

Unit **4**

Relating Multiplication to Division

Essential Questions

- How do we use equal groups to divide?
- How is division related to multiplication?
- How can we use strategies to multiply and divide greater numbers?



Unit Story: Home Cooking

You can read the Unit Story with your student by visiting the Unit Story page on the Caregiver Hub.



Lesson 1 is the Unit Investigation. Students explore different ways amounts can be separated into equal groups to build curiosity and apply their own knowledge in a variety of ways. Use the **Caregiver Connection** to help students continue to explore the math they will see in the unit.

Caregiver Connection

Students may enjoy separating amounts of other objects into equal groups. Consider using household objects such as spoons, pencils, paper clips, or collections such as rocks or trading cards. You can ask:

- “How many groups did you make?”
- “How many objects are in each group?”

Summary | Lesson 2

In a division expression, the first number is the **dividend** and the second number is the **divisor**. The divisor can represent the number of groups or the number of objects in each group.

dividend		divisor
12	\div	2
total number of objects		number of groups or objects in each group

Try This

For Problems 1 and 2, match the expression with the situation it represents.

$$54 \div 6$$

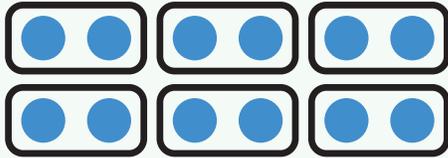
$$54 \div 9$$

- 1 Priya has 54 game tickets that she wants to share. She gives each friend 9 game tickets.

- 2 6 friends share 54 stickers. Everyone receives the same number of stickers.

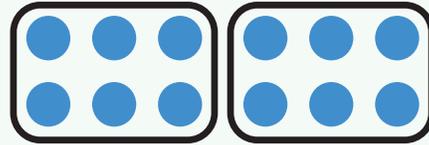
To **divide**, you make equal groups from a total number of objects to determine the number of equal groups or the number of objects in each group. The result of dividing is called the **quotient**.

How many groups?



$$12 \div 2 = 6$$

How many in each group?



$$12 \div 2 = 6$$

Try This

Solve the story problem and write a division equation to represent it.

- 1 Jada has 36 beads. She makes 4 bracelets, each with the same number of beads. How many beads are on each bracelet?

 Show your thinking.

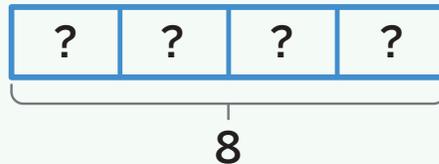
answer: _____

equation: _____

Summary | Lesson 4

There are many representations you can use to solve problems involving equal groups.

Diego has 8 pencils. He puts the pencils equally into 4 cups. How many pencils are in each cup?



$$? = 8 \div 4$$

Try This

For Problems 1 and 2, create a drawing to represent the equation.

 Draw

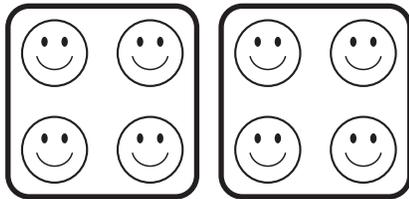
1 $27 \div 3 = 9$

2 $40 \div 8 = 5$

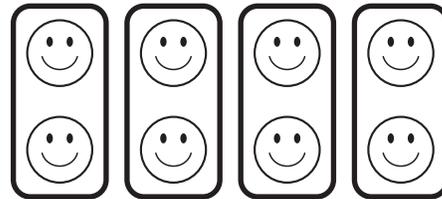
In this sub-unit . . .

- We thought about *division* as the mathematical operation related to separating or splitting things into equal groups.

Here are 8 students
in 2 equal groups.



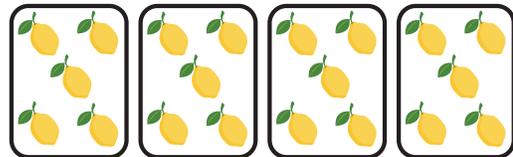
Here are 8 students
in groups of 2.



- Math tip:** In division problems, you are always given the total number of objects and are trying to determine either the number of groups or the number in each group.

- We used equal-groups drawings and diagrams to represent and solve division problems.

