2007

# Green River

## *Regional Educational Cooperative*

GRADE 7

MATHEMATICS

Measured Progress

## Table of Contents

Item 1 Chris's Money ..... p. 3

Standard: MA-07-1.1.03: Number Sense

Scoring Guide ..... p. 4

Sample Student Responses ..... pp. 5–9

Item 2 Kevin's Garden ..... p. 11

Standard: MA-07-2.1.01: Measuring Physical Attributes

Scoring Guide ..... p. 12

Sample Student Responses ..... pp. 13–17

Item 3 Maple Avenue Math Club ..... pp. 19–20

Standard: MA-07-1.3.01: Number Operations

Scoring Guide ..... p. 21

Sample Student Responses ..... pp. 22–27

Item 4 Random Ball Selection ..... p. 29

Standard: MA-07-4.4.02: Probability

Scoring Guide ..... p. 30

Sample Student Responses ..... pp. 31–35

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

## Item 1 Chris's Money

**Standard:** MA-07-1.1.03: Number Sense – Students will convert among whole numbers, fractions, decimals, percents, and pi, and will compare and order these numbers.

**Bloom's Taxonomy:** Comprehension

**Depth of Knowledge:** Level 2

1. Chris spent \$9 of the \$12 his grandmother gave him.
   a. Julie said that Chris spent exactly $\frac{2}{3}$ of his money. Explain why Julie is correct or incorrect.
   b. Jessie said that Chris spent exactly 0.75 of his money. Explain why Jessie is correct or incorrect.
   c. Mary said that Chris spent exactly 80% of his money. Explain why Mary is correct or incorrect.

## Chris's Money

**Scoring Guide**

| Score | Description |
|---|---|
| **4** | The student response demonstrates an exemplary understanding of the concepts involved in converting among whole numbers, fractions, decimals, and percents to compare numbers. |
| **3** | The student response demonstrates a good understanding of the concepts involved in converting among whole numbers, fractions, decimals, and percents to compare numbers. 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 converting among whole numbers, fractions, decimals, and percents to compare numbers. 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 converting among whole numbers, fractions, decimals, and percents to compare numbers. |
| **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: $\frac{2}{3} \times 12 = 8$, so Julie is incorrect.

Part b: $0.75 \times 12 = 9$, so Jessie is correct.

Part c: $12 \times 80\% = 12 \times .08 = 96$, so Mary is incorrect.

# *Sample Student Responses*

## Chris's Money

a. Julie is incorrect because he spent $9 out of the $12 which is $\frac{3}{4}$ of the money his grandmother gave him.

b. Jessie is correct because if you divide 3 by 4, your answer is 0.75.

c. mary is incorrect because 0.75 would be 75%.

Score Point: 4

(A) JULIE SAID THAT CHRIS SPENT EXACTLY $\frac{2}{3}$ OF HIS MONEY. JULIE IS INCORRECT BECAUSE $\frac{2}{3}$ OF HIS MONEY IS \$8.

(B) JESSIE SAID THAT CHRIS SPENT EXACTLY 0.75 OF HIS MONEY. JESSIE IS CORRECT BECAUSE $\frac{9}{12}$ IS 0.75 OF HIS MONEY.

(C) MARY SAID THAT CHRIS SPENT EXACTLY 80% OF HIS MONEY. MARY IS INCORRECT BECAUSE $\frac{9}{12}$ IS NOT EQUAL TO 80%.

Score Point: 3

The answer is (b) because if you put 9 over 12 $\left(\frac{9}{12}\right)$ and divide both the naminator and denominator by 3 $\left(\frac{9}{12} \div \frac{3}{3}\right)$ you get 3 over 4 which is equal to 0.75 —— because 3 divided by 4 is 0.75.

