

GRADE 3 MATH: ISABELLA'S GARDEN

UNIT OVERVIEW

This unit introduces and develops concepts of multiplication and division. Students experiment and practice with a variety of materials to gain fluency in multiplication facts. They learn to recognize multiplication and division situations, interpret products and quotients, and write and solve word problems.

TASK DETAILS

Task Name: Isabella's Garden

Grade: 3

Subject: Math

Depth of Knowledge: Level 1- 3

Task Description: Students use their understanding of multiplication, and of the relationship between multiplication and division, to solve word problems.

Standards:

3. OA.1: Interpret products of whole numbers

3. OA.2: Interpret whole-number quotients of whole numbers

3. OA.3: Use multiplication and division within 100 to solve word problems

3. OA.4: Determine the unknown whole number in a multiplication or division equation relating three whole numbers

3. OA.6: Understand division as an unknown-factor problem

Standards for Mathematical Practice:

MP.1 Make sense of problems and persevere in solving them.

MP.4 Model with mathematics.

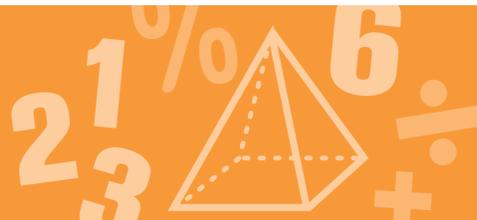
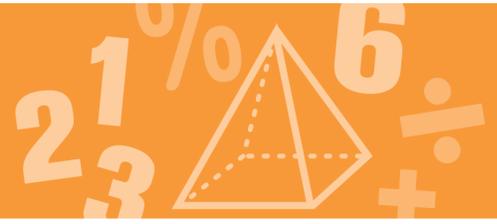


TABLE OF CONTENTS

The task and instructional supports in the following pages are designed to help educators understand and implement tasks that are embedded in Common Core-aligned curricula. While the focus for the 2012-2013 Instructional Expectations is on engaging students in Common Core-aligned culminating tasks, it is imperative that the tasks are embedded in units of study that are also aligned to the new standards. Rather than asking teachers to introduce a task into the semester without context, this work is intended to encourage analysis of student and teacher work to understand what alignment looks like. We have learned through the 2010-2011 Common Core pilots that beginning with rigorous assessments drives significant shifts in curriculum and pedagogy. Universal Design for Learning (UDL) support is included to ensure multiple entry points for all learners, including students with disabilities and English language learners.

ISABELLA’S GARDEN PERFORMANCE TASK	3
SCORING GUIDE & RUBRIC.....	7
ANNOTATED STUDENT WORK.....	10
INSTRUCTIONAL SUPPORTS	32
UNIT OUTLINE.....	33
LEARNING ACTIVITIES.....	37
UNIVERSAL DESIGN FOR LEARNING.....	64

Acknowledgements: This unit was developed by Cynthia Gehan, Common Core Math Fellow and Math Coach; Stephen Annunziato, Teacher; Allison Bristol, Lead Teacher for Math; and Jennifer Guerrero, Teacher, PS 114, Bronx. Input was provided by the following Common Core Math Fellows: Barbara Tully and Jason Westerlund.



GRADE 3 MATH: ISABELLA'S GARDEN

PERFORMANCE TASK

Name: _____

Date: _____

Isabella's Garden

Isabella loves planting vegetables in the spring. She plants different types of vegetables each year. Solve these problems using multiplication and division.



1) Isabella planted 35 pepper plants. There are 5 rows of plants. How many pepper plants are in each row? _____

Write an equation that shows how you solved this problem.

2)

Part A

Isabella planted 3 rows of potato plants. There are 3 plants in each row.

How many potato plants does she have? _____

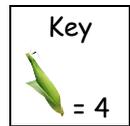
Draw a diagram of Isabella's potato plants.

Part B

If each plant produces 6 potatoes, how many potatoes will she have?

3)

The Corn in Isabella's Garden	
Day	Plants
Monday	
Tuesday	
Wednesday	
Thursday	
Friday	



The pictograph shows how many corn plants Isabella planted over 5 days.

Part A

How many corn plants did she plant on Wednesday?

Show your work.

Part B

How many more plants were planted on Thursday than Friday?

Explain how you got your answer.



4) Isabella grew 48 heads of lettuce. She has to arrange them in a display at the Farmers' Market.

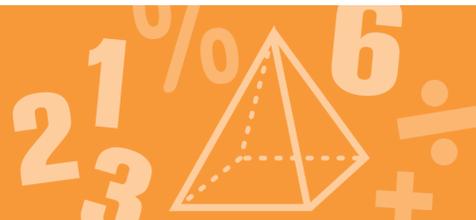
Part A

If she wants to display her heads of lettuce in equal rows, what is one way she can arrange them?

Part B

How many other ways can Isabella arrange her 48 heads of lettuce?

You may use numbers or diagrams to show all the ways.



GRADE 3 MATH: ISABELLA'S GARDEN

SCORING GUIDE & RUBRIC

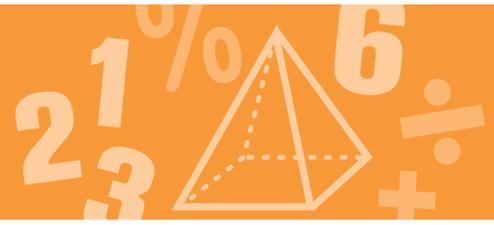
A scoring guide with possible responses has been created to evaluate this task. The rubric provides a description of the evidence-based traits and practices required to achieve each level.

Scoring Guide

ISABELLA’S GARDEN FINAL PERFORMANCE TASK											
Question #1	<p>Correct answer of 7 Acceptable solutions:</p> <p style="text-align: center;">7×5 <i>or</i> 5×7 <i>or</i> $35 \div 5$</p>										
Question #2	<p>(Part A) Correct answer of 9, <u>and</u> a 3×3 array or diagram</p> <p>(Part B) Correct answer of 54 Acceptable solutions:</p> <p style="text-align: center;">Draw an array or diagram <i>or</i> Work is shown: $(9 \times 6, 6 \times 9)$ or repeated addition</p>										
Question #3	<p>(Part A) Correct answer of 28 Acceptable solutions:</p> <p style="text-align: center;">4×7 <i>or</i> 7×4 <i>or</i> $4 + 4 + 4 + 4 + 4 + 4 + 4$ Drawing of 7 groups of 4 Drawing of 4 groups of 7</p> <p>(Part B) Correct answer of 8 Acceptable solutions:</p> <p style="text-align: center;">“There are two more ears of corn shown for Thursday. Each ear of corn represents four plants. $2 \times 4 = 8$” Or similar response</p>										
Question #4	<p>(Part A) Any of the ten solutions Acceptable solutions:</p> <p style="text-align: center;">Written as an equation or Written as an expression or Written as an array or Written as a statement</p> <table border="1" style="margin: 10px auto; border-collapse: collapse; text-align: center;"> <tbody> <tr> <td style="padding: 5px;">48×1</td> <td style="padding: 5px;">2×24</td> <td style="padding: 5px;">3×16</td> <td style="padding: 5px;">4×12</td> <td style="padding: 5px;">6×8</td> </tr> <tr> <td style="padding: 5px;">1×48</td> <td style="padding: 5px;">24×2</td> <td style="padding: 5px;">16×3</td> <td style="padding: 5px;">12×4</td> <td style="padding: 5px;">8×6</td> </tr> </tbody> </table> <p>(Part B) Correct solution of 9 different ways, and at least two examples using factors other than the ones shown in Part A, represented as expressions or diagrams.</p>	48×1	2×24	3×16	4×12	6×8	1×48	24×2	16×3	12×4	8×6
48×1	2×24	3×16	4×12	6×8							
1×48	24×2	16×3	12×4	8×6							

Rubric

ISABELLA'S GARDEN FINAL PERFORMANCE TASK	
A level 4 response	<ul style="list-style-type: none">• Indicates that the student has made sense of the problem, modeled accurately and persevered.• Shows that the student has used multiplicative reasoning.• Applies multiplication and division appropriately in solving word problems• Demonstrates an understanding of whole number products within 100• Indicates an understanding of the relationship between multiplication and division• May contain an incorrect answer that was not the result of a misunderstanding of the concepts listed above.
A level 3 response	<ul style="list-style-type: none">• Indicates that the student has made sense of the problem, modeled accurately and persevered• Shows that the student has used multiplicative reasoning.• Applies multiplication and division appropriately in solving word problems• Demonstrates an understanding of whole number products within 100• Indicates an understanding of the relationship between multiplication and division• Addresses most or all aspects of the task, using mathematically sound procedures• May contain an incorrect answer derived from a correct procedure
A level 2 response	<ul style="list-style-type: none">• Shows that the student has made sense of at least some components of the task• Shows evidence of understanding of multiplication as groups of equal number of objects• Demonstrates some understanding of whole number products within 100• May not indicate an understanding of the relationship between multiplication and division• May show that the student has relied on repeated addition to solve the problems in the task.
A level 1 response	<ul style="list-style-type: none">• Shows little evidence that the student has made sense of the problems within the task• Reflects a lack of understanding of multiplication as groups of an equal number of objects• Does not adequately address the components of the task• May apply mathematics incorrectly or inappropriately to the situation



GRADE 3 MATH: ISABELLA'S GARDEN

ANNOTATED STUDENT WORK

This section contains annotated student work at a range of score points. The student work shows examples of student understandings and misunderstandings of the task.

**Grade 3 Math: Isabella's Garden
Annotated Student Work: Level 4**

Name: _____

Date: _____

Isabella's Garden

Isabella loves planting vegetables in the spring. She plants different types of vegetables each year. Solve these problems using multiplication and division.



1) Isabella planted 35 pepper plants. There are 5 rows of plants. How many pepper plants are in each row? 7 pepper plants

Write an equation that shows how you solved this problem.

$$35 \div 5 = 7$$

3.OA.2, 3.OA.3: The student appropriately selects division to determine the number of pepper plants in each row

2) Part A

Isabella planted 3 rows of potato plants. There are 3 plants in each row.

How many potato plants does she have? 9 potatoes

Draw a diagram of Isabella's potato plants.



MP.1: The student is able to make sense of the problem and determine the product mentally.

