

2008

Green River
*Regional Educational
Cooperative*

GRADE 7
MATHEMATICS

MULTIPLE CHOICE
AND
CONSTRUCTED RESPONSE



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Multiple Choice Items

Multiple Choice Item 1

Standard: MA-07-1.3.01: Number Operations — Students will add, subtract, multiply, and divide whole numbers, fractions, and decimals to solve real-world problems and apply order of operations (including positive whole number exponents) to simplify numerical expressions.

Bloom's Taxonomy	Depth of Knowledge	Portion of Standard Being Addressed
Knowledge	Level 1	This item requires the student to apply ratios to solve real-world percent problems.
Comprehension	Level 2	
Application	Level 3	
Analysis	Level 4	
Synthesis		
Evaluation		
	Answer Key: B	

- Beth earns a commission of 3% when she sells a new computer. A new computer costs \$1,895.00. If she sells 4 new computers, how much is her commission on those 4 sales?
 - \$56.85
 - \$227.40
 - \$568.50
 - \$2,526.67

Multiple Choice Item 2

Standard: MA-07-3.3.01: Coordinate Geometry — Students will identify and graph ordered pairs on a coordinate system, correctly identifying the origin, axes, and ordered pairs; and will apply graphing in the coordinate system to solve real-world and mathematical problems.

Bloom's Taxonomy	Depth of Knowledge	Portion of Standard Being Addressed
Knowledge	Level 1	
Comprehension	Level 2	
Application	Level 3	
Analysis	Level 4	
Synthesis		
Evaluation	Answer Key: D	This item requires the student to find the distance between two points by graphing points in a coordinate plane.

2. Triangle PQR has vertices in the coordinate plane as given below.

$P(3, 1)$ $Q(9, 1)$ $R(6, 10)$

Which side of the triangle is the longest?

- A. \overline{PQ}
- B. \overline{QR}
- C. \overline{PR}
- D. Triangle PQR is isosceles, with no single longest side.

Multiple Choice Item 3

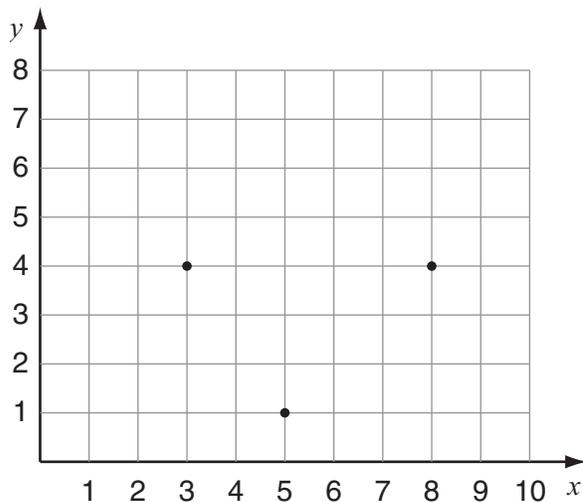
Standard: MA-07-3.3.01: Coordinate Geometry — Students will identify and graph ordered pairs on a coordinate system, correctly identifying the origin, axes, and ordered pairs; and will apply graphing in the coordinate system to solve real-world and mathematical problems.

Bloom's Taxonomy
Knowledge
Comprehension
Application
Analysis
Synthesis
Evaluation

Depth of Knowledge
Level 1
Level 2
Level 3
Level 4
Answer Key: C

Portion of Standard Being Addressed
This item requires the student to find the final coordinates for a specified polygon.

3. Jason drew these 3 vertices of a parallelogram on the coordinate plane as shown below.



Which point could **not** be the fourth vertex of Jason's parallelogram?

- A. (0, 1)
- B. (6, 7)
- C. (8, 1)
- D. (10, 1)

Multiple Choice Item 4

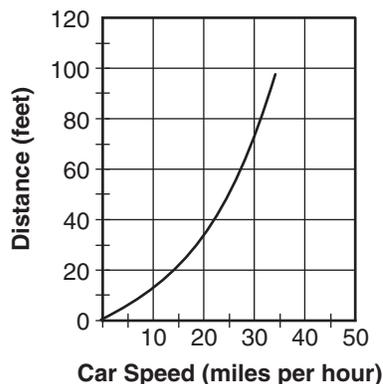
Standard: MA-07-4.1.01: Representations of Data Sets — Students will analyze and make inferences from data displays (drawings, tables/charts, pictographs, bar graphs, circle graphs, line plots, Venn diagrams, line graphs, stem-and-leaf plots, scatter plots).

Bloom's Taxonomy
Knowledge
Comprehension
Application
Analysis
Synthesis
Evaluation

Depth of Knowledge
Level 1
Level 2
Level 3
Level 4
Answer Key: D

Portion of Standard Being Addressed
This item requires the student to analyze data from a graph.

4. The graph below shows the relationship between how far a typical car travels after the brakes are applied and the speed of the car just before the brakes are applied.



A car traveling on a road stopped 40 feet after the brakes were applied. About how fast was the car traveling?

