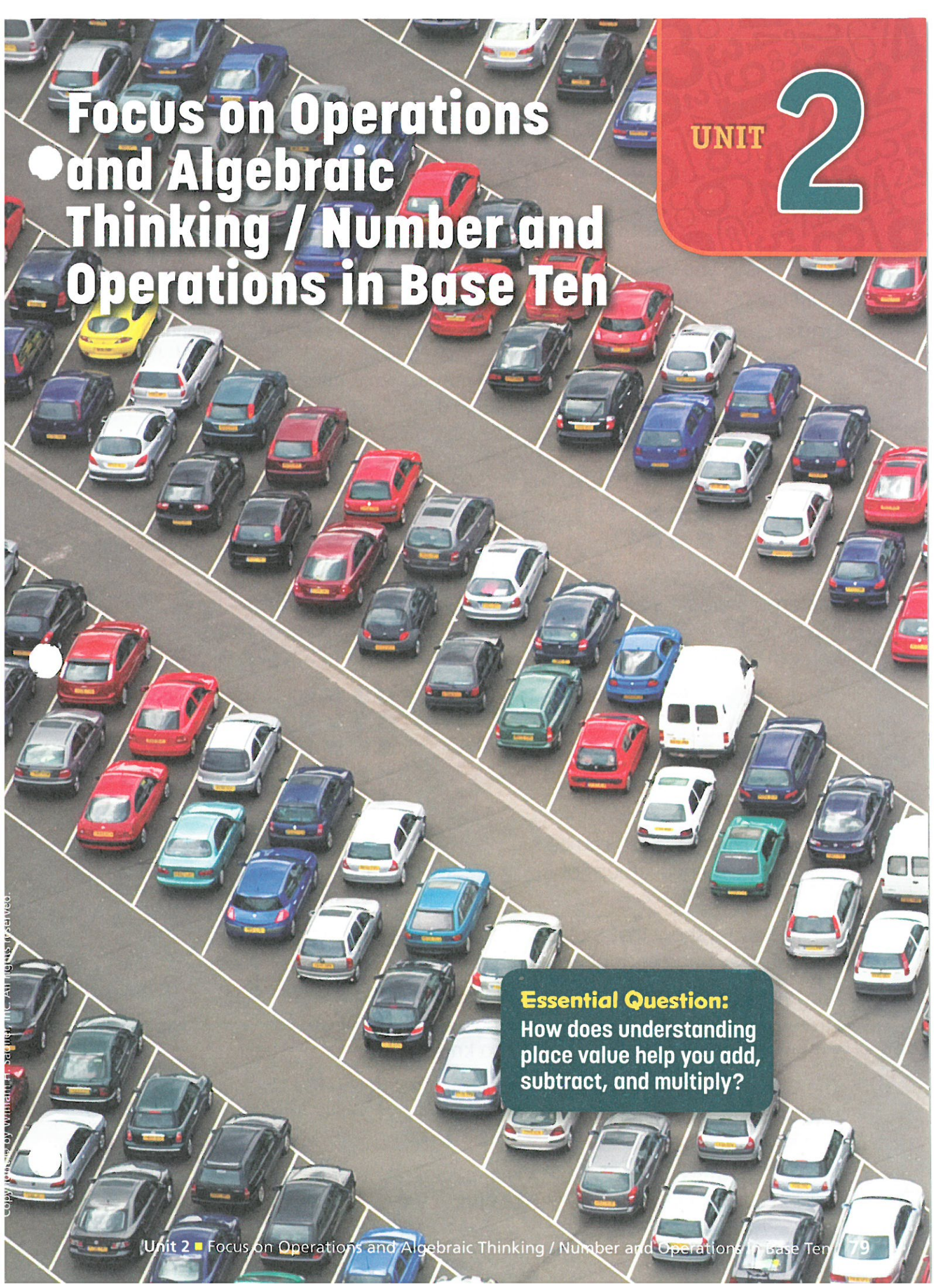


Focus on Operations and Algebraic Thinking / Number and Operations in Base Ten

UNIT 2

Essential Question:
How does understanding place value help you add, subtract, and multiply?

Lesson 9

Multiply and Divide Fluently within 100

Essential Question:
What strategies can you use to multiply and divide with one-digit numbers?

3.OA.7

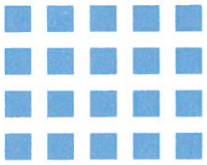
Words to Know:
strategy
Zero Property
Identity Property of Multiplication

Guided Instruction

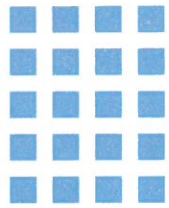
In this lesson you will learn to use different strategies to multiply and divide.

Understand: How multiplication and division are related

You have used an array to show equal groups. What does an array tell you about multiplication and division?



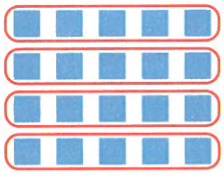
This array shows 4 equal groups of 5.
You can write $4 \times 5 = 20$.



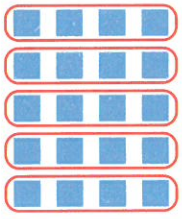
Turn the array to show 5 equal groups of 4.
You can write $5 \times 4 = 20$.

You can also write 4×5 as

$$\begin{array}{r} 4 \\ \times\ 5 \\ \hline 20 \end{array}$$



The array shows that 20 can be divided into 4 equal groups of 5.
You can write $20 \div 4 = 5$.



The turned array shows that 20 can be divided into 5 equal groups of 4.
You can write $20 \div 5 = 4$.

You can also write $20 \div 4$ as $4\overline{)20}$ (5)

▶ The arrays show that multiplication and division are related, because they undo each other.

The relationship between multiplication and division is a strategy or method you can use when you multiply or divide. When you know $4 \times 5 = 20$, you also know that $20 \div 4 = 5$.

The Commutative Property is another strategy you can use to multiply. This tells you that when you know $4 \times 5 = 20$, you also know that $5 \times 4 = 20$.

You can use the relationship between multiplication and division again to undo $5 \times 4 = 20$ to find $20 \div 5 = 4$.

Remember!
The Commutative Property says that changing the order of factors does not change the product.

Guided Instruction

Understand: How to use properties of multiplication to learn facts

The multiplication table shows all 100 products of two 1-digit numbers. You need to learn all of these facts this year. How can using a property of multiplication help?

×	0	1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9
2	0	2	4	6	8	10	12	14	16	18
3	0	3	6	9	12	15	18	21	24	27
4	0	4	8	12	16	20	24	28	32	36
5	0	5	10	15	20	25	30	35	40	45
6	0	6	12	18	24	30	36	42	48	54
7	0	7	14	21	28	35	42	49	56	63
8	0	8	16	24	32	40	48	56	64	72
9	0	9	18	27	36	45	54	63	72	81

The left column and the top row show factors. To find a product of two factors, move across a row and down a column until you reach a box where the row and the column meet. The number in that box is the product of those two factors.

The red row and column show that $7 \times 3 = 21$.

×	0	1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9
2	0	2	4	6	8	10	12	14	16	18
3	0	3	6	9	12	15	18	21	24	27
4	0	4	8	12	16	20	24	28	32	36
5	0	5	10	15	20	25	30	35	40	45
6	0	6	12	18	24	30	36	42	48	54
7	0	7	14	21	28	35	42	49	56	63
8	0	8	16	24	32	40	48	56	64	72
9	0	9	18	27	36	45	54	63	72	81

The Commutative Property helps you learn two facts at the same time.

Notice that the green row and column show that $3 \times 7 = 21$. For every multiplication fact with two different factors, there is another fact with the order of the factors changed.

×	0	1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9
2	0	2	4	6	8	10	12	14	16	18
3	0	3	6	9	12	15	18	21	24	27
4	0	4	8	12	16	20	24	28	32	36
5	0	5	10	15	20	25	30	35	40	45
6	0	6	12	18	24	30	36	42	48	54
7	0	7	14	21	28	35	42	49	56	63
8	0	8	16	24	32	40	48	56	64	72
9	0	9	18	27	36	45	54	63	72	81

The Zero Property says that if you multiply any number by 0, the product is 0.

The purple row and column use the Zero Property. The product for all facts that have 0 as a factor is 0.

×	0	1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9
2	0	2	4	6	8	10	12	14	16	18
3	0	3	6	9	12	15	18	21	24	27
4	0	4	8	12	16	20	24	28	32	36
5	0	5	10	15	20	25	30	35	40	45
6	0	6	12	18	24	30	36	42	48	54
7	0	7	14	21	28	35	42	49	56	63
8	0	8	16	24	32	40	48	56	64	72
9	0	9	18	27	36	45	54	63	72	81

The Identity Property of Multiplication says that if you multiply any number by 1, the product is that number.

