Critical Area

Place Value and Operations with Whole Numbers

CRITICAL AREA Developing understanding and fluency with multi-digit multiplication, and developing understanding of dividing to find quotients involving multi-digit dividends

Space Shuttle launching from Kennedy Space Center ▶

Project

Food in Space

The United States is planning a manned mission to Mars. The crew must take all of its food along on the journey, because there is no food available on Mars.

Get Started

Work with a partner. You are in charge of planning the amount of food needed for the Mars mission. Decide how much food will be needed for the entire trip. Use the Important Facts to help you plan. **Explain** your thinking.

Important Facts

- Length of trip to Mars: 6 months
- Length of stay on Mars: 6 months
- Length of return trip to Earth: 6 months
- Number of astronauts: 6
- 2 cups of water weigh 1 pound.
- 1 month = 30 days (on average).
- Each astronaut needs 10 cups of water and 4 pounds of food each day.

Completed by _____

Chapter 1

Place Value, Addition, and Subtraction to One Million

Show What You Know

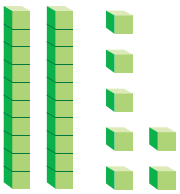
Check your understanding of important skills.

Name _____

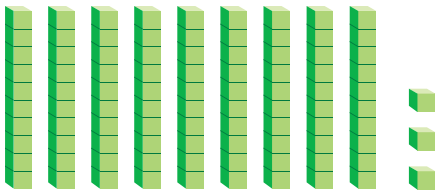
Tens and Ones

Write the missing numbers.

1. 27 = _____ tens _____ ones



2. 93 = _____ tens _____ ones



Regroup Hundreds as Tens

Regroup. Write the missing numbers.

3. 5 hundreds 4 tens = _____ tens

4. 8 hundreds 9 tens = _____ tens

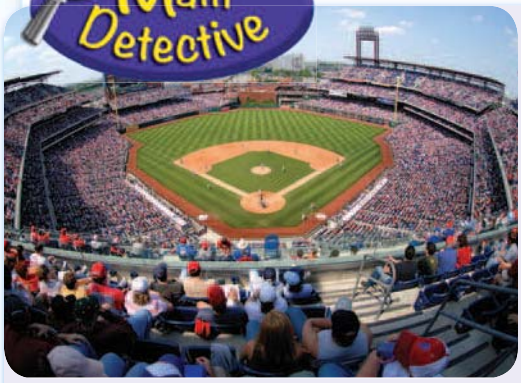
Two-Digit Addition and Subtraction

Add or subtract.

5. $\begin{array}{r} 27 \\ +\ 34 \\ \hline \end{array}$

6. $\begin{array}{r} 95 \\ +\ 46 \\ \hline \end{array}$

7. $\begin{array}{r} 84 \\ -\ 27 \\ \hline \end{array}$



The home stadium of the Philadelphia Phillies is a large baseball park in Philadelphia, PA. Be a Math Detective. Use the following clues to find the stadium's maximum capacity.

- **The 5-digit number has a 4 in the greatest place-value position and a 1 in the least place-value position.**
- **The digit in the thousands place has a value of 3,000.**
- **The digit in the hundreds place is twice the digit in the thousands place.**
- **There is a 5 in the tens place.**

Vocabulary Builder

Visualize It

Write the review words with a ✓ on the Word Line, from greatest to least place value.

Place Value

greatest

_____

_____

_____

_____

least

_____

Review Words
✓ hundreds
inverse operations
✓ ones
✓ tens
✓ ten thousands
✓ thousands

Preview Words
estimate
expanded form
period
round
standard form
word form

Understand Vocabulary

Read the definition. Which word does it describe?

1. To replace a number with another number that tells about how many or how much _____
2. A way to write numbers by showing the value of each digit _____
3. A number close to an exact amount _____
4. Each group of three digits separated by commas in a multi-digit number _____
5. A way to write numbers by using the digits 0–9, with each digit having a place value _____

Name _____

Model Place Value Relationships

Essential Question How can you describe the value of a digit?

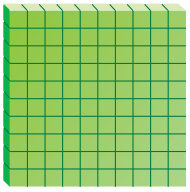
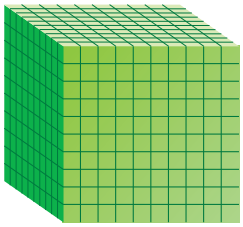
Number and Operations in Base Ten—4.NBT.1

MATHEMATICAL PRACTICES
MP.4, MP.6, MP.7

Unlock the Problem

Activity **Build numbers through 10,000.**

Materials ■ base-ten blocks

1	10	100	1,000	10,000
				?
cube	long	flat	cube	_____
1	10 ones	_____ tens	_____ hundreds	_____ thousands

A small cube represents 1.

_____ small cubes make a long. The long represents _____.

_____ longs make a flat. The flat represents _____.

_____ flats make a large cube. The large cube represents _____.

1. Describe the pattern in the shapes of the models. What will be the shape of the model for 10,000?

_____

_____

_____

Math Talk **Mathematical Practices**

Explain how you can use ten thousands longs to model 100,000.

2. Describe the pattern you see in the sizes of the models. How will the size of the model for 100,000 compare to the size of the model for 10,000?

_____

_____

_____

Value of a Digit The value of a digit depends on its place-value position in the number. A place-value chart can help you understand the value of each digit in a number. The value of each place is 10 times the value of the place to the right.

Write 894,613 in the chart. Find the value of the digit 9.

MILLIONS			THOUSANDS			ONES		
Hundreds	Tens	Ones	Hundreds	Tens	Ones	Hundreds	Tens	Ones
			8 hundred thousands	9 ten thousands	4 thousands	6 hundreds	1 ten	3 ones
			800,000	90,000	4,000	600	10	3

The value of the digit 9 is 9 ten thousands, or _____.

Compare the values of the underlined digits.

2,304 16,135

Math Talk **Mathematical Practices**

Explain how you can compare the values of the digits without drawing a model.

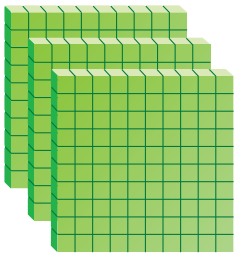
STEP 1 Find the value of 3 in 2,304.

Show 2,304 in a place-value chart.

THOUSANDS			ONES		
Hundreds	Tens	Ones	Hundreds	Tens	Ones

Think: The value of the digit 3 is _____.

Model the value of the digit 3.



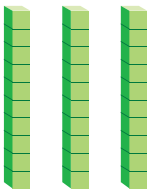
STEP 2 Find the value of 3 in 16,135.

Show 16,135 in a place-value chart.

THOUSANDS			ONES		
Hundreds	Tens	Ones	Hundreds	Tens	Ones

Think: The value of the digit 3 is _____.

Model the value of the digit 3.



Each hundred is 10 times as many as 10, so 3 hundreds is ten times as many as 3 tens.

