Modeling Understandings of Whole Number Multiplication

Materials:

- **Modeling Multiplication**
- Counters

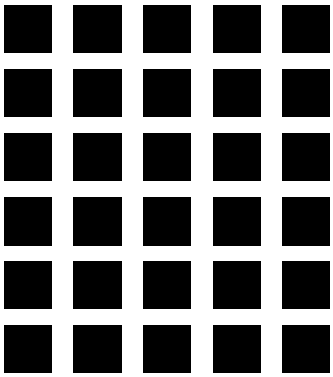
Prompt students to complete **Modeling Multiplication**.

Debriefing Activity:

- How many rows are in your array? Why?
- How many columns are in your array? Why?
- How did you determine the product of each array?
- How did you describe each fact as a comparison?

Modeling Multiplication

- Use the counters to create an array that represents the factors in each multiplication expression.
- Record a picture to show how you used the array to determine each product.
- Determine the product of each multiplication fact.

Example		
Factors 6 × 5	Array 	Product 30

The product of 6 and 5 is 6 times as much as 5.

1 Factors: 3 × 10 | Array | Product

The product of 3 and 10 is _____ times as much as _____.

2 Factors: 2 × 8 | Array | Product

The product of _____ and _____ is _____ times as much as _____.

3 Factors Array Product

6 × 4

Description

4 Factors Array Product

3 × 8

Description

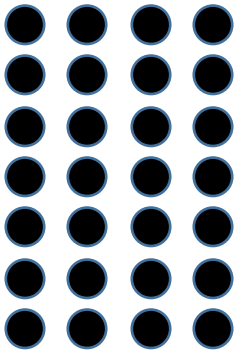
Check Point: Modeling Understanding of Multiplication

1 Provide the missing information.

Factors	Array	Product

Description

4×5

Factors	Array	Product
		

Description

Factors	Array	Product

Description

The product of 9 and 3 is 9 times as much as 3.

2 Draw an array to show the product of 5 and 7.

a) How can you describe 5 × 7 as a comparison?

_____

_____

_____

b) What is the product? _____

3 Luke had 4 bags of marbles. Each bag had exactly 9 marbles. How many marbles did Luke have?

a) Draw an array to show how to determine the total number of marbles.

b) What number sentence represents this situation?

Modeling Understanding of Whole Number Division

Materials:

- **Modeling Division**
- Counters

Prompt students to complete **Modeling Division**.

Debriefing Activity:

- Which problem prompted you to determine the number of apples in each group?
- Which problem prompted you to determine the number of groups of apples?
- How do you know when the problem is asking you to determine the number of groups or to determine the number of objects in each group?
- How did your solution process differ between problem 1 and problem 2?

Modeling Division

Use counters to model and solve each problem.

1 John had 32 apples. He placed an equal number of apples in 4 bags until all the apples were placed in a bag. How many apples are in each bag?

a) Sketch a picture of your model.

b) Does the problem tell you the number of bags of apples or the number of apples in each bag?

c) What number sentence represents this situation?

2 Lu had 18 apples. She placed 6 apples in each bag until all the apples were placed in a bag. How many bags of apples did Lu make?

a) Sketch a picture of your model.

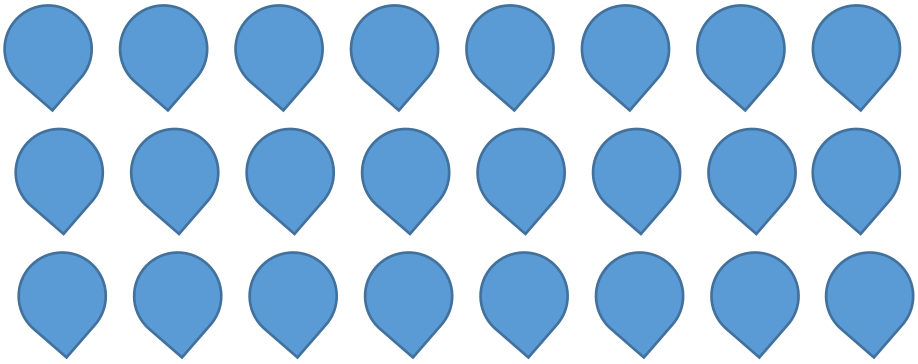
b) Does the problem tell you the number of bags of apples or the number of apples in each bag?

c) What number sentence represents this situation?

Check Point: Modeling Understanding of Whole Number Division

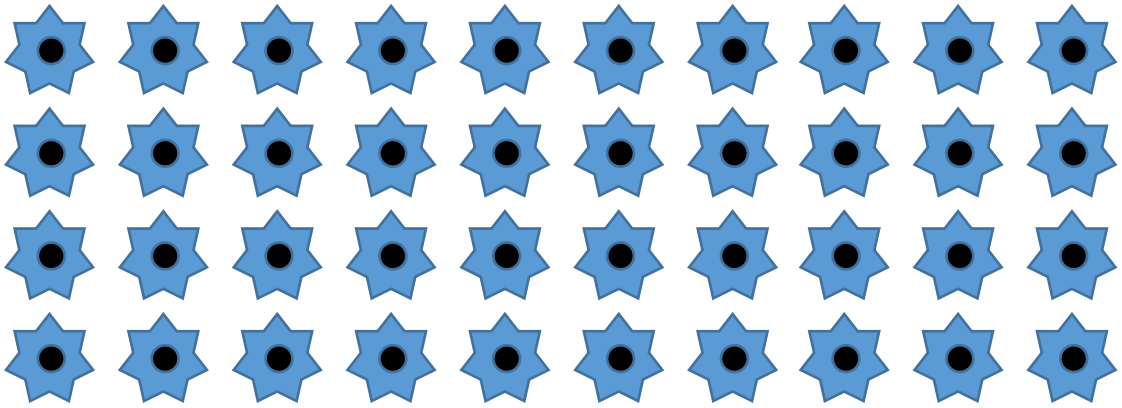
Use the pictures to solve each problem. Write a number sentence to represent the situation.

1 Ms. Romero has 24 balloons to decorate tables for a party.



She wants to put the same number of balloons on each table. She is decorating 6 tables. How many balloons can Ms. Romero use to decorate each table?

2 Mr. Smith is planting flowers in his garden. He has 40 plants.



He will plant 5 flowers in each row until he has planted all of his flowers. How many rows of flowers can he plant?

Selecting Representations for Multiplication and Division

Materials:

- **Multiplication and Division Representation Cards**
- Scissors
- Chart paper
- Tape
- Markers
- **Discussion Questions** for display

1. Distribute a card to each student.
2. Prompt students to move around the room and form groups of four with a word problem and its matching array, strip diagram, and equation.
   Note: Six sets of four cards are provided for 24 students. The number of cards used in the activity will be determined by the number of students in the class.
3. Distribute chart paper and a marker to each group of students.
4. Prompt students to attach their cards to the chart paper.
5. Display **Discussion Questions**.
6. Prompt students to work together to answer the **Discussion Questions** on their chart paper.
7. Prompt groups of students to display their cards and share their thinking process for answering the discussion questions.

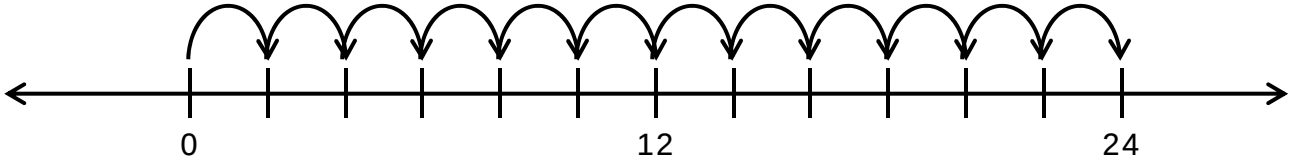
Debriefing Questions:

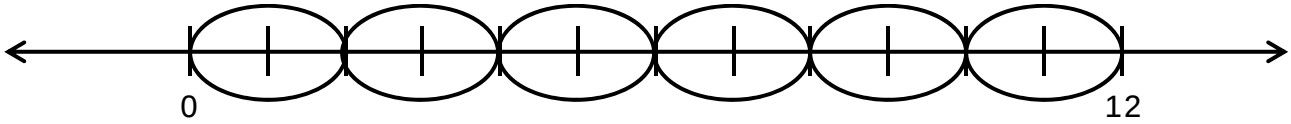
- How did your group determine which array, strip diagram, and equation represents each problem?