The orange row and column use the Identity Property. The product for all facts with 1 as a factor is the other factor itself.

×	0	1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9
2	0	2	4	6	8	10	12	14	16	18
3	0	3	6	9	12	15	18	21	24	27
4	0	4	8	12	16	20	24	28	32	36
5	0	5	10	15	20	25	30	35	40	45
6	0	6	12	18	24	30	36	42	48	54
7	0	7	14	21	28	35	42	49	56	63
8	0	8	16	24	32	40	48	56	64	72
9	0	9	18	27	36	45	54	63	72	81

Using a property is a strategy that helps save time and work while you learn all the multiplication facts.

Guided Instruction

Connect: Using what you know to multiply and divide within 100

What are some other strategies you can use for multiplying and dividing within 100?

You can skip count by 2s or by 5s, so you can multiply by 2 or 5.

×	0	1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9
2	0	2	4	6	8	10	12	14	16	18
3	0	3	6	9	12	15	18	21	24	27
4	0	4	8	12	16	20	24	28	32	36
5	0	5	10	15	20	25	30	35	40	45
6	0	6	12	18	24	30	36	42	48	54
7	0	7	14	21	28	35	42	49	56	63
8	0	8	16	24	32	40	48	56	64	72
9	0	9	18	27	36	45	54	63	72	81

Look at the red and blue rows and columns. The numbers you see in the red column and row are the numbers you would use to count by 2s: 2, 4, 6, 8, 10, 12, 14, 16, and 18. The numbers you see in the blue column and row are the numbers you would use to count by 5s: 5, 10, 15, 20, 25, 30, 35, 40, and 45.

You know that division undoes multiplication. You can use a multiplication table to find quotients. First find the divisor in the top row of factors. Next move down the column until you find the dividend. Then move left to the column of factors. The factor you find is the quotient.

×	0	1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	
2	0	2	4	6	8	10	12	14	16	18
3	0	3	6	9	12	15	18	21	24	27
4	0	4	8	12	16	20	24	28	32	36
5	0	5	10	15	20	25	30	35	40	45
6	0	6	12	18	24	30	36	42	48	54
7	0	7	14	21	28	35	42	49	56	63
8	0	8	16	24	32	40	48	56	64	72
9	0	9	18	27	36	45	54	63	72	81

To find 42 ÷ 7, go to the 7 in the top row of factors. Move down until you find 42. Then move left to the column of factors where you find 6. $42 \div 7 = 6$

You know how to use the Distributive Property to find a product. To find 6×8, start by breaking apart 8.

$6 \times 8 = 6 \times (5 + 3)$ ← Break 8 apart into 5 + 3.
$= (6 \times 5) + (6 \times 3)$ ← Multiply both addends by 6.
$= 30 + 18$ ← Add the two products.
$= 48$ ← The product of 6×8.

Using 5 as one of the addends means you will use a 5s fact.

Some strategies for multiplying and dividing are skip counting, undoing multiplication, and using the Distributive Property.

• Choose a fact that you are not sure of. Explain a strategy that you can use to learn it.

Guided Practice

Multiply. Use the Zero Property and the Identity Property.

1. $5 \times 0 =$ ____
2. $1 \times 9 =$ ____
3. $1 \times$ ____ $= 0$

Multiply. Skip count by 2s or 5s to help.

4. $5 \times 7 =$ ____
5. $7 \times 2 =$ ____
6. $2 \times$ ____ $= 18$

Divide. Write the related multiplication.

7. $28 \div 7 =$ ____ The related multiplication is _____.
8. $36 \div 4 =$ ____ The related multiplication is _____.
9. $56 \div 8 =$ ____ The related multiplication is _____.
10. $81 \div 9 =$ ____ The related multiplication is _____.

Multiply or divide. Use any strategy you like.

11. $1 \times 5 =$ ____
12. $3 \times 5 =$ ____
13. $5 \times$ ____ $= 25$

14. $\begin{array}{r} 6 \\ \times\ 2 \\ \hline \end{array}$
15. $\begin{array}{r} 6 \\ \times\ 0 \\ \hline \end{array}$
16. $\begin{array}{r} 6 \\ \times\ 3 \\ \hline \end{array}$

17. $10 \div 2 =$ ____
18. $15 \div 3 =$ ____
19. $12 \div 3 =$ ____

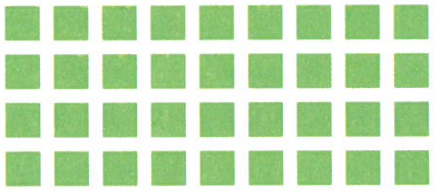
20. $2\overline{)14}$
21. $2\overline{)12}$
22. $2\overline{)16}$

Think•Pair•Share

MP1 23. Explain two strategies you can use to find $42 \div 7$. What is the quotient?

Independent Practice

1. Use the array. Write four related multiplications and divisions.



___ × ___ = ___

___ × ___ = ___

___ ÷ ___ = ___

___ ÷ ___ = ___

2. Which property says that 8 × 0 = 0?

a. Associative Property

b. Commutative Property

c. Distributive Property

d. Zero Property

3. Which property says that 8 × 9 = 9 × 8?

a. Associative Property

b. Commutative Property

c. Distributive Property

d. Zero Property

Find the product.

4. 1 × 9 = ___

5. 9 × 2 = ___

6. 3 × 9 = ___

7. 5 × 9 = ___

8. 9 × 8 = ___

9. 0 × 9 = ___

10. 9 × 6 = ___

11. 9 × 9 = ___

12. Which multiplication could you use to find *n*?

$24 \div 3 = n$

a. 8 × 3 = 24

b. 6 × 4 = 24

c. 4 × 6 = 24

d. 1 × 24 = 24

13. Which division could you use to find *n*?

$3 \times n = 12$

a. 12 ÷ 1 = 12

b. 12 ÷ 2 = 6

c. 12 ÷ 3 = 4

d. 12 ÷ 6 = 2

Independent Practice

Divide. Write the related multiplication.

14. 18 ÷ 3 = ____ The related multiplication is _____.

15. 45 ÷ 5 = ____ The related multiplication is _____.

16. 64 ÷ 8 = ____ The related multiplication is _____.

17. 72 ÷ 9 = ____ The related multiplication is _____.

Find the product.

18. 8 × 0 = ____

19. 5 × 1 = ____

20. 8 × 6 = ____

21. 6 × 3 = ____

22. 9 × 5 = ____

23. 7 × 6 = ____

24.
$$\begin{array}{r} 4 \\ \times\ 2 \\ \hline \end{array}$$

25.
$$\begin{array}{r} 0 \\ \times\ 6 \\ \hline \end{array}$$

26.
$$\begin{array}{r} 4 \\ \times\ 4 \\ \hline \end{array}$$

27.
$$\begin{array}{r} 8 \\ \times\ 7 \\ \hline \end{array}$$

28.
$$\begin{array}{r} 7 \\ \times\ 1 \\ \hline \end{array}$$

29.
$$\begin{array}{r} 2 \\ \times\ 5 \\ \hline \end{array}$$

Find the quotient.

30. 24 ÷ 6 = ____

31. 35 ÷ 7 = ____

32. 42 ÷ 6 = ____

33. 63 ÷ 7 = ____

34. 45 ÷ 9 = ____

35. 48 ÷ 8 = ____

36. $3\overline{)12}$

37. $2\overline{)8}$

38. $1\overline{)9}$

39. $3\overline{)21}$

40. $6\overline{)54}$

41. $8\overline{)56}$

Independent Practice

MP6 **42.** Tell how you would find m. Then solve.

$m = 7 \times 9$

Answer ____ $= 7 \times 9$

MP7 **43.** Marcus knows that $2 \times 7 = 14$. How can he use that fact to find the answer to 4×7?

Answer $4 \times 7 =$ ____

MP8 **44.** Simone knows that 8 groups of 6 make 48. How can she find $48 \div 6$?

Answer $48 \div 6 =$ ____

Solve the problems.

MP2 **45.** The school band has 9 rows, with 9 students in each row. How many students are in the band?

Show your work.

Answer _____

Independent Practice

MP1 **46.** For a long camping trip, the Rubio family packed 42 apples. Mr. and Mrs. Rubio and their four children will each eat one apple a day. How many days will it take the Rubio family to eat all the apples?

Show your work.