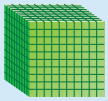
So, the value of 3 in 2,304 is _____ times the value of 3 in 16,135.

Name _____

Share and Show

MATH BOARD

1. Complete the table below.

Number	1,000,000	100,000	10,000	1,000	100	10	1
Model	?	?	?				
Shape				cube	flat	long	cube
Group				10 hundreds	10 tens	10 ones	1 one

Find the value of the underlined digit.

2. 7̲03,890

_____

3. 63,54̲0

_____

4. 18̲2,034

_____

5. 34̲5,890

_____

Compare the values of the underlined digits.

6. 2̲,000 and 2̲00

The value of 2 in _____ is _____ times the value of 2 in _____.

7. 4̲0 and 4̲00

The value of 4 in _____ is _____ times the value of 4 in _____.

On Your Own

Find the value of the underlined digit.

8. 23̲0,001

_____

9. 80̲3,040

_____

10. 46,84̲2

_____

11. 9̲80,650

_____

Compare the values of the underlined digits.

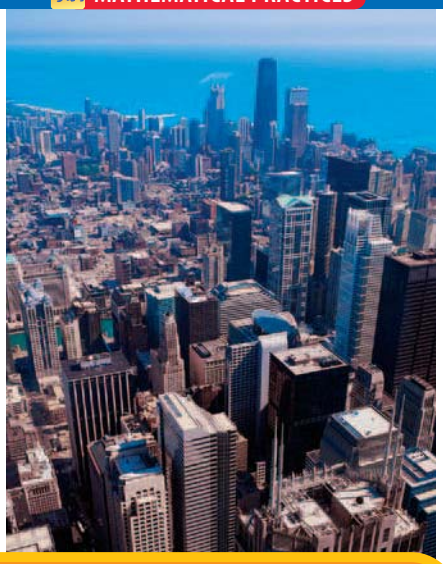
12. 6̲7,908 and 7̲6,908

The value of 7 in _____ is _____ times the value of 7 in _____.

13. 546,3̲00 and 3̲,456

The value of 3 in _____ is _____ times the value of 3 in _____.

Problem Solving • Applications



Use the table for 14.

14. GO DEEPER What is the value of the digit 7 in the population of Memphis? How many times as much is the value of the place that the 7 is in than the value of the place to the right?

15. THINK SMARTER How many models of 100 do you need to model 3,200? Explain.

City Populations

City	Population*
Cleveland	431,369
Denver	610,345
Memphis	676,640

*2009 U. S. Census Bureau Estimation

16. MATHEMATICAL PRACTICE 6 Sid wrote 541,309 on his paper. Using numbers and words, **explain** how the number would change if he exchanged the digits in the hundred thousands and tens places.

WRITE Math • Show Your Work

17. THINK SMARTER For numbers 17a–17e, select True or False for each statement.

17a. The value of 7 in 375,081 is 7,000. ○ True ○ False

17b. The value of 6 in 269,480 is 600,000. ○ True ○ False

17c. The value of 5 in 427,593 is 500. ○ True ○ False

17d. The value of 1 in 375,081 is 10. ○ True ○ False

17e. The value of 4 in 943,268 is 40,000. ○ True ○ False

FOR MORE PRACTICE: Standards Practice Book

Name _____

Read and Write Numbers

Essential Question How can you read and write numbers through hundred thousands?

Number and Operations in Base Ten—4.NBT.2

MATHEMATICAL PRACTICES
MP.2, MP.7

Unlock the Problem

The International Space Station uses 262,400 solar cells to change sunlight to electricity.

Write 262,400 in standard form, word form, and expanded form.

Use a place-value chart.

Each group of three digits separated by a comma is called a **period**. Each period has hundreds, tens, and ones. The greatest place-value position in the thousands period is hundred thousands.

Write 262,400 in the place-value chart below.

PERIOD			PERIOD		
THOUSANDS			ONES		
Hundreds	Tens	Ones	Hundreds	Tens	Ones

The number 262,400 has two periods, thousands and ones.

Standard Form: 262,400

Word Form: two hundred sixty-two thousand, four hundred

Expanded Form: 200,000 + 60,000 + 2,000 + 400

Math Talk **Mathematical Practices**

Which digit has the greatest value in 262,400? **Explain.**

Try This! Use place value to read and write numbers.

A **Standard Form:** _____

Word Form: ninety-two thousand, one hundred seventy

Expanded Form:

90,000 + 2,000 + _____ + 70

B **Standard Form:** 200,007

Word Form:
two hundred _____, _____

Expanded Form:

_____ + 7

Share and Show

MATH BOARD

1. How can you use place value and period names to read and write 324,904 in word form?

Read and write the number in two other forms.

2. four hundred eight thousand, seventeen

3. 65,058

Math Talk — **Mathematical Practices**

Explain how you can use the expanded form of a number to write the number in standard form.

On Your Own

Read and write the number in two other forms.

4. five hundred eight thousand

5. forty thousand, six hundred nineteen

6. 570,020

7. 400,000 + 60,000 + 5,000 + 100

Use the number 145,973.

8. Write the name of the period that has the digits 145.

9. Write the name of the period that has the digits 973.

10. Write the digit in the ten thousands place.

11. Write the value of the digit 1.

Name _____

THINK SMARTER **Find the sum. Then write the answer in standard form.**

12. 5 thousands 2 tens 4 ones
+ 4 thousands 3 hundreds 2 ones

13. 6 thousands 5 hundreds
+ 1 thousand 3 hundreds 4 tens

14. 4 ten thousands + 3 ten thousands
4 hundreds 8 tens

15. 4 ten thousands 3 ones + 1 ten thousand
9 hundreds 5 ones

Problem Solving • Applications

Use the table for 16–17.

Major Cities in North Carolina

City	Population*
Durham	229,171
Greensboro	255,124
Raleigh	405,612

*U.S. Census Bureau 2008 Estimated Population

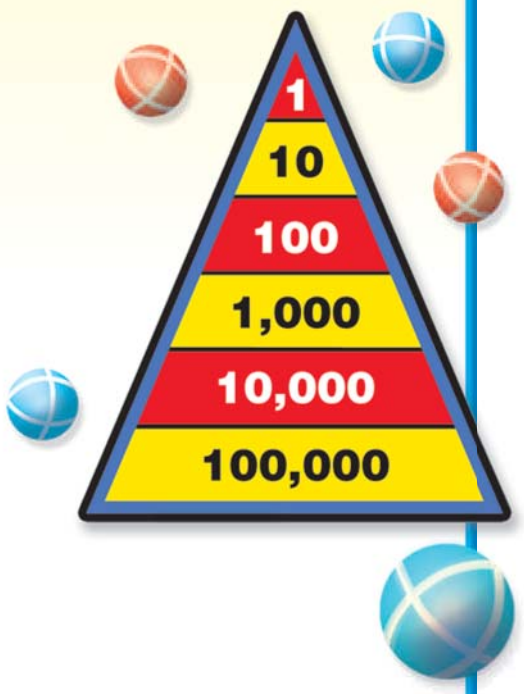
16. MATHEMATICAL PRACTICE 4 **Use Graphs** Which city has a population of two hundred fifty-five thousand, one hundred twenty-four?

