

2007

Green River
*Regional Educational
Cooperative*

GRADE 6
MATHEMATICS

CONSTRUCTED RESPONSE



Table of Contents

Item 1 T-Shirt Sizes.....	pp.3–4
Standard: MA-06-1.3.01: Number Operations	
Scoring Guide.....	p. 5
Sample Student Responses	pp. 6–10
Item 2 Summer Jobs.....	p. 11
Standard: MA-06-1.3.01: Number Operations	
Scoring Guide.....	p. 12
Item 3 Stories about Graphs	p. 13
Standard: MA-06-4.1.01: Representations of Data Sets	
Scoring Guide.....	p. 14
Item 4 Pattern Game	p. 15
Standard: MA-06-5.1.01: Patterns, Relations and Functions	
Scoring Guide.....	p. 16
Item 5 Triangle Translation	p. 17
Standard: MA-06-3.2.02: Transformations of Shapes	
Scoring Guide.....	p. 18

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

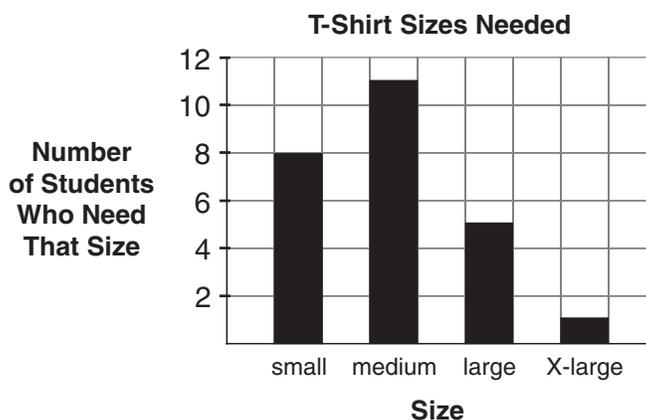
Item 1 T-Shirt Sizes

Standard: MA-06-1.3.01: Number Operations — Students will add, subtract, multiply, and divide whole numbers, fractions, and decimals to solve real-world problems and apply order of operations to simplify numerical expressions.

Bloom’s Taxonomy: Analysis

Depth of Knowledge: Level 2

1. Students in Ms. Gwin’s class want to order school T-shirts. The number of each size they need is shown on the graph below.



The prices of the T-shirts are shown below.

- \$6.00 for a package of 4, all the same size
- \$2.50 for each individual shirt

Order Form

Size	Small	Medium	Large	X-Large
Number of packages of 4 shirts each (\$6 per package)				
Number of individual shirts (\$2.50 per shirt)				

- a. Complete the order form so that
- the order includes **at least** all the shirts that are needed and
 - the price of the entire order is the **lowest possible price**.

Show all your work. Explain how you know that the price of the order is the lowest possible price.



b. What is the price of the entire order? Show or explain how you found your answer.

T-Shirt Sizes

Scoring Guide

Score	Description
4	The student response demonstrates an exemplary understanding of the Number Properties and Operations concepts involved in solving real-world problems that require addition and multiplication of whole numbers and decimals.
3	The student response demonstrates a good understanding of the Number Properties and Operations concepts involved in solving real-world problems that require addition and multiplication of whole numbers and decimals. 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 Number Properties and Operations concepts involved in solving real-world problems that require addition and multiplication of whole numbers and decimals. 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 Number Properties and Operations concepts involved in solving real-world problems that require addition and multiplication of whole numbers and decimals.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response.

