2007

Green River

Regional Educational Cooperative

Grade 7

Mathematics

Constructed Response

Measured Progress

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Note: Each item is aligned to a standard, but does not necessarily measure the entire standard.

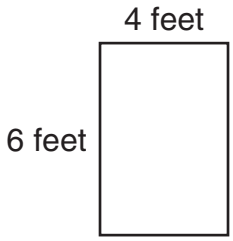
Item 1 Kevin's Garden

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: a. Comprehension
b. Application

Depth of Knowledge: Level 2

1. The measurements of Kevin's garden are shown below.



a. What is the area of Kevin's garden?

Next summer, Kevin wants a garden that has twice as much area as the one he has now.

b. Describe how Kevin can enlarge his garden so the area will double. Show or explain how you know you are right.

c. Jill thinks that Kevin can double the area of his garden by doubling both the length and the width. Use words, pictures, or numbers to show that Jill is either correct or incorrect.

Be sure to label your responses (a), (b), and (c).

Kevin's Garden

Scoring Guide

Score	Description
4	The student response demonstrates an exemplary understanding of the concepts involved in determining the area of a rectangle to solve real-world problems.
3	The student response demonstrates a good understanding of the concepts involved in determining the area of a rectangle to solve real-world problems. Although there is significant evidence that the student was able to recognize and apply the concepts involved, some aspect of the response is missing or flawed. As a result the response merits 3 points.
2	The student response demonstrates a fair understanding of the concepts involved in determining the area of a rectangle to solve real-world problems. While some aspects of the task are completed correctly, others are not. The mixed evidence provided by the student merits 2 points.
1	The student response demonstrates a minimal understanding of the concepts involved in determining the area of a rectangle to solve real-world problems.
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: 24 square feet
Part b: He could double the width to 8 feet. The area would be $6 \times 8 = 48$
Part c: Jill is wrong. If both the length and width are doubled, the area would be $12 \times 8 = 96$ sq. ft.
96 is 4 times 24.

Sample Student Responses

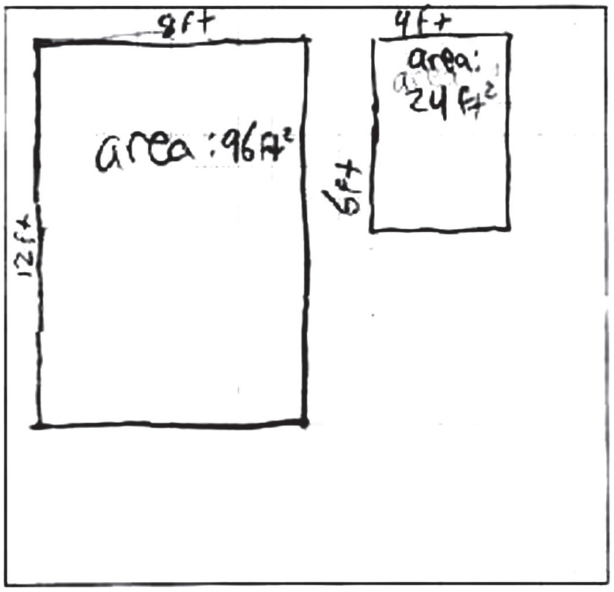
Kevin's Garden

(a.) 4 ft × 6 ft = 24 ft^2

(b) he wants the area to be 48 ft^2 so you just take factors of 48

12 and 4
6 and 8
3 and 16
2 and 24
1 and 48

(c) Jill is not correct because if you look at the gardens →



the area is 4 times larger

Score Point: 4

a. $6 \times 4 = 24$ Area = 24 feet

b. Double the length or width
This will create: $12 \times 4 = 48$ or $6 \times 8 = 48$