Total	Number of groups	Number in each group
20	4	5



- We wrote equations to represent division problems.

dividend	divisor	quotient
12	2	6
total number of objects	number of groups or objects in each group	objects in each group or number of groups

The *quotient* in a division *equation* can also be represented as one of the factors in a related multiplication equation. The quotient can represent the number of groups or the number in each group.

A farmer has 20 apples.
He puts them in 4 boxes.
Each box has the same
number of apples. How many
apples are in each box?

factor: number in each group

$$4 \times b = 20$$

$$20 \div 4 = b$$

quotient: size of each group

Try This

- 1 Write a division equation and a multiplication equation to represent the story problem. Use a letter to represent the unknown value.

Clare has 50 state flags. She put the same number of flags at each of 5 tables. How many flags did she put at each table?

division equation: _____

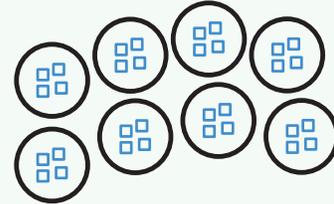
multiplication equation: _____

You can use multiplication or division equations to represent division problems. Strategies related to each operation can be helpful when determining quotients.

Max bought 32 new stamps for his collection. He put 4 stamps on each page of his book. How many pages did he use?

I can solve using multiplication because I know $8 \times 4 = 32$.

I can find the value of p in $32 \div 4 = p$ by drawing a diagram.



Try This

- 1 Write an equation to represent the story problem. Use a letter to represent the unknown value. Then solve the story problem.
A gardener has 48 vegetable plants. He plants the same number of vegetable plants in 6 rows. How many vegetable plants are in each row?

i Show or explain your thinking.

equation: _____

answer: _____

Summary | Lesson 7

Because multiplication and division are related, you can always use multiplication facts to determine division facts and division facts to determine multiplication facts.

$$5 \times 7 = 35$$

$$7 \times 5 = 35$$

$$35 \div 7 = 5$$

$$35 \div 5 = 7$$

Try This

For Problems 1 and 2, use the set of numbers to complete the multiplication and division equations.

1 20, 4, 5

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

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

$$\underline{\quad} \div \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} \div \underline{\quad} = \underline{\quad}$$

2 7, 6, 42

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

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

$$\underline{\quad} \div \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} \div \underline{\quad} = \underline{\quad}$$

Summary | Lesson 8

The multiplication table is a tool that can help you visualize patterns in multiplication facts. Understanding patterns in multiplication can help you determine unknown products and explain why the patterns occur.

×	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16		20
3	3	6	9	12	15	18	21	24		30
4	4	8	12	16	20	24	28	32		40
5	5	10	15	20	25	30	35	40		50
6	6	12	18	24	30	36	42	48		60
7	7	14	21	28	35	42	49	56		70
8	8	16	24	32	40	48	56	64		80
9	9									90
10	10	20	30	40	50	60	70	80	90	100

Try This

- 1 Based on the pattern shown in the table, is the unknown number represented by the ? *odd* or *even*?

odd even

Explain your thinking.

×	1	2	3	4	5
1			3		
2			6		
3	3	6	?	12	15
4			12		
5			15		

In this sub-unit . . .

- We wrote multiplication and division equations to represent the same division problem because division can be represented as an unknown factor.

$$4 \times b = 20$$

$$20 \div 4 = b$$

-
- We used multiplication and division flexibly to solve equal-groups problems.

A farmer has 20 apples. He puts an equal number of apples in 4 boxes. How many apples are in each box?

I can make a drawing with 4 groups and put 1 apple in each group until I have 20 total.

I can think about what number multiplied by 4 equals 20.

-
- We used multiplication facts we know to identify related multiplication and division facts.

If I know $5 \times 7 = 35$, then I know $7 \times 5 = 35$, $35 \div 5 = 7$, and $35 \div 7 = 5$.

- 🔥 **Math tip:** You can use the Commutative Property of Multiplication and the relationship between multiplication and division to determine related facts from known facts.