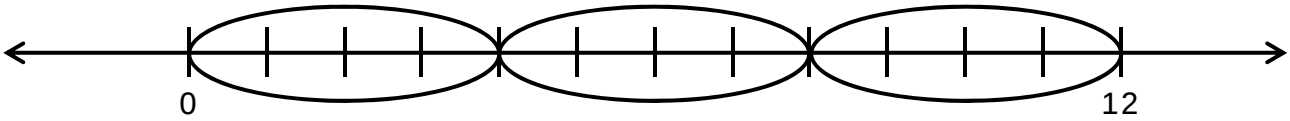
Multiplication and Division Representation Cards

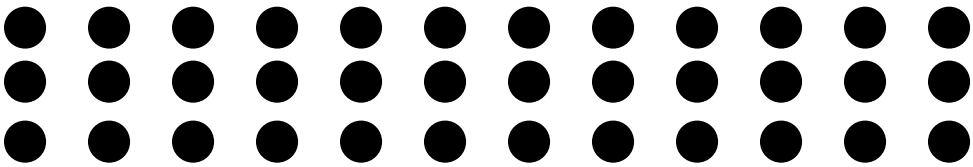
Cut along the dotted lines.

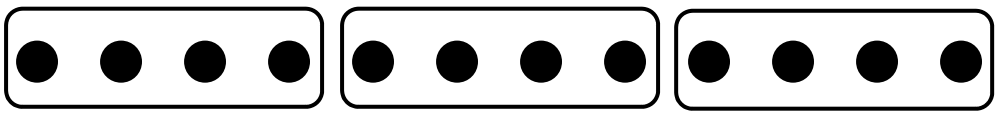
Maggie uses 2 cups of sugar to make a batch of chocolate chip cookies. She needs to make 12 batches of chocolate chip cookies for the school fair. How many cups of sugar will Maggie use to make the chocolate chip cookies?	Charlie has 12 miniature cars. He wants to store his miniature cars equally among 3 storage boxes. How many miniature cars will Charlie place in each storage box?
The shirt store sells t-shirts in packages of 2. Marcie purchased 12 t-shirts. How many packages did Marcie purchase?	Marla placed 12 jump ropes in each gym bag. She placed jump ropes in 4 different gym bags. How many jump ropes did Marla place in the gym bags altogether?
The cookie factory places 3 candies in each cookie. The cookie factory has 12 cookies in the display case. How many candies did the cookie factory use to make the 12 candy-filled cookies?	Jacob collected 4 power-ups for each completed level of the video game he played. Jacob collected 12 power-ups when he completed the video game. How many levels did Jacob complete during the game?
$12 \times 3 = \square$	$12 \div 3 = \square$
$4 \times 12 = \square$	$12 \div 4 = \square$
$12 \times 2 = \square$	$12 \div 2 = \square$

