Grade 5

Open-Ended Questions and Rubrics

PRIME2

Open-Ended Questions for Grades 4 and 5

Grade 4

Math topic	Task	All or optional	Rubric	EM
Algebra	Hexagon Desks*	All teachers	MARS	6.8
	Math Rules	Optional	MARS	
Multiplication	Stone Soup	Optional	PRIME2	Unit 5
	Line of Laundry	All teachers	MARS	Unit 5
Area & perimeter	Same Shape, Different Area	All teachers	PRIME2	8.5
	Tina's Rabbit Pen	Optional	PRIME2	8.5
Fractions	A Weighty Problem	All teachers	PRIME2	7.5, 7.7
Decimals	School Supplies	Optional	PRIME2	4.6

Grade 5

Math topic	Task	All or optional	Rubric	EM
Algebra	Hexagons in a Row	All	MARS	Unit 10
	Walls with Windows	Optional	MARS	Unit 10
Fractions	Finding Fractions*	All	CLA #2/EM	Unit 5
	Knowing Fractions	All	MARS	8.7
Volume	A Box of Cubes	All	MARS	Unit 11
	Boxes of Cubes	Optional	PRIME2	Unit 11

* Give the task to your students by January 24, 2013. Bring the student work from the task to the PRIME2 After-School Workshop on January 24. We will score it at the workshop.

PRIME2

Open-Ended Questions for Grades 4 and 5

The purpose of administering the open-ended tasks is to have your students gain familiarity and comfort with these types of tasks, and provide them with an opportunity to show the highest level of their mathematical thinking on problems.

BEFORE THE TASK

PRE-ACTIVITY

You may elect to design a pre-activity to get students used to the type of problem, and promote equal access to the task.

EXPECTATIONS FOR QUALITY WORK

Share with students what makes an excellent paper. You may refer to the highest score in the rubric and explain all the parts that will make the work successful. Include the importance of calculating accurately, clearly explaining their thinking if the problem calls for it, and organizing their work so someone else can understand it.

VOCABULARY AND CONTEXT

Go over any difficult or unfamiliar vocabulary, or words with multiple meanings. Discuss any context that may be unfamiliar.

DURING THE TASK

TIME

Allow students as much time as needed for them to complete the task. If you give it during one math period and some students have not finished, allow them more time during another part of the day.

SHOW ALL WORK

Have students show all their work. Some tasks may not have enough space provided for students to answer a question completely. You may provide paper for them to solve the entire problem on it. Let students know that in order for you to understand their mathematical thinking about the problem, you need to see all of their work.

TEACHER ROLE

Try not to offer much prompting during the task. Observe students as they work the task. Note how they approach the problem, where they get stuck, their level of perseverance, and any questions they want to ask you.

AFTER THE TASK

SCORE THE WORK

Use the rubric provided for each task to score the work. If possible, have a scoring session with grade level colleagues.

Bring the student work from Hexagon Desks (Grade 4) or Finding Fractions (Grade 5) to the PRIME2 After- School Workshop on January 24 where they will be scored collaboratively.

(OPTIONAL)

PROVIDE FEEDBACK

Give the task back to students with their score and any comments.

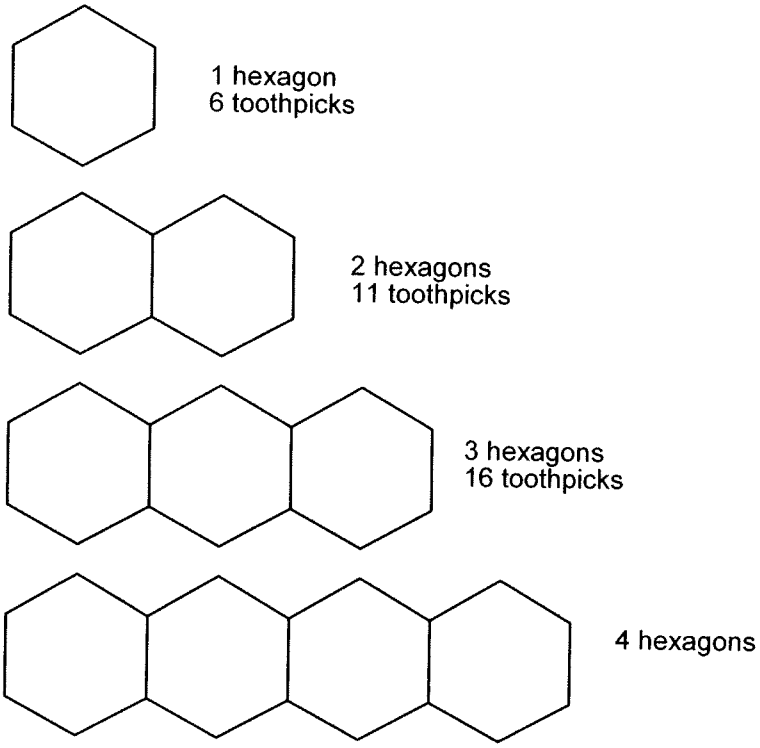
SHOW STUDENTS EXAMPLES OF EXCELLENT WORK