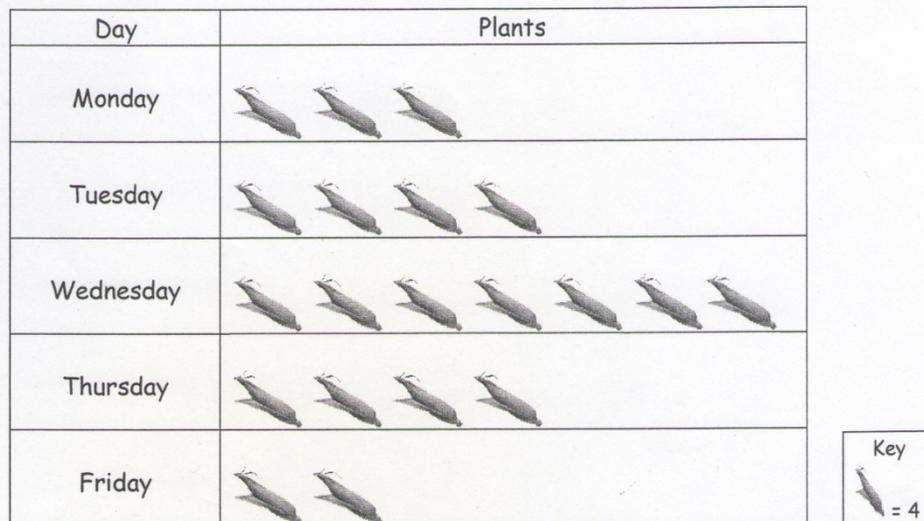
Part B

If each plant produces 6 potatoes, how many potatoes will she have?

If each plant produces 6 potatoes, she will have 54 potatoe

3)

The Corn in Isabella's Garden



The pictograph shows how many corn plants Isabella planted over 5 days.
 How many corn plants did she plant on Wednesday?

Show your work.

$7 \times 4 = 28$ corn plants

3.OA.1: Although the student misreads the problem, he or she shows the ability to interpret products of whole numbers..

How many more plants were planted on Thursday than Friday? Explain how you got your answer.

T: $4 \times 4 = 16$ corn plants F: $2 \times 4 = 8$ corn plants

I got my answer by multiplying Thursday, $4 \times 4 = 16$. Then multiplying Friday, $2 \times 4 = 8$. Which number is greater? 16 is greater.



4) Isabella grew 48 heads of lettuce. She has to arrange them in a display at the Farmers' Market.

Part A

If she wants to display her lettuces in equal rows, what is one way she can arrange them?

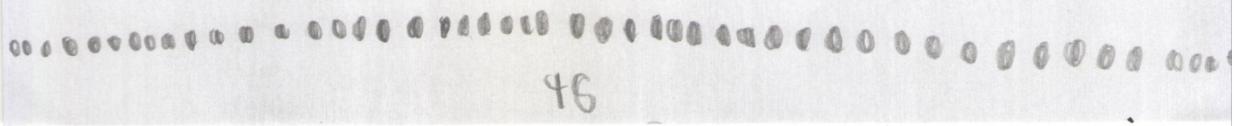
One way she can arrange is like this! →

Part B

How many other ways can Isabella arrange her 48 heads of lettuce? You may use numbers or diagrams to show all the ways.



3.OA.1: Although the student does not provide the correct answer of 9, the representation of multiple arrays shows an understanding of various ways of getting of the product, 48.



**Grade 3 Math: Isabella's Garden
Annotated Student Work: Level 3**

Name: _____

Date _____

Isabella's Garden

Isabella loves planting vegetables in the spring. She plants different vegetables each year. Solve these problems using multiplication or division.



1) Isabella planted 35 pepper plants. There are 5 rows of plants. How many pepper plants are in each row? 7 pepper plants

Write an equation that shows how you solved this problem.

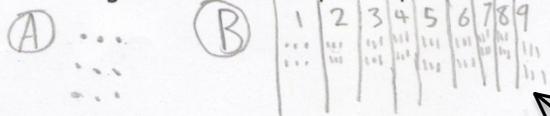
$$\begin{array}{r} \times 7 \\ 5 \end{array}$$

3.OA.6: This question is represented as an unknown-factor problem. The next step for this student will be to connect this idea to division.

2) Part A

Isabella planted 3 rows of potato plants. There are 3 plants in each row. How many potato plants does she have? 9 potato plants

Draw a diagram of Isabella's potato plants.



MP.1, MP.4: The student makes sense of the problem and models it by drawing a diagram of 9 potato plants, each producing 6 potatoes.

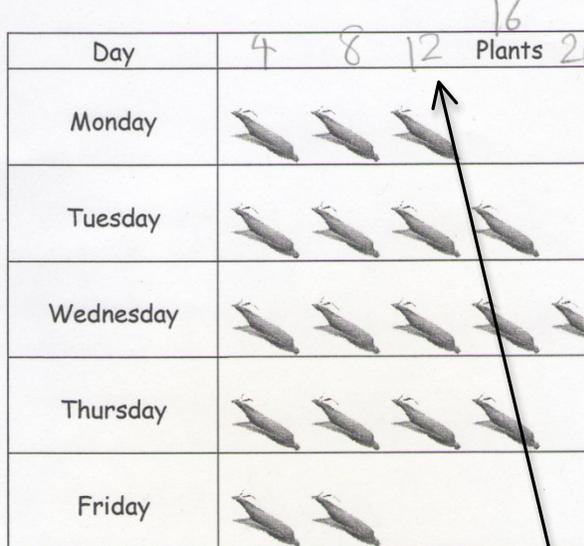
Part B

If each plant produces 6 potatoes, how many potatoes will she have?

Isabella will have 54 potatoes

3)

The Corn in Isabella's Garden



The pictograph shows how many corn plants Isabella planted each day.
How many corn plants did she plant on Wednesday?

Isabella planted 28 corn plants.
Show your work.

MP.1: The student makes sense of the problem and uses repeated addition to arrive at the correct answer.

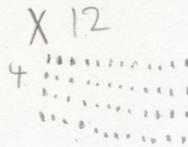
How many more plants were planted on Thursday than on Friday?
Show your work.



4) Isabella grew 48 heads of lettuce. She has to arrange them in a display at the Farmers' Market.

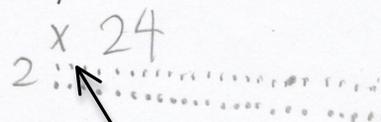
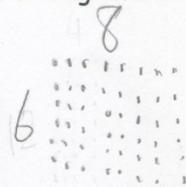
Part A

If she wants to display her lettuces in equal rows, what is one way she can arrange them?



Part B

How many other ways can Isabella arrange her 48 heads of lettuce? You may use numbers or diagrams to show all the ways.



3.OA.1: Representation of multiple arrays shows understanding of various interpretations of the product, 48.

Grade 3 Math: Isabella's Garden Annotated Student Work: Level 3

Name: _____

Date: _____

Isabella's Garden

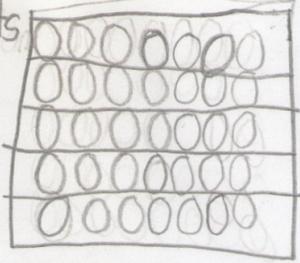
Isabella loves planting vegetables in the spring. She plants different types of vegetables each year. Solve these problems using multiplication and division.



1) Isabella planted 35 pepper plants. There are 5 rows of plants. How many pepper plants are in each row? 7 pepper plants

Write an equation that shows how you solved this problem.

$35 \div 5 = 7$ pepper plants



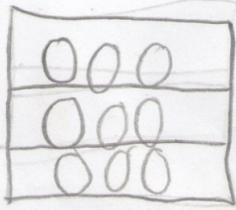
MP.1, MP.4: The student shows evidence of making sense of the problem and models accurately to arrive at a correct solution.

2) Part A

Isabella planted 3 rows of potato plants. There are 3 plants in each row.

How many potato plants does she have? 9 potato plants

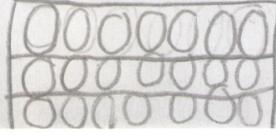
Draw a diagram of Isabella's potato plants.



$3 \times 3 = 9$ potato plants

Part B

If each plant produces 6 potatoes, how many potatoes will she have?

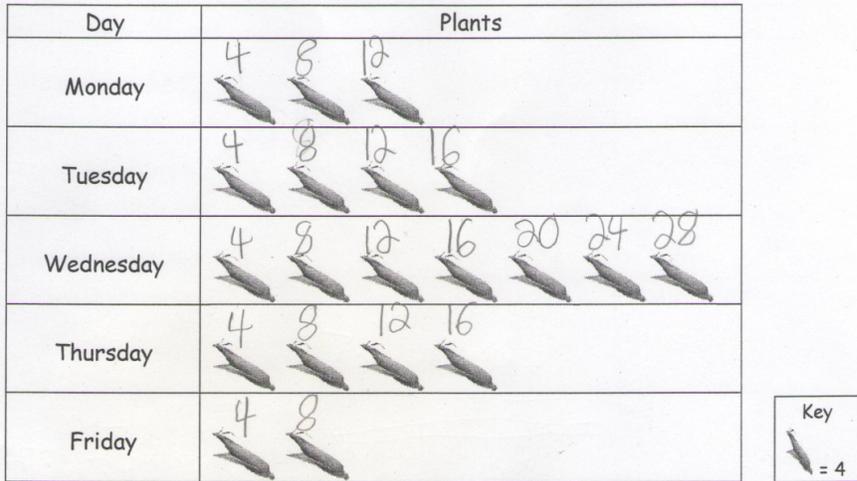


$6 \times 3 = 18$ potatoes

3.OA.1: In Part B, the student multiplies 6×3 , indicating confusion about what the numbers in the problem represent. The student multiplies the number of potatoes per plant by the number of rows instead of the number of plants. However, the student demonstrates the ability to interpret the product of whole numbers.

3)

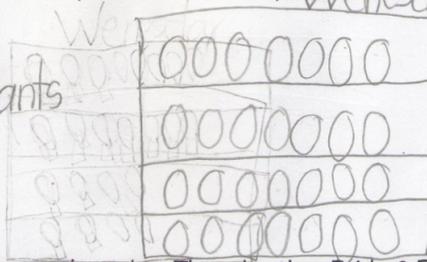
The Corn in Isabella's Garden



The pictograph shows how many corn plants Isabella planted over 5 days. How many corn plants did she plant on Wednesday?

Show your work.

$4 \times 7 = 28$ plants



3.OA.1 The student demonstrates the ability to interpret products of whole numbers by drawing an array and writing an equation.

How many more plants were planted on Thursday than Friday? Explain how you got your answer.