Answer _____

MP7 **47.** Rey says that for the equation $472 = ? \times 472$, the unknown is 1. Is he correct?

Answer _____

Justify your answer using words, drawings, or numbers.

MP3 **48.** Chiyo knows that $2 \times 8 = 16$. She uses this fact to find that $16 = 8 \div 2$. Is her answer correct? Explain your thinking.

Answer _____

Justify your answer using words, drawings, or numbers.

Lesson 10

Problem Solving: Two-Step Problems

Essential Question:
How can you use two steps to solve a problem?

3.OA.8

Words to Know:
operations
estimation
compatible numbers

Guided Instruction

In this lesson you will learn how to solve word problems with two steps.

Understand: Solving a two-step word problem

> The Maroni family bought 3 lunches for $5 each and 1 lunch for $7. How much did the lunches cost in all?

Read to find the information and the question.

3 lunches cost $5 each and 1 lunch cost $7.
What is the cost of all the lunches?

Plan how to find the answer.

Draw a diagram to represent the problem.

Total cost of the lunches			
$5	$5	$5	$7

You can use the diagram and two operations to find the total cost.

First find the cost of the three $5 lunches. Multiply. ← $3 \times \$5$
Then add the cost of the $7 lunch. ← $+ \$7$

Solve the problem.

$3 \times \$5 = \$15$
$\$15 + \$7 = \$22$

You use two steps to find the answer, so this is a two-step word problem.

▶ The lunches cost $22 in all.

Check your work. Make sure your solution answers the question in the problem.

You can work backward to check whether the answer is reasonable.

Start at the end and work back to the beginning.

$\$22 - (\$7 + \$5 + \$5 + \$5)$ should equal 0.
$\$22 - \$22 = 0$

The check shows that the answer is reasonable.

Guided Instruction

Understand: Checking that an answer is reasonable

Greenmount School has 627 students. One day, 48 students are absent. Another 103 students are on a field trip. How many students are at the school that day?

First read to find the information you will need to solve the problem. Ask the question in your own words.

The school has 627 students. 48 are absent. 103 are on a field trip. How many students are at the school?

Next plan what you will do and how you will find the answer.

Use a diagram to represent the problem.

627 students		
____ absent	103 on trip	?

Find the number of students that are not at the school. Add. ← 48 + 103
hen subtract the sum from 627. ← 627 − (48 + 103)

Write an equation. Let ■ be the number of students at the school. Solve to find the answer.

■ = 627 − (48 + 103)

■ = 627 − _____

■ = 476

There are _____ students at the school that day.

Check your work. Use estimation with compatible numbers, to see whether the answer makes sense. Compatible numbers are numbers that are easy to add and subtract.

Estimate: 627 − (48 + 103) should be close to
600 − (50 + 100) = 600 − 150 = 450

627 is close to 600.
48 is close to 50.
103 is close to 100.

Compare the answer and the estimate.

476 is close to 450, so the answer _____ sense.

Guided Instruction

Connect: Why checking your answer is important when solving a problem

Kimi made 20 popcorn balls for a party. She ate 2 popcorn balls and put the rest in bags of 3 each. How many bags of popcorn balls does Kimi have?

Step 1

Read to find what the problem is asking. Then find the information you need.

Kimi made ____ popcorn balls.

Kimi ate ____ popcorn balls.

Kimi put the rest in bags of ____ each.

How many _____ does she have?

Step 2

Plan how to use two steps to find the answer.

First find the number of popcorn balls Kimi put into bags of 3 each. Draw a diagram.

Then find the number of bags.

20 popcorn balls	
ate 2	? left to put in bags of 3

Step 3

Solve the problem.

$20 - 2 =$ ____

$18 \div 3 =$ ____

Kimi has ____ bags of popcorn balls.

Step 4

Explain how to check your answer.

Guided Practice

1. Riley has 9 crayons. Terrell has twice as many crayons as Riley. How many crayons do they have in all?

   a. Read to understand. What is the question?

   _____

   b. Explain how you plan to solve the problem.

   _____

   c. Then solve to find the answer.

   Riley and Terrell have ____ crayons in all.

   d. Check to show that your answer makes sense. Explain your reasoning.

Think•Pair•Share

MP1 2. Write a two-step word problem. Then find the answer. Check that your answer is reasonable.

Independent Practice

Follow the steps to solve the problems.

MP4 **1.** On a vacation, the Jones family travels 722 miles in three days. They travel 328 miles the first day and 115 miles the second day. How many miles do they travel on the third day?

a. Read. What information is in the problem?

b. Plan. What will you do?

c. Solve. What is your answer?

Remember to label your answer.

Answer The family traveled _____ on the third day.

d. Check. Explain why your answer is reasonable.

MP1 **2.** Taylor has 4 packages of stickers. Each package has 10 stickers in it. Leah has 14 fewer stickers than Taylor. How many stickers does Leah have?

a. Read. Underline the information you need.

b. Plan. What will you do?

c. Solve. What is your answer?

Answer Leah has ____ stickers.

d. Check. Explain why your answer is reasonable.

Independent Practice

MP2 **3.** At a basketball tournament, each of the 8 teams has 9 players and a coach. There are 100 bottles of water. How many bottles of water are left over after each player and coach get 1 bottle?

a. Read to find the information in the problem.

b. Plan what you will do.

c. Solve to find the answer.

What label will you use for your answer?

Answer There will be _____ of water left over.

d. Explain why your answer makes sense.

MP1 **4.** Mikhail has 48 stamps. His uncle gives him 15 more. The pages in his small stamp book have spaces for 9 stamps. How many pages can he fill with the stamps he has now?

a. As you read, underline the information you need.

b. What is your plan?

c. Solve to answer the question.

Answer Mikhail can fill _____ with his stamps.

d. Explain why your answer is reasonable.

Independent Practice

MP2 **5.** Trane has 145 marbles. He gives 20 to Katie, 52 to Gwen, and 31 to Yusef. He keeps the rest. Who has the most marbles?

a. Trane

b. Katie

c. Gwen

d. Yusef

Solve the problems. Check that your answer is reasonable.

MP4 **6.** Erica planted 9 zinnias each in 2 big pots. She planted another 49 zinnias, one in each small pot. How many zinnias did she plant in all?

Show your work.

Answer _____

MP6 **7.** For the school play, most of the chairs are in rows of 10 each, with one row of 8 chairs. If there are 78 chairs altogether, how many rows are there?

Show your work.

Answer _____

Independent Practice

MP3 **8.** Mr. Cook bakes 6 pans of fruit bars for a bake sale. He cuts each pan into 9 bars. He eats one bar and wraps 5 to go in his freezer. He puts the rest in a box to take to the bake sale. How many fruit bars does Mr. Cook take to the bake sale?

· Show your work.

Answer _____

MP1 **9.** When Sean adds 202 + 124 + 192, he finds that the sum is 518. To check his work, he estimates that the sum is about 600. He sees that his estimate does not agree with his answer. Which is correct, Sean's answer or his estimate?

Answer _____

· Justify your answer using words, drawings, or numbers.

MP3 **10.** Farah and her aunt are making 3 batches of jam. Each batch makes 7 jars of jam. To be sure there are enough jars, Farah's aunt wants to have 2 extra jars ready for each batch. How many jars does Farah need to get ready for the 3 batches?

· Show your work.

Answer _____

Lesson
11 Problem Solving: Use Equations

Essential Question:
How can you use an equation to solve a problem?
3.OA.8

Guided Instruction

In this lesson you will learn how to write an equation to represent a word problem.

Understand: Writing an equation for a two-step word problem

Reid buys a box of crayons for 75¢ and 3 stickers for 8¢ each. What is the total cost of these items?

Read to find the information and the question.

The crayons cost 75¢ and the stickers each cost 8¢.
What is the total cost of the items?

Plan how to find the answer. Write an equation.

total cost of items = cost of crayons + cost of stickers ← Start with words.
t = 75¢ + (3 × 8¢) ← Represent the words.

Solve the equation to find the total cost.

$t = 75¢ + (3 \times 8¢)$
$t = 75¢ + 24¢$ ← Multiply 3 × 8.
$t = 99¢$ ← Add 75 + 24.

▶ The total cost of the items is 99¢.

Estimate to check your answer.

75¢ is close to 80¢.
8¢ + 8¢ + 8¢ is 24¢, which is close to 20¢.
80¢ + 20¢ = 100¢.

Comparing 100¢ and 99¢ shows that the estimate and the answer are very close to each other.

This means that 99¢ is a reasonable answer.

