

2008

Green River
*Regional Educational
Cooperative*

GRADE 8
MATHEMATICS

MULTIPLE CHOICE
AND
CONSTRUCTED RESPONSE



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Multiple Choice Items

Multiple Choice Item 1

Standard: MA-08-3.1.02: Shapes and Relationships — Students will identify and compare properties of two-dimensional figures (circles, triangles [acute, right, obtuse, scalene, isosceles, equilateral], quadrilaterals [square, rectangle, rhombus, parallelogram, trapezoid], regular/irregular polygons), and will apply these properties and figures to solve real-world and mathematical problems.

Bloom's Taxonomy
Knowledge
Comprehension
Application
Analysis
Synthesis
Evaluation

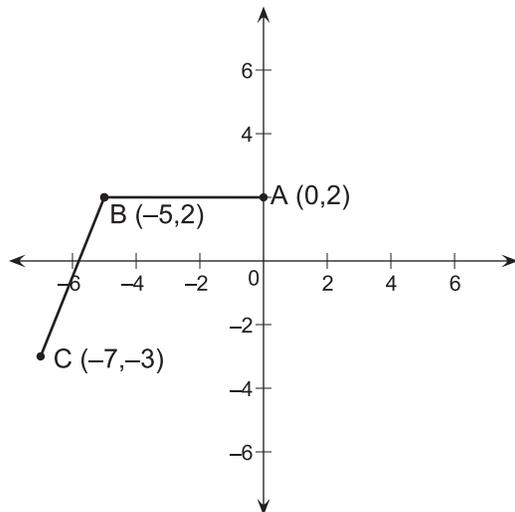
Depth of Knowledge
Level 1
Level 2
Level 3
Level 4

Answer Key: A

Portion of Standard Being Addressed

This item requires the student to identify properties of isosceles trapezoids and apply these properties to solve a mathematical problem.

1. Use the diagram below to answer the sample question.



Which location for point D will make quadrilateral ABCD an **isosceles trapezoid**?

- A. (2, -3)
- B. (0, -3)
- C. (-2, 3)
- D. (-2, -3)

Multiple Choice Item 2

Standard: MA-08-3.3.01: 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: D

Portion of Standard Being Addressed
This item requires the student to find the distance between two points in a coordinate plane.

2. What is the distance, in units, between the points $(-3, 1)$ and $(2, 1)$?
- A. -1
 - B. 2
 - C. 3
 - D. 5

Multiple Choice Item 3

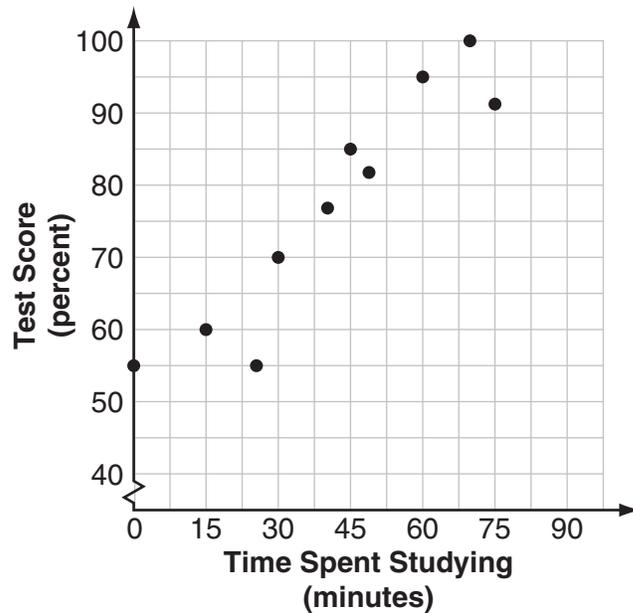
Standard: MA-08-4.1.01: Representations of Data Sets — Students will analyze and make inferences from data displays (drawings, tables/charts, pictographs, bar graphs, circle graphs, line plots, Venn diagrams, line graphs, stem-and-leaf plots, scatter plots, histograms, box-and-whiskers plots).