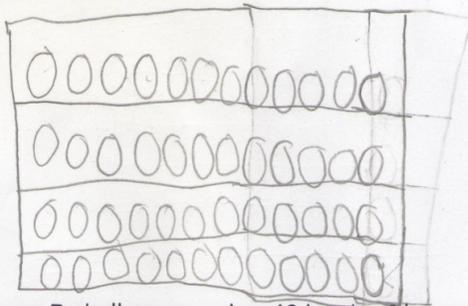
$$\begin{array}{r}
 16 \\
 - 8 \\
 \hline
 8 \text{ plants}
 \end{array}$$

I got my answer by subtracting 16 from 8. I got 16 because 16 plants were planted on Thursday. I got 8 because 8 plants were planted on Friday. Then, I had to subtract 16 from 8, which equals 8. My answer is 8 more plants were planted on Thursday than Friday.

4) Isabella grew 48 heads of lettuce. She has to arrange them in a display at the Farmers' Market.

Part A

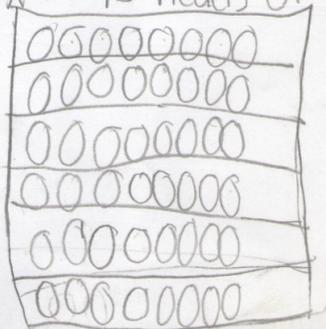
If she wants to display her lettuces in equal rows, what is one way she can arrange them? $4 \times 12 = 48$ heads of lettuce



Part B

How many other ways can Isabella arrange her 48 heads of lettuce? You may use numbers or diagrams to show all the ways.

① $8 \times 6 = 48$ heads of lettuce ②



MP.4: The student draws only one alternative array as a model. Multiple arrays would strengthen this answer.

**Grade 3 Math: Isabella's Garden
Annotated Student Work: Level 3**

Name: _____

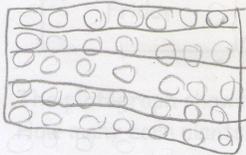
Date: _____

Isabella's Garden

Isabella loves planting vegetables in the spring. She plants different types of vegetables each year. Solve these problems using multiplication and division.

1) Isabella planted 35 pepper plants. There are 5 rows of plants. How many pepper plants are in each row? 7 pepper plants

Write an equation that shows how you solved this problem.



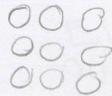
$35 \div 5 = 7$ pepper plants

2) Part A

Isabella planted 3 rows of potato plants. There are 3 plants in each row.

How many potato plants does she have? 9 potato plants

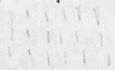
Draw a diagram of Isabella's potato plants.



$3 \times 3 = 9$ potato plants

Part B

If each plant produces 6 potatoes, how many potatoes will she have?



$9 \times 6 = 54$ potatoes
she will have 54 potatoes.

3.OA.1, 3.OA.2, 3.OA.3: The student uses correct algorithms and models to interpret products and quotients in word problems

3)

The Corn in Isabella's Garden

Day	Plants
Monday	$\begin{array}{cccc} 4 & 8 & 12 & = 12 \\ \text{corn} & \text{corn} & \text{corn} & \end{array}$
Tuesday	$\begin{array}{cccc} 4 & 8 & 12 & 16 \\ \text{corn} & \text{corn} & \text{corn} & \text{corn} \end{array} = 16$
Wednesday	$\begin{array}{ccccccc} 4 & 8 & 12 & 16 & 20 & 24 & 28 \\ \text{corn} & \text{corn} & \text{corn} & \text{corn} & \text{corn} & \text{corn} & \text{corn} \end{array} = 20$
Thursday	$\begin{array}{cccc} 4 & 8 & 12 & 16 \\ \text{corn} & \text{corn} & \text{corn} & \text{corn} \end{array} = 16$
Friday	$\begin{array}{cc} 4 & 8 \\ \text{corn} & \text{corn} \end{array} = 8$

Key
 = 4

The pictograph shows how many corn plants Isabella planted over 5 days. How many corn plants did she plant on Wednesday?

Show your work.

She planted 28 corn plants on Wednesday.

How many more plants were planted on Thursday than Friday? Explain how you got your answer.

$$\begin{array}{r} 16 \\ - 8 \\ \hline 8 \end{array}$$
 Eight more plants were planted on Thursday than Friday.

I got my answer by looking at the pictograph and looking for Thursday and Friday. Then I looked at the number of plants and subtracted the number that was 16 by 8 and gave me 8.

Name _____

Date: 2/11/2

Isabella's Garden

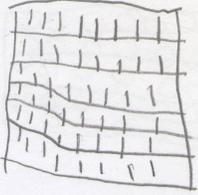


Isabella loves planting vegetables in the spring. She plants different types of vegetables each year. Solve these problems using multiplication and division.

4) Isabella grew 48 heads of lettuce. She has to arrange them in a display at the Farmers' Market.

Part A

If she wants to display her lettuces in equal rows, what is one way she can arrange them?

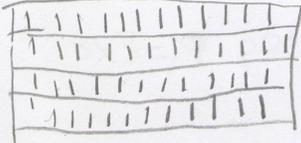
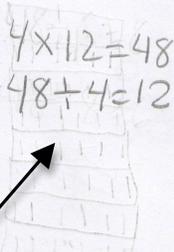


$$6 \times 8 = 48 \text{ lettuces}$$

Part B

How many other ways can Isabella arrange her 48 heads of lettuce? You may use numbers or diagrams to show all the ways.

Draw a diagram of Isabella's potato plants.



MP.4, 3.OA.1: Student draws only one alternate array. Multiple arrays would strengthen this answer.

3.OA.6: Student's inclusion of both multiplication and division equations indicates understanding of division as an unknown factor problem.

**Grade 3 Math: Isabella's Garden
Annotated Student Work: Level 2**

Name: _____

Isabella's Garden

Isabella loves planting vegetables in the spring. She plants a variety of vegetables each year. Solve these problems using multiplication and division.



1) Isabella planted 35 pepper plants. There are 5 rows of pepper plants. How many pepper plants are in each row? 7 pepper plants

Write an equation that shows how you solved this problem.

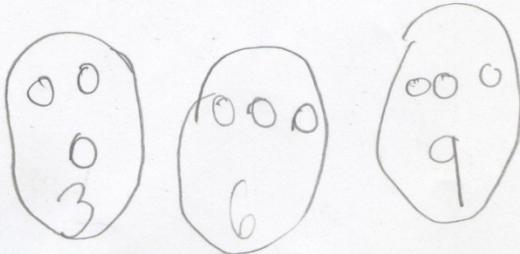
$$35 \div 5 = 7$$

3.OA.2, 3.OA.3: The student uses division appropriately to solve this word problem.

2) Part A

Isabella planted 3 rows of potato plants. There are 3 potato plants in each row. How many potato plants does she have? 9 potato plants

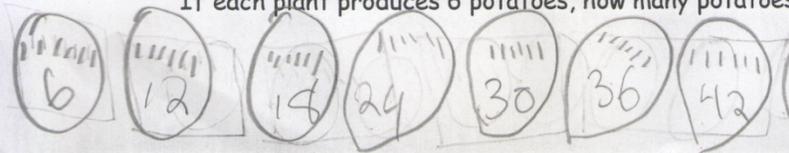
Draw a diagram of Isabella's potato plants.



MP.1, 3.OA.1: Although the student makes sense of this problem, he or she uses repeated addition or counting to solve this problem.

Part B

If each plant produces 6 potatoes, how many potatoes does each plant produce?



3)

The Corn in Isabella's Garden

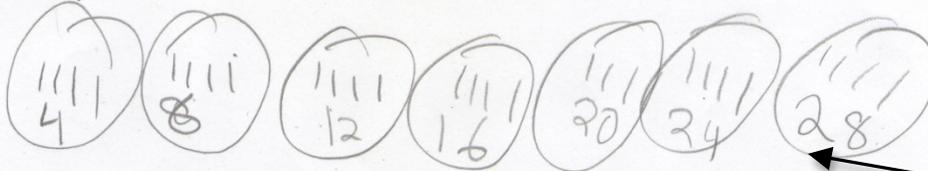
Day	Plants
Monday ₁	4 8 12 12
Tuesday ₂	4 8 12 16
Wednesday ₃	4 8 12 16 20 24 28 28
Thursday ₄	4 8 12 16 16
Friday ₅	4 8 8

Key
 = 4

The pictograph shows how many corn plants Isabella planted over 5 days. How many corn plants did she plant on Wednesday?

Isabella planted 28 Corn plants

Show your work.



How many more plants were planted on Thursday than Friday? Explain how you got your answer.

I got my answer by subtracting 8 from 16 in a new way $16 - 8 = 8$

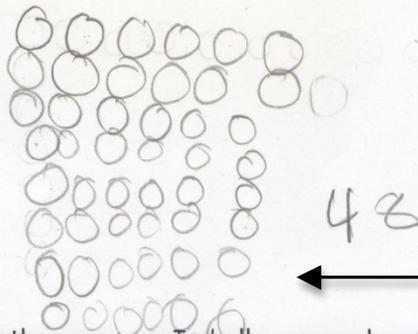
$$\begin{array}{r}
 \text{|||||} \\
 \hline
 \text{8}
 \end{array}$$

MP.1: The student makes sense of the problem and solves it correctly, but again relies on counting objects.

4) Isabella grew 48 heads of lettuce. She has to arrange them in a display at the Farmers' Market.

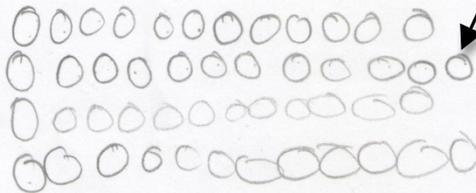
Part A

If she wants to display her lettuces in equal rows, what is one way she can arrange them?



Part B

How many other ways can Isabella arrange her 48 heads of lettuce? You may use numbers or diagrams to show all the ways.



48 heads of lettuce

3:OA.1: Although the student shows two correct arrays for 48, there is no representation of the factors. The next step for this student would be to begin to use multiplication sentences to record these arrays, leading to an understanding of products of whole numbers.

**Grade 3 Math: Isabella's Garden
Annotated Student Work: Level 2**

Name: _____

Date: _____

Isabella's Garden

Isabella loves planting vegetables in the spring. She plants different types of vegetables each year. Solve these problems using multiplication and division.



1) Isabella planted 35 pepper plants. There are 5 rows of plants. How many pepper plants are in each row? 7 pepper plants

Write an equation that shows how you solved this problem.

$7 \times 5 = 35$

Show my work →

$7 \times 5 = 35$



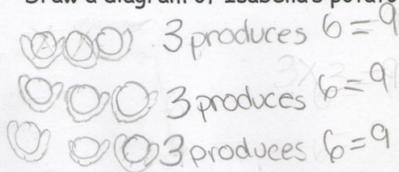
3.OA.6: The student represents this problem using multiplication and determines the unknown factor. The next step for this student is to begin to connect this to division.