Score Point: 2

a. Julie was right because $\frac{2}{3}$, of 12 is 8

b. Jessie was wrong

c. Mary was wrong

Score Point: 1

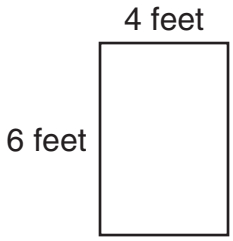
## Item 2 Kevin's Garden

**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

2. 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*

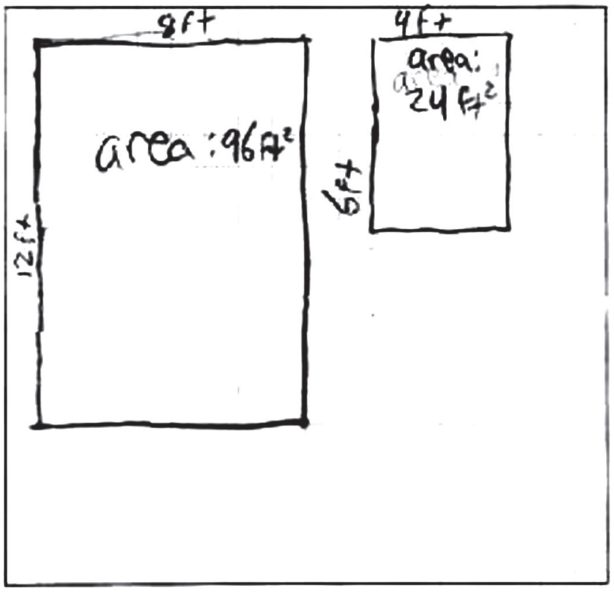
## Kevin's Garden

(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

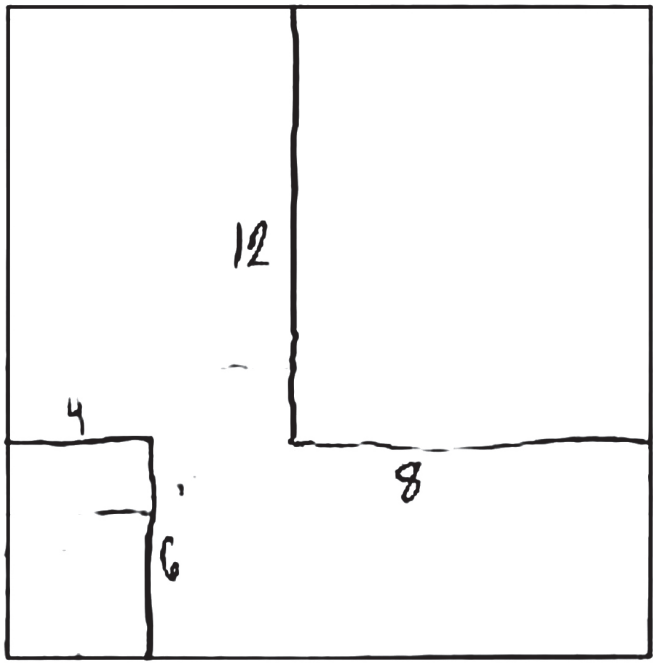
6 · 6 = 36

Score Point: 2

a. 29 feet

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

C. She's correct




Score Point: 1

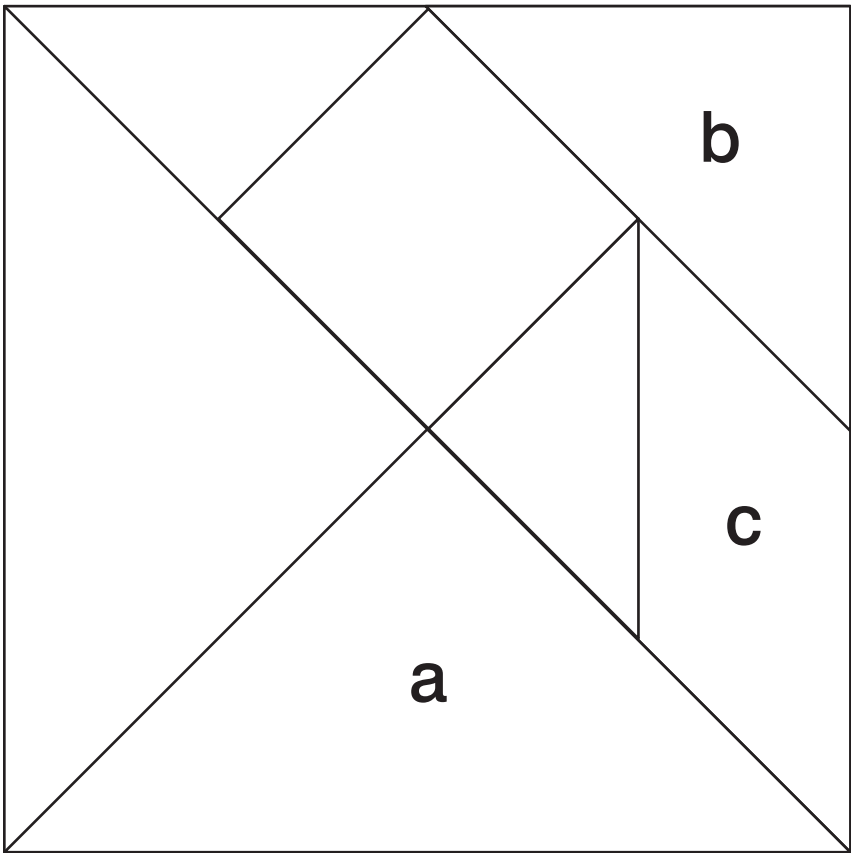
## Item 3 Maple Avenue Math Club

**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:** Application

**Depth of Knowledge:** Level 2

*Use the picture below and the tangram from your white envelope to answer question 3.*

