

2007

Green River
*Regional Educational
Cooperative*

GRADE 4
MATHEMATICS

CONSTRUCTED RESPONSE



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

Item 1 Jacob's Chores

Standard: MA-04-1.5.01: Properties of Numbers and Operations — Students will identify and determine odd numbers, even numbers, multiples of a number and factors of a number, and will apply these numbers to solve real-world problems.

Bloom's Taxonomy: a. Comprehension
b. Application

Depth of Knowledge: Level 2

1. Jacob's mother made the schedule shown below for Jacob's chores for the first 60 days of summer vacation.
 - Walk the dog every 2nd day starting on day 2.
 - Brush the dog every 3rd day starting on day 3.
 - Water the plants every 4th day starting on day 4.
 - a. On what day will Jacob first walk **and** brush the dog? Show or explain how you found your answer.
 - b. On what day will Jacob first do **all three** chores? Show or explain how you found your answer.
 - c. How many times in the 60 days will Jacob do all three chores on the same day? Show or explain how you found your answer.

Jacob's Chores

Scoring Guide

Score	Description
4	The student response demonstrates an exemplary understanding of the Number Operations and Procedures concepts involved in determining multiples of numbers to solve real-world problems.
3	The student response demonstrates a good understanding of the Number Operations and Procedures concepts involved in determining multiples of numbers 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 Number Operations and Procedures concepts involved in determining multiples of numbers 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 Number Operations and Procedures concepts involved in determining multiples of numbers 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: 6 because 6 is the least common multiple of both 2 and 3.

Part b: 12 because 12 is the least common multiple of 2, 3, and 4.

Part c: 5 times. He will do all three chores on days 12, 24, 36, 48, and 60.

Sample Student Responses

Jacob's Chores

walk dog on day 2, 4, 6, 8, 10

a.) on the 6th day brush his dog on day 3, 6, 9, 12

b.) on the 12th day

walk dog on day 2, 4, 6, 8, 10, 12
 Brush dog on day 3, 6, 12, 15, 18
 water plants on day 4, 8, 12, 16

c.) 5 times

water 4, 8, 12, 16, 20, 24, 28, 32, 36
 plant 40, 44, 48, 52, 56, 60

walk dog 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22,
 24, 26, 28, 30, 32, 34, 36,
 38, 39, 40, 42, 44, 46, 48, 50,
 52, 54, 56, 58, 60

brush dog 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, 45, 48, 51, 54, 57,
 60

Score Point: 4

$$A) 2+2+2=6 = \text{day } 6$$

$$3+3=6 = \text{day } 6$$

$$B) 4+4+4=12$$

$$2+2+2+2+2+2=12 = \text{day } 12$$

$$3+3+3+3=12$$

$$C) 4 \times 6 = 24 = \text{day } 24$$

$$3 \times 8 = 24$$

$$2 \times 12 = 24$$

only 2 times and
day 12 and on day
24.

Score Point: 3

(a) Day 6 he will do both. I found this by listing their least common multiples,

2, 4, 6
3, 6

(b) Day 12 he will do all three. This is because they all have the multiple of 12 in common.

2, 4, 6, 8, 10, 12
3, 6, 9, 12
4, 8, 12

(c) He will do all 4 times in 60 days.

2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22,
24, 26, 28, 30, 32, 34, 36, 38, 40
42, 44, 46, 48, 50, 52, 54, 56, 58,
60
3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36,
39, 42, 45, 48, 51, 54, 57, 60, 63, 66

4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52, 56, 60

Score Point: 3

- A. Second and first day. It tells you.
- B. 5th day. It goes in order.
- C.
$$\begin{array}{r} 5 \overline{) 60} \\ \underline{-50} \\ 10 \\ \underline{-10} \\ 0 \end{array}$$
 (12)

Score Point: 2

- (a) Day 12 will be the first day Jacob does both
I found this out with a compassine.
- (b) Day 12 will also be the day he does
all 3 I found this out by a graph
- (c) 3 times he will do all 3 I found
this out by graph

Score Point: 1

- a. Jacob can't brush and walk the dog on 2 days. So I picked day 4.
- b. Jacob can do his chores on the 4th day because he didn't do it on day 2 or 3.
- c. 1,218,240. First, I multiply 234×60 . Next, I figure out the answer.