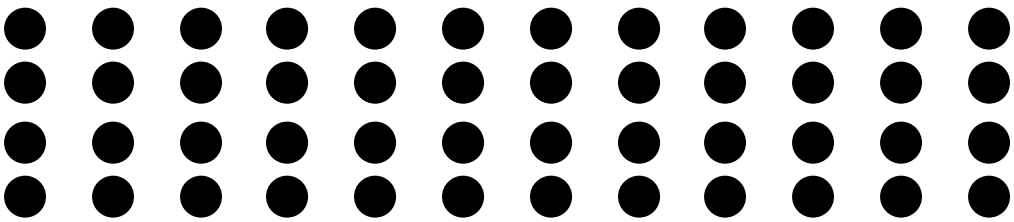


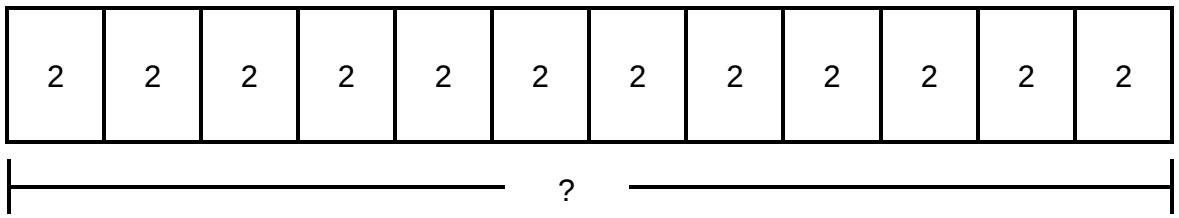


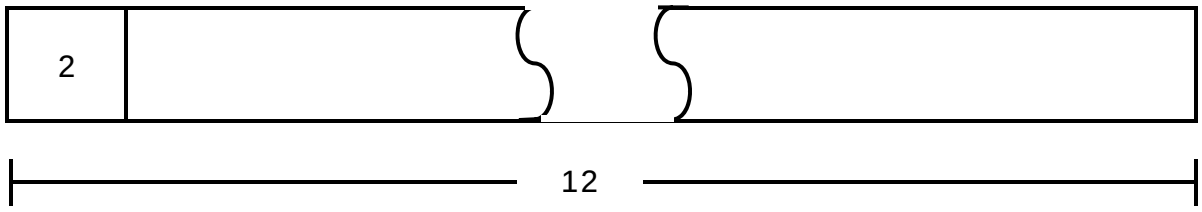


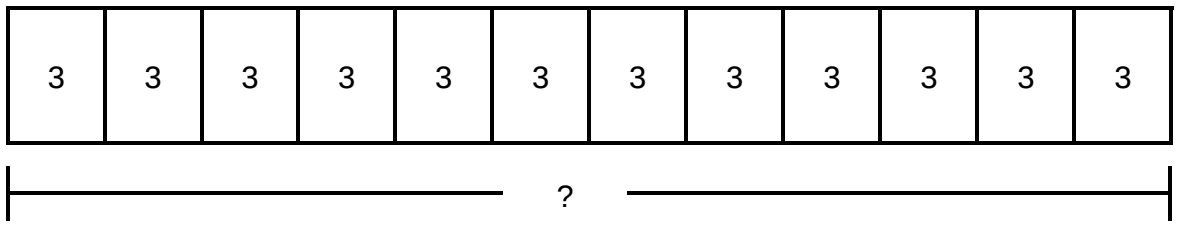


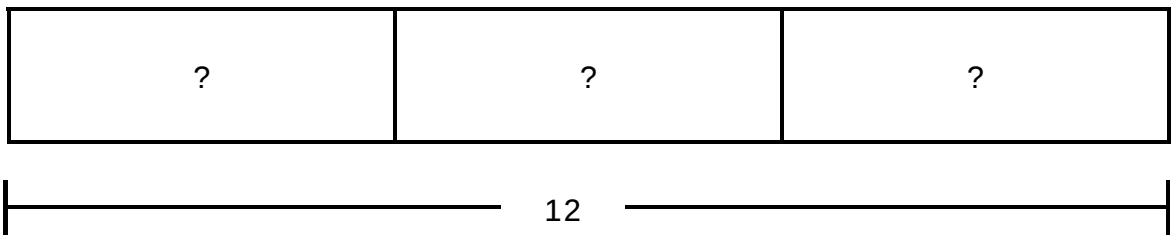


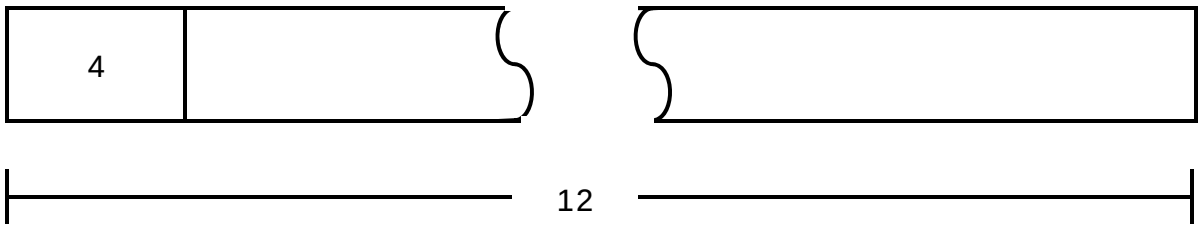


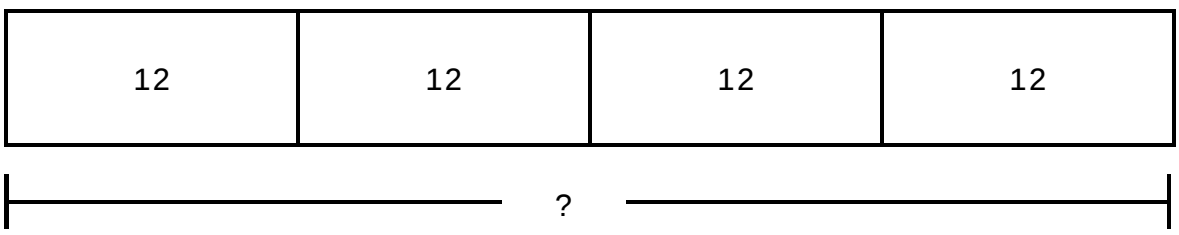












Generating Representations for Multiplication and Division Using Models

Materials:

- **Representations for Multiplication and Division**
- **Partner Discussion Questions and Sentence Frames** for display
- Colored pencils (optional)

1. Prompt students to complete **Representations for Multiplication and Division** independently.
2. Once students have completed the activity, display **Partner Discussion Questions and Sentence Starters**.
3. Prompt students to find a partner and share their models using the **Partner Discussion Questions and Sentence Starters**.

Debriefing Questions:

- What model did you use to represent the problem situation?
- How is the problem situation represented in your model?
- What other representation could be used to model the problem situation?

Representations for Multiplication and Division

Represent the following problem situations using two different models. Sketch or write your models in the space provided.

Possible Models
Area Model
Arrays
Jumps on a Number Line
Strip Diagram
Equation

1 Justin is packing glasses into 4 boxes. He packs 8 glasses in each box. How many total glasses did Justin pack?

Representation 1
Representation 2

2 Justin places 30 bowls equally among 5 different shelves. How many bowls did Justin place on each shelf?

Representation 1
Representation 2

Partner Discussion Questions and Sentence Frames

- What models did you use to represent the problem situation? Why?

  I used _____ and _____ because _____.

- How does your model represent the problem situation?

  My _____ model represents the problem situation by _____.

- What other representation can be used to model the problem situation?

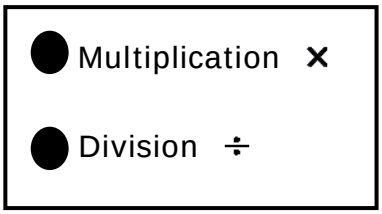
  I think we can use _____ to model the problem situation because _____.

Selecting the Operation of Multiplication or Division Based on Problem Context

Materials:

- **Select the Operation: Multiplication or Division**
- **Problem Cards** for display
- Index cards
- Marker

1. Distribute an index card to each student.
2. Prompt students to create a multiplication and division response card.



3. Distribute **Select the Operation: Multiplication or Division** to each student.
4. Prompt students to complete Problem 1 on **Select the Operation: Multiplication or Division**.
5. Display the **Problem Card** 1.
6. Prompt students to display their selection by pinching or touching the dot next to the word on their multiplication and division response card.
7. Ask,
    - How did you determine if the problem required multiplication/division to solve?
    - What equation could be used to represent the problem?
      Prompt students to record the equation on **Select the Operation: Multiplication or Division** below the problem.

    Multiplication Problems
    - How many equally-sized groups are in the problem?
    - How many groups are in the problem?

    Division Problems
    - Is the problem asking you to determine the number of groups or to determine the number of objects? How do you know?
8. Repeat steps 4–7 for each problem.

Select the Operation: Multiplication or Division

- Read each problem.
- Determine if you would use multiplication or division to solve the problem.

Problem	Operation (Circle One)	
Katherine made 5 deposits into her savings account. Each deposit was for $15. How much money did Katherine deposit into her savings account?	Multiplication	Division
Jay has 5 baseball cards in her collection. Dylan's collection has 14 times more baseball cards than Jay's. How many baseball cards does Dylan have in his collection?	Multiplication	Division
Richard made 3 deposits of equal amounts into his savings account. He deposited a total of $75. How much money was each deposit?	Multiplication	Division
Ms. Parkinson has 78 pieces of candy. She will fill 3 bags of candy equally for the party. How many pieces of candy will Ms. Parkinson place in each bag?	Multiplication	Division
Zack used 48 red building blocks for his project. He used 6 times as many red building blocks as blue building blocks. How many blue building blocks did Zack use for his project?	Multiplication	Division
Mr. Tang gave a total of 36 stickers to 3 of his students. Mr. Tang shared the stickers equally. How many stickers did each student receive?	Multiplication	Division
Printing-Here charges $14 to print a mini-poster in color. Lynn needs to print 8 colored mini-posters. How much will it cost?	Multiplication	Division

Check Point: Representing Multiplication and Division Problems

Represent each problem using a model. Justify your model.

Possible Models
Area Model
Array
Jumps on a Number Line
Strip diagram
Equation

1 Ms. Carl bought 9 dozen marshmallow treats. She distributed the 9 dozen marshmallow treats evenly between 4 nursing homes. How many marshmallow treats did Ms. Carl distribute to each nursing home?

My model represents the problem situation . . .

2 Herman earns $26 a day for caring for his grandmother's dog. He spends $14 for a bus pass for the week. How much money will Herman have if he cares for his grandmother's dog for 7 days?

My model represents the problem situation . . .

Problem Cards

Cut along the dotted lines.

1 Katherine made 5 deposits into her savings account. Each deposit was for $15. How much money did Katherine deposit into her savings account?

2 Jay has 5 baseball cards in her collection. Dylan's collection has 14 times more baseball cards than Jay's. How many baseball cards does Dylan have in his collection?

3 Richard made 3 deposits of equal amounts into his saving. He deposited a total of $75. How much money was each deposit?

4 Ms. Parkinson has 78 pieces of candy. She will fill 3 bags of candy equally for the party. How many pieces of candy will Ms. Parkinson place in each bag?

5 Zack used 48 red building blocks for his project. He used 6 times as many red building blocks as blue building blocks. How many blue building blocks did Zack use for his project?

6 Mr. Tang gave a total of 36 stickers to 3 of his students. Mr. Tang shared the stickers equally. How many stickers did each student receive?

7 Printing-Here charges $14 to print a mini-poster in color. Lynn needs to print 8 colored mini-posters. How much will it cost?

Generating Representations for Two-Step Problems Using Models

Materials:

- **Two-Step Problem Cards** – One card per group
- Chart paper
- Markers
- Tape or glue

Groups of 2-3 students

1. Distribute a **Two-Step Problem Card**, chart paper, and marker to each group of students.
2. Prompt students to attach their problem card to the chart paper.
3. Prompt students to represent the problem situation using at least two different models (an array, a strip diagram, and/or an equation) that could be used to solve the problem situation.
4. Once students have completed their models, prompt students with the same problem situation to display their posters together and discuss similarities and differences.
5. Whole group: Prompt groups of students to share their poster and thinking processes.

Debriefing Questions:

- What model did you use to represent the problem situation? Why?
- How does your model represent the problem situation?
- What other model can be used to represent the problem situation?

Two-Step Problem Cards

Cut along the dotted lines.

Ms. Kellie removed bottles of bubbles from 4 boxes. Each box contained 12 bottles of bubbles. Ms. Kellie distributed the bottles of bubbles to 6 different classrooms. How many bottles of bubbles did each classroom receive?

Patricia babysat 3 times last week. She earned $15 each time. Patricia also earned $52 for cleaning the house. How much money did Patricia earn?

José, Simon, and Eric are training for a race.

- José ran 63 miles.
- Simon ran 16 miles fewer than Eric.
- José ran 3 times as many miles as Eric.

How many miles did Simon run?

Mr. Watt purchased 27 cases of footballs to share equally between 3 schools. Each case contained 8 footballs. How many footballs did each school receive?