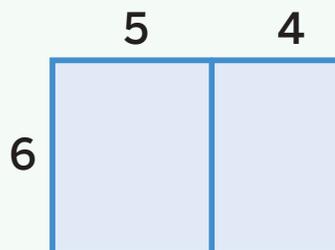
Summary | Lesson 9

To determine unknown products, you can rewrite 1 factor as a sum and then multiply each of the addends by the other factor.

$$6 \times 9$$

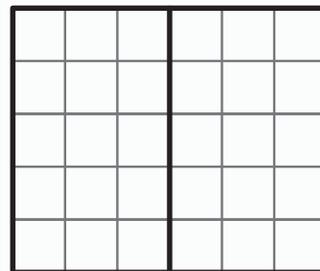
$$6 \times (5 + 4)$$

$$6 \times 5 + 6 \times 4$$



Try This

- 1 Jada composed the rectangle shown. Write an expression to represent her work. Then determine the area of the rectangle.



expression: _____

area: _____ square units

You can determine the product of an expression by decomposing the factors to create known facts.

$$6 \times 9$$

$$(6 \times 5) + (6 \times 4)$$

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

Try This

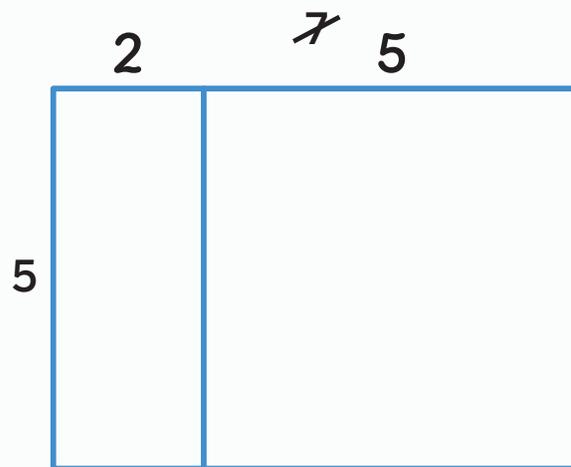
- 1 Clare decomposed the rectangle to show a strategy for determining its area. Complete the expressions to represent how she decomposed the rectangle and determined the area.

$$5 \times (2 + \underline{\quad})$$

$$(5 \times 2) + (5 \times \underline{\quad})$$

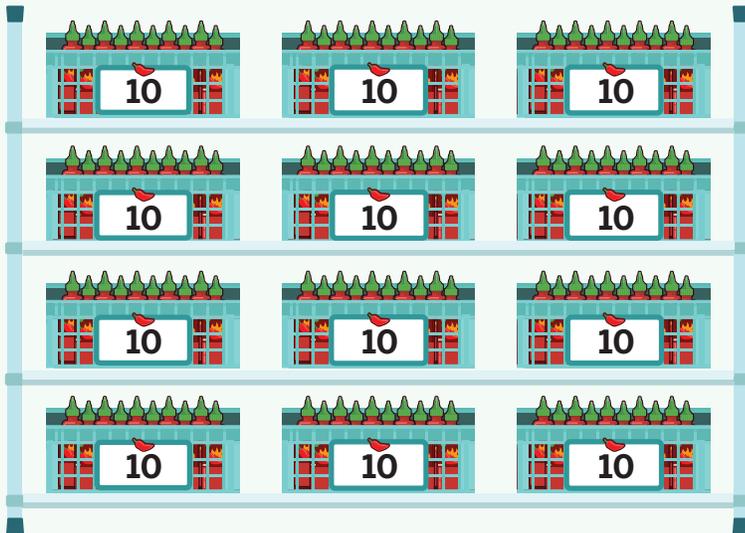
$$\underline{\quad} + \underline{\quad}$$

area: _____



You can decompose a multiple of 10 into groups of 10. Because of the **Associative Property of Multiplication**, you can then multiply in any order and get the same product.

