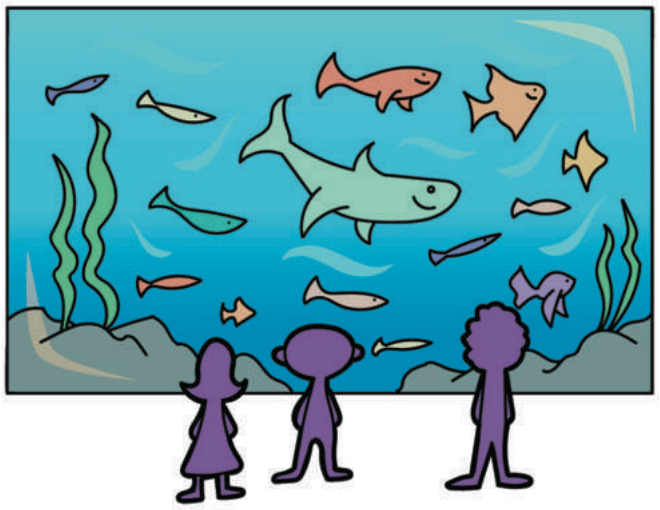
Core Knowledge® MATHEMATICS

Relating Multiplication to Division



Student Workbook

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Relating Multiplication to Division

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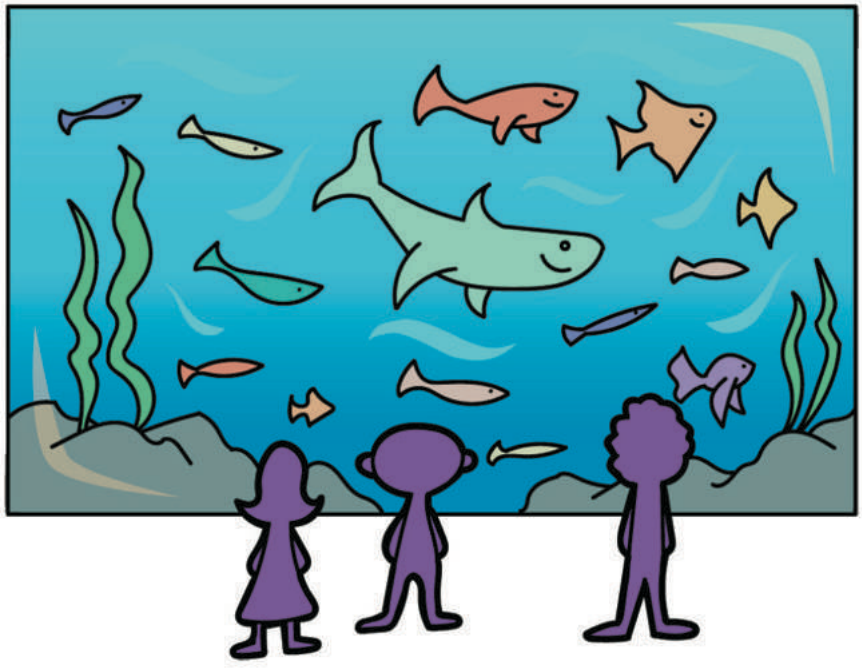


Relating Multiplication to Division

Student Workbook

Core Knowledge Mathematics™

Lesson 1: How Many Groups?

- Let's represent and solve problems.

Warm-up: How Many Do You See: Apples

How many do you see? How do you see them?

1.1: How Many Apples?

Solve each problem. Show your thinking using objects, a drawing, or a diagram.

1. If 24 apples are put into boxes with 8 apples in each box, how many boxes are there?

2. If 42 apples are put into boxes with 6 apples in each box, how many boxes are there?

3. If 32 apples are put into boxes with 4 apples in each box, how many boxes are there?

1.2: Gallery Walk: Apples in Boxes

1. Visit the posters around the room with your partner. Discuss what is the same and what is different about the thinking shown on each poster.

2. Reflect on what you saw. Write down one thing that was the same and one thing that was different about the thinking shown on each poster.

Lesson 2: How Many in Each Group?

- Let's represent and solve more problems.

Warm-up: Notice and Wonder: More Apples

What do you notice? What do you wonder?

2.1: How Many Apples?

Solve each problem. Show your thinking using objects, a drawing, or a diagram.

1. If 20 apples are packed into 4 boxes with each box having the same number of apples, how many apples are in each box?

2. If 36 apples are packed into 6 boxes with each box having the same number of apples, how many apples are in each box?

3. If 45 apples are packed into 9 boxes with each box having the same number of apples, how many apples are in each box?

2.2: Gallery Walk

Visit the posters around the room with your partner. Discuss what is the same and what is different about the thinking shown on each poster.

2.3: All the Apples

If 24 apples are put into boxes with 8 apples in each box, how many boxes are there?

If 20 apples are packed into 4 boxes with each box having the same number of apples, how many apples are in each box?

Discuss with your partner:

- How are these problems alike?
- How are they different?
- What is alike and what is different about how these problems are represented and solved?

Lesson 3: Division Situation Drawings

- Let's represent division situations with drawings.

Warm-up: Number Talk: The More Things Change...

Find the value of each expression mentally.

- $120 + 120$
- $121 + 119$
- $125 + 115$
- $129 + 111$

3.1: Groups of Students

1. What did you notice about how the students put themselves into groups of 2?

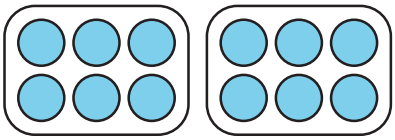
2. What did you notice about how the students put themselves into 2 groups?

3.2: Elena's Colored Pencils

Elena has 12 colored pencils. She has 2 boxes and wants to put the same number of colored pencils in each box. How many colored pencils will go in each box?

Which drawing matches the situation? Explain your reasoning.

A



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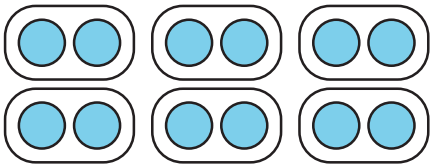
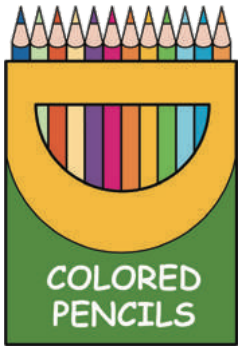




3.3: Which Drawing Matches?

Match each situation to a drawing. Be prepared to explain your reasoning.

1. Mai has 8 markers. She puts 4 markers in each box. How many boxes of markers are there?

2. Kiran has 20 pens. He puts 2 pens at each table. How many tables can he put pens on?

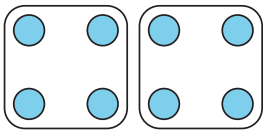
3. Lin has 8 colored pencils. She puts them into 2 bags. Each bag has the same number of colored pencils. How many colored pencils will be in each bag?