Solve Two-Step Problems with Objects

Materials:

- Counters
- Device to record video
- **Cafeteria Counters**

Prompt student to complete **Cafeteria Counters**.

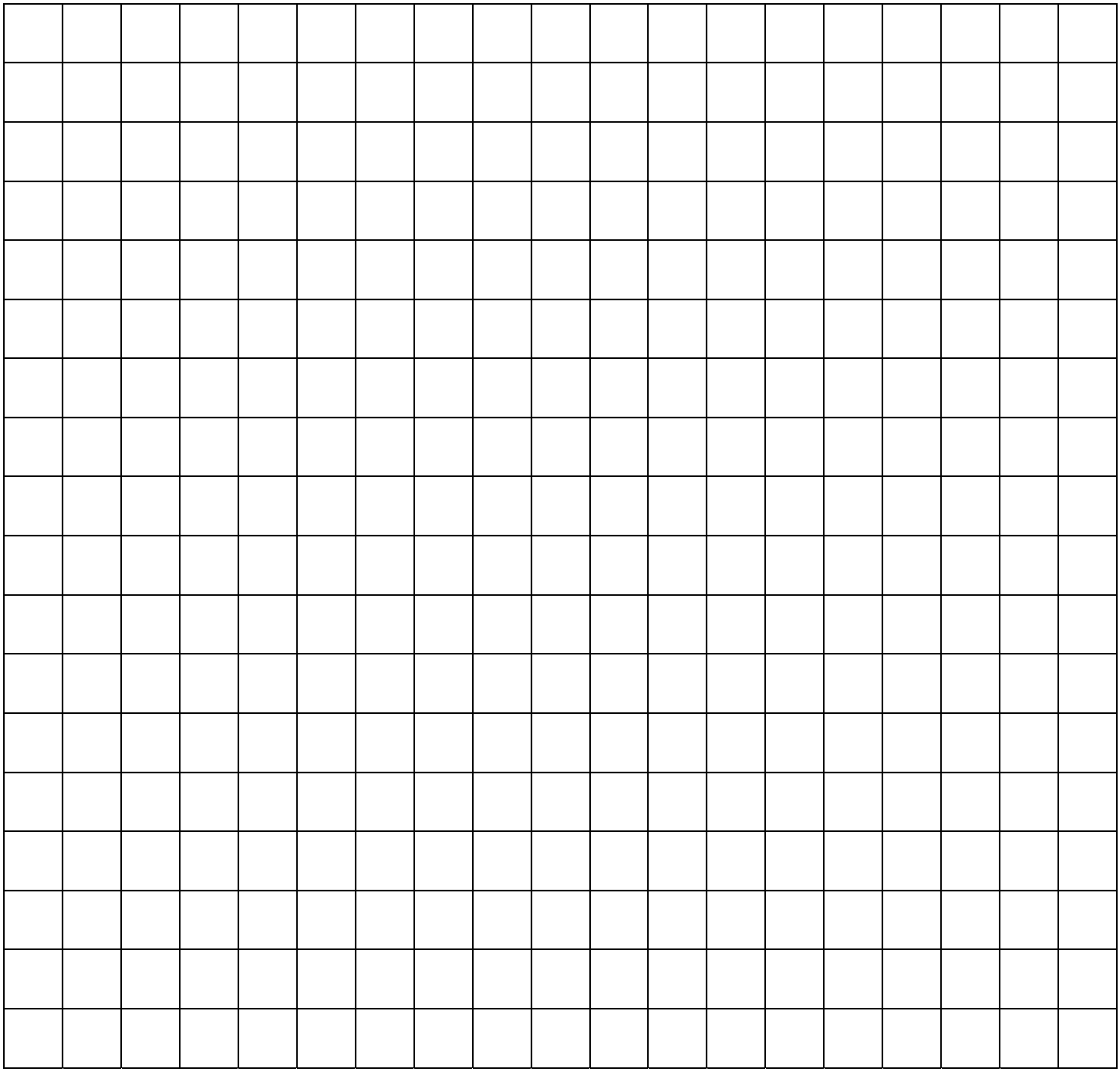
Debriefing Questions:

- How are the relationships among the quantities in the problem represented with the counters?
- How is the solution process represented with the counters?
- What understanding is seen/heard in the video?
- What would next steps be for these students based on the video?

Cafeteria Counters

- Use the counters and grid paper to model each situation described below, and solve the problem.
- Record a video showing how you used the counters to solve the problem. Be sure to describe what you are doing and why you are doing it.

1 The school cafeteria has 15 tables with 6 seats available at each table. Yesterday, there were 14 empty seats in the cafeteria during lunch. How many seats were filled in the cafeteria during lunch yesterday?



2 Ms. Carrell had 4 bags of buttons for an art project. There were 15 buttons in each bag. She gave 12 buttons to each student. Ms. Carrell gave out all the buttons. How many students received buttons?

Solve One-Step Problems with Area Models

Materials:

- **The Flower Farm**
- **Petunia Palace**

1. Prompt students to complete **The Flower Farm**. Students should work together with their group to complete the writing prompt.
2. Prompt students to complete **Petunia Palace**.

Debriefing Questions for **The Flower Farm**:

- How are all four of the area models alike? How are they different?
- How are Aaron's model and Carter's model alike? How are they different?
- How are Aaron's model, Brianna's model, and Danielle's model alike? How are they different?
- Why do all four of these models work?

Debriefing Questions for **Petunia Palace**:

- How are the models alike?
- How are they different?
- Are there some models that are more alike than other? Which ones? Why?
- How did you decide how to decompose the factors? Are there some decompositions that make it easier to determine the product than another? Why?

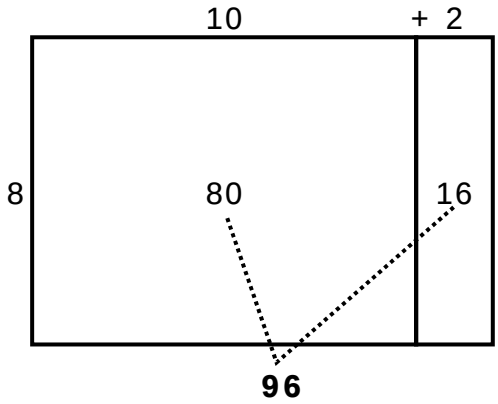
The Flower Farm

Mr. Martinez asked his students to solve the problem below using an area model.

The Flower Farm planted 8 rows of bluebonnets with 12 bluebonnet plants in each row. How many bluebonnet plants were planted?

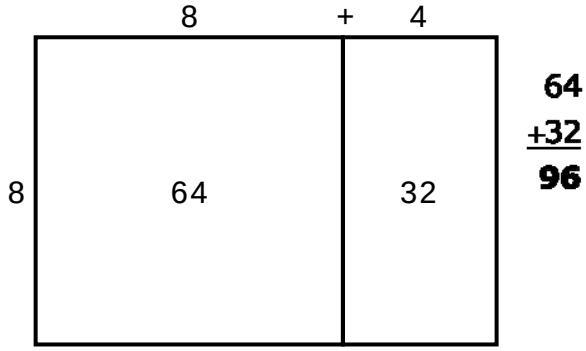
The work of four different students is shown below.

Aaron's Solution Process



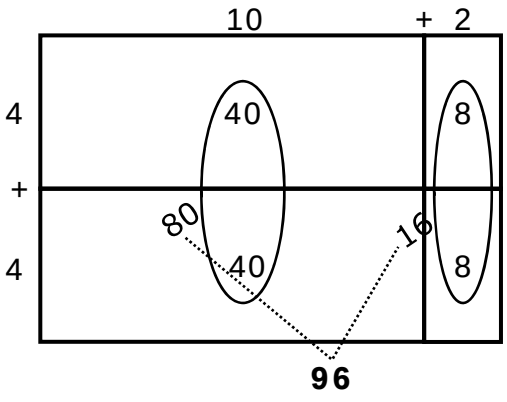
The Flower Farm planted 96 bluebonnet plants.

