MATHEMATICS DEPTH OF KNOWLEDGE EXAMPLE ITEMS

Example items that represent the applicable DOK levels across various Grade 7 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 7 Content Domain: Statistics and Probability

Standard: MGSE7.SP.5. Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around $\frac{1}{2}$ indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.

Which of these probability values indicates an event that is MOST LIKELY to happen?

A. $\frac{1}{17}$

B. $\frac{3}{17}$

C. $\frac{3}{20}$

D. $\frac{17}{20}$

Correct Answer: D

Explanation of Correct Answer: The correct answer is choice (D) $\frac{17}{20}$. Choice (A) is incorrect because it indicates the probability of the event that is least likely to happen. Choices (B) and (C) are incorrect because they represent the probabilities of events that are less likely to happen than the event described by choice (D). Both probabilities are less than $\frac{17}{20}$.

Example Item 2

DOK Level 2:

Mathematics Grade 7 Content Domain: Ratio and Proportional Relationships

Standard: MGSE7.RP.2. Recognize and represent proportional relationships between quantities. c. Represent proportional relationships by equations. For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as $t = pn$.

A package of Little Bites dog cookies costs \$9.20.

Which equation can be used to find the total cost, c, of p packages of dog cookies?

A. $c = p + 9.20$

B. $c = p - 9.20$

C. $c = \dfrac{p}{9.20}$

D. $c = 9.20p$

Correct Answer: D

Explanation of Correct Answer: The correct answer is choice (D) $c = 9.20p$. Choice (D) is correct because the total cost and the number of packages are in a proportional relationship, so the total cost is the product of the cost per package and the number of packages. Choice (A) is incorrect because it adds the number of packages and the cost per package. Choice (B) is incorrect because it subtracts the cost per package from the number of packages. Choice (C) is incorrect because it divides the number of packages by the cost per package instead of multiplying.

Example Item 3

DOK Level 3:

Mathematics Grade 7 Content Domain: The Number System

Standard: MGSE7.NS.2. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.

Which rational numbers when multiplied by $-\frac{1}{2}$ will result in a positive rational number as the product? Why?

A. any negative rational number because the product of two negative rational numbers is a positive rational number

B. any even rational number because the product of a rational number and an even rational number is a positive rational number

C. any rational number greater than $\frac{1}{2}$ because the product of two rational numbers takes the sign of the greater rational number

D. any rational number greater than 0 because the product of a negative rational number and a positive rational number is a positive rational number

Correct Answer: A

Explanation of Correct Answer: The correct answer is choice (A) any negative rational number because the product of two negative rational numbers is a positive number. Choice (B) is incorrect because it assumes that the even/odd property of a number determines the sign of the product. Choice (C) is incorrect because it confuses the rules of addition and multiplication. Choice (D) is incorrect because it misstates the rule for multiplication of rational numbers.

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.

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

Georgia Milestones Grade 7 EOG Assessment Guide

Mathematics
Formula Sheet
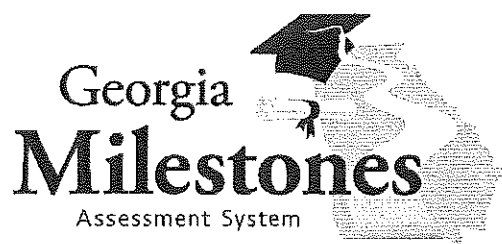
Georgia
Milestones
Assessment System

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

Alicia shoots a basketball at a hoop 100 times. She hits the backboard and misses with $\frac{2}{5}$ of her shots, hits the rim and misses with 32% of her shots, and makes a basket with the rest of her shots.

How many baskets does she make?

A. 68
B. 40
C. 32
D. 28

Item 2

Of the 60 students who auditioned in a singing contest, 40% were asked to come back for a second audition. After the second audition, 6 students were asked to come back for a final audition.

What percentage of the students from the second audition were asked to come back for the final audition?

A. 4%
B. 10%
C. 15%
D. 25%

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Item 3

Figure 1 is a right rectangular pyramid, and Figure 2 is a right rectangular prism.

Figure 1   **Figure 2**
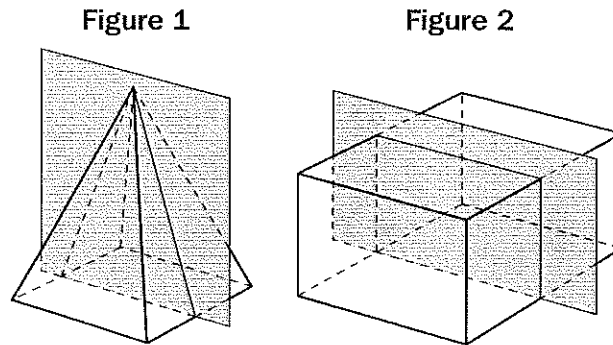
Which statement describes the cross-sections of each figure created by the shaded planes?