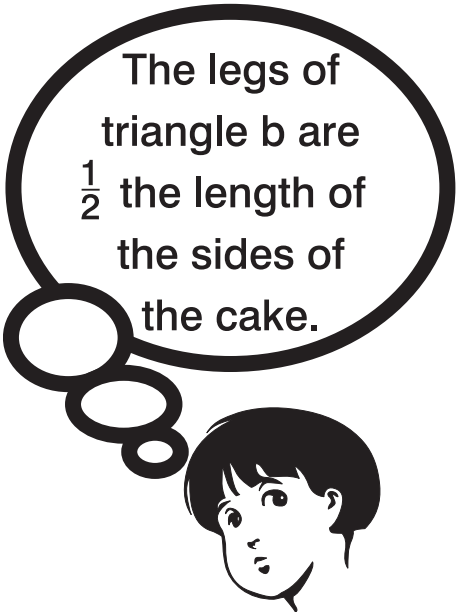



3. The Maple Avenue School mathematics club is having a bake sale to raise $48. A huge cake was baked and cut like a tangram. Each piece is priced based on its size. The sum of the cost of all of the pieces is $48.

a. What is the price of triangle a? Show your work or explain how you found your answer.

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

c. What is the price of parallelogram c? Show your work or explain how you found your answer.



## Maple Avenue Math Club

**Scoring Guide**

| Score | Description |
|---|---|
| **4** | The student response demonstrates an exemplary understanding of the concepts involved in multiplying whole numbers and fractions to solve real-world and mathematical problems. |
| **3** | The student response demonstrates a good understanding of the concepts involved in multiplying whole numbers and fractions to solve real-world and mathematical 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 multiplying whole numbers and fractions to solve real-world and mathematical problems. While some aspects of the task are completed correctly, others are not. The mixed evidence provided by the student response merits 2 points. |
| **1** | The student response demonstrates a minimal understanding of the concepts involved in multiplying whole numbers and fractions to solve real-world and mathematical 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: Triangle a is $\frac{1}{4}$ of the square. $\frac{1}{4} \times 48 = 12$. \$12

Part b: Triangle b is $\frac{1}{8}$ of the square because $\frac{1}{2}bh = \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{8}$. $\frac{1}{8} \times 48 = 6$. \$6

Part c: Parallelogram c can be made from two of the smallest triangles. The smallest triangles are half of triangle b, so parallelogram c has the same area as triangle b. \$6

# *Sample Student Responses*

## Maple Avenue Math Club

A. \$12 A is $\frac{1}{4}$ of the whole square, $\frac{1}{4}$ of \$48 = \$12

B. \$6 B is $\frac{1}{8}$ of square, $\frac{1}{8}$ of \$48 = \$6

C. \$6 C is $\frac{1}{8}$ of square, $\frac{1}{8}$ of \$48 = \$6

total = \$24
total left = \$24

Score Point: 4

a. $12.00 for triangle A. Triangle 8 is the length of one side. There are 4 sides so divide 48 by 4 = 12.

b. $6.00 for triangle B. The length of triangle 6 is half the length of the sides of the cake. Since the whole cake is $48 and there are four sides you divide 48 by 4 = 12, 12 is the length of one side, So you divide 12 by 2 = 6.

c. 7.50 for parrallelogram c, The length of parallelogram is a little over half the length of one side. The side is 4 in. long. The side on the edge is 2 in. The side going in is 1½ in long. If half of the side is $6.00 than half (2" + 1½") + a little over half is $7.56

Score Point: 3

Ta) Triangle a would be $12.
Tb) Triangle b wold be $66.
Pc) Parallelgram c wood be $6.

$$\begin{array}{r} 24 \\ +\ 24 \\ \hline 48 \end{array} \qquad \begin{array}{r} 12 \\ +12 \\ \hline \cancel{324} \end{array}$$

$12

$$\begin{array}{r} 6 \\ +6 \\ \hline 12 \end{array}$$

Score Point: 2

a) piece a would be $11. I got that by saying half of 48 is 24 and half of that is 11.

b) piece b should be $8.

c) piece c should be $6.

Score Point: 2

$3 \times 1\frac{3}{8}$ they sell by the ~~pr~~

a) = $12

b) = $3

c) $3

2·1 + 8 =

Score Point: 1

## Item 4 Random Ball Selection

**Standard:** MA-07-4.4.02: Probability – Students will determine theoretical probabilities of simple events; determine probabilities based on the results of an experiment; and make inferences from probability data.