$$4 \times 30$$



4 groups of 3 groups of 10

$$4 \times 3 \times 10$$

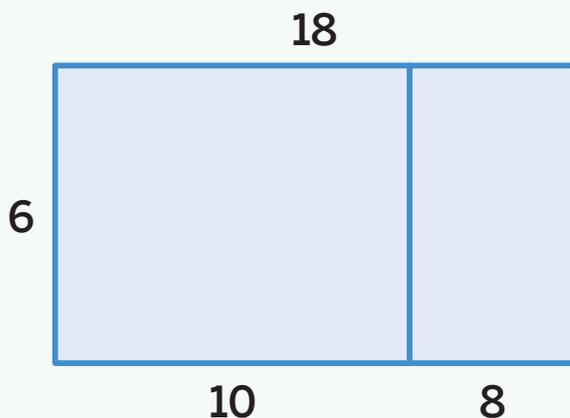
$$4 \times 3 = 12$$

$$12 \times 10 \text{ or } 12 \text{ tens} = 120$$

Try This

- Diego is evaluating the expression 6×40 . He says 40 is 4 tens and 6×4 is 24, so 24 tens is equal to 240. So, $6 \times 40 = 240$. Do you agree with Diego? Explain your thinking.

When multiplying a teen number and a one-digit factor, you can decompose the teen number into a ten and ones.

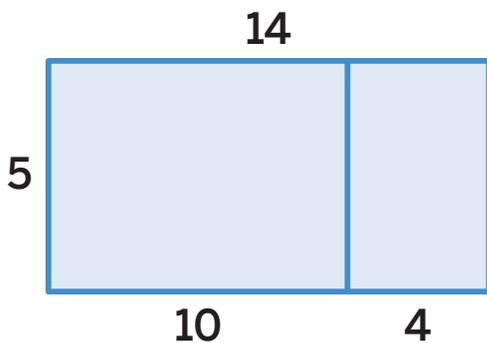


$$\begin{aligned} &6 \times 18 \\ &6 \times (10 + 8) \\ &(6 \times 10) + (6 \times 8) \end{aligned}$$

Try This

- 1 Priya was evaluating 5×14 . Use her diagram to determine the product.

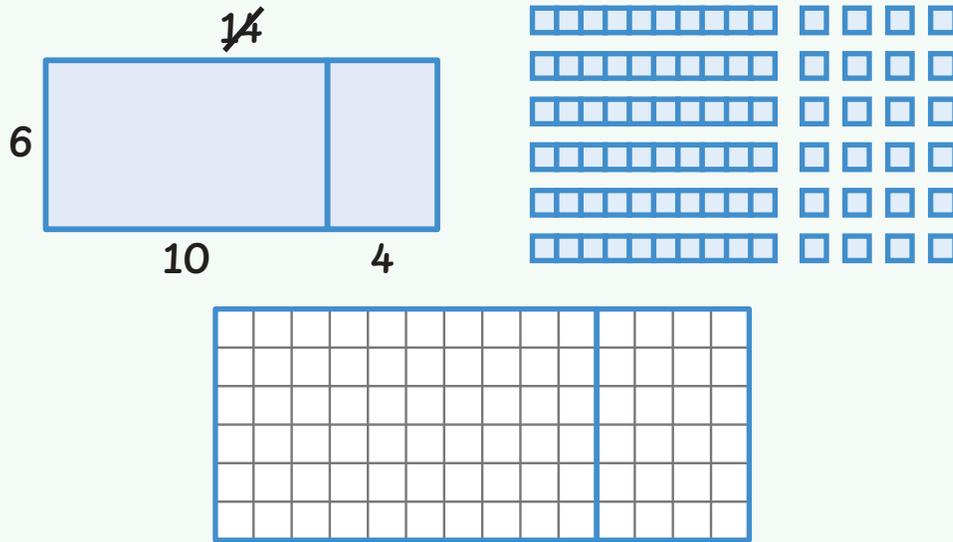
i Show or explain your thinking.



answer: _____

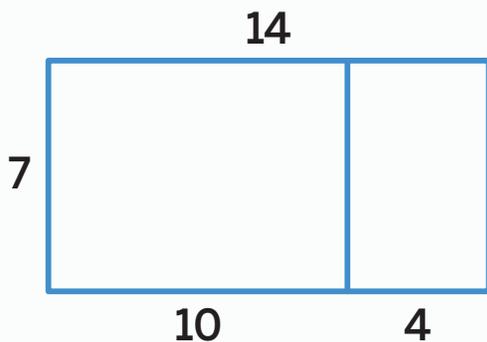
Summary | Lesson 13

Any representation or diagram can be used to solve a problem, regardless of context.



Try This

- 1 Jada's father wants to install a garden that measures 14 feet by 7 feet. He asks Jada to determine the area of the garden. Complete her work.