Cover the name of the students whose work you are showing, or show work from another class. Discuss with students what makes the paper an excellent one.

Hexagons in a Row

This problem gives you the chance to:
- find a pattern in a sequence of diagrams
- use the pattern to make a prediction

Joe uses toothpicks to make hexagons in a row.



Joe begins to make a table to show his results.

Number of hexagons in a row	1	2	3	4
Number of toothpicks	6	11		

1. Fill in the empty spaces in Joe's table of results.

2. How many toothpicks does Joe need to make 5 hexagons? _____

   Explain how you figured it out.

   _____

   _____

3. How many toothpicks does Joe need to make 12 hexagons? _____

   Explain how you figured it out.

   _____

   _____

   _____

4. Joe has 76 toothpicks.
   How many hexagons in a row can he make? _____
   Explain how you figured it out.

   _____

   _____

   _____

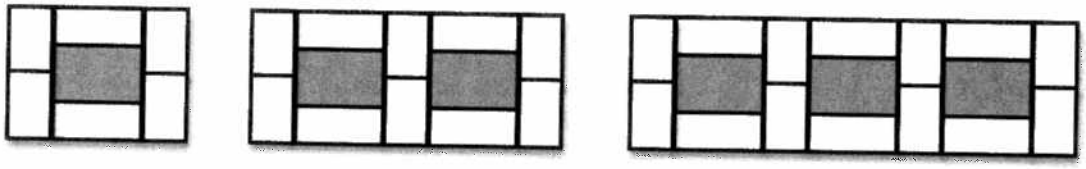
Hexagons in a Row	Rubric	
The core elements of performance required by this task are: • find a pattern in a sequence of diagrams • use the pattern to make a prediction Based on these, credit for specific aspects of performance should be assigned as follows	points	section points
1. Gives correct answers: **16** and **21**	1	1
2. Gives correct answer: **26**	1	
Gives correct explanation such as: I added on 5: accept diagrams	1	2
3. Gives correct answer: **61**	1	
Gives correct explanation such as: The first hexagon needs 6 toothpicks; each extra needs 5. $6 + 11 \times 5 =$ Accept diagrams or adding on.	1	2
4. Gives correct answer: **15**	1	
Gives correct explanation such as: The first hexagon needs 6 toothpicks; each extra needs 5. $76 - 1 = 75, \quad 75 \div 5 = 15$ Accept diagrams	1 1	3
Total Points		**8**

Walls with Windows

This problem gives you the chance to:

-identify and extend a pattern

Darla is making windows in walls using rectangles. These pictures show how she builds windows.



1 window
6 rectangles

2 windows
10 rectangles

3 windows
14 rectangles

1. Draw a wall with 4 windows.

2. How many rectangles will a wall with 5 windows have? _____

3. Complete this table to show the rectangles needed for each wall with windows.

Number of windows	1	2	3	4	5
Number of rectangles	6	10	14		

4. Darla used 30 rectangles to make a wall with windows.

   How many windows will that wall have? _____ windows

   Explain how you figured this out.

   _____

   _____

   _____

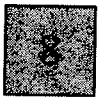
5. Darla wants to build a wall with 10 windows! She thinks that she needs 44 rectangles to build that wall. Explain how you know that she is wrong.