4. Priya has 15 crayons. She puts 5 crayons on each desk. How many desks will have crayons?

5. Noah has 20 pencils. He puts the same number of pencils into 10 boxes. How many pencils will be in each box?

6. Jada has 15 markers. She puts the same number of markers on 3 tables. How many markers will be on each table?

A



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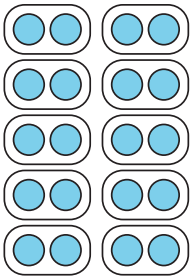
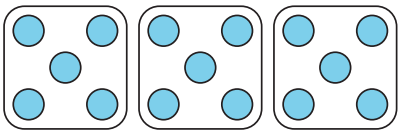


C



Lesson 4: Interpret Division Expressions

- Let's make sense of division expressions.

Warm-up: Number Talk: More or Less?

Find the value of each expression mentally.

- $500 - 475$
- $504 - 475$
- $512 - 475$
- $512 - 449$

4.1: Spinning Tops

Spinning tops are popular around the world. Here are spinning tops from a few different cultures.




Match each situation about spinning tops with an expression that can represent it.

1. Clare has a collection of 24 spinning tops in four colors. She has the same number of tops in black, white, red, and green. How many tops of each color does she have?

A. $24 \div 2$

2. Priya and her friend are decorating 24 wooden tops with paint. If each person is painting the same number of tops, how many tops is each person painting?

B. $12 \div 2$

3. A store has 24 tops from around the world displayed in 6 boxes. Each box contains the same number of tops. How many tops are in each box?

C. $24 \div 4$

4. Diego has 12 trompos that he wants to give as gifts. If he gives each friend 2 trompos, how many friends can get them as gifts?

D. $12 \div 6$

5. Six friends are playing with 12 dreidels. If everyone is playing with the same number of dreidels, how many dreidels does each person have?

E. $24 \div 6$

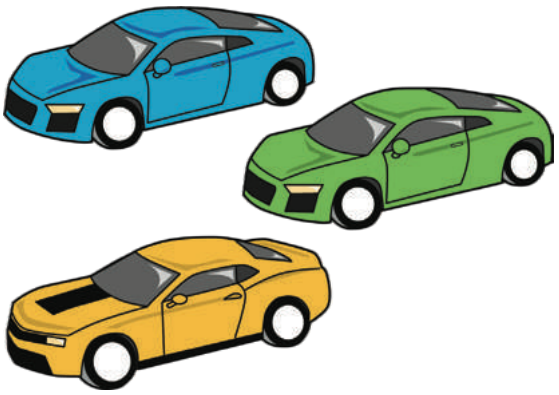
4.2: Cars in Boxes

Consider these two situations.

A. Han has 21 toy cars. He puts the same number of cars in each of 3 boxes. How many cars will be in each box?

B. Han has 21 toy cars. He wants to put 3 cars in each box. How many boxes will he need?

Which situation does the expression $21 \div 3$ represent? Explain your reasoning.



4.3: Stacks of Blocks

Match each situation to a drawing and an expression that represent the situation. Be prepared to explain your reasoning.

1. Kiran uses 6 blocks to make stacks. Each stack has 2 blocks. How many stacks are there?

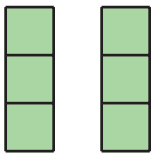
2. Han uses 6 blocks to make two equal stacks. How many blocks are in each stack?

3. Jada uses 6 blocks to build stacks with 3 blocks each. How many stacks are there?

4. Mai uses 6 blocks to make 3 equal stacks. How many blocks are in each stack?

drawings

A



B

expressions

C

$6 \div 2$

D

$6 \div 3$

Lesson 5: Write Division Expressions

- Let's write division expressions and solve "how many groups?" and "how many in each group?" problems.

Warm-up: Number Talk: What's the Same?

Find the value of each expression mentally.

- $225 - 100$
- $227 - 102$
- $230 - 105$
- $220 - 95$

5.1: Card Sort: All about Bugs

1. Your teacher will give you a set of cards that show situations. Sort the cards into 2 categories of your choosing. Be prepared to explain the meaning of your categories.

   A. Mole crickets have special legs for digging. Ten special legs belong to 5 mole crickets. How many special legs does each mole cricket have?

   B. A beetle has a pair of antennae for sensing heat, touch, smell, and more. If there are 8 antennae, how many beetles are there?

   C. Fourteen antennae belong to a group of bees. If each bee has 2 antennae, how many bees are there?

   D. There are 12 wings. If each dragonfly has 4 wings, how many dragonflies are there?

   E. Thirty legs belong to 5 ants. If all the ants have the same number of legs, how many legs does each ant have?

   F. There are 50 spots on 5 butterflies. If each butterfly has the same number of spots, how many spots does each butterfly have?

2. Write a division expression to represent each situation. Be ready to explain your reasoning.

5.2: Solve a Buggy Problem

Your teacher will assign a problem to your group.

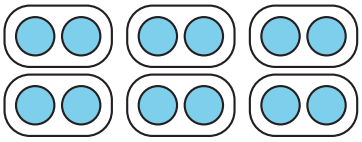
Create a visual display that shows your thinking and your solution to the problem.

Section Summary

Section Summary
In this section, we learned that division is finding the number of groups or finding the size of each group when we put objects into groups of equal size. We represented division situations with drawings and expressions, and solved division problems.

"How many groups?"

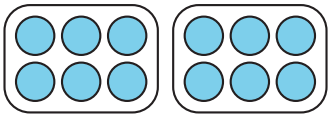
Han has 12 colored pencils. He wants to put 2 colored pencils in each box until he's out of colored pencils. How many boxes does Han need?



$12 \div 2$

"How many in each group?"

Elena has 12 colored pencils. She has 2 boxes and wants to put the same number of colored pencils in each box. How many pencils will be in each box?



$12 \div 2$

Lesson 6: Division as an Unknown Factor

- Let's connect division equations to multiplication equations.

Warm-up: Notice and Wonder: Missing Numbers

What do you notice? What do you wonder?

$3 \times ? = 12$

$12 \div 3 = ?$

6.1: Equations about Onions

A farmer puts 14 onions into 2 bags, with the same number of onions in each bag.

Lin says the situation should be represented by the equation:

$$2 \times \square = 14$$

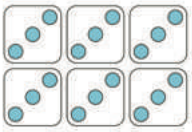
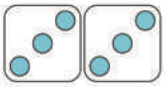
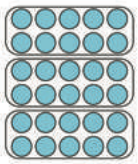
Mai says the situation should be represented by the equation:

$$14 \div 2 = \square$$

Whose equation do you agree with? Be ready to explain your reasoning.

6.2: At the Farmers' Market

Complete each row. Be prepared to explain your reasoning.

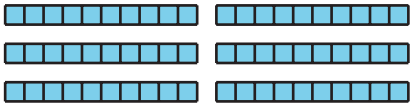
situation	drawing or diagram	multiplication equation	division equation
Elena's family buys 18 avocados at the farmers market. The avocados are in bags of 3 each.			$18 \div 3 =$ _____
Andre sees 25 tomatoes. They are in 5 bunches. Each bunch has the same number of tomatoes.		$5 \times ? = 25$	$25 \div 5 = ?$
Lin orders 6 banana fritters. The fritters are served on 2 plates and each plate has the same number of fritters.		$2 \times ? = 6$	
		_____ $\times 10 = 30$	$30 \div 10 =$ _____

Lesson 7: Relate Multiplication and Division

- Let’s make more connections between multiplication and division.