17. Write the population of Raleigh in expanded form and word form.

18. **THINK SMARTER** **What's the Error?** Sophia said that the expanded form for 605,970 is 600,000 + 50,000 + 900 + 70. Describe Sophia's error and give the correct answer.

Unlock the Problem Real World

19. GO DEEPER Mark tossed six balls while playing a number game. Three balls landed in one section, and three balls landed in another section. His score is greater than one hundred thousand. What could his score be?



a. What do you know? _____

_____

_____

b. How can you use what you know about place value to find what Mark's score could be? _____

_____

_____

_____

_____

_____

_____

c. Draw a diagram to show one way to solve the problem.

d. Complete the sentences.

Three balls could have landed in the _____ section.

Three balls could have landed in the _____ section.

Mark's score could be _____ _____.

20. THINK SMARTER What is another way to write 615,004? Mark all that apply.

(A) six hundred fifteen thousand, four

(B) six hundred five thousand, fourteen

(C) 60,000 + 10,000 + 5,000 + 4

(D) 600,000 + 10,000 + 5,000 + 4

FOR MORE PRACTICE: Standards Practice Book

Name _____

Compare and Order Numbers

Essential Question How can you compare and order numbers?

Number and Operations in Base Ten—4.NBT.2

MATHEMATICAL PRACTICES
MP.2, MP.4, MP.5

Unlock the Problem

Grand Canyon National Park in Arizona had 651,028 visitors in July 2008 and 665,188 visitors in July 2009. In which year did the park have more visitors during the month of July?

- How many visitors were there in July 2008?

_____

- How many visitors were there in July 2009?

_____

Example 1 Use a place-value chart.

You can use a place-value chart to line up the digits by place value. Line up the ones with the ones, the tens with the tens, and so on. Compare 651,028 and 665,188.

Write 651,028 and 665,188 in the place-value chart below.

THOUSANDS			ONES		
Hundreds	Tens	Ones	Hundreds	Tens	Ones

Start at the left. Compare the digits in each place-value position until the digits differ.

STEP 1 Compare the hundred thousands.

651,028

665,188

6 hundred thousands ◯ 6 hundred thousands

Write <, >, or =.

The digits in the hundred thousands place are the same.

STEP 2 Compare the ten thousands.

651,028

665,188

5 ten thousands ◯ 6 ten thousands

Write <, >, or =.

5 ten thousands is less than 6 ten thousands so, 651,028 < 665,188.

Since 651,028 < 665,188, there were more visitors in July 2009 than in July 2008.

Example 2 Use a number line to order 10,408; 10,433; and 10,416 from least to greatest.

Locate and label each point on the number line. The first one is done for you.

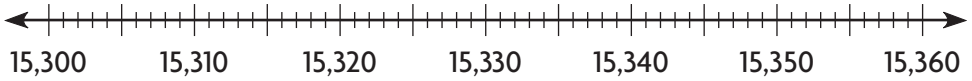
Think: Numbers to the left are closer to 0.

So, the numbers from least to greatest are 10,408; 10,416; and 10,433.
$10{,}408 < 10{,}416 < 10{,}433$

Share and Show

MATH BOARD

1. Compare 15,327 and 15,341.
Write <, >, or =. Use the number line to help.



15,327 ◯ 15,341

Compare. Write <, >, or =.

2. $631,328 ◯ $640,009

3. 56,991 ◯ 52,880

4. 708,561 ◯ 629,672

5. 143,062 ◯ 98,643

Order from greatest to least.

6. 20,650; 21,150; 20,890

_____

Math Talk **Mathematical Practices**

Explain how you ordered the numbers from greatest to least in Exercise 6.

Name _____

On Your Own

Compare. Write <, >, or =.

7. $2,212 ◯ $2,600

8. 88,304 ◯ 88,304

9. $524,116 ◯ $61,090

10. 751,272 ◯ 851,001

Order from least to greatest.

11. 41,090; 41,190; 40,009

12. 910,763; 912,005; 95,408

MATHEMATICAL PRACTICE 7 **Identify Relationships** **Algebra** **Write all of the digits that can replace each ▢.**

13. $567 < 5▢5 < 582$

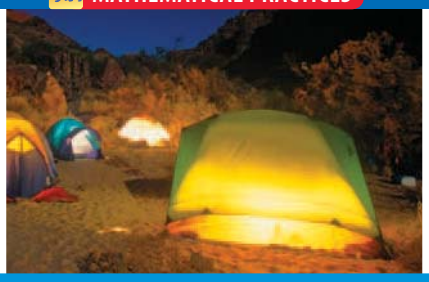
14. $464{,}545 > 4▢3{,}535 > 443{,}550$

15. Which digits can replace the ▢ to make a true statement?
$6{,}456 < 6{,}▢12 < 6{,}788$

16. GO DEEPER At Monica's Used Cars, the sales staff set a goal of $25,500 in sales each week. The sales for three weeks were $28,288; $25,369; and $25,876. Which total did not meet the goal?

17. THINK SMARTER Max said that 36,594 is less than 5,980 because 3 is less than 5. Describe Max's error and give the correct answer.

Problem Solving • Applications



Use the pictograph for 18–20.

18. MATHEMATICAL PRACTICE 4 **Use Graphs** In which month shown did the Grand Canyon National Park have about 7,500 tent campers?

_____

19. Which months had more than 10,000 tent campers?

_____

20. What if during the month of October, the park had 22,500 tent campers? How many symbols would be placed on the pictograph for October?

_____

Grand Canyon National Park Tent Campers

Month (2008)	Estimated Number of Campers
June	⛺ ⛺
July	⛺ ⛺ ⛺
August	⛺ ⛺ ◢
September	⛺ ◢

Key: Each ⛺ = 5,000.

21. THINK SMARTER **What's the Question?**
Compare: 643,251; 633,512; and 633,893.
The answer is 633,512.

_____

_____

Personal Math Trainer

22. THINK SMARTER + Zachary's school set a goal of collecting 12,155 cans of food each day. In the first 3 days they collected 12,250 cans; 10,505 cans; and 12,434 cans. Write each number in the box that tells whether or not they met their goal.

12,434 | 10,505 | 12,250

Met the daily goal	Did not meet the daily goal

FOR MORE PRACTICE: Standards Practice Book

Name _____

Round Numbers

Essential Question How can you round numbers?

Number and Operations in Base Ten—4.NBT.3

MATHEMATICAL PRACTICES
MP.1, MP.2, MP.5, MP.7

Unlock the Problem

During May 2008, the Mount Rushmore National Monument in South Dakota welcomed 138,202 visitors. A website reported that about 1 hundred thousand people visited the park during that month. Was the estimate reasonable?

- Underline what you are asked to find.
- Circle the information you will use.