48 feet is double the garden's area

C. She is incorrect because
double both the width
and hight will four
too much area

ex: $12 \times 8 = 96$

Score Point: 3

a) area = 24ft

-next summer = 48ft

b) add 2 ft to length and width

6 + 2 = 8 8 × 6 = 48ft

4 + 2 = 6

c) incorrect

4 · 4 = 16

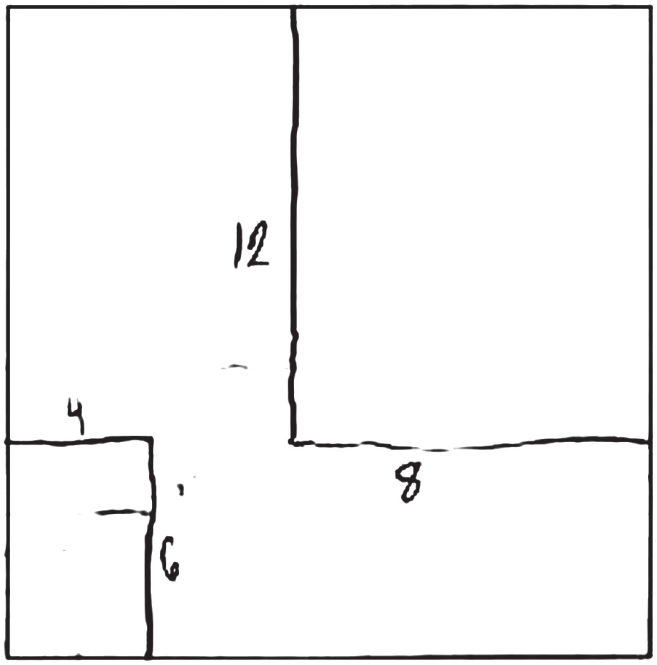
6 · 6 = 36

Score Point: 2

a. 29 feet

B. All he has to do is add 6 to the 6 and 4 to the 4,

C. Shes correct



Score Point: 1

Item 2 Height of a Tree

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: Analysis

Depth of Knowledge: Level 3

2. Erin wants to cut down a dead tree in her yard. Her yard is level.
   a. On a sunny day, Erin measured the tree's shadow and found it was 20 feet long. She also measured the shadow cast by an 8-foot-tall lamppost and found that it was 5 feet long. Sketch the tree, the lamppost, and their shadows. Label your sketch with the appropriate lengths.

   b. If the base of the tree is 25 feet from Erin's house, is it possible for the tree to hit the house when it falls? Explain or show how you determined the height of the tree.

   c. Explain how Erin could have calculated the height of the tree, without climbing it or measuring it directly, on a day when there were no shadows. Carefully describe each step in the process.

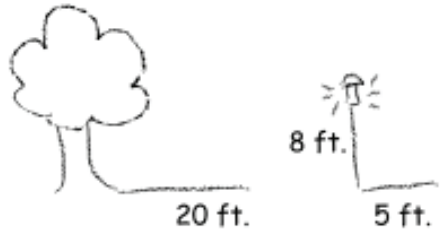
Height of a Tree

Scoring Guide

Score	Description
4	The student demonstrates excellent problem solving skills by accurately analyzing and solving real-world problems involving geometric similarity.
3	The student demonstrates good problem solving skills by analyzing and solving real-world problems involving geometric similarity 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:



Part b: $\frac{x}{20} = \frac{8}{5}$ $5x = 160$ $x = 32$ feet

Yes it is possible that the tree could hit the house because 32 > 25.

Part c: She could attach a rope to a toy airplane and land the airplane in the top of the tree. While the rope is hanging down, she can mark where it touches the ground. Measuring the rope would show the height of the tree.
OR
She could use a sextant.
OR
Measure a long string and tie it to a helium balloon. Let the balloon rise to the top of the tree. Measure how much string is left over on the ground and subtract it from the total amount.

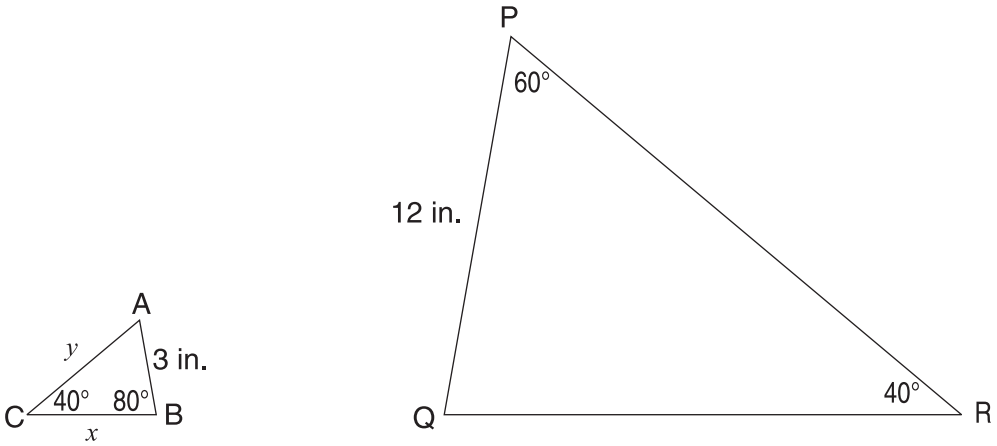
Item 3 Similar Triangles

Standard: MA-07-3.1.04: Shapes and Relationships — Students will describe and provide examples of congruent and similar figures, and will apply congruent and similar figures to solve real-world and mathematical problems.