   _____

   _____

   _____

   How many rectangles will she need? _____ rectangles



2012 MAC Rubrics Grade 5

Walls with Windows — Rubric

The core elements of performance required by this task are:
• identify, describe and extend a pattern

Based on these, credit for specific aspects of performance should be assigned as follows

	points	section points
1. Draws a wall with 4 windows and 18 rectangles	1	1
2. Gives correct answer: **22**	1	1
3. Fills in the table with the correct answers:	1x2	2
4. Gives correct answer: **7** Gives correct explanation such as: 5 windows used 22 rectangles and I added 2 more groups of 4 for 6 windows and 7 windows or I continued the chart Accept correct diagrams	1 1	2
5. Gives correct explanation such as: If I continue to count the pattern by four it would be 42 or 46 not 44 or 2 + 4 times 10 equals 42. Gives correct answer: **42**	1 1	2
Total Points		**8**

Windows	1	2	3	4	5
Rectangles	6	10	14	**18**	**22**

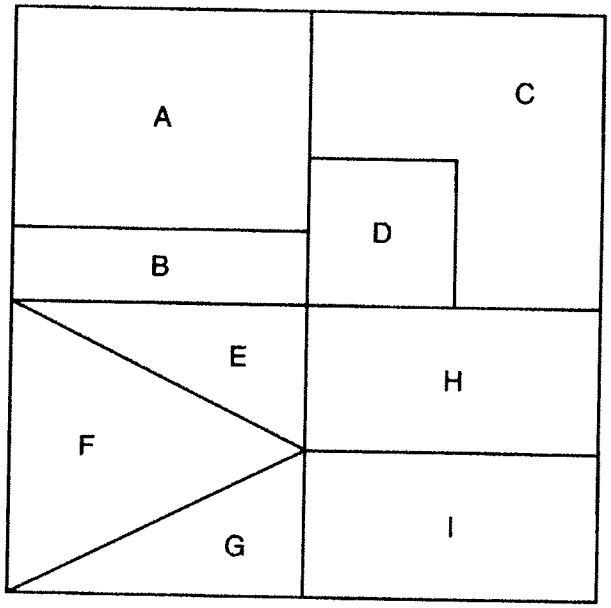
Math CLA Grade 5 Performance Assessment #2
Finding Fractions

Name_____

The figure below represents One.

Find and write the correct fraction in each of the figure's parts.

Check to be sure that the sum of the fractions is 1.



Explain how you found the fraction for the part labeled F.

List a combination of parts that is worth about $\frac{2}{3}$. Explain your answer.

Taken from page 179 of the Everyday Math Assessment Masters

Math CLA Grade 5 Performance Assessment #2
Finding Fractions - Rubric

MA.5.NS.2.3 Solve simple problems, including ones arising in concrete situations, involving the addition and subtraction of fractions and mixed numbers (like and unlike denominators of 20 or less), and express answers in the simplest form.

This rubric is designed to help you assess levels of mathematical performance on this task. It emphasizes mathematical understanding with only a mention of clarity of explanation. Consider the expectations of standardized tests in your area when applying a rubric. Modify this sample rubric as appropriate.

Score = 0,1,2,3,4 Points Possible = 4

4 Clearly labels all regions with the correct fraction. Clearly explains how to use a relationship between regions to determine the fraction name for Region F. In the last part of the problem, chooses regions that total about $\frac{2}{3}$ and clearly justifies how the regions are chosen.

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3 Labels most regions with the correct fraction. Explains how to use a relationship between regions to determine the fraction name for Region F. In the last part of the problem, chooses regions that total more than $\frac{1}{2}$. Attempts to justify how the regions are chosen, but the explanation might be unclear.

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2 Labels all regions demonstrating some understanding of how to find the fraction of a region. Makes reference to some relationship between regions to determine a fraction name for Region F. Might attempt to solve the last part of the problem.

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1 Attempts to label regions. Attempts to explain how to find the fraction name for Region F, but the explanation might be incorrect or makes no sense in the context of the problem. Might attempt to solve the last part of the problem.

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0 Does not attempt to solve the problem.

This performance assessment was taken from the Everyday Mathematics Assessment Handbook. To accurately score each Open Response task, please refer to Everyday Mathematics Assessment Handbook which includes student work samples that illustrate each performance level.