2) Part A

Isabella planted 3 rows of potato plants. There are 3 plants in each row.

How many potato plants does she have? 9 potato plants

Draw a diagram of Isabella's potato plants.



$3 \times 3 = 9$ $6 \times 9 = 48$

MP.1, 3.OA.1, 3.OA.3: Although the student's work indicates some difficulty making sense of the problem (or difficulty with recording his or her thinking), there is some indication that the student understands the meaning of the product of whole numbers.

27

Part B

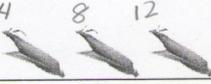
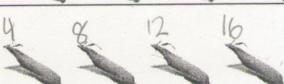
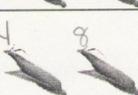


If each plant produces 6 potatoes, how many potatoes will she have?

She will have 48 potatoes.

3)

The Corn in Isabella's Garden

Day	Plants
Monday	4 8 12 
Tuesday	4 8 12 16 
Wednesday	4 8 12 16 20 24 28 
Thursday	4 8 12 16 
Friday	4 8 

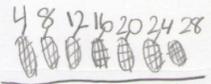


The pictograph shows how many corn plants Isabella planted over 5 days.

How many corn plants did she plant on Wednesday?

She planted 28 corn plants on Wednesday

UNIT
corn

4 x 7 = 28  = 28

3.OA.1: The student demonstrates the ability to interpret products of whole numbers by showing multiple representations of the solution.

^{subtraction}
How many more plants were planted on Thursday than Friday? Explain how you got your answer.

This is my answer: 8

This is my answer because Friday she planted 8 corn plants and on Thursday she planted 16 corn plants, 16 - 8 = 8. That was when I knew that my answer was 8.

Grade 3 Math: Isabella's Garden Annotated Student Work: Level 1

Name: _____

Date: _____

Isabella's Garden

Isabella loves planting vegetables in the spring. She plants different types of vegetables each year. Solve these problems using multiplication and division.



1) Isabella planted 35 pepper plants. There are 5 rows of plants. How many pepper plants are in each row? 7

Write an equation that shows how you solved this problem.

3.OA.1: Although the student appears to have misread the question, he or she understands the connection between multiplication and arrays, and appropriately applies multiplication to find the product using a correct algorithm.



$$\begin{array}{r} + 5 \\ 35 \\ \hline 175 \end{array}$$



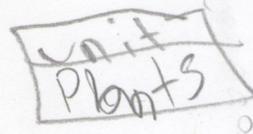
2) Part A

Isabella planted 3 rows of potato plants. There are 3 plants in each row.

How many potato plants does she have? 9

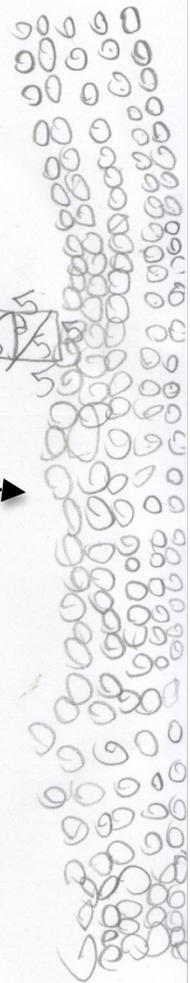
Draw a diagram of Isabella's potato plants.

$$\begin{array}{r} \times 3 \\ 3 \\ \hline 9 \end{array}$$



Part B

If each plant produces 6 potatoes, how many potatoes will she have?



3)

The Corn in Isabella's Garden

Day	Plants
Monday	
Tuesday	
Wednesday	
Thursday	
Friday	

Key
 = 4

The pictograph shows how many corn plants Isabella planted over 5 days. How many corn plants did she plant on Wednesday?

Show your work.

4 8 12 16 20 24 28 32
 There is 28
 She plant 28 corn on wednesday

Unit
 Corn

How many more plants were planted on Thursday than Friday? Explain how you got your answer.

Th 16
 Fr 8

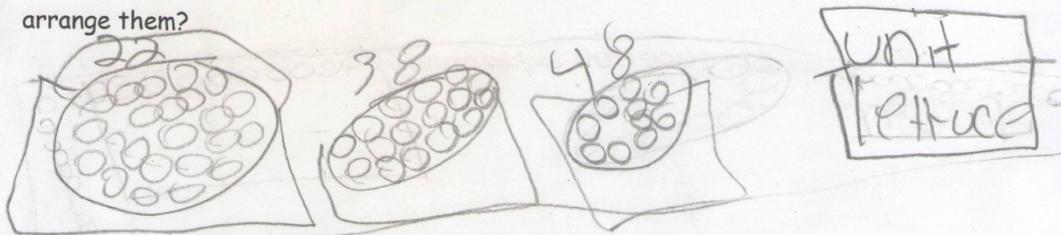
Unit
 Corn

MP.1: The student partially understands the problem, but may have read "How many more" as "Which is more?" This student may benefit from vocabulary/language support.

4) Isabella grew 48 heads of lettuce. She has to arrange them in a display at the Farmers' Market.

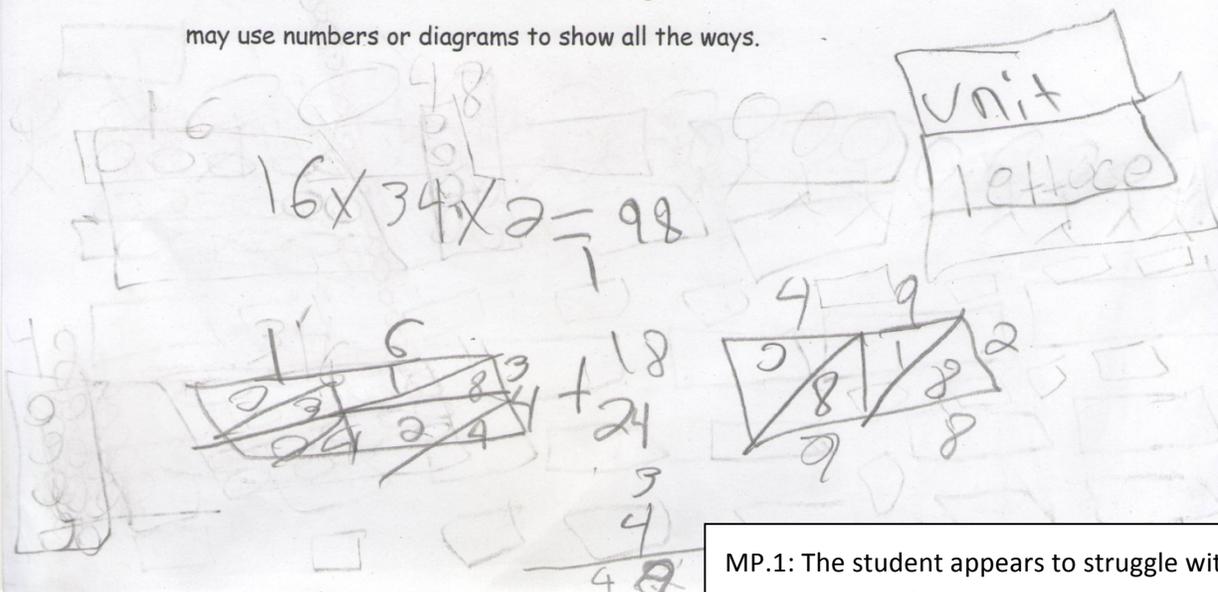
Part A

If she wants to display her lettuces in equal rows, what is one way she can arrange them?

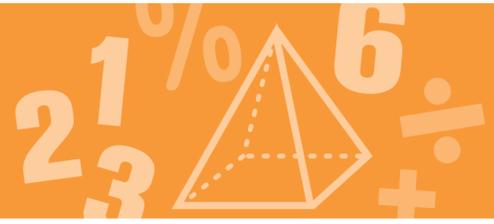


Part B

How many other ways can Isabella arrange her 48 heads of lettuce? You may use numbers or diagrams to show all the ways.



MP.1: The student appears to struggle with making sense of this problem. However, the student perseveres by trying and rejecting several strategies, as indicated by the erasures.



GRADE 3 MATH: ISABELLA'S GARDEN

INSTRUCTIONAL SUPPORTS

The instructional supports on the following pages include a unit outline with formative assessments and suggested learning activities. Teachers may use this unit outline as it is described, integrate parts of it into a currently existing curriculum unit, or use it as a model or checklist for a currently existing unit on a different topic.

Grade 3 Math: Unit Outline

Grade 3 Math: ISABELLA'S GARDEN

UNIT TOPIC AND LENGTH:

This unit introduces multiplication of whole numbers within 100 and develops an understanding of its application and its relationship to division. The commutative property is addressed, and work on the distributive property is included as an extension activity. The unit is designed to be taught during the first month to six weeks of Grade 3, and is not the only multiplication/division unit of the year.

COMMON CORE CONTENT STANDARDS

3.OA.1: Interpret products of whole numbers

3.OA.2: Interpret whole-number quotients of whole numbers

3.OA.3: Use multiplication and division within 100 to solve word problems

3.OA.4: Determine the unknown whole number in a multiplication or division equation relating three whole numbers

3.OA.6: Understand division as an unknown-factor problem

MATHEMATICAL PRACTICES

MP.1: Make sense of problems and persevere in solving them

MP.4: Model with mathematics

VERTICAL ALIGNMENT

2.OA.3: Determine whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by 2s; write an equation to express an even number as a sum of two equal addends.

2.OA.4: Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.

4.OA.4: Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite.

Grade 3 Math: Unit Outline

<p>BIG IDEAS/ ENDURING UNDERSTANDINGS:</p> <ul style="list-style-type: none">➤ Any whole-number product can be represented as an array.➤ Multiplication and division are inverse operations.➤ Understand the part/whole relationship in multiplication and division.➤ The commutative and distributive properties apply to multiplication.➤ Multiplication is a more efficient strategy than repeated addition.	<p>ESSENTIAL QUESTIONS:</p> <ul style="list-style-type: none">➤ In what situations do we use multiplication and division to solve problems?➤ What is the relationship between multiplication and division?
<p>CONTENT:</p> <ol style="list-style-type: none">1. Learn multiplication facts within 1002. Understand multiplication as a number of groups with an equal number of objects in each group3. Learn multiplication/division number bonds4. Understand division as a number of objects partitioned into equal groups5. Understand division as an unknown-factor problem	<p>SKILLS:</p> <ul style="list-style-type: none">➤ Interpret products of whole numbers➤ Interpret quotients of whole numbers➤ Model multiplication and division in word problems➤ Recognize the need for a particular operation in a given situation➤ Multiply and divide fluently

Grade 3 Math: Unit Outline

VOCABULARY/ KEY TERMS:

multiply	product	separate	two times as many
multiplication	quotient	join	three times as many
divide	array	share	inverse
division	arrange	groups	commutative property
factor	row	relationship	identity property
multiple	column	property	distributive property

ASSESSMENT EVIDENCE AND ACTIVITIES:

Initial Assessment: Questions on doubling and sharing situations to assess readiness for multiplication and division

FORMATIVE ASSESSMENTS:

These are integrated throughout the learning activities:

Assessment #1: Located in *Amanda Bean's Amazing Dream* Activity

Assessment #2: Located In "Factor Times Factor Equals Product" Activity

Assessment #3: Located in *Six Dinner Sid* Activity

Assessment #4: Located in *The Doorbell Rang* Activity

FINAL PERFORMANCE TASK:

"Isabella's Garden": Students solve a series of problems based on a garden in which the plants are arranged in rows of an equal number of plants. The questions require the students to apply the multiplication facts within 100 accurately, and to use the relationship between multiplication and division to solve some problems.