Jada's work:

$$7 \times 14$$

$$7 \times (\text{_____} + 4)$$

$$(7 \times \text{_____}) + (7 \times 4)$$

$$\text{_____} + \text{_____} = \text{_____}$$

The area of the garden is _____.

When multiplying a factor and a number greater than 20, you can decompose the greater factor to help you work with facts you know or facts you can figure out.

$$3 \times 24$$

$$3 \times 20 = 60$$

$$3 \times 4 = 12$$

$$60 + 12 = 72$$

$$3 \times 24 = 72$$

	20	4
3	60	12

$$60 + 12 = 72$$

$$3 \times 24 = 72$$

Try This

- 1 Clare is evaluating 3×27 . Complete her work.

Clare's work:

$$3 \times 27$$

$$3 \times (20 + \underline{\hspace{2cm}})$$

$$(3 \times 20) + (3 \times \underline{\hspace{2cm}})$$

$$\underline{\hspace{2cm}} + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

So, 3×27 is $\underline{\hspace{2cm}}$.

The information you are given and not given can help you solve problems requiring more than 1 operation.

The farmer cut open 10 Baklouti peppers and collected 250 seeds. He filled 4 seed packets by placing 21 seeds in each packet. He planted the rest of the seeds in 2 neat rows.

How many seeds did the farmer plant?

$$250 - (4 \times 21) = s$$

Try This

Solve the story problem and represent it with an equation, using a letter for the unknown value.

 Show or explain your thinking.

- 1 Diego has 125 baseball cards. His mother buys him 3 more packages of baseball cards. Each package contains 18 baseball cards. How many baseball cards does Diego have now?

answer: _____

equation: _____

Sub-Unit 3 | Summary

In this sub-unit . . .

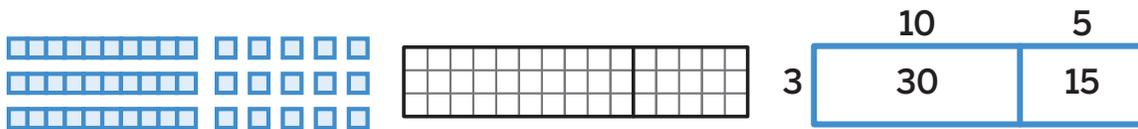
- We multiplied with factors greater than 10 using place value and properties of operations.

$$\begin{array}{r} 4 \times 18 \\ 4 \times (10 + 8) \\ (4 \times 10) + (4 \times 8) \\ 40 + 32 \\ 72 \end{array}$$

$$\begin{array}{r} 4 \times 18 \\ 4 \times (2 \times 9) \\ (4 \times 2) \times 9 \\ 8 \times 9 \\ 72 \end{array}$$

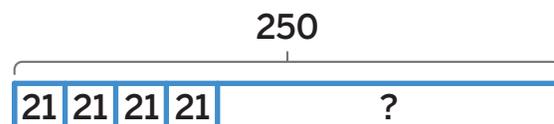
$$\begin{array}{r} 4 \times 30 \\ 4 \times (3 \times 10) \\ (4 \times 3) \times 10 \\ 12 \times 10 \\ 120 \end{array}$$

- We represented multiplication with factors greater than 10 using base-ten blocks, gridded rectangles, and area models.



- We identified known and unknown information and then used addition, subtraction, and multiplication to solve two-step problems.

The farmer collected 250 seeds. He filled 4 seed packets by placing 21 seeds in each packet. He planted the rest of the seeds in 2 neat rows. How many seeds did the farmer plant?



$$4 \times 21 = 84$$

$$250 - 84 = 166$$

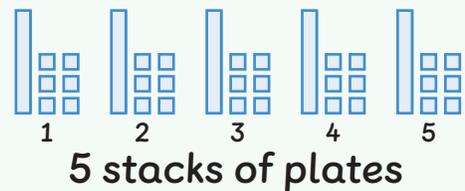
So, he planted 166 seeds.

You can use the same division strategies you already know to solve division problems with greater numbers.