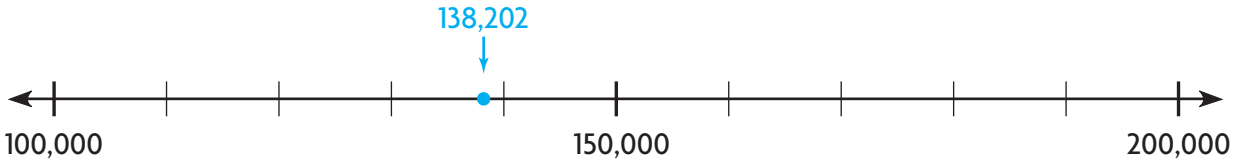
An **estimate** tells you about how many or about how much. It is close to an exact amount. You can **round** a number to find an estimate.

One Way Use a number line.

To round a number to the nearest hundred thousand, find the hundred thousands it is between.

_____ < 138,202 < _____

Use a number line to see which hundred thousand 138,202 is closest to.



138,202 is closer to _____ than _____.

So, 1 hundred thousand is a reasonable estimate for 138,202.

Math Talk **Mathematical Practices**

Is 155,000 closer to 100,000 or 200,000? **Explain.**

1. What number is halfway between 100,000 and 200,000?

_____

2. How does knowing where the halfway point is help you find which hundred thousand 138,202 is closest to? Explain.

_____

_____

_____

Another Way Use place value.

Mount Rushmore is located 5,725 feet above sea level. About how high is Mount Rushmore above sea level, to the nearest thousand feet?

To round a number to the nearest thousand, find the thousands it is between.

_____ < 5,725 < _____

Look at the digit in the place-value position to the right.

5,725

Think: The digit in the hundreds place is 7.
So, 5,725 is closer to 6,000 than 5,000.

So, Mount Rushmore is about _____ feet above sea level.

Math Talk **Mathematical Practices**

Explain how you know that 5,700 is closer to 6,000 than to 5,000.

3. What number is halfway between 70,000 and 80,000?

_____

4. What is 75,000 rounded to the nearest ten thousand? Explain.

_____

_____

_____

Math Idea

When a number is exactly half way between two rounding numbers, round to the greater number.

Try This! Round to the place value of the underlined digit.

A 6̲4,999

_____

B 8̲50,000

_____

C 30̲1,587

_____

D 1̲0,832

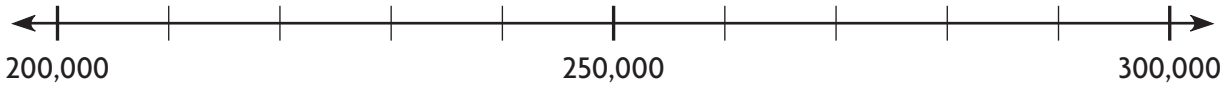
_____

Name _____

Share and Show

MATH BOARD

1. Suppose 255,113 people live in a city. Is it reasonable to say that about 300,000 people live in the city? Use the number line to help you solve the problem. Explain.



Round to the place value of the underlined digit.

2. 93<u>4</u>,567

3. 6<u>4</u>1,267

4. <u>2</u>34,890

5. 3<u>4</u>7,456

On Your Own

Round to the place value of the underlined digit.

6. <u>5</u>62,408

7. 2<u>8</u>4,792

8. 19<u>9</u>,814

9. 923,7<u>1</u>8

Problem Solving • Applications

Real World

10. THINK SMARTER The number 2,▢00 is missing a digit. The number rounded to the nearest thousand is 3,000. List all of the possibilities for the missing digit. Explain your answer.

11. GO DEEPER What is 277,300 rounded to the nearest thousand? to the nearest ten thousand?

_____

12. THINK SMARTER About 300,000 people attended a festival. For numbers 12a–12e, choose Yes or No to show whether each number could be the exact number of people that attended the festival.

12a.	351,213	○ Yes	○ No
12b.	249,899	○ Yes	○ No
12c.	252,348	○ Yes	○ No
12d.	389,001	○ Yes	○ No
12e.	305,992	○ Yes	○ No

Connect to Science

Data Gathering

Some scientists count and measure groups of things. Benchmarks can be used to estimate the size of a group or a population. A *benchmark* is a known number of things that helps you understand the size or amount of a different number of things.

Benchmark
100 shells

200; 500; or 5,000

Use the benchmark to find a reasonable estimate for the number of coquina shells it would take to fill a jar.

It would take about 5 times the benchmark to fill the jar.
$100 + 100 + 100 + 100 + 100 = 500$

The most reasonable estimate for the number of coquina shells it would take to fill the jar is 500 shells.

MATHEMATICAL PRACTICE 1 **Evaluate Reasonableness** **Use the benchmark to find a reasonable estimate. Circle the reasonable estimate.**

13.

500 beads

1,000; 2,000; or 3,000

14.

10,000 blades of grass

1,000; 10,000; or 100,000

FOR MORE PRACTICE: Standards Practice Book

Name _____

Mid-Chapter Checkpoint

Vocabulary

Choose the best term from the box.

Vocabulary
expanded form
period
round
standard form

1. The _____ of 23,850 is 20,000 + 3,000 + 800 + 50. (p. 9)

2. You can _____ to find *about* how much or how many. (p. 17)

3. In 192,860 the digits 1, 9, and 2 are in the same _____. (p. 9)

Concepts and Skills

Find the value of the underlined digit. (4.NBT.1)

4. 3<u>8</u>0,671 _____

5. 10,6<u>9</u>8 _____

6. <u>6</u>50,234 _____

Write the number in two other forms. (4.NBT.2)

7. 293,805

_____

_____

_____

8. 300,000 + 5,000 + 20 + 6

_____

_____

_____

Compare. Write <, >, or =. (4.NBT.2)

9. 457,380 ◯ 458,590

10. 390,040 ◯ 39,040

11. 11,809 ◯ 11,980

Round to the place of the underlined digit. (4.NBT.3)

12. <u>1</u>40,250 _____

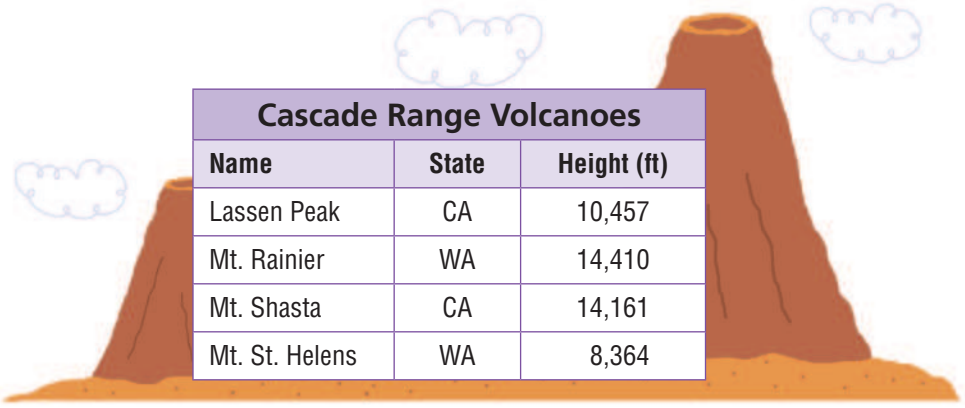
13. 10,<u>4</u>50 _____

14. 12<u>6</u>,234 _____

15. Last year, three hundred twenty-three thousand people visited the museum. What is this number written in standard form? (4.NBT.2)