Warm-up: How Many Do You See: Tens

How many do you see? How do you see them?



7.1: Division Round Table

Your teacher will give you a sheet of paper with 4 boxes on it and instruct you to draw or write something in each box.

After working on each box, pause and wait for your teacher's instructions for the next box.

1. Draw equal groups in Box 1 on your recording sheet.
2. In Box 2, write a description of a division situation that matches the drawing you just received.
3. In Box 3, write a multiplication equation that matches the drawing and division situation you just received. Use a symbol for the unknown quantity.
4. In Box 4, write a division equation that matches the drawing, division situation, and multiplication equation you just received. Use a symbol for the unknown quantity.

7.2: Sets of School Supplies

For each situation:

a. Write an equation with a symbol for the unknown quantity to represent the situation.

b. Solve the problem and find the unknown number in the equation. Be prepared to explain your reasoning.

1. Kiran had 32 paper clips. He gave each student 4 paper clips. How many students received paper clips?

    a. Equation: _____

    b.

2. There are 28 books in 4 stacks. If each stack has the same amount of books, how many books are in each stack?

    a. Equation: _____

    b.

3. There are 6 boxes. Each box has 8 erasers. How many erasers are there?

    a. Equation: _____

    b.

4. Lin had 36 sticky notes. She placed 6 sticky notes on each notebook. How many notebooks received sticky notes?

    a. Equation: _____

    b.

Lesson 8: Relate Quotients to Familiar Products

- Let's consider the products and quotients we know right away or can find quickly.

Warm-up: Number Talk: Multiplication and Division

Find the value of each expression mentally.

- 4×10
- $40 \div 4$
- $40 \div 10$
- $60 \div 6$

8.1: Card Sort: Multiplication

Quiz your partner on their multiplication facts. Sort your partner's facts into one of these columns:

1. know it right away
2. can find it quickly
3. don't know it yet

Multiplication expressions I'm going to practice:

1.

2.

3.

4.

5.

8.2: If I Know, Then I Know

If I know $4 \times 5 = 20$, then I know ____.

1. Set the multiplication fact cards in a stack face down.
2. Take turns drawing a multiplication fact card.
3. Use the multiplication fact on the card to record a multiplication equation in the "If I know . . ." column.
4. Then, record related division equations in the "Then I know . . ." column.

If I know . . . ,	then I know . . .

Lesson 9: Patterns in the Multiplication Table

- Let's find patterns in the multiplication table and use them to multiply.

Warm-up: Notice and Wonder: Multiplication Table

What do you notice? What do you wonder?

×	1	2	3	4	5
1	1	2	3	4	5
2	2	4	6	8	10
3	3	6	9	12	15
4	4	8	12	16	20
5	5	10	15	20	25

9.1: Products in the Table

Here is a partially completed multiplication table.

×	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5					
2	2	4	6	8	10		A			
3	3	6	9	12	15				B	
4	4	8	12	16	20	C				
5	5	10	15	20	25			D		
6	6	12	18	24	30					E
7	7	14	21	28	35		F			
8	8	16	24	32	40	48			G	
9	9	18	27	36	45	54	63			
10	10	20	30	40	50	60	70	80		

1. Use the products in the table to help you find the numbers that should replace letters A–G. Be prepared to explain your reasoning.

2. Find the number that should go in three other empty cells in the table. Use:

   a. 7 as a factor

   b. 9 as a factor

   c. 10 as a factor

   Be prepared to explain your reasoning.

9.2: If I Know, Then I Know: Multiplication

1. In each row, write down at least two multiplication facts you can figure out because you know the given multiplication fact in the left column. Be prepared to share your reasoning.

If I know . . . ,	then I also know . . .
2×4	$4 \times 2, 4 \times 4, 2 \times 8$
3×5	
4×10	
7×2	
5×8	

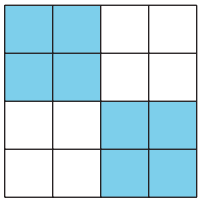
2. If time permits, complete the rest of the multiplication table. Use the multiplication facts you know to find those you don't know.

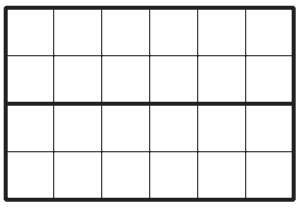
Lesson 10: Explore Multiplication Strategies with Rectangles

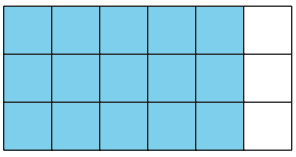
- Let's use rectangles to explore multiplication strategies.

Warm-up: How Many Do You See: Squares

How many do you see? How do you see them?

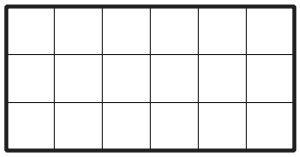




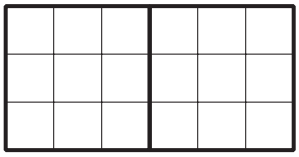


10.1: From Diagrams to Expressions

Andre and Elena are finding the area of this rectangle.



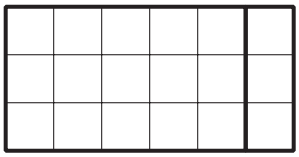
Andre writes 6×3. He marks the rectangle like this:



He then writes:

$2 \times (3 \times 3)$
$2 \times 9 = 18$

Elena writes 3×6. She marks the rectangle like this:



She then writes:

$3 \times (5 + 1)$
$(3 \times 5) + (3 \times 1)$
$15 + 3$
18

1. Discuss with a partner:

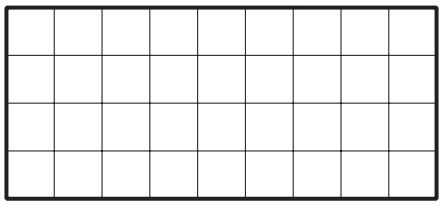
   a. How are Andre and Elena's strategies alike? How are they different?

   b. How are the numbers in Andre's expressions related to his diagram?

   c. How are the numbers in Elena's expressions related to her diagram?

2. Here is another rectangle.

   Its area can be found by finding 4×9.



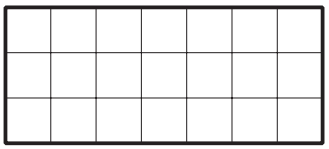
   a. Mark or shade the rectangle in a way that would help you find its area.

   b. Write one or more expressions that can represent your work on the diagram and show how you find the area.

10.2: From Expressions to Diagrams

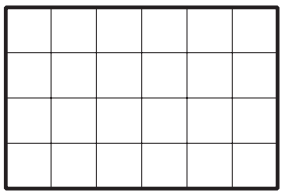
Here are some rectangles and expressions that show how three students saw the area of the rectangles.