Bloom's Taxonomy
Knowledge
Comprehension
Application
Analysis
Synthesis
Evaluation

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

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

3. The scatter plot below shows the test scores of ten students and the amount of time each student spent studying for the test.



Based on the scatter plot, which of the following is the best estimate of the amount of time that a student scoring 87 on the test spent studying?

- A. 40 minutes
- B. 55 minutes
- C. 70 minutes
- D. 95 minutes

Multiple Choice Item 4

Standard: MA-08-5.1.02: Patterns, Relations, and Functions — Students will represent, analyze, and generalize simple first and second degree relationships using tables, graphs, words, and algebraic notations, and will apply the relationships 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 represent a first degree relationship using values for x and y in a table.

4. Which equation is true for all values of x and y in the table?

x	y
-2	-4
-1	$-3\frac{1}{2}$
0	-3
1	$-2\frac{1}{2}$
2	-2

- A. $y = 2x$
- B. $y = x - 3$
- C. $y = \frac{1}{2}x - 3$
- D. $y = -x - \frac{5}{2}$

Multiple Choice Item 5

Standard: MA-08-5.3.01: Equations and Inequalities — Students will model and solve single variable, first-degree real-world and mathematical problems (e.g., $5x+2 = x+22$, $x-4 < -60$).

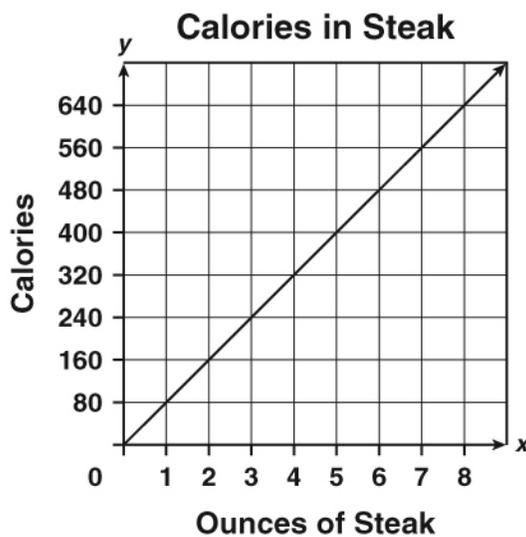
Bloom's Taxonomy
Knowledge
Comprehension
Application
Analysis
Synthesis
Evaluation

Depth of Knowledge
Level 1
Level 2
Level 3
Level 4

Answer Key: B

Portion of Standard Being Addressed
This item requires the student to define expressions with variables based on a real-world problem.

5. The graph below shows the relationship between the number of ounces and the number of calories in steak.



Which equation **best** represents this relationship?

- A. $x = 80y$
- B. $y = 80x$
- C. $x = y + 80$
- D. $y = x + 80$

Multiple Choice Item 6

Standard: MA-08-5.3.01: Equations and Inequalities — Students will model and solve single variable, first-degree real-world and mathematical problems (e.g., $5x+2 = x+22$, $x-4 < -60$).

Bloom's Taxonomy	Depth of Knowledge	Portion of Standard Being Addressed
Knowledge	Level 1	This item requires the student to find a solution set for an equation.
Comprehension	Level 2	
Application	Level 3	
Analysis	Level 4	
Synthesis		
Evaluation	Answer Key: B	

6. The cost of a long-distance call made on a certain pay phone depends on the length of the call. The equation shown below represents the relationship between the cost (y), in dollars, of the call and the number (x) of minutes that the call lasts.

$$y = 0.10x + 2$$

Which ordered pair is a solution to this equation?

- A. (1, 0.30)
- B. (3, 2.30)
- C. (4, 6.00)
- D. (5, 0.52)

Constructed Response Items

Constructed Response Item 7 Car Depreciation

Standard: MA-08-1.4.01: Ratios and Proportional Reasoning — Students will apply ratios and proportional reasoning to solve real-world problems (e.g., percents, constant rate of change, unit pricing, percent of increase or decrease).