For Mr. Gharbi's birthday party, Mateo set out stacks of plates on a table next to the food. He set out 80 plates with 16 plates in each stack. How many stacks of plates are on the table?

$$\overset{1}{16} + \overset{2}{16} + \overset{3}{16} + \overset{4}{16} + \overset{5}{16} = 80$$

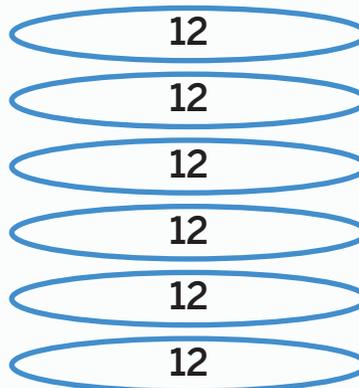
5 stacks of plates



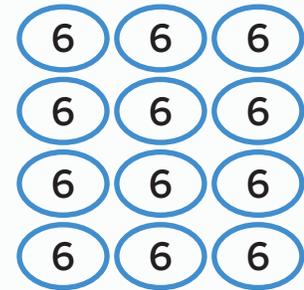
Try This

For Problems 1 and 2, match the diagram with the story problem it represents.

A



B



- 1** A florist has 72 roses. He places 6 roses in each vase.

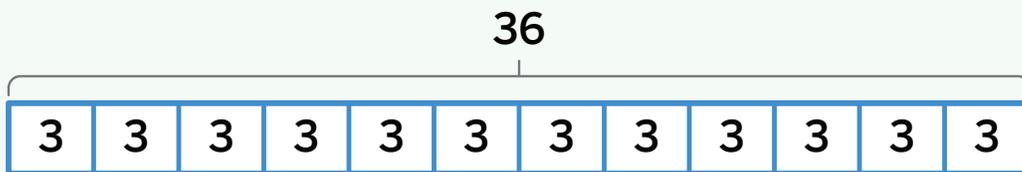
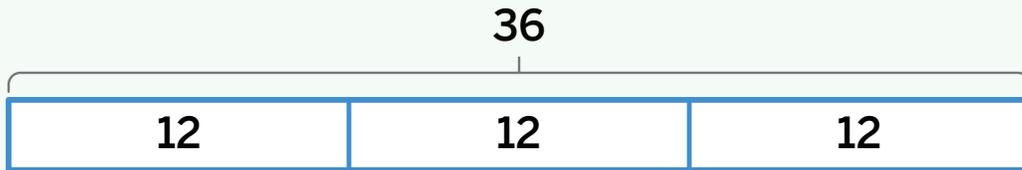
How many vases does the florist need? _____

- 2** A florist has 72 roses. He places the same number of roses in

6 vases. How many roses are in each vase? _____

When determining the value of a division expression, you can choose whether to think of the divisor as the number of groups or the number in each group to strategically divide.

$$36 \div 3$$



Try This

The work of determining the quotient $60 \div 15$ is partially complete. Use the work for Problems 1 and 2.

$$? \times 15 = 60$$

$$2 \times 15 = 30$$

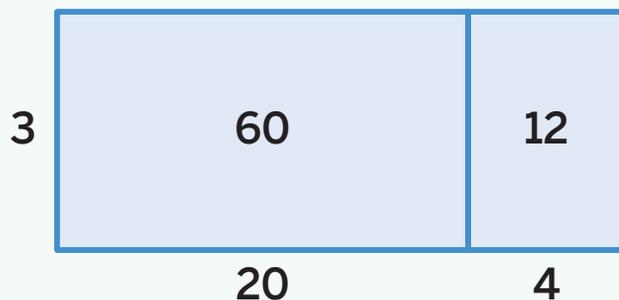
$$\square \times 15 = 60$$

- 1** What number belongs in the box for the quotient $60 \div 15$?

- 2** Explain how this strategy works to calculate $60 \div 15$.

When working with greater dividends, you can decompose the dividend and use facts you know to determine the quotient.

$$72 \div 3$$



$$72 = 60 + 12$$

$$3 \times 20 = 60$$

$$3 \times 4 = 12$$

$$20 + 4 = 24$$

Try This

- 1 Complete the diagram to determine the quotient $54 \div 3$.



answer: _____

Summary | Lesson 19

When comparing quotients, you can use what you know to estimate and compare without evaluating.