A. The cross-sections of both figures are rectangles.

B. The cross-sections of both figures are parallelograms that are not rectangles.

C. The cross-section of Figure 1 is a triangle, and the cross-section of Figure 2 is a rectangle.

D. The cross-section of Figure 1 is a trapezoid, and the cross-section of Figure 2 is a rectangle.

Item 4

Andrea made a spinner with a letter marked on each section. She said the probability of the arrow landing on G is $\frac{1}{4}$.

Which spinner could be the one that Andrea made?

A.

B.

C.

D.

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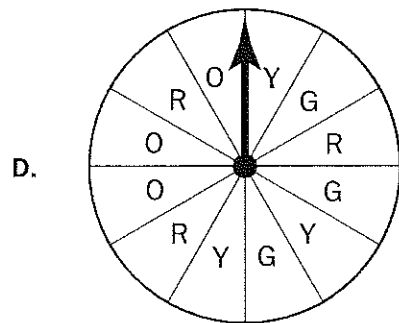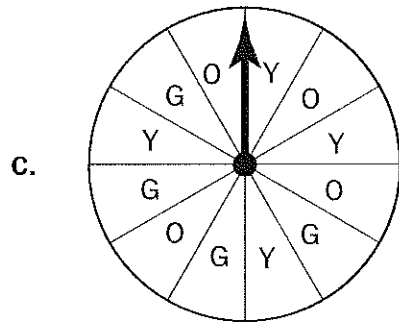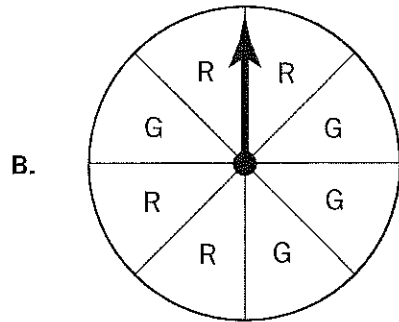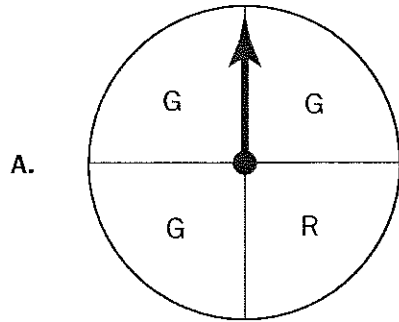
Item 5

Tara had $1\frac{5}{8}$ pounds of dried nuts. She ate $\frac{1}{4}$ pound of dried nuts each day for 6 days.

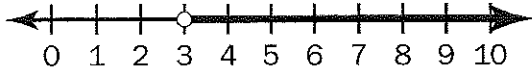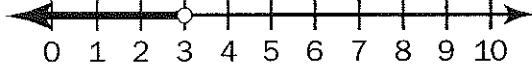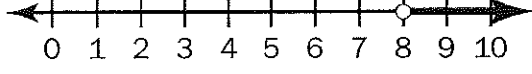How many pounds of dried nuts did Tara have left after 6 days?
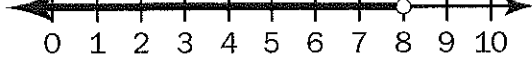
A. $\frac{1}{8}$

B. $\frac{7}{8}$

C. $1\frac{1}{2}$

D. $1\frac{3}{8}$

Item 6

Look at the inequality.

$$2x + 5 < 11$$

Which number line shows the solution to this inequality?

A.

B.

C.

D.

Item 7

A processing machine crushes $3\frac{1}{4}$ kilograms of dry fruits in $\frac{3}{4}$ minute.

What is the rate, in kilograms per minute, at which the machine crushes dry fruits?

A. $\frac{3}{13}$

B. $\frac{16}{39}$

C. $2\frac{7}{16}$

D. $4\frac{1}{3}$

Item 8

A circle has a diameter of 14.5 inches.

Using 3.14 for π, what is the circumference of the circle, rounded to the nearest hundredth of an inch?

A. 22.77 inches
B. 45.53 inches
C. 91.06 inches
D. 165.05 inches

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Item 9

A volcano in the ocean rises approximately 14,000 feet above sea level. Its base is approximately 20,000 feet below sea level.

What is the total height of the volcano? Show or explain your work and write your answer in the space provided.

_____ feet

Item 10

A zoo wanted to know which animal exhibit is liked the most by children under 12 years of age. One day, zoo officials surveyed every 20th person leaving the zoo and asked them to name their favorite animal exhibit. Of the people surveyed, 73% reported that the elephant habitat was their favorite exhibit. The zoo officials concluded that children under 12 years of age like the elephant habitat the most.