Bloom's Taxonomy
Knowledge
Comprehension
Application
Analysis
Synthesis
Evaluation

Depth of Knowledge
Level 1
Level 2
Level 3
Level 4

7. An automobile is purchased for \$18,000. Its value decreases each year according to the following schedule:
- The car's value decreases by 30% in the first year.
 - After the first year, its value decreases by 20% of the preceding year's value.
- a. What is the value of this car at the end of one year?
 - b. During which year will the car's value decrease to less than half its original price? Explain or show how you found your answer.
 - c. Suppose the value of another car, which also costs \$18,000, decreases at the rate of 25% each year. After two years of decrease at the rates given, how do the values of the two cars compare? Explain or show how you found your answer.

Car Depreciation

Scoring Guide

Score	Description
4	The student demonstrates excellent problem solving skills by correctly analyzing and solving real-world problems involving simple and successive percent decreases.
3	The student demonstrates good problem solving skills by analyzing and solving real-world problems involving simple and successive percent decreases 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 totally incorrect or correct only in ways irrelevant to what is being measured.
Blank	No response.

Sample Response:

Part a: \$12,600

Part b: End of 2nd year: $\$12,600 \times 80\% = \$10,080$

End of 3rd year: $\$10,080 \times 80\% = \8064 , which is less than \$9000

Part c: First car: depreciated value: $\$18,000 \times 0.7 \times 0.8 = \$10,080$

Second car: depreciated value: $\$18,000 \times 0.75 \times 0.75 = \$10,125$

OR

Student may compare percents directly:

$$0.7 \times 0.8 \times 0.56; \quad 0.75^2 = 0.5625$$

Sample Student Responses

Car Depreciation

A. \$12,600

B. After third year. $18,000 \times .7 = 12,600$
 $12,600 \times .8 = 10,080$
 $10,080 \times .8 = 8,064$
less than half.

C. after the second car is worth more.
 $18,000 \times .75 = 13,500$
 $13,500 \times .75 = 10,125$ to $10,080$.

Score Point: 4

a. \$12,600.00

b. 3rd year \rightarrow \$8064.00

c. 1st Car \rightarrow worth \$10,080. at 2nd year.
2nd Car \rightarrow worth \$10,125. at 2nd year.

The car that decreases 25% per year is worth more than the car that decreases 30% the first year and 20% after that.

Score Point: 4

A) $\$18,000(.70) = \$12,600 = 1\text{st yr}$

B) $\$12,600(.80) = \$10,080 = 2\text{nd yr}$

$\$10,080(.80) = \$8,064 = 3\text{rd yr}$

C) $\$18,000(.75) = \$13,500 = 1\text{st yr}$

$\$13,500(.75) = \$10,125 = 2\text{nd yr}$

the 3rd year

ratio

1st car : 2nd car
 $\$10,080 : \$10,125$

I found the amount of decrease at the second year of each car, and then compared them to each other. The 2 cars are only \$95 apart from each other.

Score Point: 3

A. 12,600.

B. The 3rd year took
20% off each time.

C. No, the second car
will be a little more expensive.

$$\begin{array}{r}
 12,600 \\
 \times 0.2 \\
 \hline
 2,520 \\
 + 12,600 \\
 \hline
 15,120
 \end{array}$$

$$\begin{array}{r}
 18,000 \\
 \times 0.3 \\
 \hline
 5,400 \\
 + 18,000 \\
 \hline
 23,400 \\
 - 5,400 \\
 \hline
 18,000
 \end{array}$$

Score Point: 2

$$\begin{aligned} \text{a) } 1800 \times 3 &= 5400 \\ 1800 - 5400 &= 12600 \end{aligned}$$

$$\text{b) The second year } 30\% + 20\% = 50\%$$

Score Point: 1

Constructed Response Item 8 Job Offers

Standard: MA-08-5.1.02: Patterns, Relations, and Functions — Students will represent, analyze, and generalize simple first and second degree relationships using tables, graphs, words, and algebraic notations, and will apply the relationships to solve real-world and mathematical problems.