Grade 3 Math: Unit Outline

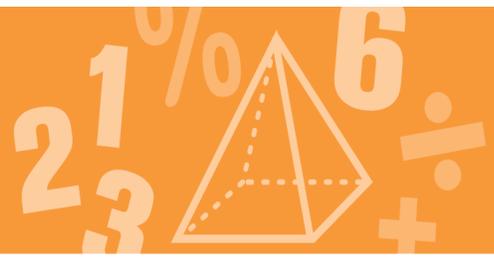
LEARNING PLAN & ACTIVITIES:

- Literature presenting multiplication and division situations
- Making arrays and recording them on grid paper
- Number Talks: daily activities for developing mental math skills and computation strategies
- Learning multiplication/division “bonds” to 144
- “Look and Talk” activities with pictures or common household items (egg carton, muffin tin, 6-pack of soda)
- Games involving joining and partitioning groups of objects and recording solutions
- Writing and illustrating word problems that present multiplication and division
- Creation of a “Gallery of Arrays” (photos or drawings of objects arranged in arrays or the objects themselves)
- Daily fluency practice (including physical exercises counting by numbers other than 1)
- Weekly fluency quizzes, *although fluency is not expected by the end of this unit*

RESOURCES:

1. Neuschwander, Cindy, Liza Woodruff, and Marilyn Burns. *Amanda Bean's Amazing Dream: A Mathematical Story*. New York: Scholastic Press, 1998. Print.
2. Pinczes, Elinor J and Bonnie, MacKain, *One Hundred Hungry Ants*. Boston, Mass.: Houghton Mifflin, 1999.
3. Burns, Marilyn. *Lessons for Introducing Multiplication, Grade 3*. Saucilto, Calif.: Math Solutions Publications, 2001.
4. Moore, Inga. *Six-dinner Sid*. New York: Simon and Schuster Books for Young Readers, 1991.
5. Giganti, Paul., and Donald Crews. *Each Orange Had Eight Slices: A Counting Book*. New York: Mulberry Books, 1994.
6. Hutchins, Pat. *The Doorbell Rang*. New York: Greenwillow Books, 1986.
7. Parrish, Sherry. *Number Talks: Helping Children Build Mental Math and Computation Strategies, Grades K-5*. Sausalito, CA: Math Solutions, 2010. Print.
8. Abrohms, Alison. *Literature-based Math Activities: An Integrated Approach*. New York, NY: Scholastic, 1992.
9. K-5 Teaching Resources: <http://www.k-5mathteachingresources.com>
10. Progressions: <http://ime.math.arizona.edu/progressions/>
11. See Singapore Math materials for “Number Bonds” and “Look and Talk”

Mathematics



Initial Assessment

Name _____

Date _____

Double the following numbers:

3

9

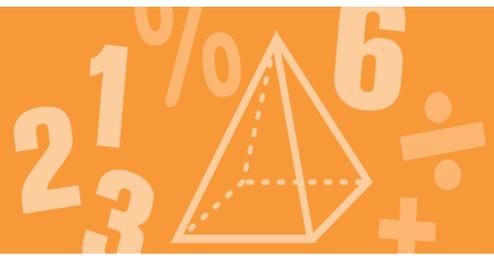
12

15

26

Ms Walton gave \$5 to each of her three children. How much money did she give her children altogether?
Show your work.

Mark and his two brothers shared 12 cookies equally. How many cookies did each boy eat?
Show your work.



Initial Assessment: Answer Key

Name _____

Date _____

Double the following numbers:

3 **6**

9 **18**

12 **24**

15 **30**

26 **52**

Ms Walton gave \$5 to each of her three children. How much money did she give her children altogether?

Answer \$15.00

Show your work.

Solution 1

$5 \times 3 = 15$

Solution 2

$5 + 5 + 5 = 15$

Both the multiplication algorithm and the use of repeated addition should be expected and accepted. Use this information to determine entry points for individual students.

Mark and his two brothers shared 12 cookies equally. How many cookies did each boy eat?

Answer 4 cookies

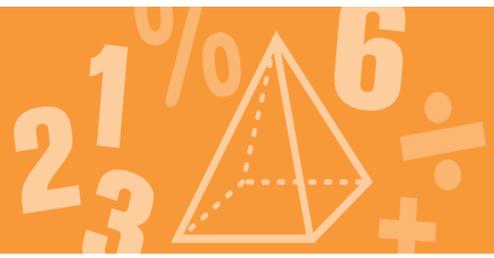
Show your work.

Solution 1

$12 \div 3 = 4$

Solution 2

$4 + 4 + 4 = 12$



GRADE 3 MATH: LEARNING ACTIVITIES

Many students will initially rely on repeated addition to solve multiplication problems. A primary goal of this unit is to transition students to multiplicative reasoning. Repeated addition should be acknowledged as a solution, but explicitly identified as *not* the skill we are learning/using here.

The omission of the use of equations in the beginning activities is deliberate. The intention is not to have students memorize a series of “fact families,” but to have them see composite numbers as quantities that can be separated into equal groups that can be counted as groups rather than one-by-one, and to have them gain facility in doing that mentally.

Extension activities in this unit address the distributive property of multiplication, although it is not assessed in the final task.

CONTENTS

I. Daily activities

II. Ongoing Activities

III. Working With Arrays

Activity 1: Activities with Color Tiles

Activity 2: Gallery of Arrays

Literature-Based Lessons to Accompany Arrays Activities

Amanda Bean’s Amazing Dream by Cindy Neuschwander

(Includes Formative Assessment #1)

One Hundred Hungry Ants by Elinor J. Pinczes

Factor/Factor/Product Bond Template

IV. Factors and Products: Beans and Cups Activities

Activity 3: Beans and Cups, Part 1: Understanding Factors and Products

Activity 4: Beans and Cups, Part 2: Factor Times Factor Equals Product (Includes Formative Assessment #2)

Activity 5: Beans and Cups, Part 3: Unknown Factors

Literature-Based Lessons to Accompany Beans & Cups Activities

Six Dinner Sid by Inga Moore (Includes Formative Assessment #3)

The Doorbell Rang by Pat Hutchins (Includes Formative Assessment #4)

V. Culminating Activity: Creating a Book of Word Problems

I. DAILY ACTIVITIES

Multiplication number talks: see *Number Talks* by Sherry Parish

Exercise breaks: students should perform exercises in sets of 10 or 12 repetitions, counting by numbers other than one to facilitate the memorization of the multiples of a particular number through Total Physical Response (TPR).

Counting on by a number other than one is a Level 2 solution strategy for a multiplication problem as defined in the Progressions for the Common Core State Standards in Mathematics (<http://ime.math.arizona.edu/progressions/>)

Fluency quizzes (beginning after equations and standard format of multiplication are introduced)

II. ONGOING ACTIVITIES

Look and Talk: See *Activity 2: Gallery of Arrays* in the following pages.

Multiplication Top-It: (see Everyday Math or http://everydaymath.uchicago.edu/about/understanding-em/EM2007_G4_samples.pdf)

Buzz: A group of at least four students identifies a certain factor and then counts off by ones. Each time the count reaches a multiple of that factor, the student whose turn it is says “buzz” instead of the number. For example, if the students choose four the count is “1, 2, 3, buzz, 5, 6, 7, buzz...”

Nests and Eggs: Roll a die for the number of nests, roll another for the number of eggs in each nest. Record the factors and the number of eggs in all. Two dice may be used for one or both factors as students gain fluency.

III. WORKING WITH ARRAYS

Activity 1: Activities with Color Tiles

Materials:

color tiles

Lesson:

1. Teach the word **array**, and make the connection to the word **arrange**.
2. Give students 12 color tiles each, and have them make rectangles. (Define **rectangle**, and make sure that students know that squares are rectangles.)

Students have a tendency to form rectangular “frames,” rather than rows and columns, when beginning these activities.

3. Compare results and have the students describe their arrays as a certain number of rows or columns with a certain number of tiles in each row/column. Prompt for any possibilities not shown.
4. Teach vocabulary: **row** and **column**, **length** and **width**. Terminology is important in order to distinguish between a 2 x 6 and a 6 x 2 array.

Sentence frames may be helpful to some students:

I have _____ rows of _____ tiles in each row.
There are _____ tiles in all.

or

I have _____ tiles in all.
There are _____ rows of _____ tiles in each row.

5. Have students record the arrays on grid paper. Find and represent all possible arrays for composite numbers up to 72 (to be done over the course of a week or so). Include a few prime numbers such as 5, 7, and 11 so that students may see that some numbers can only be represented by a single array, although prime and composite numbers are not taught formally in this unit. Students must be provided sufficient experience making

rectangular arrays with color tiles and graph paper before moving on to working with objects that are not squares. Each array should be labeled with the number of rows and number of columns.

- Sort the arrays by product, and display on charts. Solicit and chart student observations. As students work, they will notice that some numbers (products) can be arranged in various ways, and some numbers (factors) appear on more than one chart.

This activity supports MP.7 (Look for and make use of structure).

These recording and sorting activities provide an opportunity for students to see that the **commutative property** applies to multiplication. Make sure that all product charts contain all possible arrays and do not just represent all factors of that number (for example, the “24” chart should show both an 8 x 3 and a 3 x 8 array).

Some students may be ready to explore using the distributive property in the following extension activity.

- Extension:** Distributive property with arrays: Students will compose arrays with tiles in two different colors to show that, for example, 5×6 can be shown as $(5 \times 4) + (5 \times 2)$ when the 6 is decomposed to $4 + 2$. Arrays should be recorded on grid paper using the colors, with separate labels for the sets of rows and columns.