Score Point: 0

Item 2 Guess My Number

Standard: MA-04-1.1.01: Number Sense — Students will apply multiple representations (e.g., drawings, manipulatives, base-10 blocks, number lines, expanded form, symbols) to represent whole numbers (0 to 99,999); apply multiple representations (e.g., drawings, manipulatives, base-10 blocks, number lines, symbols) to describe commonly used fractions through tenths and decimals through hundredths; apply these numbers to represent real-world problems, and explain how the base 10 number system relates to place value.

Standard: MA-04-1.5.01: Properties of Numbers and Operations — Students will identify and determine odd numbers, even numbers, multiples of a number and factors of a number, and will apply these numbers to solve real-world problems.

Bloom's Taxonomy: Synthesis

Depth of Knowledge: Level 3

2. Nadine was playing a Guess My Number game with her mother. The first clue she told her mother was, “I am thinking of a three-digit whole number that has the digits 1, 5, and 8.”
- List all the numbers that Nadine could be thinking of.

Nadine's next clue was this: “My number is also a multiple of 5.”

- List all the numbers that Nadine could be thinking of now.

Finally, Nadine told her mother the last clue: “When my number is rounded to the nearest hundred, it is 200.”

- What is Nadine's number?
- Write three clues for another game of Guess My Number and number your clues. The game must have **only one** correct answer. Write the answer.

Guess My Number

Scoring Guide

Score	Description
4	The student demonstrates a thorough understanding of place value, multiples, and rounding by correctly solving and creating puzzles based on these concepts.
3	The student demonstrates a general understanding of place value, multiples, and rounding by solving and creating puzzles based on these concepts 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 place value, multiples, and rounding 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 place value, multiples, and/or rounding. 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: 158, 185, 518, 581, 815, 851

Part b: 185, 815

Part c: 185

Part d: I am thinking of a number between 60 and 80.

My number is even.

My number is a multiple of 7.

70

Item 3 Clubs at Lincoln School

Standard: MA-04-1.3.01: Number Operations — Students will analyze real-world problems to identify appropriate representations using mathematical operations, and will apply operations to solve real-world problems with the following constraints: add and subtract whole numbers with four digits or less; multiply whole numbers with two digits or less; divide whole numbers with three digits or less by single-digit divisors (with or without remainders); add and subtract fractions with like denominators less than or equal to 10, and add and subtract decimals through hundredths.

Bloom’s Taxonomy: Analysis

Depth of Knowledge: Level 3

3. Last year Lincoln School started three clubs for third and fourth graders. The tables below show how many students belonged to the clubs last year and this year.

Students Belonging to Clubs LAST Year			Students Belonging to Clubs THIS Year		
	Number of 3rd Graders	Number of 4th Graders		Number of 3rd Graders	Number of 4th Graders
Art Club	8	5	Art Club	10	8
Math Club	6	9	Math Club	8	11
Science Club	3	8	Science Club	6	9

- Which club has the greatest number of members **this** year? Explain how you found your answer.
- How many more students belong to the science club this year than belonged last year? Explain how you found your answer.
- Which club had the greatest **increase** in membership this year over last year? Explain how you found your answer.
- There are 25 students in the fourth grade this year. Can you tell from the information given whether any student is in more than one club?
 - If so, explain how you can tell.
 - If not, explain what additional information you need to be able to tell.

Clubs at Lincoln School**Scoring Guide**

Score	Description
4	The student demonstrates excellent problem solving skills by correctly analyzing and solving real-world problems involving the identification of needed information from a chart and the use of that information in addition, subtraction, and reasoning.
3	The student demonstrates good problem solving skills by analyzing and solving real-world problems involving the identification of needed information from a chart and the use of that information in addition, subtraction, and reasoning, 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.

Clubs at Lincoln School

Sample Response:

Part a: You add up the number of 3rd graders and 4th graders in each row of the chart on the right. The number that is the largest is 19 for Math Club.

OR

$$10 + 8 = 18$$

$$8 + 11 = 19 \quad \text{Math Club is the largest group.}$$

$$6 + 9 = 15$$

Part b: I added the number of 3rd graders and 4th graders in the Science Club row of the chart on the left...11. Then I added the number of 3rd graders and 4th graders in the Science Club row of the chart on the right...15. That's a difference of 4.