16. Rounded to the nearest thousand, what number will 4,645 be rounded to? (4.NBT.3)

17. What is the highest volcano in the Cascade Range? (4.NBT.2)



Cascade Range Volcanoes

Name	State	Height (ft)
Lassen Peak	CA	10,457
Mt. Rainier	WA	14,410
Mt. Shasta	CA	14,161
Mt. St. Helens	WA	8,364

18. Richard got 263,148 hits when he did an Internet search. What is the value of the digit 6 in this number? (4.NBT.1)

Name _____

Rename Numbers

Essential Question How can you rename a whole number?

Number and Operations in Base Ten—4.NBT.1 *Also 4.NBT.2*

MATHEMATICAL PRACTICES
MP.2, MP.4, MP.7

Investigate

Materials ■ base-ten blocks

Hands On

You can regroup numbers to rename them.

A. Use large cubes and flats to model 1,200. Draw a quick picture to record your model.

The model shows _____ large cube and _____ flats.

Another name for 1,200 is _____ thousand _____ hundreds.

B. Use only flats to model 1,200.
Draw a quick picture to record your model.

The model shows _____ flats.

Another name for 1,200 is _____ hundreds.

Draw Conclusions

1. How is the number of large cubes and flats in the first model related to the number of flats in the second model?

_____

_____

2. Can you model 1,200 using only longs? Explain.

3. You renamed 1,200 as hundreds. How can you rename 1,200 as tens? Explain.

4. THINK SMARTER What would the models in Step A and Step B look like for 5,200? How can you rename 5,200 as hundreds?

Make Connections

You can also use a place-value chart to help rename numbers.

THOUSANDS			ONES		
Hundreds	Tens	Ones	Hundreds	Tens	Ones
5	0	0,	0	0	0

5 hundred thousands
50 ten thousands
500 thousands
5,000 hundreds
50,000 tens
500,000 ones

Write 32 hundreds on the place-value chart below. What is 32 hundreds written in standard form?

THOUSANDS			ONES		
Hundreds	Tens	Ones	Hundreds	Tens	Ones

32 hundreds

32 hundreds written in standard form is _____.

Math Talk **Mathematical Practices**

Explain how you can rename 4 ten thousands 3 thousands as thousands.

Name _____

Share and Show

MATH BOARD

Rename the number. Draw a quick picture to help.

1. 150

_____ tens

2. 1,400

_____ hundreds

3. 2 thousands 3 hundreds

_____ hundreds

4. 13 hundreds

_____ thousand _____ hundreds

Rename the number. Use the place-value chart to help.

5. 18 thousands = _____

THOUSANDS			ONES		
Hundreds	Tens	Ones	Hundreds	Tens	Ones

6. 570,000 = 57 _____

THOUSANDS			ONES		
Hundreds	Tens	Ones	Hundreds	Tens	Ones

Rename the number.

7. 580 = _____ tens

8. 740,000 = _____ ten thousands

9. 8 hundreds 4 tens = 84 _____

10. 29 thousands = _____

Unlock the Problem Real World

11. THINK SMARTER A toy store is ordering 3,000 remote control cars. The store can order the cars in sets of 10. How many sets of 10 does the store need to order?

a. What information do you need to use?

b. What do you need to find?

c. How can renaming numbers help you solve this problem?

d. Describe a strategy you can use to solve the problem.

e. How many sets of 10 remote control cars does the store need to buy?

12. GO DEEPER Ivan sold 53 boxes of oranges on Friday and 27 boxes on Saturday during a citrus sale. There were 10 oranges in each box. How many oranges did he sell in all?

13. MATHEMATICAL PRACTICE 2 **Use Reasoning** A store sold a total of 15,000 boxes of buttons last month. If the store sold 150,000 buttons, how many buttons were in each box?

14. THINK SMARTER For numbers 14a–14d, select True or False for each statement.

14a.	9 hundreds 3 tens can be renamed as 39 tens.	○ True	○ False
14b.	370,000 can be renamed as 37 ten thousands.	○ True	○ False
14c.	780 can be renamed as 78 tens.	○ True	○ False
14d.	42,000 can be renamed as 42 thousands.	○ True	○ False

FOR MORE PRACTICE: Standards Practice Book

Name _____

Add Whole Numbers

Essential Question How can you add whole numbers?

Number and Operations in Base Ten—4.NBT.4 *Also 4.OA.3, 4.NBT.3*

MATHEMATICAL PRACTICES
MP.1, MP.5, MP.8

Unlock the Problem

Alaska is the largest state in the United States by area. Its land area is 570,374 square miles and its water surface area is 86,051 square miles. Find the total area of Alaska.

- Underline what you are asked to find.
- Circle the information you will use.

▲ The area of Alaska is outlined in the photo above.

Find the sum.

Add. 570,374 + 86,051

Think: It is important to line up the addends by place value when adding two numbers.

STEP 1 Add the ones.

Add the tens. Regroup.

12 tens = 1 hundred _____ tens

$$\begin{array}{r} {\scriptstyle 1} \\ 570,374 \\ +\ 86,051 \\ \hline \end{array}$$

STEP 2 Add the hundreds.

Add the thousands.

$$\begin{array}{r} {\scriptstyle 1} \\ 570,374 \\ +\ 86,051 \\ \hline 25 \end{array}$$

STEP 3 Add the ten thousands.

Regroup.

15 ten thousands =

1 hundred thousand _____ ten thousands

$$\begin{array}{r} {\scriptstyle 1}{\scriptstyle 1} \\ 570,374 \\ +\ 86,051 \\ \hline 6,425 \end{array}$$

STEP 4 Add the hundred thousands.

$$\begin{array}{r} {\scriptstyle 1}{\scriptstyle 1} \\ 570,374 \\ +\ 86,051 \\ \hline 56,425 \end{array}$$

So, the total area of Alaska is _____ square miles.

Math Talk

Mathematical Practices

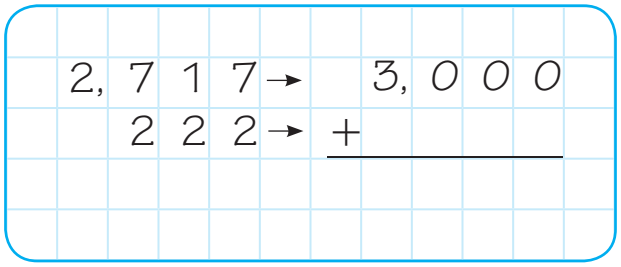
Explain how you know when to regroup when adding.