Activity 2: Gallery of Arrays

Materials:

(Optional) *Each Orange Had Eight Slices*, by Paul Giganti

The creation of the gallery can serve as a bridge to creating arrays of objects that are less easily shaped into rectangles. It is important for students to work with a variety of objects to facilitate the transition to abstraction.

Lesson:

1. (Optional) Launch the activity by reading *Each Orange Had Eight Slices* .
2. Have students bring in objects from home (or pictures, photographs or drawings of them) that show arrays—egg cartons, ice trays, packages of cookies or crackers, or tiles on the walls or windowpanes, for example. All pictures or items can be labeled with the factors, accompanied by a sentence or two describing the array, or matched with an array recorded on graph paper.
3. Conduct a "Look and Talk" discussion using gallery pictures or objects. "Look and Talk" discussions are brief discussions in which the students identify and talk about the mathematics in a picture chosen for that purpose. For example, the students might look at the windows in the classroom and say "There are eight rows of window panes. There are four panes in each row. There are thirty-two panes in all," or "There are eight rows of window panes. There are four panes in each row. Eight times four is thirty-two." A sentence frame will be useful to some students.

LITERATURE-BASED LESSONS TO ACCOMPANY ARRAYS ACTIVITIES

Do not move on to these activities until the students have had sufficient practice with color tiles.

Three texts are referenced in this section:

1. Neuschwander, Cindy, Liza Woodruff, and Marilyn Burns. *Amanda Bean's Amazing Dream: A Mathematical Story*. New York: Scholastic Press, 1998. Print.
2. Pinczes, Elinor J and Bonnie, MacKain, *One Hundred Hungry Ants*. Boston, Mass.: Houghton Mifflin, 1999.
3. Burns, Marilyn. *Lessons for Introducing Multiplication, Grade 3*. Saucilto, Calif.: Math Solutions Publications, 2001.

Amanda Bean's Amazing Dream by Cindy Neuschwander

Materials: *Amanda Bean's Amazing Dream*; a variety of objects to use for arrays—squared paper, crayons, paper, scissors, glue

Vocabulary: *row, column, groups, vertical, horizontal, rectangular*

Lesson:

Pre-Lesson Scaffold

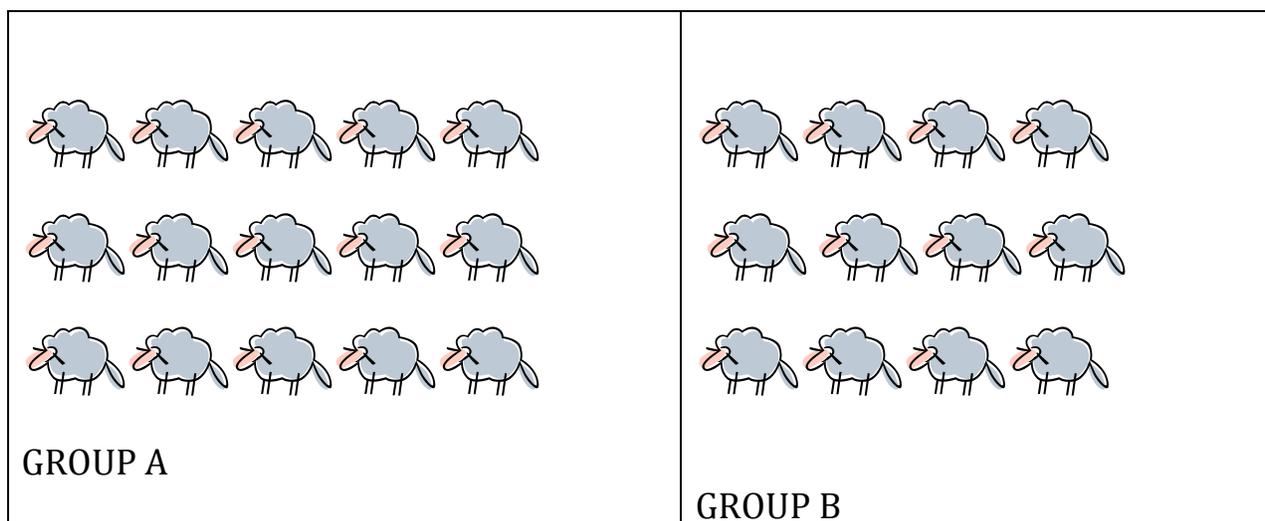
Review **row, column, horizontal** (relate to the word “horizon”), **vertical**. Have students use their hands to indicate the directions.

Write an expression and tell students that **length times width** is the sequence commonly used, and the one they will be using to represent their arrays

1. Read *Amanda Bean's Amazing Dream* and discuss Amanda's problems (her reluctance to learn the multiplication tables, her difficulty in counting large numbers of objects), and her solutions (arranging objects into arrays, memorizing the multiplication facts) with the class. Acknowledge that multiplication is like adding

things quickly but is a better strategy so that one does not need to spend a long time counting and adding every group.

2. Review the illustrations in the book, and discuss that arrays can be formed with any objects, not just with the square tiles that were used in the first set of activities. Note that the arrays themselves are always rectangular, regardless of the shape of the objects.



3. Compare the two arrays above. Students may note that there are three rows in each array, but in the first one there are more sheep in each row, and so a greater number of sheep in all.
4. Write the multiplication equation for each group as a class. Call students' attention to the fact that in two equations in which one of the factors is the same, the product will be greater in the equation in which the other factor is greater.

Having students cut out pictures and arrange objects will help them create arrays to model the word problems. Some students may need squared paper to help line their objects up.

5. Allow time for students to practice creating arrays independently or in pairs. Use the following problems and other similar ones.

Formative Assessment #1

Use this activity as a formative assessment. Look for

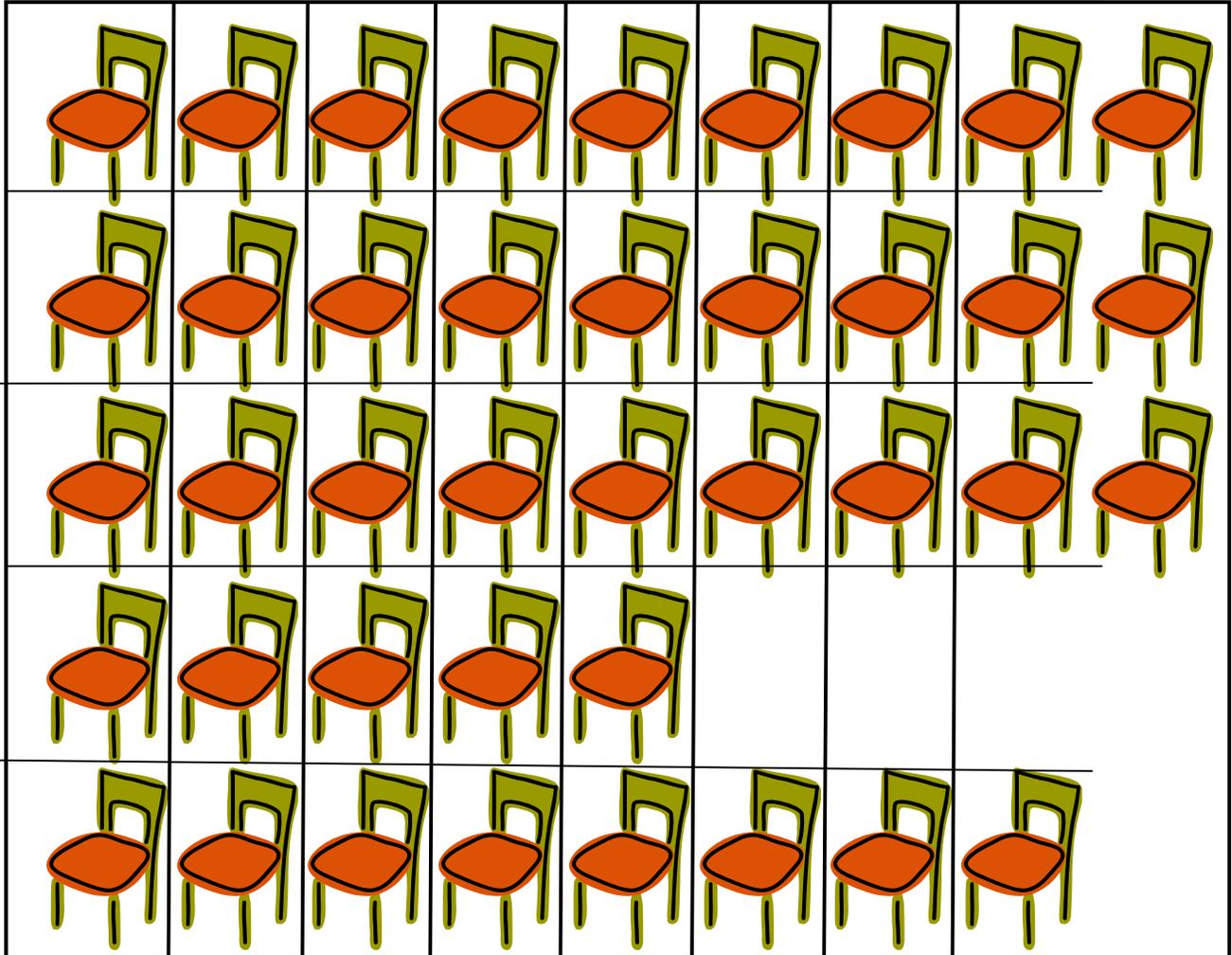
- Understanding of the rows \times columns convention
- Arrays that are rectangular in shape
- Equations showing a product from two factors

- Use the pictures below to show the following arrays:

8 rows of 2 chairs

3 rows of 6 chairs

Write equations to describe your arrays.