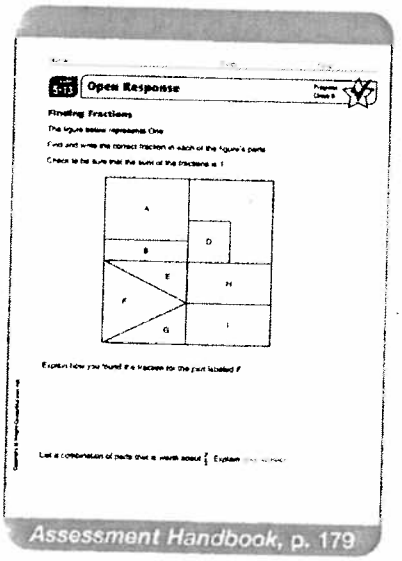
Taken from pages 87-88 of the Everyday Math Assessment Handbook - Lesson 5-13 Open Response Progress Check 5

Open Response, *Finding Fractions*

35-45 Min.

Description

For this task, students identify fractions of a region by using relationships between the fractional parts.



Focus

- **Use numerical expressions to represent equivalent names for fractions.** [Number and Numeration Goal 5]
- **Use mental math and paper-and-pencil algorithms to solve addition and subtraction problems involving fractions; describe the strategies used and explain how they work.** [Operations and Computation Goal 4]

Implementation Tips

- Relate the fraction of a region exploration to students' experiences with pattern blocks for exploring fractions. Relate the *fraction of a fraction* idea to making fraction strips.
- Remind students that for the last problem, they are looking for a total of about $\frac{2}{3}$.

Modifications for Meeting Diverse Needs

- Provide students with an additional copy of the figure and a pair of scissors so they can manipulate the individual pieces. For the last part, convert all fractions to percents, using a calculator if necessary.
- Have students provide at least three different solutions to the last part of the problem. Record their solutions with letters and as number sentences.

Improving Open Response Skills

Before students begin the task, have them read the problem together. Review Level 4 of the rubric using the board or overhead projector. Have them restate Level 4 of the rubric; record the students' version on chart paper; and display this during the task. Have students compare their work with the posted Level 4 description before turning in their papers.

Note: The wording and formatting of the text on the student samples that follow may vary slightly from the actual task your children will complete. These minor discrepancies will not affect the implementation of the task.

Knowing Fractions

This task gives you a chance to:

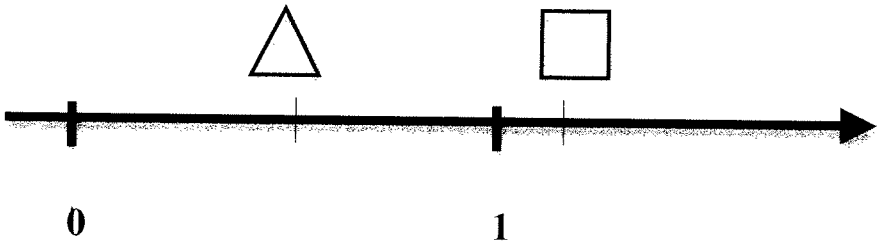
- Work with fractions
- Use number lines

Joey and Kris are studying about fractions and number lines.

1. Circle whether the statement is true or false.

   $4/5 \times 7/8 > 1$. True False

Joey and Kris draw the following number line and symbols. The triangle and square stand for numbers on the number line.



2. Joey thinks if you add the triangle and square you will get a number to the left of the square. Kris thinks Joey is wrong. Who do you agree with? Explain.

3. Kris thinks that if you subtract the triangle from the square you will get exactly 1. Joey thinks Kris is wrong. Who do you agree with? Explain.

Joey and Kris are trying to figure when the statements are true. Indicate which statement is Always True, Sometimes True or Never True.

4. When I add two fractions between 0 and 1, I will get fractions bigger than 1.

ALWAYS TRUE SOMETIMES TRUE NEVER TRUE

Explain.

5. When I multiply two fractions that are both between 0 and 1, I will always get a fraction between zero and 1.

ALWAYS TRUE SOMETIMES TRUE NEVER TRUE

Explain.

6. If I pick any positive number and then multiply it times a positive fraction less than one, the answer is bigger than the first number I picked.

ALWAYS TRUE SOMETIMES TRUE NEVER TRUE

Explain.