Guided Instruction

Understand: Using diagrams in solving two-step word problems

> Sabrena bikes 3 miles a day. Her goal is to bike 25 miles. After 6 days, how many more miles must Sabrena bike to meet her goal?

After you read, describe the problem in words.

number of miles more
equals 25 miles minus 6 days times 3 miles a day

Use the words to write an equation.

Represent the words with numbers and symbols.

$m = 25 - (6 \times 3)$ ← Use m to represent the number of miles more

Solve the equation to find the answer.

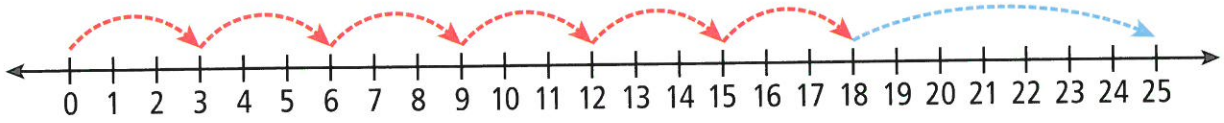
$m = 25 - (6 \times 3)$

$m = 25 - 18$ ← Multiply 6×3.

$m = 7$ ← Subtract: $25 - 18$.

▶ Sabrena must bike ____ more miles to meet her goal.

Draw a number line to check your answer.



6 times 3 equals 18, and 18 plus 7 equals 25.

· Look at the problem. Find another way to solve it.

Guided Instruction

Connect: Using a diagram and writing an equation

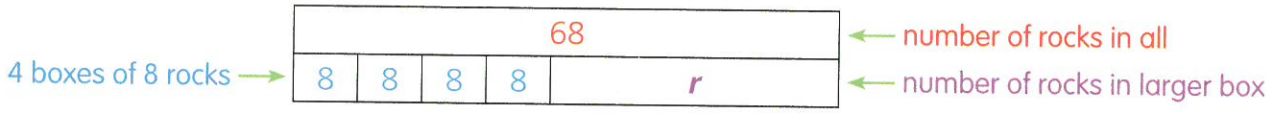
The 68 rocks in John's rock collection are stored in 5 boxes. Four small boxes hold 8 rocks each. The fifth box is larger and holds the rest of the rocks. How many rocks are in the fifth box?

Step 1

Read the problem again and underline the information you need.

Step 2

Draw a diagram to help plan your work.



The diagram shows how you can write an equation.

number of rocks in larger box = number of rocks in all − 4 boxes of 8 rocks

$r = 68 - (4 \times 8)$

Step 3

Solve the equation to find the answer.

$r = 68 - (4 \times 8)$

$r = 68 - \_\_\_\_$

$r = \_\_\_\_$

What label should you use for your answer?

There are _____ in the fifth box.

Step 4

Check that your answer is reasonable.

Estimate. 68 is close to ____. 8 is close to 10, and $4 \times 10 =$ ____.

$70 - 40 =$ ____

Compare 30 and 36.

36 is close to 30, so 36 is a _____ answer.

Guided Practice

1. The Durands are driving 900 miles to visit their cousins. The first day they drive 385 miles. The second day they drive 319 miles. How many miles do they have left to drive?

   a. Read the problem again. Underline information and the question.

   b. Explain how you plan to solve the problem.

   _____

   c. Solve to find the answer.

   d. Explain how you can check to show that your answer makes sense.

Answer The Durands have _____ left to drive.

Think•Pair•Share

MP7 2. One way to solve a two-step problem is to find and solve the two one-step problems that are inside the two-step problem. Look at problem 1. Explain what the two one-step problems are and solve them. Compare your answer with your answer to problem 1.

Independent Practice

Circle the letter of the correct answer.

1. Xavier shoots 75 baskets on Monday and 110 baskets on Tuesday. His goal is to shoot a total of 500 baskets by the end of the week. How many baskets does he have left to shoot?

   Which equation could you use to solve this problem?

   a. $75 + 110 = b + 500$

   b. $110 - 75 + b = 500$

   c. $75 + 100 - b = 500$

   d. $75 + 110 + b = 500$

2. In Natalie's class, August has 3 times as many birthdays as February. September has 2 fewer birthdays than August. There are 4 birthdays in February. How many birthdays are in September?

   Which equation could you use to solve this problem?

   a. $3 \times 4 = s$

   b. $(3 \times 4) - 2 = s$

   c. $(3 \times 4) + 2 = s$

   d. $3 \times 4 \times 2 = s$

3. Taren bikes 2 miles to school each day, and 2 miles back home. How many miles does Taren bike in 5 days?

   Which equation could you use to solve this problem?

   a. $5 \times (2 + 2) = t$

   b. $5 \times (2 - 2) = t$

   c. $2 + (2 \times t) = 5$

   d. $2 + 5 + t = 10$

Independent Practice

As you read each problem, underline information you need. Follow the steps to solve. Show your work.

MP2 **4.** Jia-li needs 32 trading cards to fill her album. Each of 4 friends gives her 6 cards. How many more cards does Jia-li need?

a. What information helps you write an equation?

_____

b. Write and solve an equation.

c. Check your answer. Does it make sense? Explain.

Answer Jia-li needs ____ more cards.

MP1 **5.** Five hundred seventy-nine students are at school today. Three hundred fifteen students rode the bus, ninety-four rode to school in a car, and the rest walked to school. How many students walked to school today?

a. What information can you use to write an equation?

b. Write and solve an equation to find the answer.

c. Check to show that your answer is reasonable.

Answer Today, ____ students walked to school.

Independent Practice

Write an equation to solve. Tell how you checked your answer.

MP4 **6.** A delivery truck was carrying 136 packages. At the next stop, 25 packages were dropped off and 13 packages were picked up. How many packages did the truck carry then?

Show your work.

Answer The truck carried _____ after the stop.

MP6 **7.** Ana filled 9 baskets with blueberries at the farm. Jeremiah filled three times as many baskets as Ana. How many baskets of blueberries did they fill together?

Show your work.

Answer Jeremiah and Ana together filled _____ with blueberries.

Independent Practice

MP5 **8.** For a food drive, Jack collected 3 cans of food from each of 8 neighbors. His goal is 30 cans of food. How many more cans does he need?

Show your work.

Answer Jack needs ____ more cans of food.

MP7 **9.** Lillian is shopping for a bicycle. The red bike costs $79 more than the blue bike. The blue bike costs $18 less than the yellow bike. The yellow bike costs $125. How much does the red bike cost?

Show your work.

Answer The red bike costs _____.

Lesson
12 Identify and Explain Arithmetic Patterns

Essential Question:
How can you identify and explain arithmetic patterns?
3.OA.9

Words to Know:
pattern
odd
even
rule

Guided Instruction

In this lesson you will work with arithmetic patterns, including patterns in the multiplication and addition tables.

Understand: Patterns in the multiplication table

Look at the multiplication table.
What patterns do you see?

×	0	1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9
2	0	2	4	6	8	10	12	14	16	18
3	0	3	6	9	12	15	18	21	24	27
4	0	4	8	12	16	20	24	28	32	36
5	0	5	10	15	20	25	30	35	40	45
6	0	6	12	18	24	30	36	42	48	54
7	0	7	14	21	28	35	42	49	56	63
8	0	8	16	24	32	40	48	56	64	
9	0	9	18	27	36	45	54	63	72	81

Remember that the numbers in the blue boxes at the top and the left are factors. Use them to identify a row or a column.

Look at the 1 column and the 1 row. The numbers are the same. Every column has a matching row with the same numbers. This is just one pattern that you can see in the multiplication table.

Look at the 3 row. The difference between 2 numbers next to each other in that row is 3. Notice that 3 is the factor for that row. This kind of pattern is true for all rows.

Look at the 6 column. The difference between 2 numbers above and below each other in that column is 6. Notice that 6 is the factor for that column. This kind of pattern is true for all columns.

Look at the 7 row. Start with the 1 column. The product 7×1 is odd. An odd number always has one left over when broken into equal addends. Look at the 2 column. The product 7×2 is even. An even number can be broken down into two equal addends. This pattern continues across the row.

There are many number patterns in the multiplication table.

Find another pattern in the multiplication table.

Guided Instruction

Understand: Patterns in the addition table

Look at the addition table.
What patterns do you see?

+	0	1	2	3	4	5	6	7	8	9
0	0	1	2	3	4	5	6	7	8	9
1	1	2	3	4	5	6	7	8	9	10
2	2	3	4	5	6	7	8	9	10	11
3	3	4	5	6	7	8	9	10	11	12
4	4	5	6	7	8	9	10	11	12	13
5	5	6	7	8	9	10	11	12	13	14
6	6	7	8	9	10	11	12	13	14	15
7	7	8	9	10	11	12	13	14	15	16
8	8	9	10	11	12	13	14	15	16	17
9	9	10	11	12	13	14	15	16	17	18

The numbers in the green boxes at the top and the left are addends. Use them to identify a row or a column.