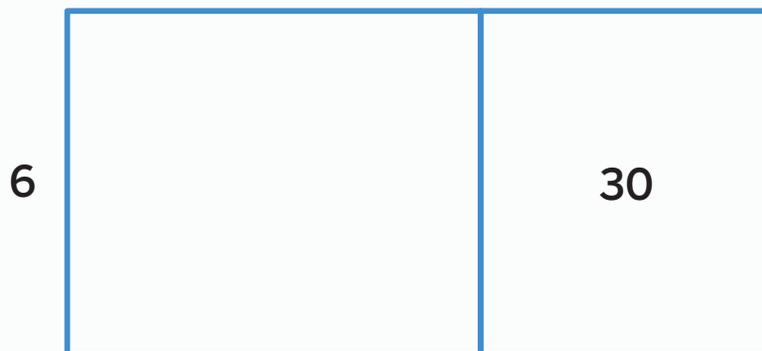
$84 \div 6$

$52 \div 2$

The quotient of 84 divided by 6 will only have 1 ten. The quotient of 52 divided by 2 will have 2 tens. So, I know that the second quotient is greater.

Try This

- 1 The area of a garden is 90 square feet. The width of the garden is 6 feet. Complete the diagram. How long is the garden?



answer: _____

Equations with more than 1 operation and a letter representing the unknown value can be used to represent and solve a problem with more than 1 step.

First, I did this:

$$150 - 128 = 22$$

Then, I did this:

$$22 \div 2 = 11$$

Which is the same as this: $(150 - 128) \div 2 = s$

Try This

For Problems 1 and 2, match the story problem with the equation that represents it.

$(120 - 20) \div 4 = n$	$(120 \div 4) - 20 = n$
$(120 \div 4) + 20 = n$	$(120 + 20) \div 4 = n$

- 1** Shawn had 120 stickers. After using 20 stickers, Shawn gave the rest to 4 friends. Each friend received the same number of stickers. How many stickers did each friend receive?

- 2** Diego had 120 marbles. His mother gave him 20 more marbles. Then he put the marbles equally in 4 bins. How many marbles did Diego put in each bin?

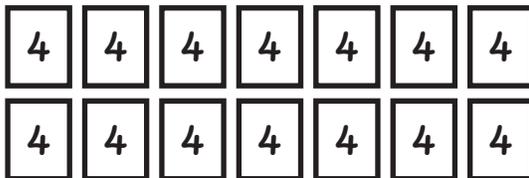
Sub-Unit 4 | Summary

In this sub-unit . . .

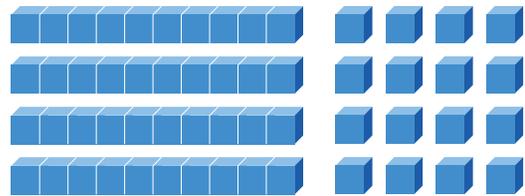
- We divided with greater numbers. Sometimes the divisor represented the number of groups, and sometimes the divisor represented the number in each group.

$$56 \div 4 = n$$

56 divided into groups of 4



56 divided into 4 groups



- We decomposed dividends to divide.

$$56 \div 4 = n$$

$$56 \div 4 = n$$
$$\begin{array}{cc} & 56 \\ & \swarrow \quad \searrow \\ 40 & 16 \end{array}$$

$$4 \times 10 = 40$$

$$4 \times 4 = 16$$

$$56 \div 4 = 10 + 4$$

 **Math tip:** Decomposing the dividend can help you use multiplication facts you know.

- We used our understanding of all 4 operations to solve two-step problems.

First, I subtracted, and then I divided the difference.