Brianna's Solution Process



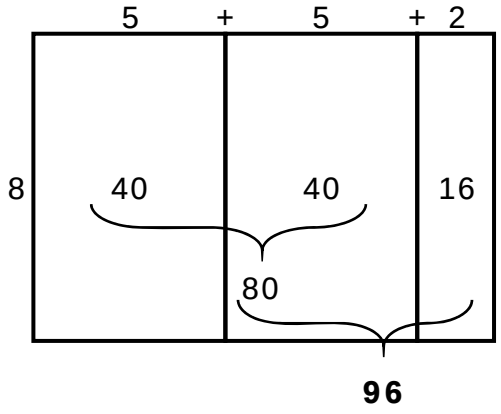
The Flower Farm planted 96 bluebonnet plants.

Carter's Solution Process



The Flower Farm planted 96 bluebonnet plants.

Danielle's Solution Process



The Flower Farm planted 96 bluebonnet plants.

1 How did each of these four students decompose the factors in the problem?

Aaron	Brianna
Aaron decomposed the factor _____ into _____ and _____.	Brianna decomposed the factor _____ into _____ and _____.

Carter	Danielle
Carter decomposed the factor _____ into _____ and _____. Carter also decomposed the factor _____ into _____ and _____.	Danielle decomposed the factor _____ into _____, _____, and _____.

2 Each of these area models shows a different way to decompose the factors. Why does each area model result in a product of 96?

_____

_____

_____

_____

_____

_____

Petunia Palace

- Use an area model to solve the first problem below in the space labeled First Model.
- Pass your paper to the person on your right.
- Solve the problem using an area model that decomposes the factors in a different way.
- Pass your paper to the person on your right.
- Repeat this process with the second problem.

1 Petunia Palace planted 6 rows of petunias with 13 petunia plants in each row. How many petunia plants were planted?

First Model	Second Model

2 Petunia Palace planted 7 rows of petunias with 14 petunia plants in each row. How many petunia plants were planted?

First Model	Second Model

Solve One-Step Problems with Area Models

Materials:

- **The Pumpkin Patch**
- **Zucchini Garden**

1. Prompt students to complete **The Pumpkin Patch**. Students should work together with their group to complete the writing prompt.
2. Prompt students to complete **Zucchini Garden**.

Debriefing Questions for **The Pumpkin Patch**:

- How are all four of the area models alike? How are they different?
- How are Aaron's model and Carter's model alike? How are they different?
- How are Aaron's model, Brianna's model, and Danielle's model alike? How are they different?
- Why do all four of these models work?

Debriefing Questions for **Zucchini Garden**:

- How are the models alike?
- How are they different?
- Are there some models that are more alike than other? Which ones? Why?
- How did you decide how to decompose the dividend? Are there some decompositions that make it easier to determine the quotient than another? Why?

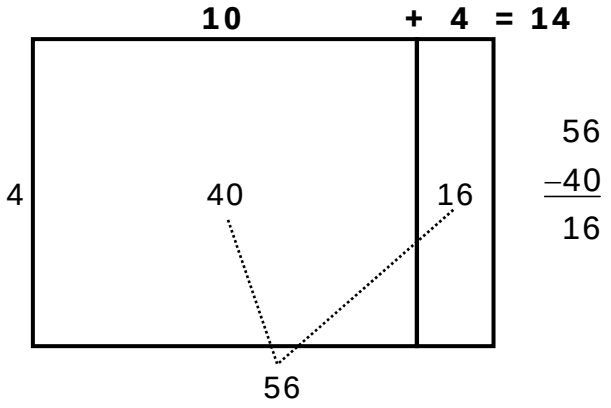
The Pumpkin Patch

Mrs. Meyers asked her students to solve the problem below using an area model.

> Farmer Brown planted a total of 56 pumpkins in his pumpkin patch. He planted 4 rows of pumpkins. How many pumpkins were planted in each row?

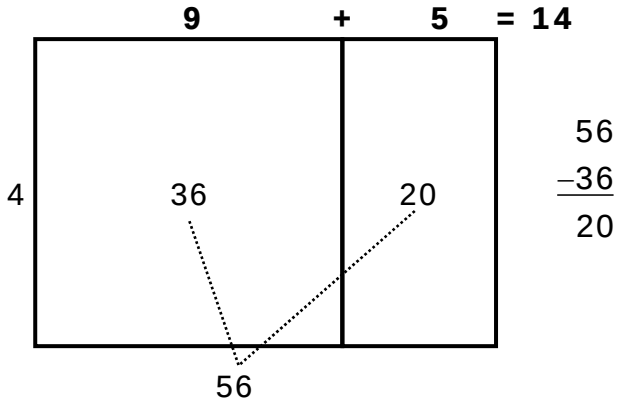
The work of four different students is shown below.

Aaron's Solution Process



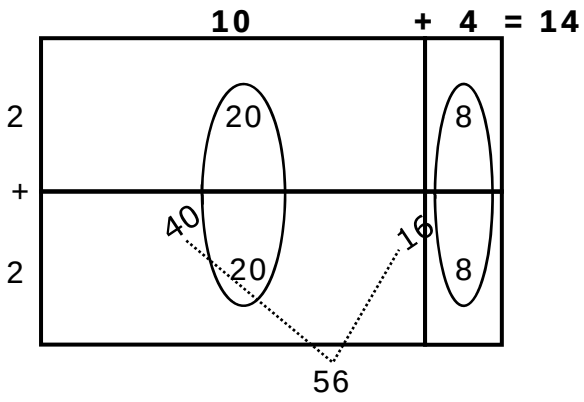
There were 14 pumpkins planted in each row.

Brianna's Solution Process



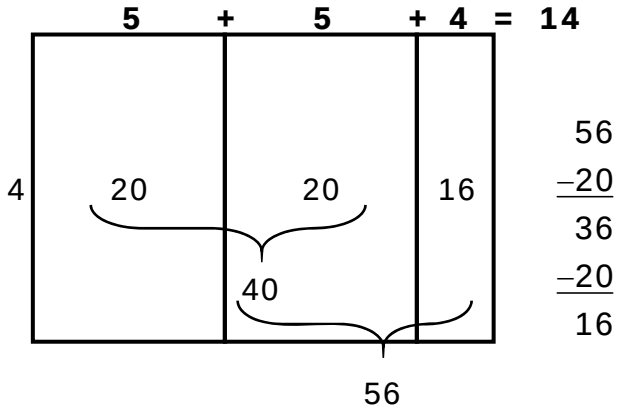
There were 14 pumpkins planted in each row.

Carter's Solution Process



There were 14 pumpkins planted in each row.

Danielle's Solution Process



There were 14 pumpkins planted in each row.

1 How did each of these four students decompose the dividend in the problem?

Aaron	Brianna
Aaron decomposed the dividend _____ into _____ and _____.	Brianna decomposed the dividend _____ into _____ and _____.

Carter	Danielle
Carter decomposed the dividend _____ into _____, _____, _____, and _____.	Danielle decomposed the dividend _____ into _____, _____, and _____.

2 Each of these area models shows a different way to decompose the dividend. Why does each area model result in a quotient of 14?

_____

_____

_____

_____

_____

_____

The Zucchini Garden

- Use an area model to solve the first problem below in the space labeled First Model.
- Pass your paper to the person on your right.
- Solve the problem using an area model that decomposes the dividend in a different way.
- Pass your paper to the person on your right.
- Repeat this process with the second problem.