Sample Response:

Order Form

Size	Small	Medium	Large	X-Large
Number of packages of 4 shirts each (\$6 per package)	2	3	1	
Number of individual shirts (\$2.50 per shirt)			1	1
Total Price	\$12	\$18	\$8.50	\$2.50

Since packages are cheaper than 3 or 4 individual shirts, I used packages when the package was cheaper than the number of individual shirts I needed. Total Price: \$41.00

Sample Student Responses

T-Shirt Sizes

Size	Small	medium	large	X-large
number of packages of 4 shirts each. (\$6 per pack)	2	3	2	1
Number of individual shirts (\$2.50 per shirt)	8	11	5	1

= 8 packages at \$48
- or -
= 25 shirts at \$62.50

- or -

	SM	MED	LG	X-LG
packages of 4 shirts at \$6 a pack	2	3	1	
individual shirts at \$2.50 a shirt			1	1

= \$36 for 8 packs
= \$5 for 2 shirts

Total price of shirts = **\$41**

B This is the lowest price possible because I didn't spend \$6 more dollars for a package when all I needed was one shirt. Two packs of smalls is all I needed because there were 8 shirts even. Three packs of medium is cheaper than two packs and three individual. One package of large and one individual was cheaper than two packs of large. Only one person wanted x-large so I ordered a single.

Score Point: 4

Size	small	medium/large	x-large	
Number of packages of 4 shirts each (\$6 per package)	2	3	1	0
Number of individual shirts (\$2.50 per shirt)	0	0	1	1

small = 8 shirts
 2 packages = \$12 dollars
 8 shirts separate = \$20

medium = 11 shirts
 3 packages = \$18
 1 extra
 2 packages = \$12
 3 separate \$7.50 $\frac{12}{2} = 6$
 \$19.50

Large = 5 shirts
 2 packages = \$12
 1 package w/ 1 individual = \$8.50

x-Large = 1 shirt
 1 individual = \$2.50
 1 package = \$6.00

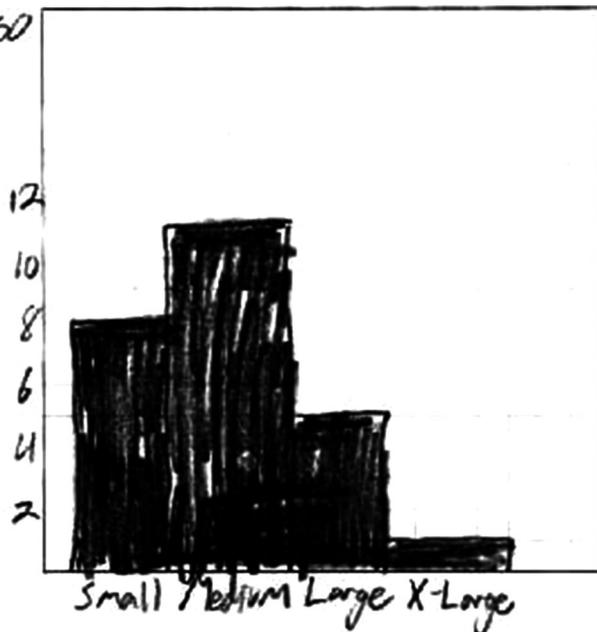
Score Point: 3

size	Small	Medium	Large	X-L
Number of packages of 4 shirts (\$6 per package)	2	2	1	0
Number of individual shirts (\$2.50 per shirt)	0	3	1	1

$5 \cdot 6 = 30$ $3 \cdot 2.5 = 7.50$
 $5 \cdot 2.5 = 12.50$
 30.00
 12.50
 $\hline 42.50$

Total = \$42.50

Small - $4 \cdot 8 = 32$
 Medium - $4 \cdot 11 = 44$
 Large - $4 \cdot 5 = 20$
 X-Large - $4 \cdot 3 = 12$



Score Point: 2

$$8 + 11 + 5 + 1 = 25$$

$$\$2.50 \times 25 = \$62.5$$

$$4 \overline{) 62.5}$$

$$6.25 \times 6 = \boxed{\$37.5}$$

The package of 4
because it is \$25
cheaper.

$$62.5 - 37.5 = 25$$

Score Point: 1

Summer Jobs

Scoring Guide

Score	Description
4	The student demonstrates excellent problem solving skills by correctly analyzing and solving real-world problems involving money.
3	The student demonstrates good problem solving skills by analyzing and solving real-world problems involving money 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 tasks.
1	The student demonstrates minimal problem solving skills. 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: Cost of units = $\$60 + \$40 = \$100$