Noah



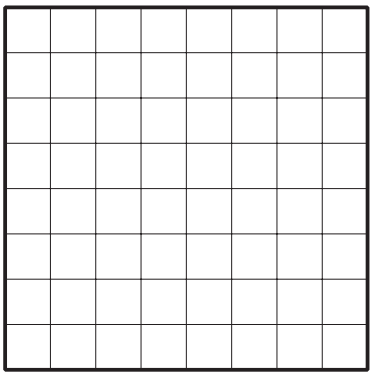
$(5 \times 3) + (2 \times 3)$

Priya



$2 \times (2 \times 6)$

Tyler



$(5 \times 8) + (3 \times 8)$

For each rectangle:

1. Name the two factors that can be multiplied to find its area.

2. Mark or shade each rectangle to show how each student saw the area. Be prepared to explain your reasoning.

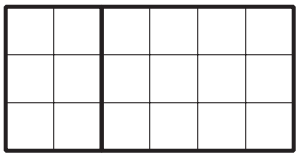
Lesson 11: Multiplication Strategies on Ungridded Rectangles

- Let's use different strategies to find the area of ungridded rectangles.

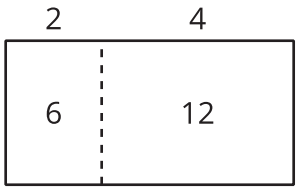
Warm-up: Which One Doesn't Belong: Multiplication in Many Forms

Which one doesn't belong?

A



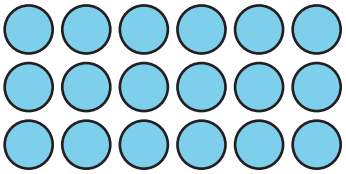
B



C

$(3 \times 2) + (3 \times 4)$

D



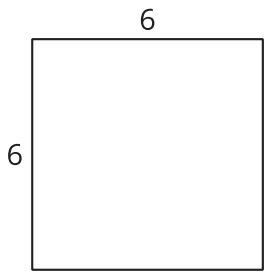
11.1: Mark, then Express

For each rectangle:

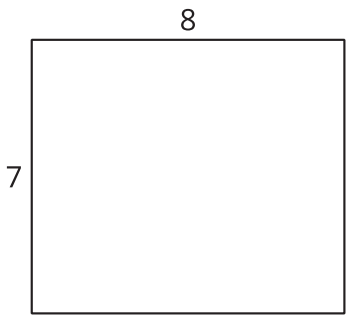
- Mark or shade each rectangle to show a strategy for finding its area.
- Write one or more expressions that can represent how you find the area.

A

B



C



11.2: Card Sort: Different Expressions, Same Rectangle

Your teacher will give you a set of cards with expressions that represent areas of rectangles.

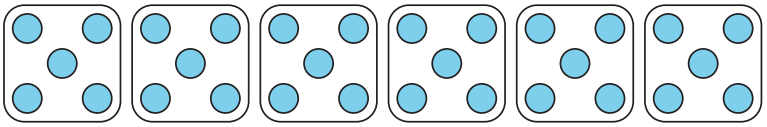
Sort the expressions into groups so that the expressions in each group can represent the area of the same rectangle. Be prepared to explain your reasoning.

You can draw rectangles if you find them helpful.

A $(7 \times 2) \times 2$	B 6×7	C 7×4	D 8×3
E $3 \times 6 + 5 \times 6$	F $(4 \times 3) \times 2$	G $4 \times (2 \times 3)$	H 4×9
I $(5 \times 6) + (2 \times 6)$	J $2 \times (2 \times 9)$	K 8×6	L $(5 \times 4) + (2 \times 4)$

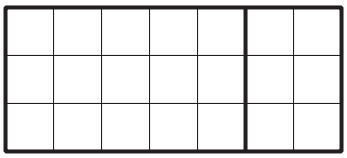
Section Summary

Section Summary
In this section, we learned how multiplication and division are related.



$6 \times 5 = ?$ $30 \div 5 = ?$ $30 \div 6 = ?$

We used strategies to multiply and divide and worked towards fluent multiplication and division within 100.



7×3

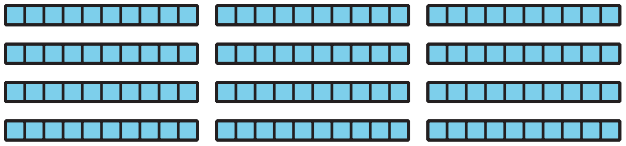
$(5 \times 3) + (2 \times 3)$

Lesson 12: Multiply Multiples of Ten

- Let's multiply one-digit numbers times multiples of 10.

Warm-up: Notice and Wonder: Tens

What do you notice? What do you wonder?



12.1: A Whole Lot of Dollars

Six friends are playing a board game that uses play money. The paper bills come in $5, $10, $20, $50, and $100.

1. Every player received $100 to start. Which of the following could be the bills that a player received?

   Write an expression to represent the play bills and the amount in dollars.

bills	expression	dollar amount
one $100 bill		
four $20 bills		
ten $10 bills		
ten $5 bills		
five $20 bills		
twenty $10 bills		
twenty $5 bills		
two $50 bills		

2. At one point in the game, Noah had to pay Lin $150. He gave her that amount using the same type of bill.

   a. Which bill and how many of it could Noah have used to make $150? Name all the possibilities.

   b. Write an expression for each way that Noah could have paid Lin.

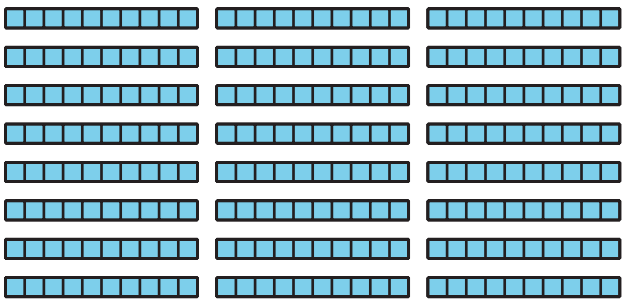
3. The table shows what the players had at the end of the game. The person with the most money wins. Who won the game?

   Write an expression to represent the bills each person has and the amount in dollars.

player	bills	expression	dollar amount
Andre	nine $10 bills and ten $5 bills		
Clare	fourteen $10 bills		
Jada	ten $10 bills and three $50 bills		
Lin	eight $20 bills		
Noah	six $50 bills		
Tyler	twenty-one $10 bills		

12.2: Two Strategies

1. Two students used base-ten blocks to find the value of 8×30.



   - Jada counted: 30, 60, 90, 120, 150, 180, 210, 240, and said the answer is 240.
   - Kiran said he knew 8×3 is 24, then found 24×10 to get 240.

   How are Jada and Kiran's strategies alike? How are they different?

2. Find the value of each expression. Explain or show your reasoning.

   a. 5×60

   b. 8×50

   c. 4×30

   d. 7×40

   e. 9×20

Lesson 13: Solve Problems With Equal Groups

- Let's multiply some teen numbers.

Warm-up: Estimation Exploration: Multiply Teens

$$4 \times 18$$

Record an estimate that is:

too low	about right	too high

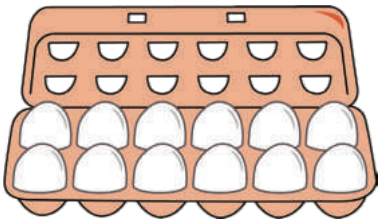
13.1: Problems with Teen Numbers

Solve each problem. Show your thinking using objects, a drawing, or a diagram.