- A. 140 miles per hour
- B. 45 miles per hour
- C. 25 miles per hour
- D. 22 miles per hour

Multiple Choice Item 5

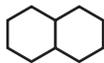
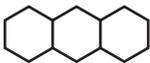
Standard: MA-07-5.1.01: Patterns, Relations, and Functions — Students will extend, describe rules for patterns and find a missing term in a pattern from real-world and mathematical problems.

Bloom's Taxonomy
Knowledge
Comprehension
Application
Analysis
Synthesis
Evaluation

Depth of Knowledge
Level 1
Level 2
Level 3
Level 4
Answer Key: A

Portion of Standard Being Addressed
This item requires the student to use variables to describe numerical patterns based on arithmetic sequences in mathematical problems.

5. Use the information below to answer the question.

Train			
Number of Polygons	1	2	3
Perimeter	6	10	14

Which rule describes the perimeter of a train of n polygons?

- A. $4n + 2$
- B. $5n - 1$
- C. $n + 4$
- D. $6n$

Multiple Choice Item 6

Standard: MA-07-5.2.02: Variables, Expressions, and Operations — Students will describe, define, and provide examples of variables and expressions with a missing value based on real-world and mathematical problems.

Bloom's Taxonomy	Depth of Knowledge	Portion of Standard Being Addressed
Knowledge	Level 1	This item requires the student to define expressions with variables based on real-world problems.
Comprehension	Level 2	
Application	Level 3	
Analysis	Level 4	
Synthesis		
Evaluation	Answer Key: B	

6. The Erie Canal in the United States is 60 miles longer than 3 times the length of the Suez Canal in Egypt. If the length of the Suez Canal is represented by the variable x , which expression below **best** represents the length of the Erie Canal?
- A. $60(3x)$
 - B. $3x + 60$
 - C. $3x \div 60$
 - D. $60 + 3 + x$

Constructed Response Items

Constructed Response Item 7 Savings Based on Ratios

Standard: MA-07-1.4.01: Ratios and Proportional Reasoning — Students will apply ratios and proportional reasoning to solve real-world problems (e.g., percents, sales tax, discounts, rate).

Bloom's Taxonomy
Knowledge
Comprehension
Application
Analysis
Synthesis
Evaluation

Depth of Knowledge
Level 1
Level 2
Level 3
Level 4

7. Each month Chris earns \$270 from her paper route. Of this amount, she saves twice as much money as she spends.
- How much money will she have saved at the end of 4 months? Show your work.
 - Beginning with the 5th month and continuing through the 12th month, Chris changes the ratio of her savings to her spending to 3:2. How much money will she have saved at the end of the year? Show your work.

Savings Based on Ratios

Scoring Guide

Score	Description
4	The student demonstrates a thorough understanding of ratios by correctly solving real-world problems involving ratios.
3	The student demonstrates a general understanding of ratios by solving real-world problems involving ratios with only minor errors or omissions. The response indicates that the student could readily correct any errors and omissions if given written feedback.
2	The student demonstrates a basic understanding of ratios by correctly completing a significant portion of the required tasks. The response indicates that the student would require some instruction to successfully complete the tasks.
1	The student demonstrates a minimal understanding of ratios. The response indicates that the student would require significant instruction to complete the tasks.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response.

Sample Response:

Part a: $\frac{270}{3} = 90$

save \$180

$$180 (4) = \$720$$

OR

$$x + 2x = 270$$

$$3x = 270$$

$$x = 90$$

$$2x = 180$$

$$180 (4) = \$720$$

OR

$$4 \times 270 = 1080$$

$$\frac{2}{3}(1080) = \$720$$

OR

$$180 \times 4 = \$720$$

Part b: $\frac{270}{5} = 54$

$$54 \times 3 = 162$$

$$162 \times 8 = 1296$$

$$1296 + 720 = \$2016$$

OR

$$2x + 3x = 270$$

$$5x = 270$$

$$x = 54$$

$$3x = 162$$

$$8(162) + 720 = \$2016$$

OR

$$8 \times 270 = 2160$$

$$\frac{3}{5}(2160) = 1296$$

$$1296 + 720 = \$2016$$

Sample Student Responses

Savings Based on Ratios

$$270 \div 3 = 90$$

$$\text{saves} - 180$$

$$\text{sports} - 90$$

$$90 \times 2 = 180$$

$$a) 180 \times 4 = 720$$

$$b) 2016$$

$$270 \div 5 = 54$$

$$162 : 108$$

$$162 \times 8 = 1716 + 720 = 2016$$

$$a. 720$$

$$b. 2016$$

Score Point: 4

Ⓐ If she saves twice as much as she spends that means she saves \$180 and spends \$90 (2:1 ratio)
So... at the end of 4 months she will have saved \$720 ($4 \cdot 180$).

Ⓑ 3:2 ratio would mean each month she saves \$162 and spends \$108.
So in 7 months she will have saved \$1134 ($162 \cdot 7$). At the end of the year she will have saved \$1854. Add \$720 (savings from flat months) to 1134 (savings of other months).