Look at the 1 column and the 1 row. The numbers are the same. Every column has a matching row.

Look at the 3 row. Each number is ____ greater than the one before it. This pattern is true for all rows and columns.

Look at the 6 column. Each number is 1 _____ than the one ter it. This pattern is true for all rows and columns.

Look at the 7 row. The first number is _____, the next one is _____, and this pattern continues across the row. You can find this pattern in any row or column with an odd addend.

There are many number patterns in the addition table.

Find another pattern in the addition table.

Understand: Rules for patterns

Look at the 6 row. What pattern do you see? Describe its rule.

A rule for a pattern tells what number to start with and how to find the next number in the pattern.

The pattern in the 6 row shows that the row starts with 6, and each number is 1 more than the one before it.

The pattern rule is: Start with 6. Add 1.

Guided Instruction

Connect: Patterns and multiplying by 9

Some students think that learning the facts for the 9s multiplications is difficult. How can using patterns make it easier to learn the 9s facts?

Complete this table to look for patterns in the 9s multiplications.

9s fact	Sum of the digits in the product	Digit in tens place in the product	Digit in ones place in the product
9 × 1 = 09	0 + 9 = 9	0	9
9 × 2 = 18	1 + 8 = 9	1	8
9 × 3 = 27	2 + 7 = ____	2	7
9 × 4 = 36	3 + 6 = ____		
9 × 5 = 45	4 + 5 = ____		
9 × 6 = 54			
9 × 7 = 63			
9 × 8 = 72			
9 × 9 = 81			

The sum of the digits in the products for all the 9s facts is ____.

The pattern of the digits in the tens place for the 9s facts is that the digits increase by ____ for each multiplication.

The pattern of the digits in the ones place for the 9s is that the digits are 1 _____ for each multiplication.

For any 9s fact, the digit in the _____ place is 1 less than the factor you multiply by 9.

▶ The patterns in the 9s multiplications show relationships that make them easier to remember.

✏ Explain how you can use these patterns to find 9 × 7.

Guided Practice

Use the addition table for exercises 1–4.

1. Complete the addition table.

+	0	1	2	3	4	5	6	7	8	9
0	0	1	2	3	4	5	6	7		
1	1	2	3	4	5	6	7	8		
2	2	3	4	5	6	7	8	9		
3	3	4	5	6	7	8	9	10		
4	4	5	6	7	8	9	10	11		
5	5	6	7	8	9	10	11	12		
6										
7										
8										
9										

2. Describe two patterns you see in the addition table.

3. How can you use the addition table to find the sum of 5 + 9 two different ways?

4. Look at the row and column for 0. What can you say about the sum of any number and 0? Explain.

Think•Pair•Share

MP7 5. The house numbers on the south side of East Street form a pattern. Write the next three house numbers. Explain how you decided on the next three house numbers.

4	8	12	16			

Independent Practice

1. Complete the multiplication table for factors to 10.

×	0	1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0	0	
1	0	1	2	3	4	5	6	7	8	9	
2	0	2	4	6	8	10	12	14	16	18	
3	0	3	6	9	12	15	18	21	24	27	
4	0	4	8	12	16	20	24	28	32	36	
5	0	5	10	15	20	25	30	35	40	45	
6	0	6	12	18	24	30	36	42	48	54	
7	0	7	14	21	28	35	42	49	56	63	
8	0	8	16	24	32	40	48	56	64	72	
9	0	9	18	27	36	45	54	63	72	81	
10											

MP7 2. What pattern do you see in the 10 row and the 10 column? Describe the pattern. Then name the pattern rule.

Rule: _____

Multiply. Then draw lines to match each pair of products.

3. $4 \times 9 =$ ____

4. $5 \times 7 =$ ____

5. $1 \times 8 =$ ____

6. $3 \times 6 =$ ____

a. $8 \times 1 =$ ____

b. $6 \times 3 =$ ____

c. $7 \times 5 =$ ____

d. $9 \times 0 =$ ____

e. $9 \times 4 =$ ____

MP8 7. Use exercises 3–6. What do you notice about each pair of products? What property of multiplication does this show?

Independent Practice

Use the multiplication table for exercises 8–11.

8. Complete the multiplication table for the factors 3 and 9.

×	0	1	2	3	4	5	6	7	8	9
0	0	0	0		0	0	0	0	0	
1	0	1	2		4	5	6	7	8	
2	0	2	4		8	10	12	14	16	
3										
4	0	4	8		16	20	24	28	32	
5	0	5	10		20	25	30	35	40	
6	0	6	12		24	30	36	42	48	
7	0	7	14		28	35	42	49	56	
8	0	8	16		32	40	48	56	64	
9										

9. Use the multiplication table or skip-counting to find each product.

$0 \times 3 =$ ____
$1 \times 3 =$ ____
$2 \times 3 =$ ____
$3 \times 3 =$ ____
$4 \times 3 =$ ____
$5 \times 3 =$ ____
$6 \times 3 =$ ____
$7 \times 3 =$ ____
$8 \times 3 =$ ____
$9 \times 3 =$ ____
$10 \times 3 =$ ____

$0 \times 9 =$ ____
$1 \times 9 =$ ____
$2 \times 9 =$ ____
$3 \times 9 =$ ____
$4 \times 9 =$ ____
$5 \times 9 =$ ____
$6 \times 9 =$ ____
$7 \times 9 =$ ____
$8 \times 9 =$ ____
$9 \times 9 =$ ____
$10 \times 9 =$ ____

MP7 **10.** What patterns do you see for the products of 3 and the factors 0–9?

MP8 **11.** What patterns do you see for the products of 9 and the factors 0–9?

Independent Practice

Complete the pattern. Then name the pattern rule.

12. 7, 14, 21, ____, ____, ____, ____

Rule: _____

13. 8, 16, 24, ____, ____, ____, ____

Rule: _____

14. 42, 36, 30, ____, ____, ____, ____

Rule: _____

MP8 **15.** Jean says that the product of two odd numbers is always odd. Is Jean's statement correct?

Complete parts a, b, and c to show your work.

a. Find the product of two odd numbers: 3×5.

b. Break apart the product into two addends. Can you break apart the product into two equal addends?

c. Find the products of other pairs of odd numbers. Can you break them apart into two equal addends?

Answer _____

Circle the correct answer.

MP6 **16.** Which statement explains why 6 times a number is always even?

a. You can break apart the product into three equal addends.

b. You can break apart the product into two equal addends.

c. You cannot break apart the product into three equal addends.

d. You cannot break apart the product into two equal addends.

Independent Practice

Solve the problems.

MP7 **17.** Mrs. Gonzalez puts whole-wheat rolls on racks to cool. She puts 12 rolls on the first rack, 18 rolls on the second rack, 24 rolls on the third rack, 30 rolls on the fourth rack, and 36 rolls on the fifth rack. If the pattern continues, how many rolls will Mrs. Gonzalez put on the sixth rack?

· Show your work.

Answer _____

MP3 **18.** Addison uses the multiplication table to find the product of an even number and any other number. He says that sometimes the product is even and sometimes the product is odd. What mistake might Addison have made?

Answer _____

· Justify your answer using words, drawings, or numbers.

MP8 **19.** Kwan says that the product of 9 times an odd number is always odd. Is Kwan's statement correct?

Answer _____

· Justify your answer using words, drawings, or numbers.

Lesson
13 Round Whole Numbers to the Nearest 10 or 100

Essential Question:
How can you round whole numbers?

3.NBT.1

Words to Know:
round

Guided Instruction

In this lesson you will round whole numbers to the nearest 10 or 100.

Understand: Rounding two-digit numbers to the nearest 10

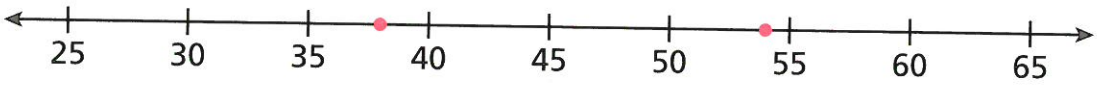
There are 38 third graders at recess. There are 54 fourth graders at recess. About how many students from both grades are at recess?

You can estimate to solve this problem. The word *about* in the question shows that an exact answer is not needed.

A 10 is a number you count when you skip count by 10. The 10s are 10, 20, 30 40, 50, 60, 70, 80, and 90.