OR

$$3 + 8 = 11 \quad 6 + 9 = 15 \quad 15 - 11 = 4$$

Part c: Add up each row in each chart. Then compare the change for each club.

Art Club – 5 Math Club – 4 Science Club – 4 Art Club grew the most.

OR

Club–Year	Total Students	Club–Year	Total Students	Difference
Art–Last	13	Art–This	18	5
Math–Last	15	Math–This	19	4
Science–Last	11	Science–This	15	4

Art Club

Part d: $8 + 11 + 9 = 28$ but there are only 25 students. That means some students are in more than 1 club.

Item 4 Geometric Figures

Standard: MA-04-3.1.02: Shapes and Relationships — Students will describe and provide examples of basic two-dimensional shapes [circles, triangles (right, equilateral), squares, rectangles, trapezoids, rhombuses, pentagons, hexagons, octagons] and will apply these shapes to solve real-world and mathematical problems.

Bloom’s Taxonomy: Application

Depth of Knowledge: Level 3

4. Think about the three groups of geometric figures described below and then answer the question parts.

Group 1:	Group 2:	Group 3:
Polygons	Figures with all sides of equal length	Figures with at least one set of parallel lines

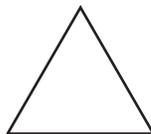
A polygon is a closed figure made up of line segments.



Parallel lines will never intersect



a. This figure is a rectangle. Write the numbers of **all** the **groups**—Group 1, Group 2, or Group 3—in which this rectangle belongs.



b. This figure is an equilateral triangle. Write the numbers of **all** the **groups** in which this triangle belongs.



c. This figure is a trapezoid. Write the numbers of **all** the **groups** in which this trapezoid belongs.

d. Name **and** draw one figure that does **not** belong in any of the three groups.

e. Name **and** draw one figure that belongs in **all** three groups.

Geometric Figures

Scoring Guide

Score	Description
4	The student demonstrates a thorough understanding of geometric figures by accurately classifying figures as polygons, as figures with sides of equal length, and as figures with a set of parallel sides.
3	The student demonstrates a general understanding of geometric figures by classifying figures as polygons, as figures with sides of equal length, and as figures with a set of parallel sides, 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 geometric figures 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 geometric figures. 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.

Geometric Figures

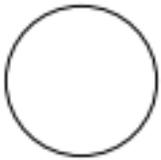
Sample Response:

Part a: Group 1, Group 3

Part b: Group 1, Group 2

Part c: Group 1, Group 3

Part d: Circle



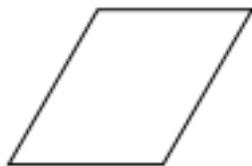
OR
Fat S



Part e: Square



OR
Rhombus



Item 5 Fibonacci Sequences

Standard: MA-04-5.1.01: Patterns, Relations and Functions — Students will extend patterns (e.g., 108, 208, 308, 408, ...) from real-world and mathematical problems; compare simple patterns (numbers, pictures, words), and describe rules for simple number patterns (e.g., 1, 3, 5, 7, ...; 5, 10, 15, 20, ...; 30, 27, 24, 21, ...).

Bloom’s Taxonomy: Application

Depth of Knowledge: Level 2

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th
1	1	2	3	5								

5. In the number boxes above,

- the 1st and 2nd numbers are added to get the 3rd number.
- the 2nd and 3rd numbers are added to get the 4th number.
- the 3rd and 4th numbers are added to get the 5th number.

- a. What number should be in the 6th box? _____
- b. What number should be in the 8th box? _____
- c. What box should have the first number larger than 100? _____
- d. Complete the chart below to show the pattern that the even and odd numbers form in the number boxes above. Use the letter O for odd numbers and the letter E for even numbers.

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th

Fibonacci Sequences

Scoring Guide

Score	Description
4	The student demonstrates a thorough understanding of patterns by correctly extending a pattern given the first five terms and the rule, and creating another pattern based on the first pattern.
3	The student demonstrates a general understanding of patterns by extending a pattern given the first five terms and the rule, and creating another pattern based on the first pattern, 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: 8

Part b: 21

Part c: 12th box

Part d:

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th
O	O	E	O	O	E	O	O	E	O	O	E	O