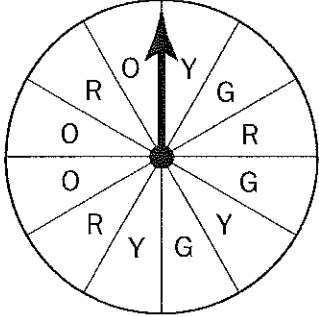**Part A: Describe the sample for this survey.**

_____

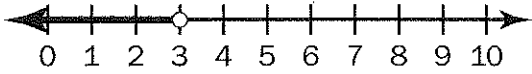**Part B: If 560 visitors were at the zoo on the day of the survey, what was the sample size for the survey?**

_____

Part C: Was the survey random? Explain your answer.

_____

_____

Part D: Explain why the zoo's conclusion is invalid.

_____

_____

_____

MATHEMATICS ADDITIONAL SAMPLE ITEM KEYS

Item	Standard/ Element	DOK Level	Correct Answer	Explanation
1	MGSE7.EE.3	2	D	The correct answer is choice (D) 28. Alicia hits the backboard with $\frac{2}{5}(100) = 40$ shots, hits the rim with $0.32(100) = 32$ shots, and makes $100 - 40 - 32 = 28$ shots. Choice (A) is incorrect because it does not subtract the number of shots that hit the backboard. Choice (B) is incorrect because it is the number of shots that hit the backboard. Choice (C) is incorrect because it is the number of shots that hit the rim.
2	MGSE7.RP.3	2	D	The correct answer is choice (D) 25%. 40% of 60 is 24, and 6 out of 24 is 25%. Choice (A) is incorrect because it is the result of dividing 60 by 0.4 instead of multiplying, and then dividing 6 by that quotient. Choice (B) is incorrect because it is the result of dividing 6 by 60. Choice (C) is incorrect because it is the result of dividing 6 by 40.
3	MGSE7.G.3	2	C	The correct answer is choice (C) The cross-section of Figure 1 is a triangle, and the cross-section of Figure 2 is a rectangle. The plane intersects Figure 1 perpendicular to its base and passing through its apex, so the cross-section is a triangle, and the plane intersects Figure 2 parallel to its rectangular faces. Choice (A) is incorrect because the plane does not intersect Figure 1 parallel to its base. Choice (B) is incorrect because the planes intersect the figures perpendicular to their bases. Choice (D) is incorrect because the plane passes through the apex of Figure 1.

Item	Standard/ Element	DOK Level	Correct Answer	Explanation
4	MGSE7.SP.7a	2	D	The correct answer is choice (D). The spinner is divided into 12 equal sections, three of which are marked "G." Since $\frac{3}{12}=\frac{1}{4}$, the probability of the arrow landing on G is $\frac{1}{4}$. Choice (A) is incorrect because three of the four sections are labeled "G," so the probability of landing on G is $\frac{3}{4}$. Choice (B) is incorrect because four of the eight sections are labeled "G," so the probability of landing on G is $\frac{1}{2}$. Choice (C) is incorrect because four out of the twelve sections are labeled "G," so the probability of landing on G is $\frac{1}{3}$.
5	MGSE7.NS.3	2	A	The correct answer is choice (A) $\frac{1}{8}$. Tara ate $6 \times \frac{1}{4} = \frac{6}{4}$ pounds of nuts in 6 days, which is equivalent to $\frac{12}{8}$ pounds. So, she has $\frac{13}{8}-\frac{12}{8}=\frac{1}{8}$ pound left after 6 days. Choice (B) is incorrect because $\frac{6}{4}$ was incorrectly converted to $\frac{6}{8}$ and then subtracted from $1\frac{5}{8}$. Choice (C) is incorrect because it is the number of pounds of nuts that Tara ate, not the pounds left over. Choice (D) is incorrect because it is the result of subtracting $\frac{1}{4}$ from $1\frac{5}{8}$.