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8. Sheila has offers of part-time work at two businesses.

Offer 1 (Pete's Restaurant): Pay is \$5.50 per hour. Sheila will be required to purchase a uniform for \$55.00, and she will be working 20 hours each week.

Offer 2 (Two-Minute Car Wash): Pay is \$4.25 per hour. Sheila will be given a shirt at no cost, and no other special clothing is required. She will be working 24 hours each week.

- If Sheila works for eight weeks at Pete's Restaurant, how much will she earn (before taxes or any other deductions)? Be sure to include the cost of the uniform.
- Write an equation for each job that shows how much Sheila will earn (before taxes or any other deductions) at that job. Use w to represent the number of weeks worked and y to represent the amount earned. Again, include the cost of the uniform.
- How many weeks will Sheila have to work at Pete's Restaurant in order for it to be the better-paying job? Explain or show how you found your answer.

Job Offers

Scoring Guide

Score	Description
4	The student demonstrates a thorough understanding of linear equations and problem solving by correctly writing equations for real-life situations and solving a related problem.
3	The student demonstrates a general understanding of linear equations and problem solving by writing equations for real-life situations and solving a related problem, 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 linear equations and problem solving 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 a minimal understanding of linear relationships and problem solving. 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 Responses:

Part a: $160 \times 5.5 - 55 = \$825$

Part b: Pete's Restaurant: $y = 5.50(20w) - 55$

Two-Minute Car Wash: $y = 4.25(24w)$

OR

$y = 110w - 55$

$y = 102w$

Part c: $5.50(20w) - 55 > 4.25(24w)$

$110w - 55 > 4.25(24w)$

$8w > 55$

$w > 6.875$

7 weeks

OR

$110w - 55 = 102w$

$8w = 55$

$w = 6.875$

7 weeks

OR

Week	Offer1	Offer2
5	\$495	\$510
6	\$605	\$612
*7	\$715	\$714

Sample Student Responses

Job Offers

(a)

$$\begin{array}{r} 5.50 \\ \times 20 \\ \hline 110.00 \\ \times 8 \\ \hline \$880.00 \\ - 55.00 \\ \hline \end{array}$$

\$825.00 earned in 8 weeks

(b) ^{Pete's:} $y = \$5.50(20)(w) - \55.00

Car wash:
 $y = \$4.25(24)(w)$

(c) She has to work 7 weeks at Pete's in order for it to be a better paying job

Pete's: $\$5.50(20)(7) - \$55.00 = \$715$ 7 weeks
Car wash: $\$4.25(24)(7) = \714

Pete's: $5.50(20)(6) - 55.00 = \$605$ 6 weeks
Car wash: $4.25(24)(6) = \$612$

Score Point: 4

a) $20 \times 8 =$ Number of hours worked
 $= (160 \times 5.5) - 55.00 =$ amount of profit
 $\$825.00$

b) Pete's Restaurant
 $y = (5.50)(20w) - 55.00$
 $y = 110w - 55.00$

Two-Minute Car Wash
 $y = 4.25(24w)$
 $y = 102w$

c) $110w - 55 > 102w$
 $8w > 55$
 $w > 6.875$

She would need to work there 7 weeks
 for it to be the better paying job.

Score Point: 4

a) $(20 \times 5.5) \times 8 + 55 = \880

b) $y = \$102w$ - car wash

$y = \$110w - 55$ - Pete's

Use Calculator

c) Pete's \$55/week
car wash 102/week

P - 165^{2nd}
C - 204^{2nd}

P - 495^{5th}
C : 510^{5th}

605^{6th}
612^{6th}

715^{7th}
714^{7th}

7 weeks

Score Point: 3