One way to estimate is to round numbers before you calculate an answer. Rounding a 2-digit number to the nearest 10 gives a number with 0 in the ones place.

Locate 38 and 54 on the number line.



The number line shows which 10 each number is closest to.

38 is closer to 40 than to 30.
38 rounds to 40.

54 is closer to 50 than to 60.
54 rounds to 50.

Now add 40 + 50 to estimate the answer: 40 + 50 = 90.

▶ About 90 students from both grades are at recess.

You can use these rules to round two-digit numbers.

If the ones digit is 1, 2, 3, or 4, round to the lesser 10.
If the ones digit is 5 or greater, round to the greater 10.

To round 68 using the rules, think:

68 is between 60 and 70. The ones digit is 8, so round to the greater 10. 68 rounds to 70.

Guided Instruction

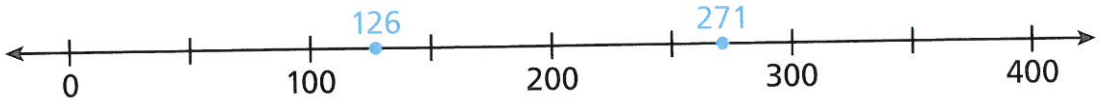
Understand: Rounding three-digit numbers to the nearest 100

Mr. Klein's class counted birds for a science project. They counted 126 blue jays, and 271 robins. To the nearest 100, estimate how many birds the class counted.

The problem asks you to estimate to the nearest 100, so you need to round each number to the nearest 100. This gives numbers with 0 in both the ones place and the tens place.

A 100 is a number you count when you skip count by 100. The 100s are 100, 200, 300, 400, 500, 600, 700, 800, and 900.

You can use a number line to round the numbers to the nearest 100.



Round each number to the nearest 100.

126 is closer to 100 than 200.
126 rounds to 100.

271 is closer to 300 than to 200.
271 rounds to 300.

Now add 100 + 300 to estimate the answer.

100 + 300 = _____ ← You can use mental math.

Mr. Klein's class counted about 400 birds.

You can use these rules to round three-digit numbers.

If the tens digit is 1, 2, 3, or 4, round to the lesser 100.
If the tens digit is 5 or greater, round to the greater 100.

To round 325 using the rules, think:

325 is between 300 and 400.
The tens digit is 2, so round to the lesser 100.

325 rounds to _____.

Why does rounding let you use mental math to make an estimate?

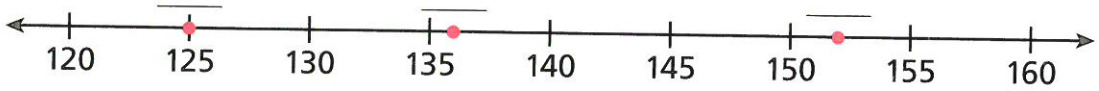
Guided Instruction

Connect: Rounding a three-digit number to the nearest 10

Some friends made a table of the number of jumping jacks they did last week. They want to round to the nearest 10 to estimate how many jumping jacks they did in all. About how many jumping jacks is that?

Our Jumping Jacks	
Marta	125
Liz	152
Kate	136

One way to round to the nearest 10 is to use a number line. Locate the numbers from the problem on the number line.



125 is between 120 and _____. 125 rounds to 130.

136 is between _____ and 140. 136 rounds to _____.

152 is between _____ and _____. 152 rounds to _____.

You can also use rules for rounding to the nearest 10.

When you round a three-digit number to the nearest 10, look at the ones digit to decide how to round.

125 is between _____ and 130. The ones digit is _____, so round to the greater 10. 125 rounds to _____.

136 is between 130 and _____. The ones digit is 6, so round to the _____ 10. 136 rounds to _____.

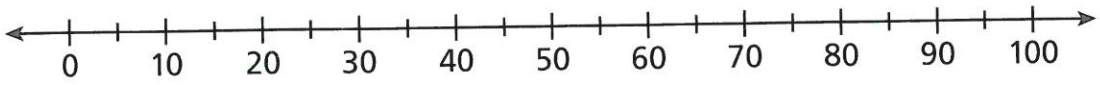
152 is between _____ and _____. The ones digit is _____, so round to the _____ 10. 152 rounds to _____.

To solve the problem, add. 130 + 140 + 150 = _____

The friends did about _____ jumping jacks in all.

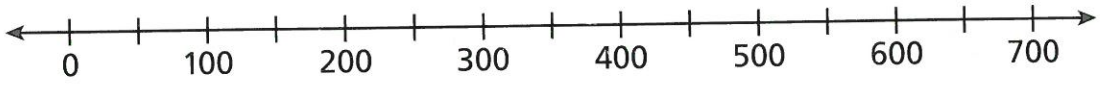
Guided Practice

Round to the nearest 10.



1. 18 _____	**2.** 25 _____	**3.** 49 _____
4. 99 _____	**5.** 7 _____	**6.** 5 _____
7. 3 _____	**8.** 64 _____	**9.** 65 _____
10. 12 _____	**11.** 55 _____	**12.** 88 _____
13. 137 _____	**14.** 272 _____	**15.** 398 _____

Round to the nearest 100.



16. 373 _____	**17.** 105 _____	**18.** 624 _____
19. 99 _____	**20.** 650 _____	**21.** 575 _____
22. 50 _____	**23.** 409 _____	**24.** 14 _____
25. 220 _____	**26.** 468 _____	**27.** 813 _____

Think•Pair•Share

MP3 **28.** Ismael says that 85 rounds to 100. Gabriella says that 85 rounds to 90. Explain why both students' answers could be correct.

Independent Practice

Use the chart for questions 1–14.

0	1	2	3	4	5	6	7	8	9	10
10	11	12	13	14	15	16	17	18	19	20
20	21	22	23	24	25	26	27	28	29	30
30	31	32	33	34	35	36	37	38	39	40
40	41	42	43	44	45	46	47	48	49	50
50	51	52	53	54	55	56	57	58	59	60
60	61	62	63	64	65	66	67	68	69	70
70	71	72	73	74	75	76	77	78	79	80
80	81	82	83	84	85	86	87	88	89	90
90	91	92	93	94	95	96	97	98	99	100

1. Use a marker or crayon. Lightly shade all the numbers that round to the greater 10.

2. Complete the rules for rounding two-digit numbers. Write **lesser** or **greater**.

Rules for Rounding Two-Digit Numbers

a. If a number has a 1, 2, 3, or 4 in the ones place, round to the _____ 10.

b. If a number has a 5, 6, 7, 8, or 9 in the ones place, round to the _____ 10.

Round to the nearest 10.

3. 6 ____ 4. 32 ____ 5. 78 ____

6. 37 ____ 7. 15 ____ 8. 8 ____

9. 84 ____ 10. 63 ____ 11. 1 ____

12. 56 ____ 13. 95 ____ 14. 49 ____

15. 557 ____ 16. 243 ____ 17. 185 ____

Independent Practice

18. Complete the rules for rounding three-digit numbers. Write **lesser** or **greater**.

Rules for Rounding Three-Digit Numbers

a. If a number has a 1, 2, 3, or 4 in the tens place, round to the _____ 100.

b. If a number has a 5, 6, 7, 8, or 9 in the tens place, round to the _____ 100.

Round to the nearest 100.

19. 702 _____	**20.** 425 _____	**21.** 241 _____
22. 329 _____	**23.** 650 _____	**24.** 889 _____
25. 855 _____	**26.** 174 _____	**27.** 817 _____
28. 438 _____	**29.** 499 _____	**30.** 977 _____

Round to the nearest 10 and the nearest 100.

31. 422 nearest 10 _____	**32.** 672 nearest 10 _____
nearest 100 _____	nearest 100 _____
33. 259 nearest 10 _____	**34.** 475 nearest 10 _____
nearest 100 _____	nearest 100 _____
35. 272 nearest 10 _____	**36.** 650 nearest 10 _____
nearest 100 _____	nearest 100 _____
37. 495 nearest 10 _____	**38.** 302 nearest 10 _____
nearest 100 _____	nearest 100 _____

Independent Practice

Solve the problems.

MP1 **39.** Janine walks several days each week. If she walked 35 miles in April and 42 miles in May, about how far did she walk in all? Estimate.

Show your work.

Answer _____

MP8 **40.** Tamika is making a list of animals she has seen. Her list has 27 birds, 13 reptiles, and 42 mammals. About how many animals has she seen?

Show your work.

Answer _____

MP6 **41.** Len buys and sells posters. At the beginning of the year, he had 63 posters. He bought 29 posters and sold 37 posters. About how many posters does he have now?