Bloom's Taxonomy: Application

Depth of Knowledge: Level 3

3. Use the diagram below to answer this question.



a. Explain why triangles ABC and PQR are similar.

b. Find the perimeter of each triangle in terms of x and y.

c. What is the ratio of the areas of the triangles? Explain your reasoning.

Similar Triangles

Scoring Guide

Score	Description
4	The student demonstrates a thorough understanding of similarity, perimeter, and area by providing a correct explanation as to why two triangles are similar, correctly calculating their perimeters, and accurately determining the ratio of their areas.
3	The student demonstrates a general understanding of similarity, perimeter, and area by providing an explanation as to why two triangles are similar, calculating their perimeters, and determining the ratio of their areas 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 similarity, perimeter, and area 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 similarity, perimeter, and area. 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: $180 - 60 - 40 = 80$ so the missing angle in the larger triangle is 80°. So, there are 2 corresponding angles that are congruent. That means that the triangles are similar (AA Similarity Postulate).

Part b: $x + y + 3$ $\quad$ $4x + 4y + 12$

Part c: The ratio is 1:16 because the base and height of the second triangle are both 4 times the base and height of the first triangle.

Item 4 Smiley's Deli

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: Application

Depth of Knowledge: Level 2

4. The choices for sandwiches at Smiley's Deli are shown below.

Bread	Meat	Cheese
white (w)	turkey (t)	American (A)
oatmeal (o)	ham (h)	Swiss (S)
pita (p)	roast beef (r)	
	corned beef (c)	
	bologna (b)	

a. Make an organized list or diagram to show all the possible combinations of one meat and one cheese.

b. How many different kinds of sandwiches can be made using one bread, one meat, and one cheese?

Smiley's Deli offers a sandwich with three different kinds of meat, no cheese, and white bread.

c. How many different ways can a person choose three different meats from the five choices? Show or explain how you found your answer.

Smiley's Deli

Scoring Guide

Score	Description
4	The student demonstrates a thorough understanding of counting procedures by correctly solving problems involving combinations of choices made from different sets and also the number of different ways a given number of choices can be made from a single set.
3	The student demonstrates a general understanding of counting procedures by solving problems involving combinations of choices made from different sets and also the number of different ways a given number of choices can be made from a single set, 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 counting procedures 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 counting procedures. 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: tA, tS, hA, hS, rA, rS, cA, cS, bA, bS

OR

t < A, S

h < A, S

r < A, S

c < A, S

b < A, S

Part b: 30

Part c: There are 10 ways: thr, thc, thb, trc, trb, tcb, hrc, hrb, hbc, rcb

OR

$$\frac{5!}{3!2!} = \frac{5\times4}{2} = 10$$

Item 5 Carefree Rentals

Standard: MA-07-5.3.01: Equations and Inequalities — Students will model and solve real-world and mathematical problems with one- or two-step single variable, first-degree equations or inequalities (e.g., $2x + 1 = 9$, $3x + 3 < 9$). (Statements and solutions use only non-negative numbers.)

Bloom's Taxonomy: Application

Depth of Knowledge: Level 2

5. Vans can be rented at Carefree Rentals. This company charges $22.00 per day and $0.25 per mile.
   a. Write an **equation** to show how much it would cost, C, to rent a van for d days and drive it m miles.

   b. How much will Trudy be charged if she rents a van from Carefree Rentals for two days and drives it a total of 150 miles? Show your work or explain how you found your answer.

   c. Chuck prepaid $140.00 to rent a van from Carefree Rentals. If he rents it for 3 days, what is the greatest number of miles he can drive the van without paying any additional money when he returns it? Show your work or explain how you found your answer.

Carefree Rentals

Scoring Guide

Score	Description
4	The student demonstrates a thorough understanding of solving a real-world problem involving algebraic concepts by writing an appropriate equation to model the situation and correctly solving related problems.
3	The student demonstrates a general understanding of solving a real-world problem involving algebraic concepts by writing an equation to model the situation and solving related problems 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 a real-world problem involving algebraic concepts 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 a real-world problem involving algebraic concepts. 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: $C = 22d + 0.25m$

Part b: $22(2) + 0.25(150) = \$81.50$
OR
$44 + 37.50 = \$81.50$

Part c: $140 = 22(3) + 0.25m$
$74 = 0.25m$
$m = 296$
OR

200	116
250	128.50
275	134.75
300	141
*296	140

OR
It increases by \$12.50 for each 50 miles, so pick a number . . . 250. 250 mi. would cost \$128.50 and 300 mi. would cost \$141. To drop \$1, drop 4 miles. . . 296 miles.