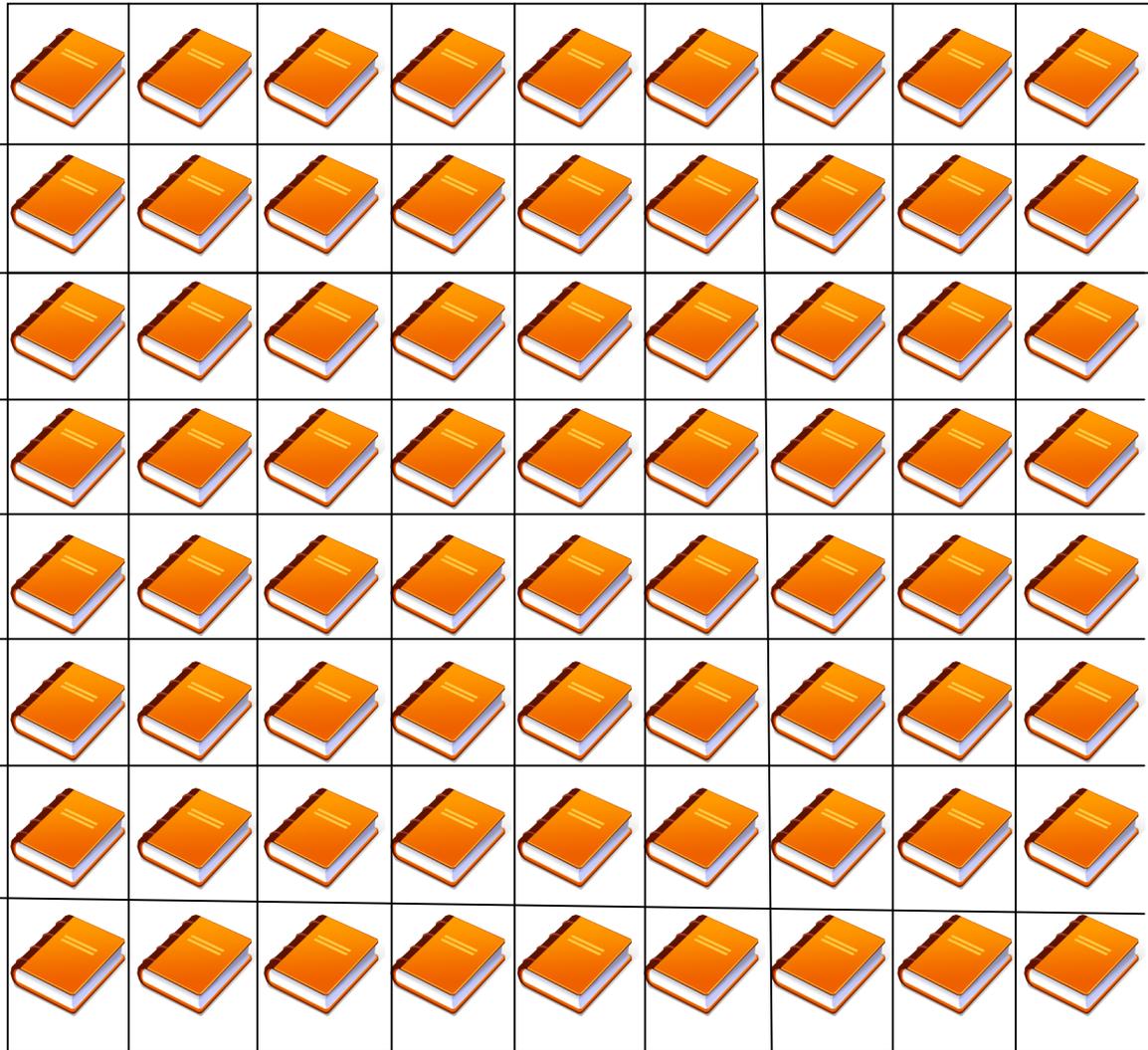


- Use the pictures below to make arrays to show:

7 shelves with 4 books on each shelf

6 shelves with 5 books on each shelf

Write equations to match your arrays.



One Hundred Hungry Ants by Elinor J. Pinczes

Materials: tiles, counters or squared paper for making arrays, 10 x 10 grids

References:

Pinczes, Elinor J. And Bonnie MacKain. *One Hundred Hungry Ants*
Burns, Marilyn. *Lessons for Introducing Multiplication, Grade 3*

Lesson:

1. Read *One Hundred Hungry Ants* aloud. Give students squared paper to record the various arrays used by the ants in the story. They should consult the text afterwards to make sure they have included all the arrays. Have the students write sentences to match the arrays. Provide sentence frames as needed.
2. Have students explore and share this problem using colored tiles: Suppose that there were 12 ants going to the picnic. How many different ways could the ants arrange themselves into equal rows?
3. Have students to choose from a selection of numbers (20, 24, 36, 40) and find and record all the ways the ants could arrange themselves.

Extension Activity

This activity provides a second opportunity for students to explore the distributive property of multiplication. Provide students with 10×10 grids to cut into two smaller rectangular grids. For example, they might decompose 10×10 into 7×10 and 3×10 . Guide students to see that since $7 + 3 = 10$, 10×10 may be decomposed this way. Allow time for students who are ready to explore these possibilities and prove the property. (MP.7)

IV. FACTORS AND PRODUCTS: BEANS AND CUPS ACTIVITIES

These activities are designed to introduce working with groups of objects, and separating a number of objects into groups of equal size. The understanding of what the factors and the product are in each situation is a key idea. An understanding of the relationship between multiplication and division is developed in the later activities. The inclusion of word problems will further develop modeling skills (applying an operation to the appropriate situation).

In this series of activities, students will explore the creation and use of “factor/factor/product bonds” (a variation of the number bonds used in Singapore Math Level 1A material. See Factor/Factor/Product Bond Template).

For Beans and Cups Activities 2 and 3, you will have to compile a large “bank” of word problems. These may be drawn from any sources you have in the classroom. Each problem should require only one or two of the basic operations, but all four operations should be required among the various problems. Make sure that the problems require students to perform operations with length, time, and money as well as with numbers of objects. Some problems should include the terms as “twice as many” and “three times as many.” Familiarity with this language will help move students towards Standard 4.OA.1, which addresses multiplicative comparison situations.

Materials:

- dice
- cups
- beans or other small objects for forming groups
- graph paper
- color tiles
- factor/factor/product bond template (see attachment)

Please refer to the Literature-Based Lessons to Accompany Beans & Cups Activities: *Six Dinner Sid* and *The Doorbell Rang*.

Beans and Cups Activity 1: Understanding Factors and Products

Materials:

dice, beans

Lesson:

1. Model the activity. Say: *When I roll my first die, I arrange the corresponding number of cups. This is one **factor**. When I roll a second die, I put that number of beans in each cup. This is another **factor**.*
2. The total number of beans in all the cups is the **product**.
3. Show how to write a factor/product bond using the cups and beans (See Factor/Factor/Product Bond Template).
4. Independent activity: Create a bond list using cups and beans (give students 5 minutes for this activity).
5. Have students share their bond lists with a partner. Each student should review the other's work for accuracy.

Language Component:

Provide a sentence frame to help students “read” the bonds they have found:

For example, “I have six cups and there are four beans in each cup. I have twenty-four beans in all. Six times four is twenty-four.”

Supports use of MP.1—students are identifying what each factor represents.

Beans and Cups Activity 2: Factor Times Factor Equals Product

Through these activities, students develop strategies to find unknown products.

Materials:

beans, cups, chart paper, markers, word problem bank

Lesson:

1. Ask: *If you know how many cups there are and how many beans are under each cup, can you determine how many beans you have all together?* (Two factors are identified, and students find the unknown product).
2. Students should work in pairs. One student represents a factor/product bond by placing an equal number of beans under each of a certain number of cups, without the other seeing. The other student must try to determine the product and is only allowed to look under one of the cups.
3. Allow students time to find and record various bonds (See Factor/Factor/Product Bond template).
4. Have students share different strategies they used to determine the products without counting the beans (repeated addition, arrays, skip counting). With practice, students will discover that some strategies are more efficient than others.
5. Introduce an equation as a model that shows the same information as a number bond. Have the students write equations that correspond to their bonds.
6. Have the class sort all their bonds and equations by product and display in charts.

Formative Assessment #2

Use this activity as a formative assessment. Look for accuracy and multiple examples.

Language Component:

1. Revisit the sentence frame, and link it to the equation. For example:

I have eight cups, and there are three beans under each cup.

I have twenty-four beans in all.

Number of groups \times Items in each group = Whole

$$8 \times 3 = 24$$

2. Have students identify and solve problems from the “word problem bank” that require finding the product when two factors are given. Emphasize that the numbers need not be the same: we are looking for a similar situation.

Supports use of MP.1 and MP.4—Students are recognizing the contexts in which the need for multiplication arises

Beans and Cups Activity 3: Unknown Factors

Students must complete bonds in which one factor and the product are given.

Materials:

beans, cups, word problem bank

Lesson:

1. Say: *We know how many cups there are, and we know how many beans there are all together. Can you determine how many beans are under each cup?* Show the bond model with one missing factor, and work this example as a group. Solicit students' ideas on how to determine the unknown factor.

Some students at this point may need to count out beans one by one into the cups. Remind these students about the initial work in arrays, in which they made rows and columns from a collection of tiles.

2. Pair students and give each pair a card with a product and one factor.
3. Have students share strategies they may have used to determine the missing factor. Assess whether students have used the charts they made in Part 2 as a resource. If not, make this link explicit.
4. Allow time for the students to practice with various products and unknown factors.
5. Discuss with the class how the problems and solutions can be modeled with equations.

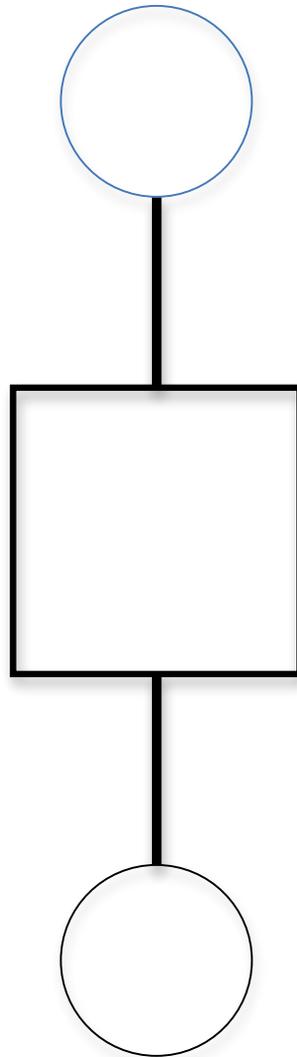
Language Component:

1. Return to the sentence frames previously used. Ask, "How can we rewrite this frame to match the kinds of problems we are solving now?" Do this as an interactive writing exercise if necessary.
2. Have student pairs write a sentence describing at least one of their problems using the sentence frames.
3. Have students identify problems from the word problem bank that require finding a missing factor when the other factor and product are given.

This further develops MP.4
(Model with Mathematics)

Factor/Factor/Product Bond Template

In this model, the factors are written in the circles, and the product in the square.



LITERATURE-BASED LESSONS TO ACCOMPANY BEANS AND CUPS ACTIVITIES

Two texts are referenced in this section:

1. Moore, Inga. *Six-dinner Sid*. New York: Simon and Schuster Books for Young Readers, 1991.
2. Hutchins, Pat. *The Doorbell Rang*. New York: Greenwillow Books, 1986.