$$(200 - 128) \div 6 = s$$

 **Math tip:** Use parentheses to show the order of the steps needed to solve a two-step problem.

Try This | Answer Key

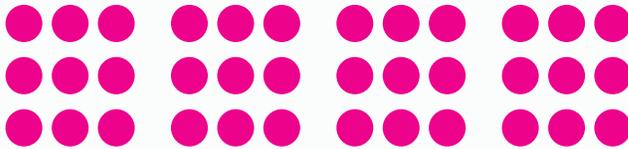
Lesson 2

1 $54 \div 9$

2 $54 \div 6$

Lesson 3

1 Sample work:

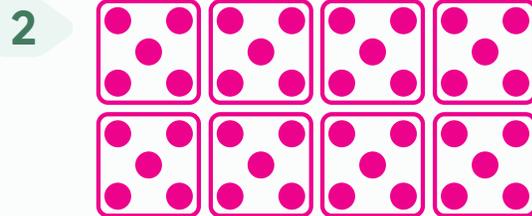
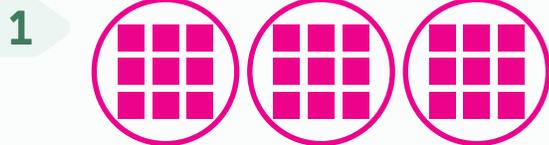


answer: 9 beads

equation: $36 \div 4 = 9$

Lesson 4

Sample responses:



Lesson 5

1 Sample response:

division equation: $50 \div 5 = f$

multiplication equation: $50 = 5 \times f$

Lesson 6

1 Sample work and equation:

I know that $8 \times 6 = 48$, so that means $48 \div 6 = 8$.

equation: $48 \div 6 = p$

answer: 8 plants

Lesson 7

1

$$\begin{array}{r} \underline{5} \times \underline{4} = \underline{20} \\ \underline{4} \times \underline{5} = \underline{20} \\ \underline{20} \div \underline{5} = \underline{4} \\ \underline{20} \div \underline{4} = \underline{5} \end{array}$$

2

$$\begin{array}{r} \underline{7} \times \underline{6} = \underline{42} \\ \underline{6} \times \underline{7} = \underline{42} \\ \underline{42} \div \underline{6} = \underline{7} \\ \underline{42} \div \underline{7} = \underline{6} \end{array}$$

Lesson 8

1 odd

Sample explanation:

Every other multiple of 3 is even. 6, the number before the ?, is even.

The missing number must be odd.

Lesson 9

1 Sample expression:

expression: $5 \times 3 + 5 \times 3$

area: 30 square units

Lesson 10

1 $5 \times (2 + \underline{5})$

$(5 \times 2) + (5 \times \underline{5})$

$\underline{10} + \underline{25}$

area: 35 square units

Lesson 11

1 Sample explanation:

Yes; The expression 6×40 can be written as $(6 \times 4) \times 10$.

6×4 is 24, and 24×10 is 240.

Try This | Answer Key

Lesson 12

1 Sample work:

$$5 \times (10 + 4)$$

$$(5 \times 10) + (5 \times 4)$$

$$50 + 20 = 70$$

answer: 70

Lesson 13

1 7×14

$$7 \times (\underline{10} + 4)$$

$$(7 \times \underline{10}) + (7 \times 4)$$

$$\underline{70} + \underline{28} = \underline{98}$$

The area of the garden is **98 square feet**.

Lesson 14

1 3×27

$$3 \times (20 + \underline{7})$$

$$(3 \times 20) + (3 \times \underline{7})$$

$$\underline{60} + \underline{21} = \underline{81}$$

So, 3×27 is **81**.

Lesson 15

1 Sample work and equation:

$$3 \times 18 = 54$$

$$125 + 54 = 179$$

answer: **179 cards**

$$\text{equation: } 125 + (3 \times 18) = c$$

Lesson 16

1 B

2 A

Try This | Answer Key

Lesson 17

1 4

2 Sample response:

I think of how many groups of 15 make 60.

2 groups of 15 is 30, so 4 groups is 60.

Lesson 18

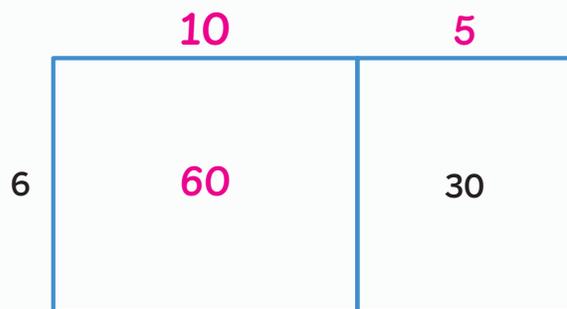
1



18

Lesson 19

1



15 feet

Lesson 20

1 $(120 - 20) \div 4 = n$

2 $(120 + 20) \div 4 = n$