1. A seller at a farmers market has 7 dozen eggs when they close for the day. How many eggs does the seller have?

2. At the farmers market there's a space for performers to play music with some chairs for people to sit and listen. There are 5 rows of chairs and each row has 15 chairs. How many chairs are there?

3. A booth at a farmers market has a table top that has lengths of 4 feet and 16 feet. What is the area of the table top?



13.2: Gallery Walk: Problems with Teen Numbers

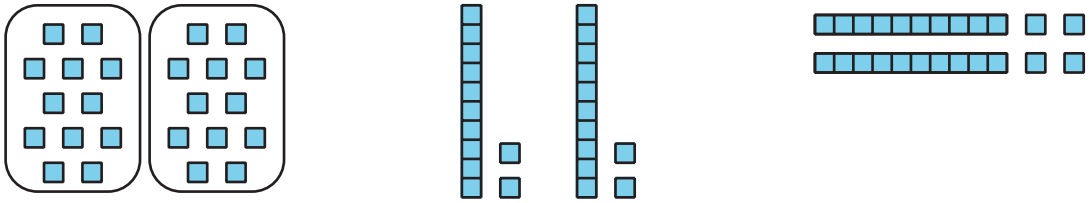
As you visit the posters with your partner, discuss what is the same and what is different about the thinking shown on each poster.

Lesson 14: Ways to Represent Multiplication of Teen Numbers

- Let's make sense of some ways to represent the multiplication of teen numbers.

Warm-up: Notice and Wonder: Seeing Groups

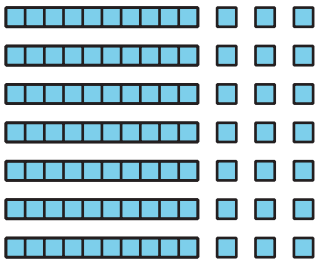
What do you notice? What do you wonder?



14.1: A Factor Greater than Ten

1. Tyler says he can use base-ten blocks to find the value of 7×13 because he knows 7×10 and 7×3. He says this diagram proves his thinking.

   Do you agree or disagree? Explain your reasoning.

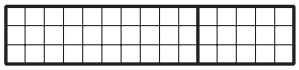


2. Use Tyler's method to find the value of 3×14. Explain or show your reasoning.

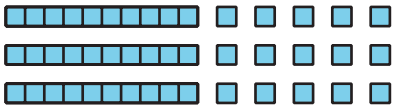
14.2: Ways to Represent

Andre, Clare, and Diego represented the same expression. Their representations are shown below.

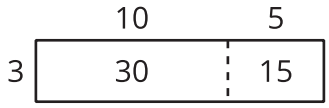
Andre



Clare



Diego



1. Where do you see the factors in each diagram?

2. Where do you see the product in each diagram?

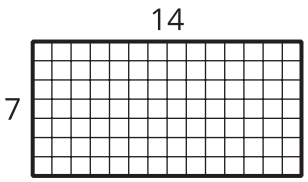
Lesson 15: Equal Groups, Larger Numbers

- Let's solve some problems with equal groups that have larger numbers.

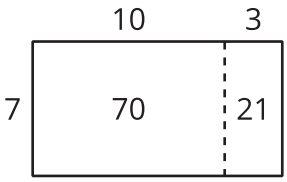
Warm-up: Which One Doesn't Belong: Rectangles

Which one doesn't belong?

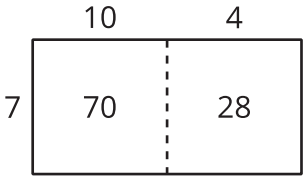
A



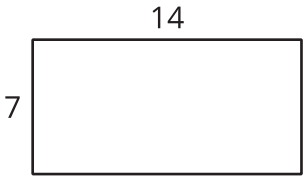
B



C



D



15.1: Equal Groups, Larger Numbers

Solve each problem. Explain or show your reasoning.

1. Noah sees a large painted mural that has side lengths of 15 feet and 4 feet. What is the area of the mural?

2. Noah's family buys a mosaic that has 12 rows and 8 columns of 1 inch tiles. What is the area of the mosaic?

3. At the art festival, Noah uses sidewalk chalk to help decorate a rectangular piece of sidewalk that is 6 feet by 14 feet. What is the area of the piece of sidewalk that Noah helped decorate?

4. At the art festival, Noah buys a pack of stickers. There are 5 sheets and each sheet has 16 stickers. How many stickers are in the pack?

15.2: Gallery Walk: Equal Groups, Larger Numbers

As you visit the posters with your partner, discuss what is the same and what is different about the thinking shown on each poster.

Lesson 16: Multiply Numbers Larger than 20

- Let's multiply numbers that are larger than 20.

Warm-up: Number Talk: Three Times Some Numbers

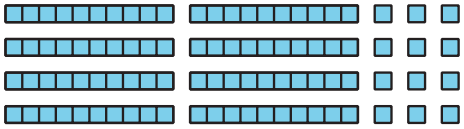
Find the value of each expression mentally.

- 3×10
- 3×20
- 3×50
- 3×25

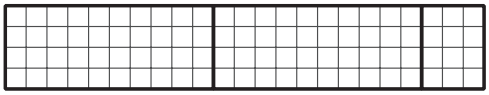
16.1: 4×23, Represented

1. Here is how Clare and Andre represented 4×23.

Clare



Andre



a. How does each diagram show 4×23?

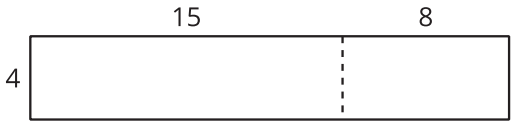
b. How could we use Clare's diagram to find the value of 4×23?

c. How could we use Andre's diagram to find the value of 4×23?

2. Diego tried different ways to partition or split a diagram to help him find the value of 4×23.

A

B



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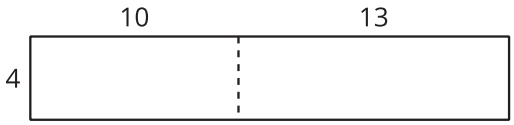
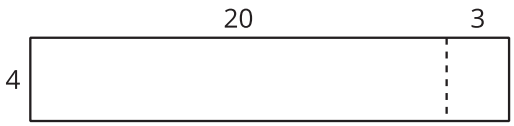


D



a. What do you notice about the numbers in his diagrams?

b. Which diagram would you use to find the value of 4×23? Explain your reasoning.

3. Find the value of 3×28. Show your thinking using diagrams, symbols, or other representations.

16.2: Some Fine Products

1. To find the value of 2×37, Mai started by writing this equation:

$$2 \times 30 = 60$$

Describe or show what Mai would do to finish finding the value of 2×37.

2. Find the value of each product. Show your reasoning.

a. 3×32

b. 2×43

c. 4×22

d. 3×29

16.3: Play Close to 100, Multiplication

Play Close to 100, Multiplication with a partner.

1. Place the cards face down.
2. Each player draws 4 cards.
3. Each player chooses 2 cards to complete the expression to make a value as close to 100 as possible. Write the 2 digits and the product.
4. Player closest to 100 wins.
5. Play 5 rounds. Player who wins the most rounds wins.