1 Zucchini Garden planted 72 zucchinis in 6 rows. How many zucchini plants were planted in each row?

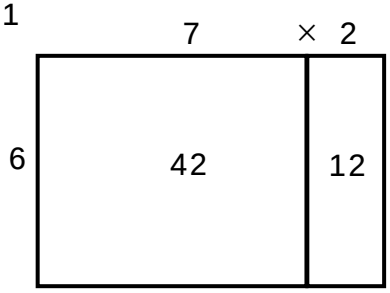
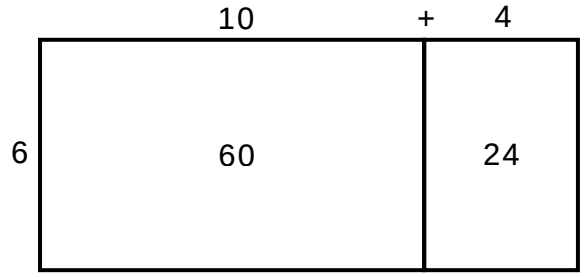
First Model	Second Model

2 Zucchini Garden planted 98 zucchinis in 7 rows. How many zucchini plants were planted in each row?

First Model	Second Model

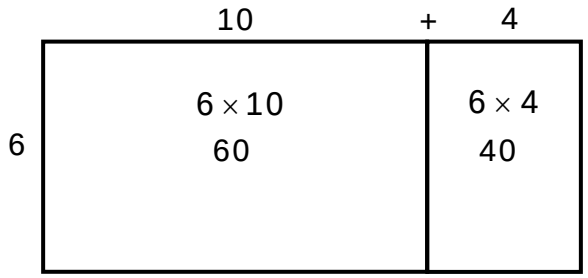
Check Point: Solve One-Step Problems with Area Models

Classify each model as a correct or incorrect representation of the problem. Justify your answer.

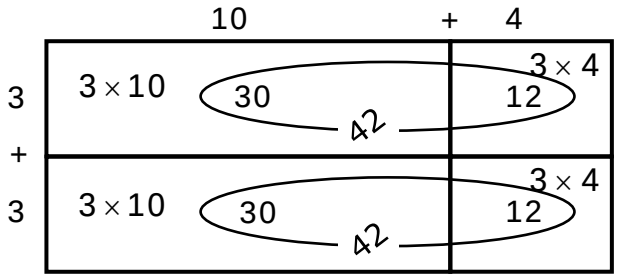
	Problem A: Kyra made 6 treat bags to give to her friends. Each treat bag had 14 pieces of candy. How many total pieces of candy did Kyra use to make the treat bags?	Problem B: Kyra has 84 pieces of candy. Kyra puts an equal amount of candy into 6 treat bags. How many pieces of candy will Kyra put in each bag?
Model 1 	_____ _____ _____ _____ _____	_____ _____ _____ _____ _____
Model 2 	_____ _____ _____ _____	_____ _____ _____ _____

Problem A:	Problem B:
Kyra made 6 treat bags to give to her friends. Each treat bag had 14 pieces of candy. How many total pieces of candy did Kyra use to make the treat bags?	Kyra has 84 pieces of candy. Kyra puts an equal amount of candy into 6 treat bags. How many pieces of candy will Kyra put in each bag?
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Model 3



Model 4



Multiplying with the Associative Property

Materials:

- **Multiplying with the Associative Property**

Directions:

- Place students in groups of two.
- Prompt students to study Margaret's strategies.
- Prompt students to work together to find the missing factors to make each equation true.

Debriefing Questions:

- With what operation are the double digit factors being decomposed in these situations?
- How does making a multiple of 10 help solve the problem more efficiently?
- How does finding an easier math fact help solve the problem more efficiently?

Multiplying with the Associative Property

Margaret used the associative property to solve equations. Read Margaret's thought process about her decision on how to decompose her numbers.

Create a multiple of 10

$$12 \times 5 = \square$$

$$(3 \times 4) \times 5 = \square$$

$$3 \times (4 \times 5) = \square$$

$$3 \times 20 = \boxed{60}$$

Margaret's thought process

Step 1: When multiplying by 5, I want an even number factor. This makes a multiple of 10.

Step 2: The number 12 can be decomposed into the factors 3 and 4.

Step 3: Four is an even number. When multiplied by 5, the product is 20.

Step 4: Twenty is 2 tens, so 3 groups of 2 tens is 60.

Halving and doubling

$$14 \times 4 = \square$$

$$(7 \times 2) \times 4 = \square$$

$$7 \times (2 \times 4) = \square$$

$$7 \times 8 = \boxed{56}$$

Margaret's thought process

Step 1: I can decompose one factor and rearrange the order of the factors.

Step 2: Fourteen can be decomposed into the factors 7 and 2.

Step 3: I can multiply 2 times 4 first for a product of 8. Then, I can multiply 7 times 8 for a product of 56.

Use Margaret's strategies to determine each product.

1

$72 \times 5 = \square$

$(\_\_ \times \_\_) \times 5 = \square$

$\_\_ \times (\_\_ \times 5) = \square$

$\_\_ \times \_\_ = \square$

2

$16 \times 3 = \square$

$(\_\_ \times \_\_) \times 3 = \square$

$\_\_ \times (\_\_ \times 3) = \square$

$\_\_ \times \_\_ = \square$

3

$64 \times 5 = \square$

$(\_\_ \times \_\_) \times 5 = \square$

$\_\_ \times (\_\_ \times 5) = \square$

$\_\_ \times \_\_ = \square$

4

$48 \times 8 = \square$

$(\_\_ \times \_\_) \times 8 = \square$

$\_\_ \times (\_\_ \times 8) = \square$

$\_\_ \times \_\_ = \square$

Multiplying with the Distributive Property

Materials:

- **Multiplying with the Distributive Property**

Prompt students to complete **Multiplying with the Distributive Property.**

Debriefing Questions:

- Why do we say both processes use partial products?
- What differences do you notice between the two strategies?
- How did Kristen rewrite the first factor so that addition was required?
- How did Margaret rewrite the first factor so that subtraction was required?
- Which strategy are you more likely to use when the ones digit is closer to zero?
- Which strategy are you more likely to use when the ones digit is closer to nine?

Multiplying with the Distributive Property

Analyze Kristen and Mary's solution processes for the following equation: $\mathbf{48} \times \mathbf{7} = \square$

Kristen's Solution Process

$$40 \times 7 = 280$$
$$8 \times 7 = 56$$

Forty groups of seven plus eight groups of seven makes 48 groups of seven.

$$\begin{array}{r} 280 \\ +56 \\ \hline 336 \end{array}$$

What operation did Kristen perform with her partial products? Why?

_____

_____

_____

_____

_____

_____

Mary's Solution Process

$$50 \times 7 = 350$$
$$2 \times 7 = 14$$

Fifty groups of seven minus two groups of seven makes 48 groups of seven.

$$\begin{array}{r} 350 \\ -14 \\ \hline 336 \end{array}$$

What operation did Mary perform with her partial products? Why?

_____

_____

_____

_____

_____

_____

Complete the following two equations using Kristen's solution process.

$$64 \times 4 = \square$$

$$72 \times 3 = \square$$

Complete the following two equations using Mary's solution process.

$56 \times 9 = \square$

$27 \times 5 = \square$

Which solution process would you use to solve the following equation? Justify your thinking.

$62 \times 8 = \square$

Division with the Distributive Property

Materials:

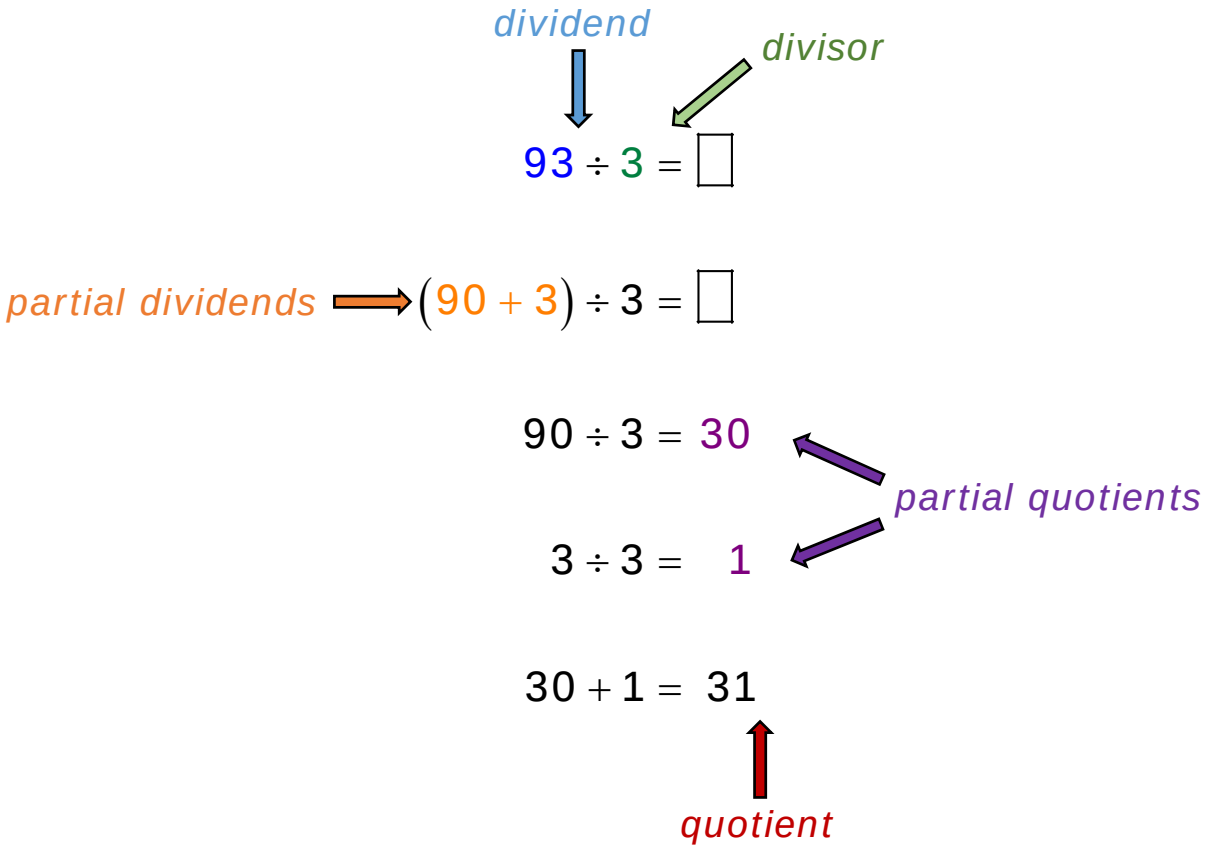
- **Dividing with Distributive Property**
- **Dividing with the Distributive Property** (for display)

Prompt students to complete **Division with Distributive Property**.

Debriefing Questions:

- How does breaking apart the dividend help with dividing?
- If your divisor is a 5, what numbers do you want to think about as you decompose the dividend? 2, 3, 4, …?

Dividing with the Distributive Property



Dividing with Distributive Property

A strategy for division is to decompose the dividend and divide each of the partial dividends by the divisor. You will end up with partial quotients to compose to determine the quotient.

Example 1

$93 \div 3 = \square$

$(90 + 3) \div 3 = \square$

$90 \div 3 = 30$

$3 \div 3 = 1$

$30 + 1 = 31$

Example 2

$68 \div 4 = \square$

$(40 + 28) \div 4 = \square$

$40 \div 4 = 10$

$28 \div 4 = 7$

$10 + 7 = 17$

Decompose each dividend and divide using the partial dividends.

1 $75 \div 5$

2 $56 \div 4$

3 $74 \div 2$

4 $51 \div 3$

Checkpoint: Using Properties to Multiply and Divide

Solve each problem.

1

56×5

2

$84 \div 6$

3 A biking club went on a biking trip for 3 days. They rode their bikes for a total of 54 miles. They rode their bikes for an equal distance each day. How many miles did they ride each day?

4 Tony and his family were driving to an amusement park for the weekend. Tony drives 67 miles in one hour. How many miles will he have driven after 4 hours if he drives the same distance each hour?

Making Connections to the Standard Algorithm

Materials:

- **Making Connections to the Standard Algorithm**
- **Sentence Frames and Word Bank Hint Card** (optional)

Prompt students to complete **Making Connections to the Standard Algorithm.**

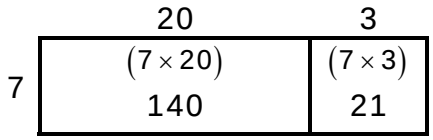
Debriefing Questions:

- What connections did you see between the partial product algorithm and the standard algorithm?
- Where are the partial products in strategy B? Strategy A?
- How is regrouping notated in the standard algorithm?
- How is fact knowledge utilized in partial products?
- How are facts utilized in the standard algorithm?

Making Connections to the Standard Algorithm

7×23

1 What connections can you make between the three multiplication strategies below?

Strategy A	Strategy B	Strategy C
 $140 + 21 = 161$	$\begin{array}{r} 23 \\ \times\ 7 \\ \hline 21 = 7 \times 3 \\ +\ 140 = 7 \times 20 \\ \hline 161 \end{array}$	$\begin{array}{r} {\scriptstyle 2}\,23 \\ \times\ 7 \\ \hline 161 \end{array}$

2 What connections can you make between the circled processes below?

Strategy B	Strategy C
$\begin{array}{r} 23 \\ \times\ 7 \\ \hline 21 = 7 \times 3 \\ +\ 140 = 7 \times 20 \\ \hline 161 \end{array}$	$\begin{array}{r} {\scriptstyle 2}\,23 \\ \times\ 7 \\ \hline 161 \end{array}$

Use the partial products method to complete the standard algorithm.

$$\begin{array}{r} 35 \\ \times 6 \\ \hline 30 = \quad 6 \times 5 \\ +\,180 = 6 \times 30 \\ \hline 210 \end{array}$$

$$\begin{array}{r} \square \\ 35 \\ \times\ 6 \\ \hline \square \end{array}$$

$$\begin{array}{r} 64 \\ \times 2 \\ \hline 8 = \quad 2 \times 4 \\ +\,120 = 2 \times 60 \\ \hline 128 \end{array}$$

$$\begin{array}{r} 64 \\ \times\ 2 \\ \hline \square \end{array}$$

Complete the following problems using the standard algorithm.

$$\begin{array}{r} 58 \\ \times\ 3 \\ \hline \end{array}$$

$$\begin{array}{r} 77 \\ \times\ 5 \\ \hline \end{array}$$

Cut along the dotted lines. Two cards are provided.

Sentence Frames and Word Bank Hint Card

Word Bank	
Compose	Product
Decompose	Regrouping
Partial products	Sum
Place value	Regrouping

Sentence Frames

- One connection between the three strategies is _____.
- Strategy ___ and Strategy ___ both _____.
- Strategy ___ is different because _____.

Sentence Frames and Word Bank Hint Card

Word Bank	
Compose	Product
Decompose	Regrouping
Partial products	Sum
Place value	Regrouping

Sentence Frames

- One connection between the three strategies is _____.
- Strategy ___ and Strategy ___ both _____.
- Strategy ___ is different because _____.

Round Robin: Solving Problems

Materials:

- **Round Robin: Solving Problems**

Directions:

- Place students in groups of four.
- Each student completes problem A on their paper.
- Pass the paper to the right.
- Look at problem A on the new paper.
    - If you agree with the answer, place your initials in the box.
    - If you disagree with the answer, make corrections to the problem and then place your initials in the box.
- Complete problem B on the same paper.
- Continue the process for each problem.
- When you receive your own paper back, discuss each problem solution as a group.

Debriefing Questions:

- What connections do you see between the strategies your group used to solve the problems?
- Were there any answers that you disagreed with? Why?
- Did any of your group members think differently than you about how to solve a problem? Was the solution still the same?

Round Robin: Solving Problems

1 Diego was counting the number of students eating lunch in the school cafeteria. He noticed that there were 8 tables with 6 student seats at each table. Diego counted 11 empty seats. How many students were in the cafeteria?

Initials

2 On Sunday, Anthony's mother separated 35 cookies equally for each of the 7 days of the week. Anthony ate 3 cookies on Monday. How many cookies did he have left for the rest of the day?

Initials

3 Serena and Whitney are counting the number of buttons they collected yesterday. Serena counted 35 buttons. Whitney counted 5 times more buttons than Serena. How many buttons did Whitney count?

Initials

4 Lauren earns $15 for babysitting 3 hours a night. Lauren babysits 3 hours every night for an entire week. How much money will Lauren earn for the week?

Initials

Checkpoint: Solving Multiplication and Division Problems

Solve each problem. Justify your answer.

1 Daniel and Gabby are counting the number of relatives that live in their hometown. Daniel counted 7 of his relatives living in their hometown. Gabby counted 6 times as many relatives as Daniel living in their hometown. How many of Gabby's relatives live in their hometown?