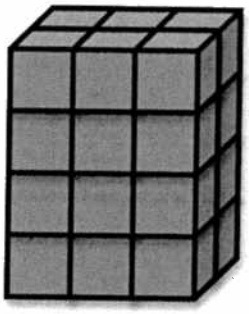
Knowing Fractions	Rubric	
The core elements of performance required by this task are: • Use number lines • Understand fractions and operations Based on these, credit for specific aspects of performance should be assigned as follows	points	section points
1. Circles the correct answer: **False**	1	1
2. Gives correct answer and explanation such as: **Kris** is right because the distance the triangle is from zero can be marked to the right of the square to show the sum.	1	1
3. Gives correct answer and explanation such as: **Joey** is right because the distance the triangle is from zero can be marked to the left of the square to show the difference is less than 1.	1	1
4. Gives correct answer: **Sometimes True** Gives a correct explanation such as: $1/2 + 3/4 > 1$ and $1/2 + 1/4 < 1$	1 1	2
5. Gives correct answer: **Always True** Gives a correct explanation such as: If you start with any fraction (between 0 and 1) and you multiply it by another fraction (between 0 and 1) the product will be smaller than either fraction, but still positive. (Accept an example)	1 1	2
6. Gives correct answer: **Never True** Gives a correct explanation such as: If you start with any number and you multiply it by a fraction (between 0 and 1) the product will be smaller than the first number, because multiplying by the fraction reduces the original number by the fraction's ratio. (Accept an example)	1 1	2
Total Points		**9**

A Box of Cubes

This gives you a chance to:

- determine dimensions of rectangular prisms
- work with volume

Dia found a lot of cubes that are each 1 inch wide, 1 inch long, and 1 inch high.



She stacked the cubes to make a rectangular prism 2 inches wide, 3 inches long and 4 inches high.

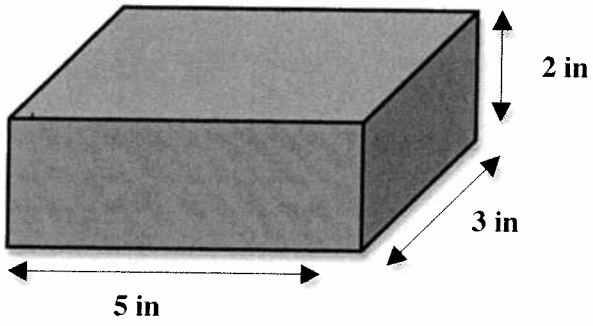
1. How many cubes did she use? _____ cubes

   Explain how you figured it out.

_____

_____

Dia found a box that was measured 5 inches long, 3 inches wide and 2 inches high.



2. How many of the 1 by 1 by 1 inch cubes can exactly fit in the box _____.

   Show how you figured it out.

3. Dia has 42 cubes and wants to make a rectangular prism. She asked for your help.

   What are the dimensions of the prism she can build? _____

   Draw a box the cubes could fit in and label the dimensions.

4. Dia has found two new rectangular boxes. One box is 2 inches by 3 inches by 6 inches and a second box has a volume of 72 cubic inches. Dia has 104 cubes. Does she have the right amount to fill the two boxes completely? Explain.

_____

_____

_____

_____

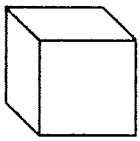
_____

_____

A Box of Cubes	Rubric	
The core elements of performance required by this task are: • understand volume • solve problems involving the volume of rectangular prisms Based on these, credit for specific aspects of performance should be assigned as follows	points	section points
1. Gives correct answer: **24** cubes. Gives a correct explanation such as: I multiplied the width 2 times the length 3 times the height 4.	1 1	2
2. Gives correct answers: **30** cubes. Shows correct work such as: 2•3•5 = 30	1 1	2
3. Gives correct answer such as: 2 by 3 by 7 Draws a box and labels the dimensions consistent with answer above.	1 1ft	2
4. Gives correct explanation such as: No she does not have enough cubes she needs 108 cubes. The first box can contain 36 cubes and the second 72 cubes.	1	1
Total Points		**7**

Boxes of Cubes

This is a sugar cube.



It is about 1/2-inch on each edge.

There are 48 cubes in each box.

You need 1000 cubes for a school project.

How many boxes will you need?

How much space will you need to store 1000 cubes?

Rubric for Boxes of Cubes

3 points	Determines 21 boxes of cubes are needed.
1 point	Uses an appropriate method to find the number of boxes needed, but makes a calculation error or incorrectly interprets the remainder, and does not arrive at 21 boxes.
2 points	Determines either 125 **or** 126 cubic inches are needed.
1 point	Uses an appropriate method to find the cubic inches needed, but makes a calculation error and does not arrive at 125 or 126 cubic inches.
	Total Possible = 5