Amount left to earn = $\$100 - \$25 = \$75$

Number of weeks needed to earn = $\$75 \div \$12.50 = 6$ weeks

Part b: Amount earned by paper route in 5 weeks = $5 \times \$12.50 = \62.50

Amount left to earn by birthday parties = $\$575 - \$62.50 = \$512.50$

Profit from each birthday party = $\$60 - \$25 = \$35$

Number of birthday parties needed: $\$512.50 \div \$35 = 14.6$ or 15 parties

Number of parties per week needed: $15 \text{ parties} \div 5 \text{ weeks} = 3$ parties/week

OR

Weekly Earnings Needed: $\$575 \div 5 = \115

Weekly Earnings Need from Parties: $\$115 - \$12.50 = \$102.50$

Number of Parties Needed per week: $\$102.50 \div \35 (party profit) = 2.93 so 3 parties

Item 3 Stories about Graphs

Standard: MA-06-4.1.01: 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).

Bloom’s Taxonomy: Synthesis

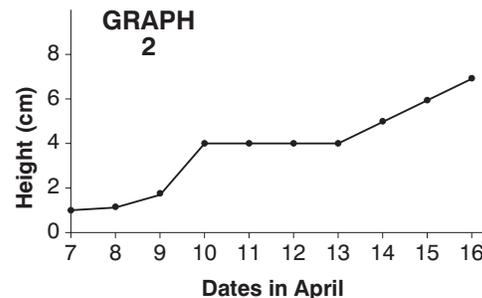
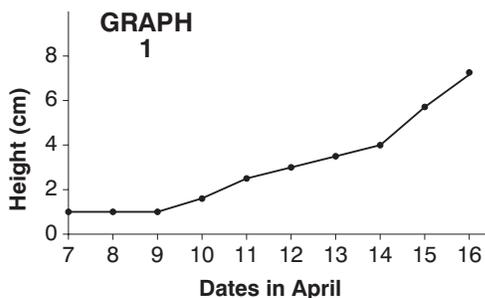
Depth of Knowledge: Level 3

3. Adam wrote the following story about a plant he grew.

THE STORY

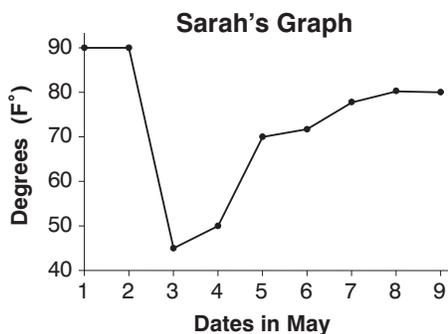
At first, my plant did not seem to grow at all. For the next five days, it grew steadily. Then, it started to grow faster.

a. Adam wants to illustrate his story with a graph. Which of the following graphs (Graph 1 or Graph 2) fits Adam’s story?



b. Look at the graph you did **not** choose. Give one reason why this graph does not fit Adam’s story.

c. Sarah drew the following graph. Create a story to go with Sarah’s graph.



Stories about Graphs

Scoring Guide

Score	Description
4	The student demonstrates a thorough understanding of graphs representing change over time by correctly matching a graph to a situation and creating a story to accurately match a graph.
3	The student demonstrates a general understanding of graphs representing change over time by matching a graph to a situation and creating a story to match a graph, 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 graphs representing change over time 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 graphs representing change over time. 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: Graph 1

Part b: Graph 2 does not show steady growth for 5 days.

OR

Graph 2 does not show steady growth and then faster growth right afterwards.

OR

Graph 2 starts with a little bit of growth, but the story says that at first the plant didn't grow.

OR

The story didn't say anything in the middle of it about not growing for a few days, but Graph 2 shows this.

Part c: It was very hot in the beginning of May and then the temperature dropped really quickly. It didn't stay cold for long though. The temperature increased for the next 5 days.

OR

Ted's family went to Maine for a vacation. When they first got there, it was great beach weather.

Unfortunately a cold front arrived, which made the next two days quite chilly. Then the temperature jumped back to more comfortable temperatures for the rest of the vacation.