**Bloom's Taxonomy:** a. Application
b. Knowledge
c. Comprehension

**Depth of Knowledge:** Level 3

4. A box contains six balls of the same size, numbered 1 through 6. One ball will be selected at random from this box.
   a. What is the probability of selecting an even-numbered ball? Explain your reasoning.
   b. What is the probability of selecting a ball with a number greater than 3? Explain your reasoning.
   c. Suppose you add balls of the same size, numbered 7 through 20, to the box. How would the probabilities you found in parts a and b change? Justify your reasoning.

   BE SURE TO LABEL YOUR RESPONSES (a), (b), AND (c).

## Random Ball Selection

**Scoring Guide**

| Score | Description |
|---|---|
| **4** | The student response demonstrates an exemplary understanding of the concepts involved in finding the theoretical probability of an event. |
| **3** | The student response demonstrates a good understanding of the concepts involved in finding the theoretical probability of an event. 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 finding the theoretical probability of an event. While some aspects of the task are completed correctly, others are not. The mixed evidence provided by the student response merits 2 points. |
| **1** | The student response demonstrates a minimal understanding of the concepts involved in finding the theoretical probability of an event. |
| **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: $\frac{\text{number of even balls}}{\text{number of all balls}} = \frac{3}{6} = \frac{1}{2}$

Part b: $\frac{\text{number of balls greater than 3}}{\text{number of all balls}} = \frac{3}{6} = \frac{1}{2}$

Part c: $\frac{\text{number of even balls}}{\text{number of all balls}} = \frac{10}{20} = \frac{1}{2}$

The probability of getting an even-numbered ball is the same because half of the numbers added are even.

$\frac{\text{number of balls greater than 3}}{\text{number of all balls}} = \frac{17}{20}$

The probability of getting a ball with a number greater than 3 would increase if you add more numbers greater than 3.

# *Sample Student Responses*

## Random Ball Selection

ⓐ $\frac{1}{2}$, of the six balls in the box, 3 of them are even numbered (1, 3, 5) and 3 of them are odd number (2, 4, 6) $\frac{3 \text{ even}}{6 \text{ total}} = \frac{1}{2}$ (or 1:2)

ⓑ $\frac{1}{2}$ of the 6 balls in the box, 3 of them are greater than 3 (4, 5 and 6) $\frac{3 \text{ higher than } 3}{6 \text{ total}} = \frac{1}{2}$

ⓒ the answer to (a) would stay the same because 10 of the balls would be even (2, 4, 6, 8, 10, 12, 14, 16, 18, 20) and 10 of them would be odd (1, 3, 5, 7, 9, 11, 13, 15, 17, 19)

$$\frac{10 \text{ even}}{20 \text{ total}} = \frac{1}{2}$$

the answer to be would change because all of the new balls would be greater than 3 so, the new probability ratio would be $\frac{17 \text{ balls higher than } 3}{20 \text{ total}} = \frac{17}{20}$

Score Point: 4

a) $\frac{1}{2}$ because there are 3 even numbers out of the six balls.

b) $\frac{1}{2}$ because there are three numbers greater than three and three numbers less than three.

c) a would not change but b would have a 17 in 20 chance to pick a ball greater than three because 4-20 are all greater than three.

Score Point: 3

a) It is a 50/50 chance. There are 3 of each ball, the probability of picking an even-numbered ball is the same as picking an odd-numbered ball.

b) It is still another 50/50 chance. There are 3 balls (1-3 and 4-6) the chance of picking a ball from 4-6 is the same as picking a ball from 1-3.

c) The 50/50 chance wouldn't change. All that would happen is that more balls are added and there is 10 even and 10 odd instead of 3 each.

In question B the probability of now picking a ball with a number greater than 3 has increased. You now have a 3:17 ratio (3 being #'s 1-3 and 17 all above 3) insted of a 3:3 ratio. It also would seem more likely to pick a ball now anywhere from 4 to 20.

Score Point: 2

(a) The probability of picking an even-numbered ball is 50%. That is because you have 3 even-numbered balls (2,4,6) and 3 odd-numbered balls (1,3,5).

(B) The probability of picking a ball numbered greater than 3 would be 33.$\overline{3}$%. This because there are 2 above 3 and 6 total giving us a ratio of 2:6. This can be represented as $\frac{2}{6}$ and 2 ÷ 6 equals .$\overline{33}$ which we represent as 33.$\overline{3}$.

(C) If you added balls 7–10 the probabilities would go down dramatically because there would be more to choose from lessening the chance of picking the marked ones.

Score Point: 1