Show your work.

Answer _____

Independent Practice

MP6 **42.** Ms. Asato's class raised $322 in autumn and $569 in winter for a charity. About how much money did the class raise in all?

Show your work.

Answer _____

MP3 **43.** Jonas rounded 249 to the nearest ten and said it was 250. He rounded 249 to the nearest hundred and said it was 300. Was this correct?

Answer _____

Justify your answer using words, drawings, or numbers.

MP1 **44.** Mrs. Moore drives 161 miles on Friday and 179 miles on Saturday. To estimate how far she drove, first she estimated to the nearest 10 before finding the total. Then she estimated to the nearest 100 before finding the total. Which method gives the closer estimate?

Answer _____

Justify your answer using words, drawings, or numbers.

Lesson

14 Add and Subtract Fluently within 1,000

Essential Question:
How can you add and subtract within 1,000?

3.NBT.2

Words to Know:
- Associative Property of Addition
- Commutative Property of Addition

Guided Instruction

In this lesson you will use strategies to add and subtract within 1,000.

Understand: Using place-value methods to add and subtract

At the school fair, the students bought 172 veggie burgers and 265 hamburgers. How many burgers did the students buy in all? How many more hamburgers than veggie burgers did the students buy?

To find how many burgers in all, add 172 + 265. Two strategies are: adding in each place first and using expanded form.

Add in Each Place First

$$\begin{array}{r} 172 \\ +265 \\ \hline 300 \\ 130 \\ 7 \\ \hline 437 \end{array}$$

← Add the hundreds.
← Add the tens.
← Add the ones.
← Add everything.

Use Expanded Form

$$\begin{array}{rl} 172 \rightarrow & 100 + 70 + 2 \\ +265 \rightarrow & \underline{200 + 60 + 5} \\ & 300 + 130 + 7 \end{array}$$

← Add each place.

$$430 + 7$$

← Add 100s and 10s.

$$437$$

← Add on the ones.

➡ The students bought 437 burgers in all.

To find how many more hamburgers than veggie burgers the students buy, you subtract. Two strategies are to ungroup first and to use expanded form.

Ungroup First

$$\begin{array}{r} {\scriptstyle 1\ 16} \\ 2\not{6}5 \\ -172 \\ \hline 93 \end{array}$$

← Ungroup hundreds and tens.

Use Expanded Form

$$\begin{array}{rl} 265 \rightarrow & 200 + 60 + 5 \rightarrow \\ -172 \rightarrow & \underline{100 + 70 + 2} \rightarrow \end{array} \quad \begin{array}{r} 100 + 160 + 5 \\ -\underline{100 + 70 + 2} \\ 90 + 3 \\ 93 \end{array}$$

➡ The students buy 93 more hamburgers than veggie burgers.

Guided Instruction

Understand: Using properties of addition to find sums

A strategy for finding sums is to use properties of addition.

When you add, changing the grouping of addends does not change the sum. This property is called the Associative Property of Addition.

When you add, changing the order of addends does not change the sum. This property is called the Commutative Property of Addition.

Find the sum of 57 and 94.

$57 + 94$

$(50 + 7) + (90 + 4)$ ← Decompose into 10s and 1s.

$50 + (7 + 90) + 4$ ← Use the Associative Property to change the grouping.

$50 + (90 + 7) + 4$ ← Use the Commutative Property to change the order.

$(50 + 90) + (7 + 4)$ ← Use the Associative Property to change the grouping.

$140 + 11$ ← Add the 10s. Add the 1s.

151 ← Add to find the sum.

▶ The sum of 57 and 94 is 151.

When you can add and subtract quickly and accurately, you can use both of these strategies to calculate mentally.

Understand: Adding on to subtract

You can add on to subtract because of the relationship between addition and subtraction.

Find $179 - 37$.

37 ← Start with the number being subtracted.

$37 + 3 = 40$ ← Add on to go to the next 10.

$40 + 60 = 100$ ← Add on to go to the next 100.

$100 + 79 = 179$ ← Add on to go to the number being subtracted from.

$3 + 60 + 79 = 142$ ← The sum of the add-ons is the difference.

▶ The difference $179 - 37$ is 142.

Guided Instruction

Connect: Add and subtract three-digit numbers

The school librarian bought 473 books this year. He bought 419 books last year. How many books did the librarian buy in all? How many more books did he buy this year?

To answer the first question, you can add.

Find the sum. $473 + 419 = \square$

Add the ones. Regroup 12 ones as 1 ten and 2 ones.

	h	t	o
		1	
+	4	7	3
	4	1	9
			2

Add the tens.

	h	t	o
		1	
+	4	7	3
	4	1	9
		9	2

Add the hundreds.

	h	t	o
		1	
+	4	7	3
	4	1	9
	8	9	2

Subtract to check.

	h	t	o
		8	12
−	8	9	2
	4	1	9
	4	7	3

The librarian bought ____ books in all.

To answer the second question, you can subtract.

Find the difference: $473 - 419 = \square$.

To subtract the ones, first regroup the tens. Then subtract.

	h	t	o
		6	13
−	4	7	3
	4	1	9
			4

Subtract the tens.

	h	t	o
		6	13
−	4	7	3
	4	1	9
		5	4

Subtract the hundreds.

	h	t	o
		6	13
−	4	7	3
	4	1	9
	0	5	4

Add to check.

	h	t	o
		1	
+	0	5	4
	4	1	9
	4	7	3

The librarian bought 54 more books this year.

Guided Practice

Add. Check your work.

1.

	h	t	o
+	6	0	2
	3	7	3

2.

	h	t	o
+	4	3	9
	1	4	2

3.

	h	t	o
+	3	9	0
	4	5	9

4.

	h	t	o
+	5	6	8
	2	9	8

Subtract. Check your work.

5.

	h	t	o
−	5	9	8
	2	9	7

6.

	h	t	o
−	2	4	3
	1	2	5

7.

	h	t	o
−	9	3	5
	6	4	8

8.

	h	t	o
−	8	5	9
	7	6	4

Think•Pair•Share

MP4 9. Explain why you can subtract to check addition and you can add to check subtraction.

Independent Practice

Use any strategy you like to find the sum.

1. 475 + 305 = _____

2. 174 + 29 = _____

3. 312 + 298 = _____

4. 623 + 377 = _____

5. 286 + 241 = _____

6. 747 + 173 = _____

Add. Check your work.

7. 408 + 436

8. 281 + 405

9. 271 + 352

10. 192 + 339

11. 545 + 375

12. 397 + 228

13. 457 + 462

14. 273 + 140

15. 609 + 329

16. 512 + 127

17. 315 + 587

18. 826 + 38

19. 128 + 205 + 137

20. 540 + 100 + 139

21. 162 + 145 + 285

Independent Practice

Use any strategy you like to find the difference.

22. 325 − 210 = _____

23. 830 − 140 = _____

24. 762 − 451 = _____

25. 794 − 392 = _____

26. 276 − 254 = _____

27. 685 − 176 = _____

Subtract. Check your work.

28. 64 − 27

29. 75 − 18

30. 41 − 25

31. 408 − 104

32. 519 − 235

33. 635 − 294

34. 235 − 45

35. 776 − 59

36. 866 − 371

37. 526 − 371

38. 645 − 293

39. 107 − 45

40. 599 − 192

41. 909 − 427

42. 352 − 278

Independent Practice

MP6 **43.** Explain how to compute the sum of 382 + 130.

MP8 **44.** Explain how to compute the difference of 382 − 130.

Solve the problems.

MP2 **45.** Last month Mrs. Turner's class collected 349 cans for recycling. This month the class collected 570 cans for recycling. How many cans did the class collect in all? Explain why your answer is reasonable.

Show your work.

Answer _____

MP6 **46.** Southwest Elementary has 739 students. If 392 students are boys, how many are girls? Explain why your answer is reasonable.

Show your work.

Answer _____

Independent Practice

MP8 **47.** Four hundred twenty-eight students came to the school fair the first day, and 355 students came the second day. How many students attended during the two days?

Show your work.

Answer _____

MP3 **48.** Ramona says that 135 + 279 equals the same sum as 279 + 135. Is Ramona's statement correct?

Answer _____

Justify your answer using words, drawings, or numbers.

MP1 **49.** Jarred subtracted 540 − 365 and got a difference of 275. Give the correct answer and explain Jarred's error.

Answer _____

Justify your answer using words, drawings, or numbers.

Lesson

15 Multiply One-Digit Whole Numbers by Multiples of 10

Essential Question:
How can you multiply a number by a multiple of 10?