I. *Six Dinner Sid* by Inga Moore

Materials:

- counters
- calendar
- *Six-dinner Sid*, by Inga Moore

References:

Moore, Inga. *Six-dinner Sid*. New York: Simon and Schuster Books for Young Readers, 1991.

Lesson:

Formative Assessment #3: **“Six Dinner Sid and Two Dinner Tom”**

Use the following activity as a formative assessment. Assess MP.1, MP.4, 3.OA.3: Are students able to identify the correct factors to use for each problem, multiply them correctly, and show an equation? (To find the number of dinners, some children will benefit from the use of a calendar or the cutouts supplied.)

1. Read *Six Dinner Sid* aloud.
2. Use the story to teach the identity property of one. Present the following situations, and solicit an equation to answer each question:
 - If Sid eats one dinner in each of his houses, how many dinners does he eat each day?
 - If Sid has one food bowl in each house, how many bowls does he have in all? How many beds?
 - Sid’s friend Tom has two houses. How many dinners does Tom eat a day? How many bowls and beds does Tom have?

- Repeat the exercise with a few other numbers, and solicit student observations. What conclusion can be drawn from these equations? Guide the students to a statement such as “When one of the factors is 1, the product is always the same as the other factor.”

Extension Activity

Use the problem below to demonstrate the use of the PARTIAL PRODUCTS strategy for multiplication of multi-digit numbers.

$$\begin{array}{r} 3 \times 14 = (3 \times 10) + (3 \times 4) \\ 30 \quad + \quad 12 \quad = 42 \end{array}$$

- Have students consider the following: *If Tom keeps eating the same number of dinners each day, how many dinners will Tom eat in three weeks?*

Name: _____

Date: _____

Six Dinner Sid and Two Dinner Tom



How many dinners does Sid eat in one week?



Show your work.

Write an equation.

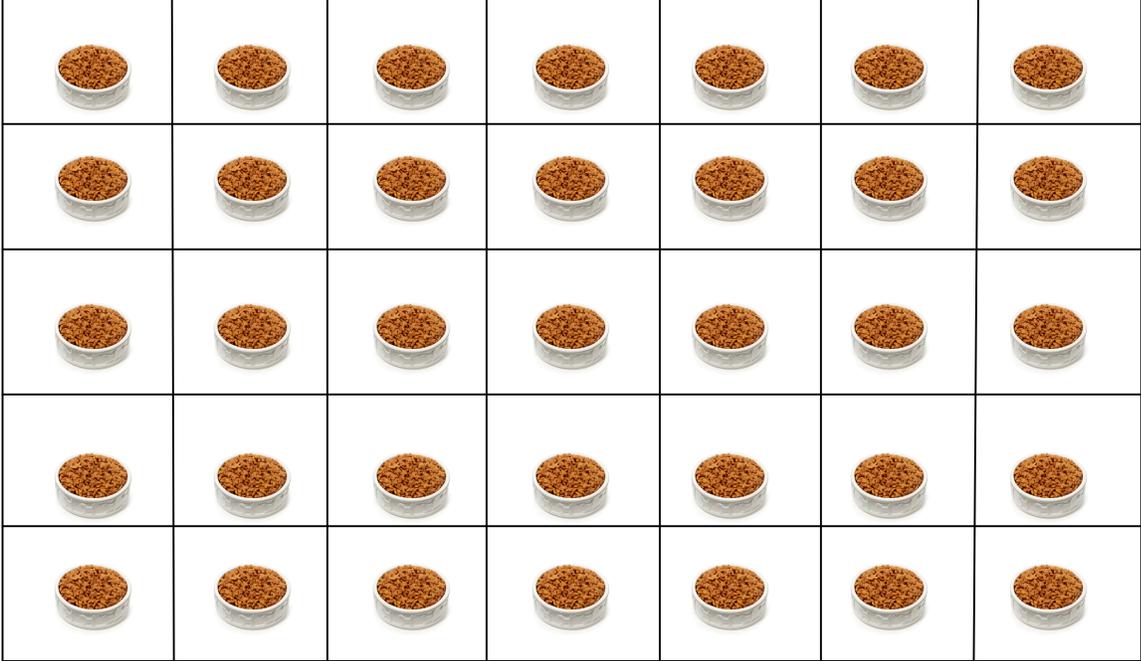
Sid's friend Tom eats two dinners a day. How many dinners does Tom eat in one week?



Show your work.

Write an equation.

This page is provided as an additional support for students who may need to cut/paste and manipulate objects.





II. *The Doorbell Rang* by Pat Hutchins

Materials:

- counters
 - plates for making groups of cookies or slates for drawing plates and/or cookies
 - template for creating booklet
1. Read the story aloud from beginning to end without interruption before beginning the activities.
 2. Vocabulary: After reading, discuss the meaning of the word “**share**” as it relates to division, and as it is used in the story. **Share** here means that each child in the story will have an equal number of cookies.
 3. Read the story a second time (this can be done immediately following the first reading, or on another day). As you read, have students model the story using small plates and counters. They should re-distribute the “cookies” among their plates as more and more characters appear in the story. Follow this activity with a re-cap of the events, prompting students to say, for example, “Now there are four children. Twelve divided by four is three.”
 4. Read the story again the next day. This time, have students keep individual “equation records” of the story. At the end of the story, each, each student should have four equations ($12 \div 2 = 6$, $12 \div 4 = 3$, $12 \div 6 = 2$ and $12 \div 12 = 1$). Have the class compare and make sure they have recorded all of these. Ask the class to describe the corresponding multiplication situation. For example, $12 \div 2 = 6$ shows that when Sam and Victoria shared 12 cookies, each child got 6 cookies. We could also say, “Sam and Victoria each had 6 cookies. There were 12 cookies in all.” Is there any way, other than the ways shown in the story, that 12 cookies could be shared equally among a group of children? (There could have been 3 children receiving 4 cookies each.)

Formative Assessment

Use the following activity to assess students’ understanding of division in situations using equal groups.

5. Assign each student a number of cookies to work with. The number should be appropriate to the student's level of fluency with multiplication facts and must have at least three factors other than 1.
6. Students should create their own books, using the cover sheet below, showing all the ways their cookies may be divided into equal groups. The booklets should contain both pictures and equations, but sentence and equation frames should be provided to those students who may need them.



_____fold here_____



V. CULMINATING ACTIVITY: CREATING A BOOK OF WORD PROBLEMS

Students will create a class book of multiplication and division problems as a culminating activity for this unit. They will take photographs or make drawings of multiplication situations that they see in and around the school (for example, the number of baskets on the shelves of a bookcase or the number of tires on cars on the street). They may also stage these situations in order to photograph them. For example, they might have a group of classmates sit at a table, and write a question about the number of shoes under the table, or arrange a group of objects into various arrays.

Literature Connection:

Each Orange Had Eight Slices can be used as a model for creating the class book.

Some samples of student work on the class book appear on the following pages.

STUDENT WORK: CREATING A BOOK OF WORD PROBLEMS

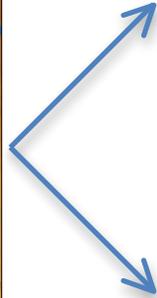
Writing about Arrays

Today in class I learned about arrays. What is an array? An array is a set that shows equal groups in rows and columns. For Example: I will organize these muffins into an array. I can group them into two columns with three rows, or we can group them in a different way. I could also make three columns of muffins with two rows. We could also make six columns with only one row. You can find arrays in a ton of places. Arrays make counting easier.

But how do arrays help you count? Sometimes counting things one by one takes a long time. But arrays arrange things into equal groups so you can count sets. Arrays can also help you multiply. When you multiply you put equal groups together to find the total. Multiplication is a operation. Just like addition and subtraction.



There are four rows of shoes and ten shoes in each row. How many shoes in all are in the array?



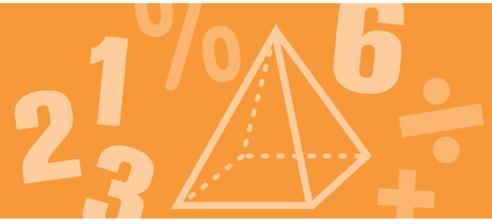
There are five rows of shoes and eight shoes in each row. How many shoes in all?

There are forty shoes in the array. How many kids took off their shoes?

$$2 \times \underline{\quad} = 40$$



Five cars are parked in front of the school. Each car has four tires. How many tires are there on all the cars?



GRADE 3 MATH: ISABELLA'S GARDEN
UNIVERSAL DESIGN FOR LEARNING (UDL)
PRINCIPLES

Grade 3 Math: Isabella's Garden

Universal Design for Learning

The goal of using Common Core Learning Standards (CCLS) is to provide the highest academic standards to all of our students. Universal Design for Learning (UDL) is a set of principles that provides teachers with a structure to develop their instruction to meet the needs of a diversity of learners. UDL is a research-based framework that suggests each student learns in a unique manner.

A one-size-fits-all approach is not effective to meet the diverse range of learners in our schools. By creating options for how instruction is presented, how students express their ideas, and how teachers can engage students in their learning, instruction can be customized and adjusted to meet individual student needs. In this manner, we can support our students to succeed in the CCLS.

Below are some ideas of how this Common Core Task is aligned with the three principles of UDL; providing options in representation, action/expression, and engagement. As UDL calls for multiple options, the possible list is endless. Please use this as a starting point. Think about your own group of students and assess whether these are options you can use.

REPRESENTATION: *The “what” of learning.* How does the task present information and content in different ways? How do students gather facts and categorize what they see, hear, and read? How are they identifying letters, words, or an author's style?

In this task, teachers can...

- ✓ **Provide options for perception and comprehension** through the use of literature, various manipulatives, and different graphic representations of multiplication and division.
- ✓ **Provide options for language, mathematical expressions, and symbols** by providing sentence frames and linking mathematical symbols to verbal explanations.

ACTION/EXPRESSION: *The “how” of learning.* How does the task differentiate the ways that students can express what they know? How do they plan and perform tasks? How do students organize and express their ideas?

In this task, teachers can...

- ✓ **Provide options for physical action** through daily exercise routines using skip-counting.
- ✓ **Provide options for expression and communication** through learning activities incorporating realia, photographs, and multiple verbal and graphic options for showing understanding.

ENGAGEMENT: *The “why” of learning.* How does the task stimulate interest and motivation for learning? How do students get engaged? How are they challenged, excited, or interested?

In this task, teachers can...

- ✓ **Recruit interest and sustain effort and persistence** by presenting mathematical concepts in the context of students' homes, their school, and the neighborhood.

Visit <http://schools.nyc.gov/Academics/CommonCoreLibrary/default.htm> to learn more information about UDL