a relevant strategy.
	• Mathematical ideas are expressed only partially using words, calculations, and/or symbols as appropriate.

0	The response achieves the following: • The response demonstrates no understanding of using ratio and rate reasoning to solve real-world and mathematical problems. ◦ Response shows no application of a strategy. • Mathematical ideas cannot be interpreted or lack sufficient evidence to support even a limited understanding.

Exemplar Response

Points Awarded	Sample Response
4	Part A: $0.42 Part B: $2.70 Part C: By shopping at Gary's Gardens, Kate will save $0.36. AND The difference in cost per pound at the two places is $0.03 per pound times 12 pounds, which is $0.36. OR other valid response
3	Part A: $0.42 Part B: $2.70 Part C: $0.36 OR other valid response
2	Part A: $0.42 Part B: $2.70
1	Part A: $0.42
0	Response is irrelevant, inappropriate, or not provided.