Item	Standard/ Element	DOK Level	Correct Answer	Explanation
6	MGSE7.EE.4b	2	B	The correct answer is choice (B). Choice (A) is incorrect because the arrow is pointing in the wrong direction and corresponds to $x > 3$. Choice (C) is incorrect because the inequality was incorrectly solved by adding 5 to the right side instead of subtracting, and the arrow points in the wrong direction. Choice (D) is incorrect because the inequality was incorrectly solved by adding 5 to the right side instead of subtracting.
7	MGSE7.RP.1	2	D	The correct answer is choice (D) $4\frac{1}{3}$. Choice (A) is incorrect because it is the result of dividing the time by the weight instead of the weight by the time. Choice (B) is incorrect because it is the result of dividing the reciprocal of the time by the weight. Choice (C) is incorrect because it is the result of multiplying the weight by the time instead of dividing.
8	MGSE7.G.4	2	B	The correct answer is choice (B) 45.53 inches. Choice (A) is incorrect because it is equal to $\frac{1}{2} \times \pi \times d$. Choice (C) is incorrect because it is equal to $2 \times \pi \times d$. Choice (D) is incorrect because it is the area of the circle.
9	MGSE7.NS.1b	2	N/A	See scoring rubric and exemplar responses on page 68.
10	MGSE7.SP.1	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 applying and extending previous understandings of addition and subtraction to add and subtract rational numbers. • Give 2 points for a correct response and a correct process shown. Response is correct and complete. • Response shows application of a reasonable and relevant strategy. • Mathematical ideas are expressed coherently through clear, complete, logical, and fully developed responses using words, calculations, and/or symbols as appropriate.
1	The response achieves the following: • The response demonstrates a minimal understanding of applying and extending previous understandings of addition and subtraction to add and subtract rational numbers. • Give 1 point for a correct response with no work shown. • 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 applying and extending previous understandings of addition and subtraction to add and subtract rational numbers. • The student cannot determine the distance between the volcano below and above sea level or add them together. • 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	14,000 + 20,000 = 34,000 (or other valid process) AND 34,000 feet
1	34,000 feet
0	Response is irrelevant, inappropriate, or not provided.

Item 10

Scoring Rubric

Points	Description
4	The response achieves the following: • The response demonstrates that the student completely understands that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. • Response also demonstrates that the student completely understands that valid inferences must be supported by random sampling, which produces a representative sample. • Give 4 points if the student's response to all 4 parts is correct and complete. The response is correct and complete. • Mathematical ideas are expressed coherently through clear, complete, logical, and fully developed responses using words, calculations, and/or symbols as appropriate.
3	The response achieves the following: • The response demonstrates that the student mostly understands that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. • Response may also demonstrate that the student mostly understands that valid inferences must be supported by random sampling, which produces a representative sample. • Give 3 points if the student's response to 3 of the 4 parts is correct and complete. • Correct and complete responses express mathematical ideas using words, calculations, and/or symbols as appropriate.
2	The response achieves the following: • The response demonstrates that the student somewhat understands that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. • Response may also demonstrate that the student somewhat understands that valid inferences must be supported by random sampling which produces a representative sample. • Give 2 points if the student's response to 2 of the 4 parts is correct and complete. • Correct and complete responses express mathematical ideas using words, calculations, and/or symbols as appropriate.

Points	Description
1	The response achieves the following: • The response demonstrates that the student has a limited understanding that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. • Response may also demonstrate that the student has a limited understanding that valid inferences must be supported by random sampling which produces a representative sample. • Give 1 point if the student's response to 1 of the 4 parts is correct and complete. • Correct and complete responses express mathematical ideas using words, calculations, and/or symbols as appropriate.
0	The response achieves the following: • The response demonstrates that the student has no understanding that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. • Give 0 points if the student's response to all of the 4 parts is incorrect, incomplete, or missing. • Response may also demonstrate that the student has no understanding that valid inferences must be supported by random sampling which produces a representative sample.

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Exemplar Response

Points Awarded	Sample Response
4	Student's response contains all of the four key elements: Part A: Every 20th person leaving the zoo. Part B: 28 Part C: Yes. By choosing systematically, the zoo officials ensured that each person had the same chance of being chosen. (or other valid explanation) Part D: The conclusion is not valid because the sample was not representative of the target population. The sample included people of all ages. (or other valid explanation)
3	Student's response contains three of the four key elements: Part A: Every 20th person leaving the zoo. Part B: 28 Part C: Yes. By choosing systematically, the zoo officials ensured that each person had the same chance of being chosen. (or other valid explanation) Part D: The conclusion is not valid because the sample was not representative of the target population. The sample included people of all ages. (or other valid explanation)
2	Student's response contains two of the four key elements: Part A: Every 20th person leaving the zoo. Part B: 28 Part C: Yes. By choosing systematically, the zoo officials ensured that each person had the same chance of being chosen. (or other valid explanation) Part D: The conclusion is not valid because the sample was not representative of the target population. The sample included people of all ages. (or other valid explanation)
1	Student's response contains one of the four key elements: Part A: Every 20th person leaving the zoo. Part B: 28 Part C: Yes. By choosing systematically, the zoo officials ensured that each person had the same chance of being chosen. (or other valid explanation) Part D: The conclusion is not valid because the sample was not representative of the target population. The sample included people of all ages. (or other valid explanation)
0	Response is irrelevant, inappropriate, or not provided.