Game 1

Round 1

$\square \times 1 \square = \_\_\_\_\_$

Round 2

$\square \times 1 \square = \_\_\_\_\_$

Round 3

$\square \times 1 \square = \_\_\_\_\_$

Round 4

$\square \times 1 \square = \_\_\_\_\_$

Round 5

$\square \times 1 \square = \_\_\_\_\_$

Game 2

Round 1

$\square \times 2 \square = \_\_\_\_$

Round 2

$\square \times 2 \square = \_\_\_\_$

Round 3

$\square \times 2 \square = \_\_\_\_$

Round 4

$\square \times 2 \square = \_\_\_\_$

Round 5

$\square \times 2 \square = \_\_\_\_$

Lesson 17: Use the Four Operations to Solve Problems

- Let's use the four operations to solve problems.

Warm-up: True or False: Multiply by 10

Decide if each statement is true or false. Be prepared to explain your reasoning.

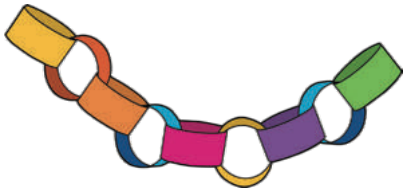
- $2 \times 40 = 2 \times 4 \times 10$
- $2 \times 40 = 8 \times 10$
- $3 \times 50 = 15 \times 10$
- $3 \times 40 = 7 \times 10$

17.1: Questions about a Situation

What questions could you ask about this situation?

There are 142 guests at a party. All the guests are in 2 rooms. Room A has 94 guests. Room B has 6 tables that each have the same number of guests. There are 4 pieces of silverware and 1 plate for each guest.

17.2: Party Problems



For each problem:

a. Write an equation to represent the situation. Use a letter for the unknown quantity.

b. Solve the problem. Explain or show your reasoning.

1. Kiran is making paper rings each day to decorate for a party. From Monday to Thursday he was able to complete 156 rings. Friday, Kiran and 2 friends worked on making more rings. Each of them made 9 more rings. How many rings did they make over the week?

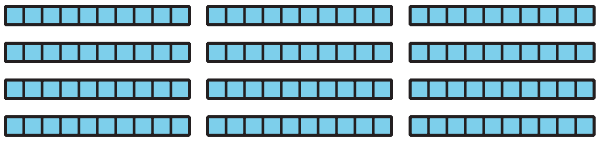
2. Mai has 168 muffins. She put 104 of the muffins in a basket. She packed the rest of the muffins into 8 boxes with the same number of muffins. How many muffins were in each box?

3. There are 184 cups on a table. Three tables with 8 people at each table come up to get drinks and each use a cup. How many cups are on the table now?

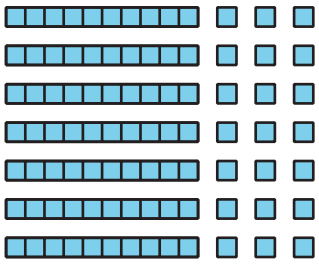
Section Summary

Section Summary

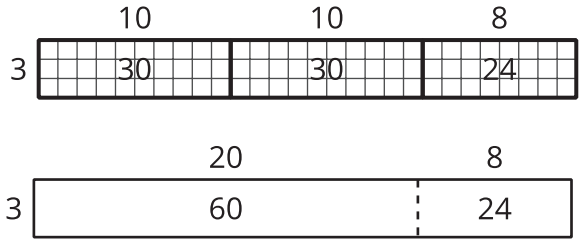
In this section, we learned how to multiply single-digit numbers by multiples of ten. We used strategies to multiply teen numbers and numbers greater than 20.



4×30



7×13



3×28

Lesson 18: Larger Numbers in Equal Groups

- Let's divide with larger numbers.

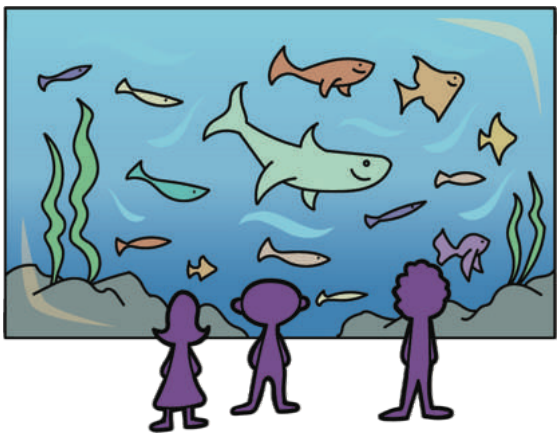
Warm-up: What Do You Know About Division?

What do you know about division?

18.1: Groups on a Field Trip

There are 48 students going on a field trip to the aquarium. They visit the exhibits in groups of 4 students. How many groups will there be?

Show your thinking using diagrams, symbols, or other representations.



18.2: Bus Ride and Lunch Groups

For each question, show your thinking using diagrams, symbols, or other representations.

1. On another field trip, 72 students and teachers rode in 3 buses to a science museum, with the same number of people in each bus. How many people rode in each bus?

2. During lunch, the 72 people sat at long tables, with 12 people at each table. How many tables did they use?

Lesson 19: Ways to Divide Larger Numbers

- Let's make sense of representations of division.

Warm-up: True or False: Ones, Tens, Twenties

Decide if each statement is true or false. Be prepared to explain your reasoning.

- $4 \times 10 = 40 \times 1$
- $4 \times 20 = 4 \times 2 \times 10$
- $8 \times 20 = 8 \times 2 \times 1$
- $8 \times 20 = 16 \times 10$

19.1: Divide with Base-Ten Blocks

1. Use base-ten blocks to represent each expression. Then, find its value.

   a. $55 \div 5$

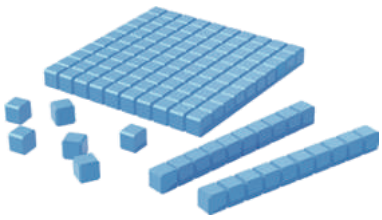
   b. $45 \div 3$

2. Find the value of each expression. Use base-ten blocks if you find them helpful.

   a. $63 \div 3$

   b. $84 \div 7$

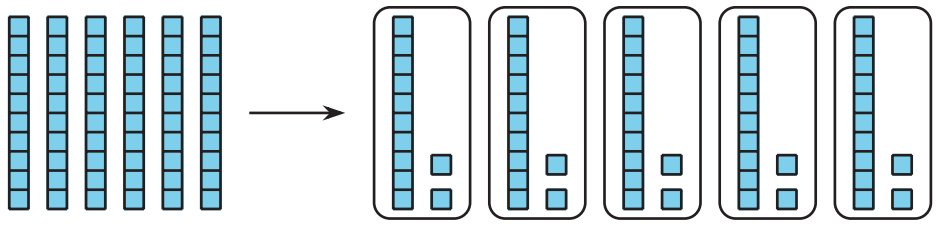
   c. $100 \div 5$



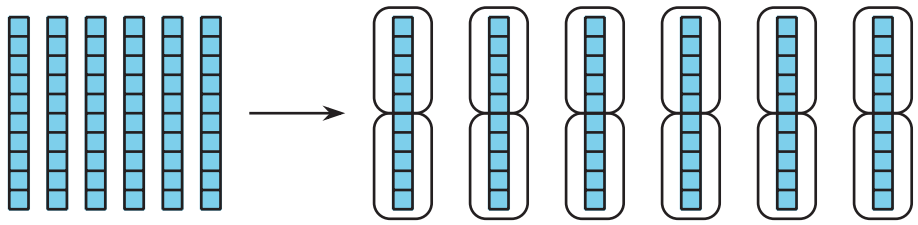
19.2: Different Ways to Show Division

Jada and Han used base-ten blocks to represent $60 \div 5$.