Item 4 Pattern Game

Standard: MA-06-5.1.01: 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: Analysis

Depth of Knowledge: Level 3

4. Ms. Engle's class is playing a guessing game. One student makes a pattern. Then the other students find the next **three** numbers in the pattern and tell how the pattern was made.

Ed made this pattern: 5, 9, 13, 17, 21.

Jana correctly said that the next **three** numbers are 25, 29, and 33 and that Ed made the pattern by starting with 5 and adding 4 over and over.

- a. This is Ruth's pattern: 1, 7, 13, 19, 25, 31.
- Write the next **three** numbers in Ruth's pattern.
 - Explain how Ruth made her pattern.
- b. This is Lola's pattern: 20, 16, 18, 14, 16, 12.
- Write the next **three** numbers in Lola's pattern.
 - Explain how Lola made her pattern.
- c. This is Eric's pattern: 1, 1, 2, 3, 5, 8, 13, 21.
- Write the next **three** numbers in Eric's pattern.
 - Explain how Eric made his pattern.

Pattern Game

Scoring Guide

Score	Description
4	The student demonstrates a thorough understanding of patterns by correctly extending patterns and writing their rules.
3	The student demonstrates a general understanding of extending patterns and writing rules for the patterns 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 patterns 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 patterns. 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: 37, 43, 49 Start with 1 and keep adding 6.

Part b: 14, 10, 12 Start with 20 and subtract 4, then add 2.

Part c: 34, 55, 89 You start with 1 and add to it the number before it in the pattern.

$$1 + \text{nothing} = 1$$

$$1 + 1 = 2$$

$$2 + 1 = 3$$

$$3 + 2 = 5$$

$$5 + 3 = 8$$

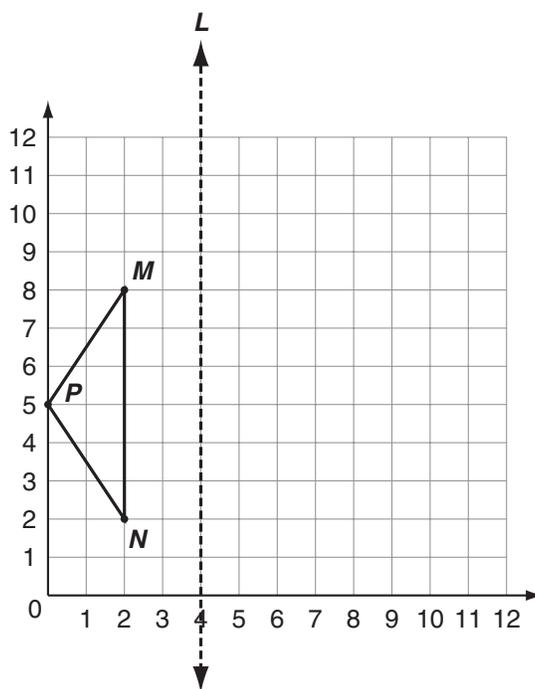
Item 5 Triangle Translation

Standard: MA-06-3.2.02: Transformations of Shapes — Students will: reflect figures across a horizontal or vertical line in the first quadrant; translate figures in a plane in the first quadrant and determine the coordinates of the image after transformation in the first quadrant.

Bloom's Taxonomy: Comprehension

Depth of Knowledge: Level 2

5. Draw the graph below in your answer booklet.



$\triangle MNP$ lies on the coordinate plane.

- What are the coordinates of point M ?
- On the grid, translate $\triangle MNP$ 9 units to the right. Label the image $\triangle QRS$.
- Reflect $\triangle MNP$ over line L . Label the image $\triangle XYZ$.

Triangle Translation

Scoring Guide

Score	Description
4	The student demonstrates a thorough understanding of transformations on the coordinate plane by correctly drawing the image of a figure after a translation and reflection.
3	The student demonstrates a general understanding of transformations on the coordinate plane by drawing the image of a figure after a translation and reflection 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 transformations on the coordinate plane 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 transformations on the coordinate plane. 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:

a. (2, 8)

b.

c.