Score Point: 3

$$\begin{array}{r} 90 \\ 3 \overline{) 270} \end{array}$$

$$\begin{array}{r} 90 + 90 + 90 \\ \underbrace{\quad} \quad \underbrace{\quad} \\ \text{save} \quad \text{spend} \end{array}$$

$$180$$

$$\times 4$$

720 dollars

Score Point: 2

$$2x = \text{money saved} = 180 \text{ per week}$$

$$x = \text{money spent} = 90$$

$$2x + x = 270$$

$$\frac{3x}{3} = \frac{270}{3}$$

$$x = 90$$

$$\frac{x \cdot 2}{180}$$

\$2,880 after
4 mos.

Saves \$210 per week
 \$840 per month
 \$6,720 in 5-12 :
 + 2,880 first 4 mos.
\$9,600 after 1 year

Score Point: 1

Constructed Response Item 8 Pizza Pans

Standard: MA-07-2.1.01: Measuring Physical Attributes — Students will measure lengths (to the nearest eighth of an inch or the nearest centimeter) and will determine and use in real-world and mathematical problems: area and perimeter of triangles; area and perimeter of quadrilaterals (rectangles, squares, trapezoids) (using the Pythagorean theorem will not be required as a strategy); area and circumference of circles and; area and perimeter of compound figures composed of triangles, quadrilaterals, and circles.

Bloom's Taxonomy
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Level 2
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Level 4

8. On a package of Luigi's Pizza Mix, the directions "read,
"Spread dough to edges of a round pan or a 10" × 14" rectangular pan."
- How large would the round pan need to be if you wanted to make a pizza of the same thickness as the one in the rectangular pan? Explain your reasoning.
 - Some of your friends who are coming over for pizza prefer more of the edge crust. Which pizza, the round one or the rectangular one, has more edge crust? Explain your reasoning.

Pizza Pans

Scoring Guide

Score	Description
4	The student demonstrates excellent problem solving skills by analyzing and solving a real-world problem involving correctly finding a circle with the same area as a rectangle and correctly comparing the perimeter of a rectangle and the circumference of a circle.
3	The student demonstrates good problem solving skills by analyzing and solving a real-world problem involving finding a circle with the same area as a rectangle and correctly comparing the perimeter of a rectangle and the circumference of a circle with only minor errors or omissions. The response indicates that the student could readily correct any errors and omissions if given written feedback.
2	The student demonstrates basic problem solving skills by correctly completing a significant portion of the required tasks. The response indicates that the student would require some instruction to successfully complete the task.
1	The student demonstrates minimal problem solving skills. The response indicates that the student would require significant instruction to complete the task.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response.

Sample Response:

Part a: $\pi r^2 = 140$

$$r^2 = 44.59$$

$$r = 6.68 \text{ inches}$$

Part b: $2\pi r = 41.95 \text{ inches}$

$$2(10) + 2(14) = 48 \text{ inches}$$

Rectangle

Sample Student Responses

Pizza Pans

$$\begin{aligned}
 a) \quad A_{\square} &= lw \\
 A_{\square} &= 140 \\
 A_{\circ} &= \pi r^2 \\
 140 &= \frac{\pi r^2}{\pi} \\
 \sqrt{44.56} &= r \\
 r &= 6.68
 \end{aligned}$$

You would need a 13.35 diameter on the round pan if you wanted the same thickness. This is because by having that big of a pan, you have the same area as the rectangular one.

$$\begin{aligned}
 b) \quad P_{\square} &= 2l + 2w \\
 &= 2(10) + 2(14) \\
 &= 20 + 28 \\
 &= 48 \\
 P_{\circ} &= 2\pi r \\
 &= 2\pi(6.68) \\
 &= 46.972
 \end{aligned}$$

The rectangular pan would have more crust because the perimeter is larger.

Score Point: 4

a) No^o You would need about a $13\frac{1}{3}$ " diameter round pan

$$A = \pi r^2$$

$$140 = \pi r^2$$

$$\approx 44.56 = r^2$$

$$r \approx 6.69$$

$$d \approx 13.35$$

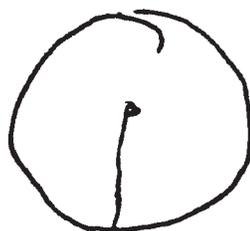
b) ~~Rectangular~~ Circumference = 48"

Circular Circumference ≈ 42 "

$$C = \pi d$$

You would use the Rectangular pan, because it has a greater circumference

Score Point: 3



a. About 10
 a 17" pan because you want the same
 area covered on the pan

$$\begin{array}{r}
 44 \\
 3.14 \overline{) 13800} \\
 \underline{1256} \\
 1440 \\
 \underline{1206}
 \end{array}$$

b. The rectangular pizza because it has more
 of an edge on a piece of the pizza,
 almost all the pieces have a lot
 of crust



Score Point: 2



$$A = \frac{H}{10} \\ \frac{00}{14 \times} \\ \frac{140}{140}$$

$$\pi \cdot r^2 \\ \approx 1277$$

Q. The round pan would have to have the same area as the rectangle



The rect. one because the circumference is larger.

Score Point: 1