3.NBT.3

Words to Know:
multiple

Guided Instruction

In this lesson you will multiply one-digit numbers by multiples of 10.

Understand: What a multiple of 10 is

You know how to multiply a one-digit number by another one-digit number. The number 10 is the first two-digit number. What happens when you multiply 3×10?

When you multiply, you find the total of a number of equal groups.

number of groups × number in each group = number in all

$3 \times 10 = n$

To think about finding 3×10, you can draw an array.

The array shows that 3 groups of 10 is equal to 30: $3 \times 10 = 30$.

The product, 30, is called a multiple of 10. It is a number found by multiplying by 10.

When you skip count by 10s to 90, you name multiples of 10.

10, 20, 30, 40, 50, 60, 70, 80, 90

$1 \times 10 = 10$
$2 \times 10 = 20$
$3 \times 10 = 30$
$4 \times 10 = 40$
$5 \times 10 = 50$
$6 \times 10 = 60$
$7 \times 10 = 70$
$8 \times 10 = 80$
$9 \times 10 = 90$

Notice the pattern. When you multiply a one-digit factor by 10, the tens digit of the product is the same as that factor.
Multiplying a one-digit factor by 10 is the same as moving that digit to the tens place and putting a 0 in the ones place.

When you multiply 3×10, you get 30. The 3 moves to the tens place and a 0 goes in the ones place.

Guided Instruction

Understand: Multiplying by a multiple of 10

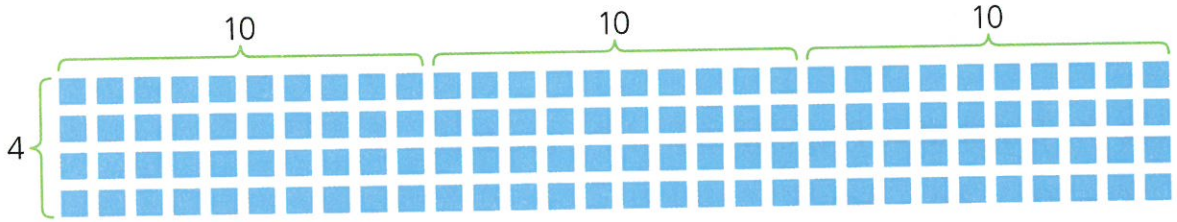
There are desks for 30 students in each of the 4 third-grade classrooms. How many desks are there in the 4 classrooms?

To answer this question, you need to multiply 4 × 30.

number of groups × number in each group = number in all

4 × 30 = *d*

One way to think about finding 4 × 30 is to draw an array.



You can count all 120 squares in the array.

Another way to think about this problem is to think about groups of tens. There are 4 groups of 3 tens.

4 groups of 3 tens = _____ tens

4 × 30 = _____

▶ There are 120 desks in the 4 classrooms.

There is a faster way to multiply with multiples of 10.

4 × 30 = 120

Notice that you can find 120 by multiplying 4 × 3 and putting a 0 to the right. When you do this, you are moving the product of 4 × 3 one place to the left and there is a 0 in the ones place.

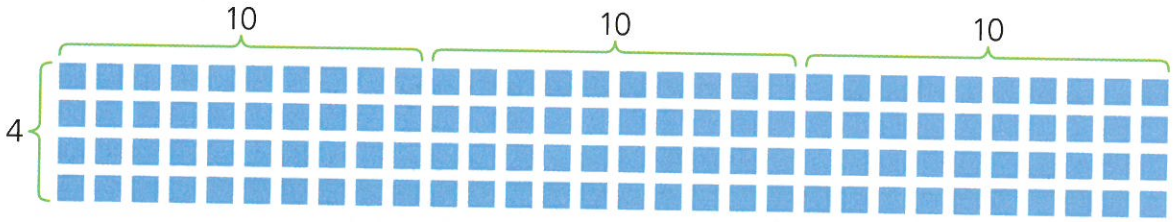
✎ Find the product of 6 × 20 two different ways.

Guided Instruction

Connect: Using properties when multiplying by a multiple of 10

How can the properties of multiplication help you understand multiplying a one-digit number by a multiple of 10?

To answer this question, look at the problem on page 129 again. You found the number of desks in 4 classrooms with 30 desks in each classroom. You used this diagram to visualize the problem.



You can use the Distributive Property to find the product.

$$\begin{aligned} 4 \times 30 &= 4 \times (10 + 10 + 10) \\ &= (4 \times 10) + (4 \times 10) + (4 \times 10) \\ &= 40 + 40 + 40 \\ 4 \times 30 &= 120 \end{aligned}$$

You can use the Associative Property to find the product.

$$\begin{aligned} 4 \times 30 &= 4 \times (3 \times 10) \leftarrow \text{Rename 30 as } 3 \times 10. \\ &= (4 \times 3) \times 10 \leftarrow \text{Use the Associative Property to change the grouping.} \\ &= 12 \times 10 \leftarrow \text{Multiply } 4 \times 3. \\ 4 \times 30 &= 120 \leftarrow \text{Multiply } 12 \times 10. \end{aligned}$$

The properties of multiplication show what happens when a number is multiplied by a multiple of 10.

· Find the product of 6×20 using the Distributive Property and using the Associative Property.

Guided Practice

Complete the multiplication equations to find the product.

1. 3 groups of 7 tens = ____ tens

   $3 \times 70 =$ ____

2. 2 groups of 8 tens = ____ tens

   $2 \times 80 =$ ____

3. 5 groups of 2 tens = ____ tens

   $5 \times 20 =$ ____

4. 4 groups of 6 tens = ____ tens

   $4 \times 60 =$ ____

5. 3 groups of 9 tens = ____ tens

   $3 \times 90 =$ ____

6. 7 groups of 6 tens = ____ tens

   $7 \times 60 =$ ____

7. Draw a diagram to represent 2×70. Then find the product. Show your work.

Think•Pair•Share

MP4 8. Use what you know about multiplying multiples of 10 to show that 2×80 equals 8×20. Then find the product.

Independent Practice

Find the unknown factor to complete the equations.

1. 2 groups of ____ tens = 12 tens
   $2 \times$ ____ $= 120$

2. 3 groups of ____ tens = 21 tens
   $3 \times$ ____ $= 210$

3. 1 group of ____ tens = 5 tens
   $1 \times$ ____ $= 50$

4. 9 groups of ____ tens = 36 tens
   $9 \times$ ____ $= 360$

5. 4 groups of ____ tens = 32 tens
   $4 \times$ ____ $= 320$

6. 9 groups of ____ tens = 81 tens
   $9 \times$ ____ $= 810$

Find the product. You can use place-value models.

7. $4 \times 80 =$ ____

8. $9 \times 40 =$ ____

9. $7 \times 10 =$ ____

10. $0 \times 30 =$ ____

11. $6 \times 90 =$ ____

12. $7 \times 70 =$ ____

13. $40 \times 2 =$ ____

14. $20 \times 5 =$ ____

15. $70 \times 5 =$ ____

16. $90 \times 5 =$ ____

Independent Practice

Circle the correct answer.

17. What is the product of 8×40?

a. 32

b. 320

c. 3,200

d. 32,000

18. What is the product of 60×5?

a. 300,000

b. 30,000

c. 3,000

d. 300

19. What is the next number in the pattern?
40, 80, 120, 160, _____

a. 160

b. 180

c. 200

d. 220

MP1 **20.** Circle all computations that do NOT help you find the product of 9×70.

a. 9×7

b. 7×9

c. $(7 + 9) \times 10$

d. $9 + 9 + 9 + 9 + 9 + 9$

Independent Practice

MP8 **21.** Explain how to compute the product of 20×3.

MP7 **22.** Explain how to find the product of 4×60.

Solve the problems.

MP1 **23.** At the animal shelter, each box of dog food holds 30 cans. How many cans of dog food are in 6 boxes?

Show your work.

Answer _____

MP2 **24.** Each sheet of stickers holds 60 stickers. If Roxanne has 8 sheets, how many stickers does she have?

Show your work.

Answer _____

Independent Practice

MP6 **25.** Two hundred students from the school are going on a field trip. How many buses will the school need if only 40 students can ride on each bus?

· **Show your work.**

Answer _____

MP3 **26.** Maiko says that 6 times 50 is 30. Give the correct answer and explain her error.

Answer _____

· **Justify your answer using words, drawings, or numbers.**

MP2 **27.** Kyle says that 5×80 is the same as $80 + 80 + 80 + 80 + 80$. Is his thinking correct?

Answer _____

· **Justify your answer using words, drawings, or numbers.**