Estimate You can estimate to tell whether an answer is reasonable. To estimate a sum, round each addend before you add.

Example Estimate. Then find the sum.

Juneau has an area of 2,717 square miles. Valdez has an area of 222 square miles. What is their combined area?

A Estimate. Use the grid to help you align the addends by place value.

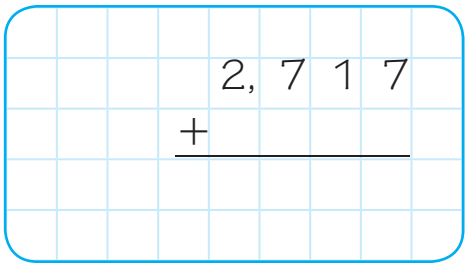


Round to the nearest thousand.

Round to the nearest hundred.

So, the combined area of Juneau and Valdez is about _____ square miles.

B Find the sum.



Think: Begin by adding the ones.

So, the combined area of Juneau and Valdez is _____ square miles.

ERROR Alert
Remember to align the addends by place value.

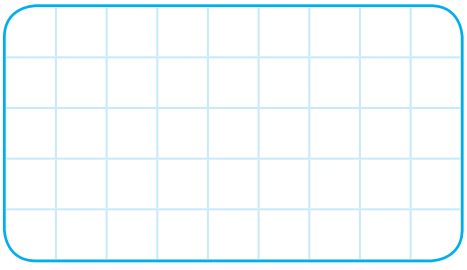
- Is the sum reasonable? Explain.

_____

Share and Show

MATH BOARD

1. Use the grid to find 738,901 + 162,389.



Use the grid to align the addends by place value.

Name _____

Estimate. Then find the sum.

2. Estimate: _____

72,931
+18,563

3. Estimate: _____

432,068
+239,576

4. Estimate: _____

64,505
+38,972

Math Talk **Mathematical Practices**

Explain how you know your answer for Exercise 2 is reasonable.

On Your Own

Estimate. Then find the sum.

5. Estimate: _____

839,136
+120,193

6. Estimate: _____

186,231
+ 88,941

7. Estimate: _____

744,201
+168,900

8. Estimate: _____

374,096
+187,543

9. Estimate: _____

100,738
+19,553

10. Estimate: _____

512,335
+297,866

MATHEMATICAL PRACTICE 2 **Reason Abstractly** **Algebra** **Find the missing number and name the property you used to find it. Write *Commutative* or *Associative*.**

11. $(4{,}580 + 5{,}008) + 2{,}351 = 4{,}580 + (\quad + 2{,}351)$

_____

12. $7{,}801 + \quad = 4{,}890 + 7{,}801$ _____

13. $2{,}592 + 3{,}385 = 3{,}385 + \quad$ _____

Remember

Commutative Property
$4 + 5 = 5 + 4$

Associative Property
$4 + (7 + 3) = (4 + 7) + 3$

Problem Solving • Applications

Use the table for 14–15.

Major Cities of Alaska

City	Population*
Anchorage	286,174
Fairbanks	35,252
Juneau	30,796

*2009 U.S. Census Bureau estimates

14. THINK SMARTER What is the combined population of the three major Alaskan cities? Estimate to verify your answer.

15. MATHEMATICAL PRACTICE 6 The digit 5 occurs two times in the population of Fairbanks. What is the value of each 5? **Explain** your answer.

16. GO DEEPER Kaylie has 164 stamps in her collection. Her friend Nellie has 229 more stamps than Kaylie. How many stamps do Kaylie and Nellie have?

WRITE Math • **Show Your Work**

17. THINK SMARTER Alaska's Glacier Bay National Park had 431,986 visitors one year. The next year, the park had 22,351 more visitors than the year before. How many people visited during the two years? Show your work and explain how you found your answer.

Name _____

Subtract Whole Numbers

Essential Question How can you subtract whole numbers?

Number and Operations in Base Ten—4.NBT.4 *Also 4.NBT.3, 4.OA.3*

MATHEMATICAL PRACTICES
MP.1, MP.5, MP.8

Unlock the Problem

Real World

Mt. Bear and Mt. Bona are two mountains in Alaska. Mt. Bear is 14,831 feet tall and Mt. Bona is 16,421 feet tall. How much taller is Mt. Bona than Mt. Bear?

Estimate. 16,000 − 15,000 = _____

Subtract. 16,421 − 14,831

▲ Mt. Bear and Mt. Bona are in the St. Elias Mountain Range located in the Wrangell-St. Elias National Park and Preserve in Alaska.

STEP 1 Subtract the ones.

Regroup to subtract the tens.

4 hundreds 2 tens =

3 hundreds _____ tens

$$\begin{array}{r} {\scriptstyle 3\,12} \\ 16,\not{4}\not{2}1 \\ -\,14,831 \\ \hline \end{array}$$

STEP 2 Regroup to subtract the hundreds.

6 thousands 3 hundreds =

5 thousands _____ hundreds

$$\begin{array}{r} {\scriptstyle 13} \\ {\scriptstyle 5\ \not{3}12} \\ 1\not{6},\not{4}21 \\ -\,14,831 \\ \hline \quad\ 90 \end{array}$$

STEP 3 Subtract the thousands.

Subtract the ten thousands.

$$\begin{array}{r} {\scriptstyle 13} \\ {\scriptstyle 5\ \not{3}12} \\ 1\not{6},421 \\ -\,14,831 \\ \hline \quad\ ,590 \end{array}$$

So, Mt. Bona is _____ feet taller than Mt. Bear. Since _____ is close to the estimate of _____, the answer is reasonable.

Try This! **Use addition to check your answer.**

$$\begin{array}{r} {}^{1}\cancel{3} \\ 5\ \cancel{3}{}^{1}12 \\ 16,\cancel{4}21 \\ -14,831 \\ \hline 1,590 \end{array} \qquad \begin{array}{r} {}^{1}\ {}^{1} \\ 1,590 \\ +14,831 \\ \hline \end{array}$$

So, the answer checks.

Math Idea

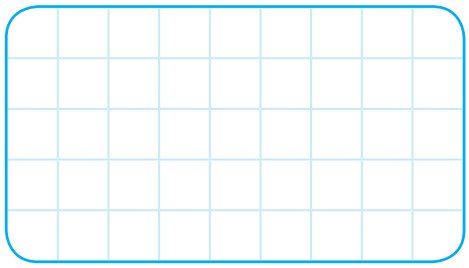
Inverse operations undo each other. Addition and subtraction are inverse operations, so you can use addition to check a subtraction problem.

Share and Show

MATH BOARD

1. Subtract. Use the grid to record the problem.

637,350 − 43,832



Math Talk **Mathematical Practices**

Explain how you know which places to regroup to subtract.

Estimate. Then find the difference.