Here is Jada's work:



Here's Han's work:



1. Make sense of Jada's and Han's work.

    a. What did they do differently?

    b. Where do we see the value of $60 \div 5$ in each person's work?

2. How would you use base-ten blocks so you could represent these expressions and find their value? Be prepared to explain your reasoning.

    a. $64 \div 4$: Would you make 4 groups or groups of 4?

b. $72 \div 6$: Would you make 6 groups or groups of 6?

c. $75 \div 15$: Would you make 15 groups or groups of 15?

Lesson 20: Strategies for Dividing

- Let's use different strategies to divide.

Warm-up: Number Talk: Multiplication and Division

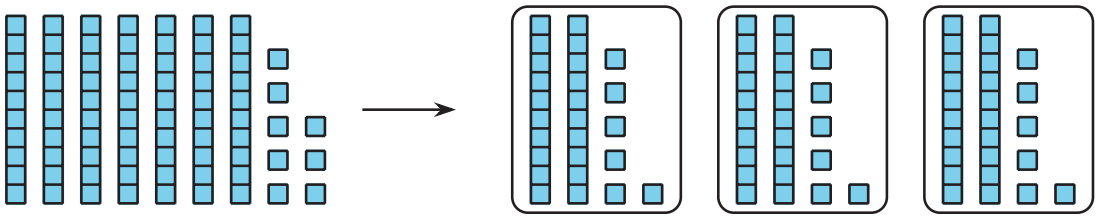
Find the value of each expression mentally.

- 3×5
- 6×5
- 10×5
- $65 \div 5$

20.1: Ways to Divide

1. Lin, Priya, and Tyler found the value of $78 \div 3$. Their work is shown. Make sense of each student's work.

   Lin

   Priya

   $3 \times 10 = 30$
   $3 \times 10 = 30$
   $3 \times \ \ 6 = 18$
   $3 \times 26 = 78$

   Tyler

   $3 \times 20 = 60$
   $3 \times \ \ 6 = 18$

   $20 + 6 = 26$

2. How are the three students' work alike?

3. How are they different?

20.2: How Would You Divide?

Find the value of each quotient. Explain or show your reasoning. Organize it so it can be followed by others.

1. $80 \div 5$

2. $68 \div 4$

3. $91 \div 7$

If you have time: Eighty-four students on a field trip are put into groups. Each group has 14 students. How many groups are there?

20.3: Compare, Divide within 100

Play Compare with 2 players.

1. Shuffle the cards and split the deck between the players.
2. Each player turns over a card.
3. Compare the values. The player with the greater value keeps both cards.
4. Play until you run out of cards. The player with the most cards at the end of the game wins.

Lesson 21: Solve Problems Using the Four Operations

- Let's represent and solve problems using all four operations.

Warm-up: Notice and Wonder: Apples Again

What do you notice? What do you wonder?

A farmer picked some apples.
Some of the apples are packed into boxes and some are not.

21.1: Apple Adventure

A farmer picked some apples. Some of the apples are packed into boxes and some are not.

From the list, choose 4 numbers that would make sense together in this situation. Write your choices in the table. Be ready to explain how your numbers make sense together.

400	300	240	12
350	290	230	10
340	280	170	5

total number of apples	number of apples not in boxes	number of boxes	number of apples in each box

21.2: Apple Days

Tyler and Clare are helping with a festival at an apple orchard.

1. Tyler is stacking apples to sell at the event. There are 85 apples for his display. He has already made 5 rows of 10 apples. How many apples are left?

    a. Write an equation with a letter for the unknown quantity to represent this situation.

    b. Solve the problem. Explain or show your reasoning.

2. Clare is helping sell baked goods at the event. A customer buys 8 brownies that cost $3 each. Clare adds that money to the cash box and now there is $125 in the cash box. How much money was in the cash box before that purchase?

    a. Write an equation with a letter for the unknown quantity to represent this situation.

    b. Solve the problem. Explain or show your reasoning.

3. The market at the orchard had 200 jars of applesauce for sale. At the end of the event, 184 jars had been sold. The rest of the jars were shared equally among 4 people who work there. How many jars of applesauce did each person get?

   a. Write an equation with a letter for the unknown quantity to represent this situation.

   b. Solve the problem. Explain or show your reasoning.

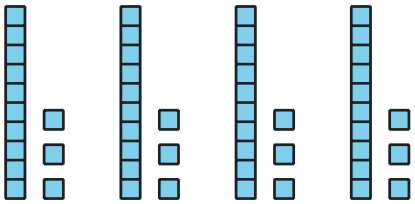
Section Summary

Section Summary
In this section, we divided larger numbers and solved problems that involve division.

We used base-ten blocks, diagrams, and equations to represent the numbers we divided. To help us divide, we used what we know about place value, equal groups, and the relationship between multiplication and division.

For example, here are some ways we could find the value of $52 \div 4$:

- Put 5 tens and 2 ones into 4 equal groups.



- Think about how many groups of 4 are in 52.

10 groups of 4 make 40.
3 groups of 4 make 12.
13 groups of 4 make 52.

- Use multiplication facts and write equations.

$$4 \times 10 = 40$$
$$4 \times 3 = 12$$

$$10 + 3 = 13$$
$$4 \times 13 = 52$$

At the end of the section, we used all four operations to solve problems.

Lesson 22: School Community Garden

- Let's plan a school garden.

Warm-up: Notice and Wonder: Garden

What do you notice? What do you wonder?

22.1: Produce

For each situation, draw a diagram and write an equation or expression.

1. A strawberry patch has 7 rows with 8 strawberry plants in each row.

   a. How many strawberry plants are in the patch?

   b. To grow strawberries in the best way, the rows should be 4 feet apart. Each plant in the row should be 2 feet apart. How long and wide is the strawberry patch?

   c. You can harvest 12 strawberries per plant. How many strawberries will grow in each row?

2. With your partner, take turns explaining where you see the numbers in the expression or equation you wrote in your diagram.

22.2: Plan the Garden

1. Read the information about some plants you could grow in a garden. Then, circle 2 plants to grow in your part of the school garden.

    a. strawberries

    b. cantaloupe

    c. zucchini

    d. tomatoes

    e. pinto beans

    f. potatoes

2. Plan your garden. Both of your plants should harvest between 50–100 fruits or vegetables.

    a. How many of each plant will you grow?

    b. Predict how many fruits or vegetables you will harvest. Show or explain your reasoning.