2 Victor bought 42 goldfish to place equally in each of his 3 fish tanks. How many goldfish will Victor place in each tank?

3 Samantha makes 8 origami animals in 1 hour. Fernando makes 7 origami animals in 1 hour. How many total animals will Samantha and Fernando make in 3 hours?

4 The music room contains 4 rows of 6 chairs. Ariana was asked to put the chairs in 3 rows. How many chairs will be in each row?

Representing Multiplication Facts

Materials:

- **Multiplication Facts: Find Someone Who . . .**

Prompt students to complete **Multiplication Facts: Find Someone Who . . .**

Debriefing Activity:

- How do the models represent the fact or expression?
- How did the models you created help you determine the product?

Multiplication Facts: Find Someone Who . . .

Find a student who can use one of the models to represent one multiplication fact and determine the product.

- equal-sized groups
- an area model
- repeated addition
- a number line
- an array
- skip-counting

can represent 5 × 5. Product: Initials:
can represent 7 × 8. Product: Initials:
can represent 9 × 4. Product: Initials:
can represent 6 × 3. Product: Initials:

Exploring Facts

Materials:

- **Exploring Facts**
- 1 large paperclip
- **Number Spinner—**One per pair of students

Prompt students to work with a partner to complete **Exploring Facts**.

Debriefing Activity:

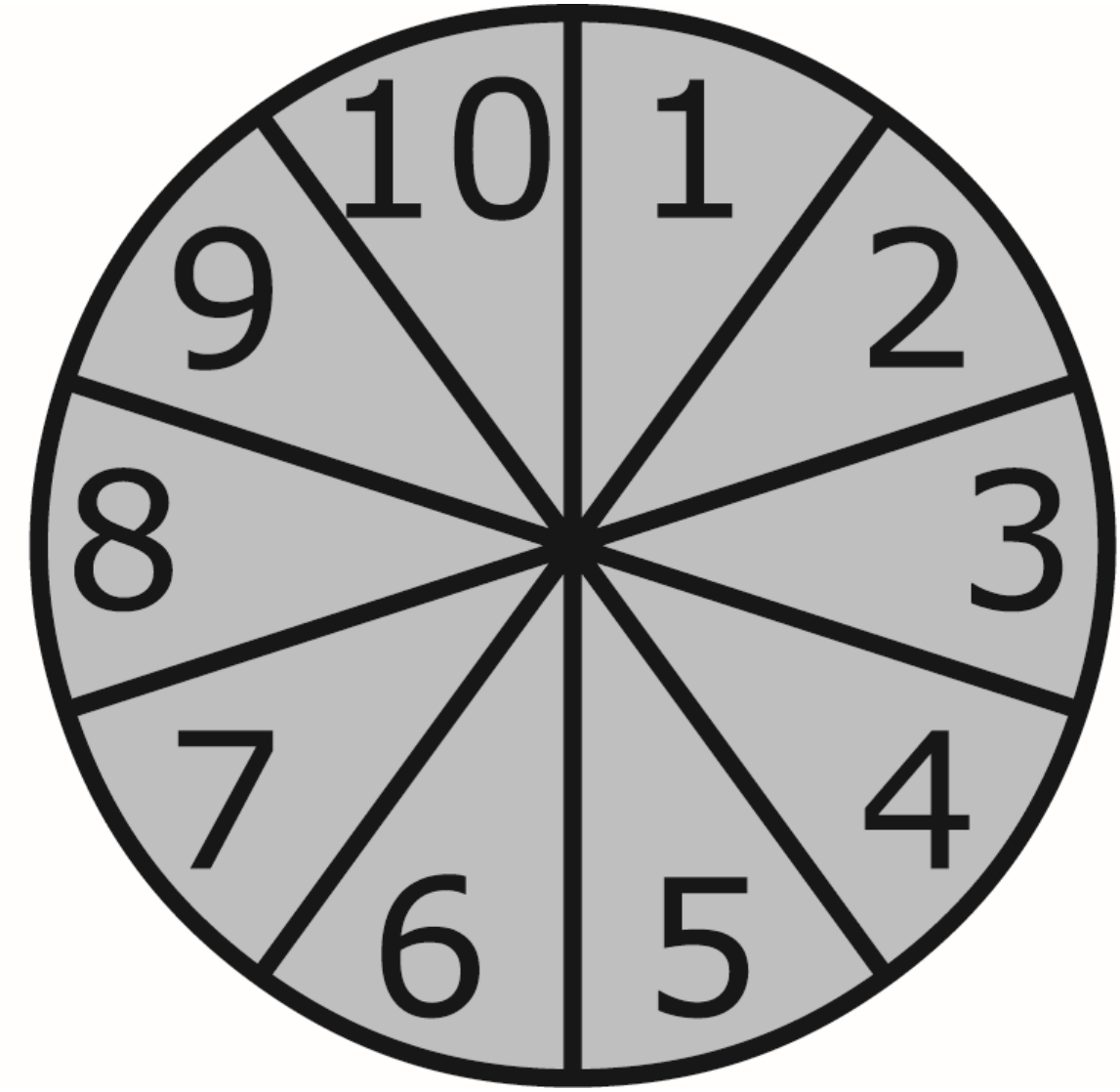
- What is the relationship between the multiplication fact and its related division fact?
- How can a multiplication fact be used to give the quotient for a division fact?
- What do you notice about the location of the product from the multiplication fact in the related division fact?

Exploring Facts

1. Partner A: Spin the **Number Spinner** two times and use the numbers to write a multiplication fact.
2. Partner B: Use the multiplication fact to write a related division fact.
3. Trade roles and allow Partner B to complete step 1 and Partner A to complete step 2.
4. Continue trading roles until all six multiplication facts and related division facts have been recorded.

Multiplication Fact	Division Fact
☐ × ☐ = ☐	☐ ÷ ☐ = ☐
☐ × ☐ = ☐	☐ ÷ ☐ = ☐
☐ × ☐ = ☐	☐ ÷ ☐ = ☐
☐ × ☐ = ☐	☐ ÷ ☐ = ☐
☐ × ☐ = ☐	☐ ÷ ☐ = ☐
☐ × ☐ = ☐	☐ ÷ ☐ = ☐

Number Spinner



Double the Fun

Materials:

- **Double the Fun**

Prompt students to complete **Double the Fun**.

Debriefing Activity:

- How can knowing doubles be used to recall a multiplication fact?

Double the Fun

Doubles can be used to help with recall when our memory fails us. Study each example of how doubles are being used, and practice with some facts on your own.

Double and Double Again – A strategy for facts with a factor of 4
2 x and 2 x

Example	You Try!	You Try!
$4 \times 7 = \square$	$4 \times 6 = \square$	$4 \times 9 = \square$

2 times 7 is 14.
Double again.
2 times 14 is 28.

Double and One More Group – A strategy for facts with a factor of 3

Example	You Try!	You Try!
$3 \times 8 = \square$	$3 \times 7 = \square$	$3 \times 9 = \square$

2 times 8 is 16.
Add one more group of 8.
$16 + 8$ is 24.

Half One Factor, Double the Other Factor – A strategy for facts with an even factor

Example	You Try!	You Try!
$4 \times 6 = \square$	$6 \times 5 = \square$	$8 \times 3 = \square$

Half of 4 is 2.
Double the other factor.
6×2 is 12.
$2 \times 12 = 24$.

Determining the Unknown

Materials:

- **Determining the Unknown**

Prompt students to complete **Determining the Unknown**.

Debriefing Activity:

- Which multiplication equation did you match to the division equation?
- How did you determine the value that made each equation true?

Determining the Unknown

- Match the multiplication equation that can be used to help you determine the unknown value in the related division problem.
- Record the number that makes each equation true.

$9 = \square \div 8$ ★ ★ $\square = 8 \times 6$

$\square = 40 \div 4$ ★ ★ $49 = 7 \times \square$

$\square \div 6 = 8$ ★ ★ $\square \times 6 = 54$

$9 = 36 \div \square$ ★ ★ $8 \times 9 = \square$

$54 \div \square = 6$ ★ ★ $9 \times \square = 36$

$49 \div \square = 7$ ★ ★ $40 = \square \times 4$