2. Estimate: _____

$$\begin{array}{r} 14,659 \\ -11,584 \\ \hline \end{array}$$

3. Estimate: _____

$$\begin{array}{r} 456,912 \\ -\ 37,800 \\ \hline \end{array}$$

4. Estimate: _____

$$\begin{array}{r} 407,001 \\ -184,652 \\ \hline \end{array}$$

On Your Own

Estimate. Then find the difference.

5. Estimate: _____

$$\begin{array}{r} 942,385 \\ -461,803 \\ \hline \end{array}$$

6. Estimate: _____

$$\begin{array}{r} 798,300 \\ -348,659 \\ \hline \end{array}$$

7. Estimate: _____

$$\begin{array}{r} 300,980 \\ -159,000 \\ \hline \end{array}$$

Name _____

Practice: Copy and Solve Subtract. Add to check.

8. 653,809 − 256,034

9. 258,197 − 64,500

10. 496,004 − 398,450

11. 500,000 − 145,609

MATHEMATICAL PRACTICE 2 **Reason Abstractly** **Algebra** Find the missing digit.

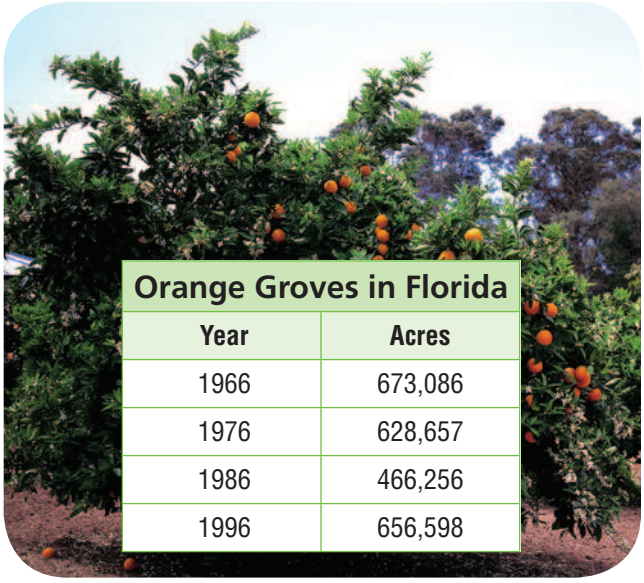
12.
$$\begin{array}{r} 6{,}532 \\ -4{,}1\square 5 \\ \hline 2{,}407 \end{array}$$

13.
$$\begin{array}{r} \square 08{,}665 \\ -659{,}420 \\ \hline 149{,}245 \end{array}$$

14.
$$\begin{array}{r} 697{,}320 \\ -432{,}\square 08 \\ \hline 264{,}712 \end{array}$$

Problem Solving • Applications Real World

Use the table for 15–18.



Orange Groves in Florida

Year	Acres
1966	673,086
1976	628,657
1986	466,256
1996	656,598

15. MATHEMATICAL PRACTICE 1 **Estimate Reasonableness** How many more acres were grown in 1996 than in 1986? Estimate to check the reasonableness of your answer.

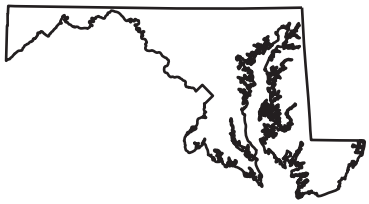
16. What is the difference between the greatest number of acres and the least number of acres used for growing oranges?

17. Grapefruit was grown on 144,416 acres in 1996. What is the total number of acres for oranges and grapefruit in 1996?

18. GO DEEPER Round the number of acres in 1966 and 1996 to the nearest ten thousand. What is the estimated difference between these two years?

19. THINK SMARTER There are 135,663 kilometers of U.S. coastline that border the Pacific Ocean. There are 111,866 kilometers of U.S. coastline that border the Atlantic Ocean. How many more kilometers of U.S. coastline border the Pacific Ocean than the Atlantic Ocean? Solve the problem and show how to check your answer.

20. THINK SMARTER **What's the Error?** Maryland has an area of 12,407 square miles. Texas has an area of 268,601 square miles. How much larger is Texas than Maryland?



Read how Janice solved the problem. Find her error.

Texas: 268,601 square miles
Maryland: 12,407 square miles
I can subtract to find the difference.

$$\begin{array}{r} 268{,}601 \\ -\ 12{,}407 \\ \hline 144{,}531 \end{array}$$

Solve the problem and correct her error.

So, Texas is _____ square miles larger than Maryland.

- MATHEMATICAL PRACTICE 3 **Verify Reasoning of Others** Describe Janice's error.

_____

_____

FOR MORE PRACTICE: Standards Practice Book

Name _____

Problem Solving • Comparison Problems with Addition and Subtraction

Essential Question How can you use the strategy *draw a diagram* to solve comparison problems with addition and subtraction?

Number and Operations in Base Ten— 4.NBT.4

MATHEMATICAL PRACTICES
MP.3, MP.4, MP.5, MP.8

Unlock the Problem

Real World

Hot air balloon festivals draw large crowds of people. The attendance on the first day of one festival was 17,350. On the second day the attendance was 18,925. How many more people attended the hot air balloon festival on the second day?

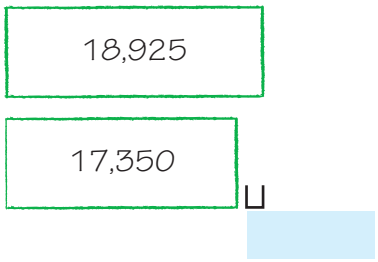
Use the graphic organizer to help you solve the problem.

Read the Problem

What do I need to find?	What information do I need to use?	How will I use the information?
Write what you need to find.	_____ people attended on the first day, _____ people attended on the second day.	What strategy can you use?

Solve the Problem

I can draw a bar model and write an equation to represent the problem.



18,925 − 17,350 = _____

So, _____ more people attended the festival on the second day.

Try Another Problem

During an event, a hot air balloon traveled a distance of 5,110 feet during the first trip and 850 feet more during the second trip. How far did it travel during the second trip?

Read the Problem

What do I need to find?	What information do I need to use?	How will I use the information?

Solve the Problem

- Is your answer reasonable? Explain how you know.

Math Talk **Mathematical Practices**

Explain how inverse operations can be used to check your answer.

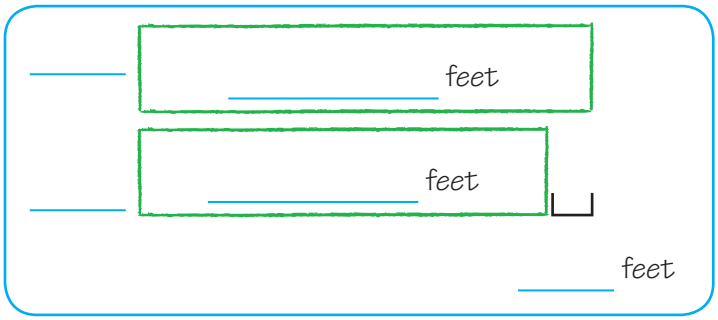
Name _____

Share and Show

MATH BOARD

1. Hot air balloons are able to fly at very high altitudes. A world record height of 64,997 feet was set in 1988. In 2005, a new record of 68,986 feet was set. How many feet higher was the 2005 record than the 1988 record?