3. Make a diagram that shows how the plants are arranged and how much space is needed.

Growing Requirements

strawberries

- Grow in patches
- Space rows: 4 feet apart
- Space plants: 2 feet apart
- Each plant produces 12 strawberries.

cantaloupes

- Grow on vines
- Space rows: 4 feet apart
- Space plants: 1 foot apart
- Each plant produces about 8 cantaloupes.

zucchini

- Grow on vines
- Space rows: 5 feet apart
- Space plants: 1 foot apart
- Each plant produces about 8 zucchini.

tomatoes

- Grow on vines
- Space rows: 4 feet apart
- Space plants: 2 feet apart
- Each plant produces about 20 tomatoes.

pinto beans

- Grow on bushes in pods
- Space rows: 2 feet apart
- Space plants: 1 foot apart
- Each plant produces 20–25 pods and each pod produces about 5 beans.

potatoes

- Grow in rows
- Space rows: 2–3 feet apart
- Space plants: 1 foot apart
- Each plant produces 5–10 potatoes.

Section B: Practice Problems

1. There are 35 books on the bookcase. There are 7 books on each shelf. How many shelves are there? Explain how the equations $35 \div 7 = ?$ and $? \times 7 = 35$ both represent the situation.

(From Unit 4, Lesson 6.)

2. There are 24 eggs in the container. There are 6 in each row. How many rows of eggs are there?

   Write an equation that represents the situation. Use a symbol for the unknown. Then, answer the question.

(From Unit 4, Lesson 7.)

3. For each multiplication equation, write a related division fact you know from the multiplication equation.

   a. $8 \times 5 = 40$

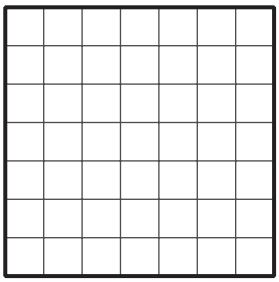
   b. $2 \times 9 = 18$

(From Unit 4, Lesson 8.)

4. Lin knows $8 \times 5 = 40$. Explain how she can use this fact to find 8×4.

(From Unit 4, Lesson 9.)

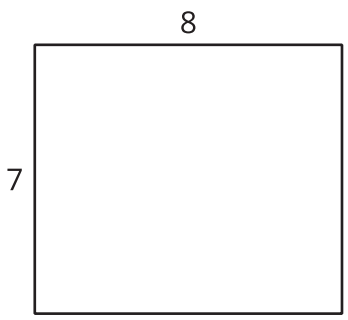
5. a. Highlight parts of the diagram to show the expression $(5 \times 7) + (2 \times 7)$.



b. Explain how you could use the diagram to calculate 7×7.

(From Unit 4, Lesson 10.)

6. Mark or shade the rectangle to show a strategy for finding its area. Then, explain how to use the diagram to find the area.



(From Unit 4, Lesson 11.)

7. **Exploration**

Noah finds 9×8 by calculating $(10 \times 8) - (1 \times 8)$.

a. Make a drawing showing why Noah's calculation works.

b. Use Noah's method to calculate 9×8.

Section C: Practice Problems

1. a. How many tens are there in 50?

   b. How many tens are there in 7×50? Explain your reasoning.

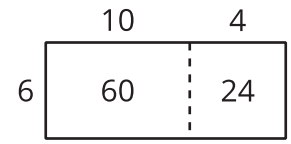
   c. What is the value of 7×50? Explain your reasoning.

(From Unit 4, Lesson 12.)

2. There are 4 lunch tables. There are 12 students at each table. How many students are there at the tables? Show your thinking using objects, a drawing, or a diagram.

(From Unit 4, Lesson 13.)

3. a. What do the 60 and 24 in the diagram represent?



b. Explain how to use the diagram to calculate 14×6.

(From Unit 4, Lesson 14.)

4. There were 14 days of school in the month. There were 7 hours of school each day. How many hours of school were there during the month?

(From Unit 4, Lesson 15.)

5. Find the value of each expression. Explain or show your reasoning.

a. 2×47

b. 3×25

(From Unit 4, Lesson 16.)

6. A rope is 640 inches long. Andre cuts off 5 pieces of rope that are 16 inches each. How much rope is left?

(From Unit 4, Lesson 17.)

7. **Exploration**

   Here is Mai's strategy for calculating 4×21: "First I double 21 and that's 42. Then I double 42 and that's 84."

   a. Explain why Mai's strategy works.

   b. Use Mai's strategy to find 4×23.

8. **Exploration**

×	1	2	3	4	5	6	7	8	9
1	1	2	3	4	5	6	7	8	9
2	2	4	6	8	10	12	14	16	18
3	3	6	9	12	15	18	21	24	27
4	4	8	12	16	20	24	28	32	36
5	5	10	15	20	25	30	35	40	45
6	6	12	18	24	30	36	42	48	54
7	7	14	21	28	35	42	49	56	63
8	8	16	24	32	40	48	56	64	72
9	9	18	27	36	45	54	63	72	81

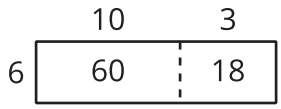
a. Make a list of the numbers less than 20 that do not appear in the multiplication table.

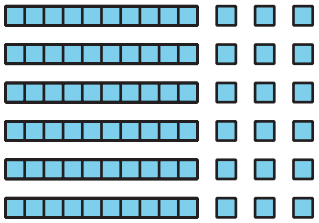
b. What do these numbers have in common?

c. Choose one of these numbers and count out that number of objects. Can you make an array out of the objects?

9. **Exploration**

Look at the two different diagrams of the same multiplication expression:





a. What multiplication expression do the two diagrams represent?

b. Can you show a third way to represent the same multiplication expression?

c. What is the value of the expression?

d. Write a story problem to match the expression.

Section D: Practice Problems

1. There are 85 chairs in the gym. They are arranged in 5 rows with the same number of chairs in each row. How many chairs are in each row? Show your thinking using diagrams, symbols, or other representations.

(From Unit 4, Lesson 18.)

2. a. Find the value of $96 \div 6$. Use base-ten blocks if they are helpful.

b. Find the value of $52 \div 4$. Use base-ten blocks if they are helpful.

(From Unit 4, Lesson 19.)

3. a. Find the value of $78 \div 6$. Draw a diagram if it is helpful.

b. Find the value of $42 \div 3$. Draw a diagram if it is helpful.

(From Unit 4, Lesson 20.)

4. Find the value of each quotient.

   a. $96 \div 6$

   b. $87 \div 3$

(From Unit 4, Lesson 20.)

5. There are 240 people at the park for the soccer games. There are 150 fans. The rest of the people are on 6 soccer teams with an equal number of players. How many players are on each soccer team?

   a. Write an equation to represent this situation. Use a letter for the unknown quantity.

   b. Solve the problem. Explain or show your reasoning.

(From Unit 4, Lesson 21.)

6. **Exploration**

   To find the value of $96 \div 3$, Diego divides 9 by 3 and 6 by 3 and says the answer is 32.

   a. Explain why Diego's method is correct. Use equations or drawings to support your reasoning.

   b. Does Diego's method work to find the value of $78 \div 3$? Explain your reasoning.

7. **Exploration**

   What are the different ways you can divide 48 objects into equal groups?

   a. Make a list.

   b. Write a multiplication or division equation for each different way.

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