First, draw a diagram to show the parts of the problem.



Next, write the problem you need to solve.

_____

Last, solve the problem to find how many feet higher the 2005 record was than the 1988 record.

So, the 2005 record was _____ feet higher.

2. What if a new world altitude record of 70,000 feet was set? How many feet higher would the new record be than the 2005 record?

_____

3. Last year, the ticket sales for a commercial hot air balloon ride were $109,076. This year, the ticket sales were $125,805. How much more were the ticket sales this year?

_____

4. A musician's first album sells 234,499 copies the first week it was released. During the second week, another 432,112 albums were sold. How many more albums were sold during the second week than the first week?

_____

Unlock the Problem

- Use the Problem Solving MathBoard
- Underline important facts.
- Choose a strategy you know.

▲ Dr. Vijaypat Singhania flew the world's largest hot-air balloon when he made his record-breaking flight. The balloon he flew was over 20 stories tall.

On Your Own

Use the information in the table for 5–6.

5. MATHEMATICAL PRACTICE 4 **Use Models** Steve Fossett attempted to fly around the world in a balloon several times before he succeeded in 2002. How many more miles did he fly during the 2002 flight than during the August 1998 flight?

Steve Fossett's Balloon Flights

Year	Distance in Miles
1996	2,200
1997	10,360
1998 (January)	5,803
1998 (August)	14,235
2001	3,187
2002	20,482

6. GO DEEPER Is the combined distance for the 1998 flights more or less than the distance for the 2002 flight? Explain.

7. THINK SMARTER There were 665 hot air balloon pilots at a hot air balloon race. There were 1,550 more ground crew members than there were pilots. How many pilots and ground crew members were there all together?

Personal Math Trainer

8. THINK SMARTER + The first year Becky owned her car she drove it 14,378 miles. The second year she drove it 422 fewer miles than the first year. She bought the car with 16 miles on it. How many miles were on the car at the end of the second year? Show your work.

FOR MORE PRACTICE: Standards Practice Book

Name _____

Chapter 1 Review/Test

1. Select a number for ▪ that will make a true comparison. Mark all that apply.

$$703{,}209 > \blacksquare$$

Ⓐ 702,309 Ⓒ 703,209 Ⓔ 730,029

Ⓑ 703,029 Ⓓ 703,290 Ⓕ 730,209

2. Nancy wrote the greatest number that can be made using each of these digits exactly once.

5	3	4	9	8	1

Part A

What was Nancy's number? How do you know this is the greatest possible number for these digits?

Part B

What is the least number that can be made using each digit exactly once? Explain why the value of the 4 is greater than the value of the 5.

GO DIGITAL Assessment Options
Chapter Test

For 3–4, use the table.

U.S. Mountain Peaks					
Name	**State**	**Height (ft)**	**Name**	**State**	**Height (ft)**
Blanca Peak	CO	14,345	Mount Whitney	CA	14,494
Crestone Peak	CO	14,294	University Peak	AK	14,470
Humboldt Peak	CO	14,064	White Mountain	CA	14,246

3. Write the name of each mountain peak in the box that describes its height, in feet.

Between 14,000 feet and 14,300 feet	Between 14,301 feet and 14,500 feet

4. Circle the name of the tallest peak. Explain how you know which of the mountain peaks is the tallest.

5. Mr. Rodriguez bought 420 pencils for the school. If there are 10 pencils in a box, how many boxes did he buy?

(A) 42

(B) 420

(C) 430

(D) 4,200

6. Bobby and Cheryl each rounded 745,829 to the nearest ten thousand. Bobby wrote 750,000 and Cheryl wrote 740,000. Who is correct? Explain the error that was made.

Name _____

7. The total season attendance for a college team's home games, rounded to the nearest ten thousand, was 270,000. For numbers 7a–7d, select Yes or No to tell whether the number could be the exact attendance.

7a.	265,888	○ Yes	○ No
7b.	260,987	○ Yes	○ No
7c.	274,499	○ Yes	○ No
7d.	206,636	○ Yes	○ No

For 8–10, use the table.

The table shows recent population data for Sacramento, California.

Population of Sacramento, CA

Age in years	Population	Age in years	Population
Under 5	35,010	20 to 34	115,279
5 to 9	31,406	35 to 49	92,630
10 to 14	30,253	50 to 64	79,271
15 to 19	34,219	65 and over	49,420

8. How many children are under 10 years old? Show your work.

9. How many people are between the ages of 20 and 49? Show your work.

10. How many more children are under the age of 5 than between the ages of 10 and 14? Show your work.

11. For numbers 11a–11d, select True or False for each sentence.

11a. The value of 7 in 375,092 is 7,000. ○ True ○ False

11b. The value of 5 in 427,593 is 500. ○ True ○ False

11c. The value of 2 in 749,021 is 200. ○ True ○ False

11d. The value of 4 in 842,063 is 40,000. ○ True ○ False

12. Select another way to show 403,871. Mark all that apply.

(A) four hundred three thousand, eight hundred one

(B) four hundred three thousand, seventy-one

(C) four hundred three thousand, eight hundred seventy-one

(D) 400,000 + 38,000 + 800 + 70 + 1

(E) 400,000 + 3,000 + 800 + 70 + 1

(F) 4 hundred thousands + 3 thousands + 8 hundreds + 7 tens + 1 one

13. Lexi, Susie, and Rial are playing an online word game. Rial scores 100,034 points. Lexi scores 9,348 fewer points than Rial and Susie scores 9,749 more points than Lexi. What is Susie's score? Show your work.

14. There were 13,501 visitors to a museum in June. What is this number rounded to the nearest ten thousand? Explain how you rounded.

Name _____

15. New Mexico has an area of 121,298 square miles. California has an area of 155,779 square miles. How much greater is the area, in square miles, of California than the area of New Mexico? Show your work and explain how you know the answer is reasonable.

16. Circle the choice that completes the statement.

10,000 less than 24,576 is | equal to / greater than / less than | 1,000 less than 14,576

17. Match the number to the value of its 5.

45,678 •	• 500
757,234 •	• 50
13,564 •	• 50,000
3,450 •	• 5,000

18. During September and October, a total of 825,150 visitors went to Grand Canyon National Park. If 448,925 visitors went to the park in September, how many visitors went to the park in October? Show your work.

19. A college baseball team had 3 games in April. Game one had an attendance of 14,753 people. Game two had an attendance of 20,320 people. Game three had an attendance of 14,505 people. Write the games in order from the least attendance to the greatest attendance. Use pictures, words, or numbers to show how you know.

20. Caden made a four-digit number with a 5 in the thousands place, a 5 in the ones place, a 6 in the tens place, and a 4 in the hundreds place. What was the number?

Chapter 2

Multiply by 1-Digit Numbers

Show What You Know

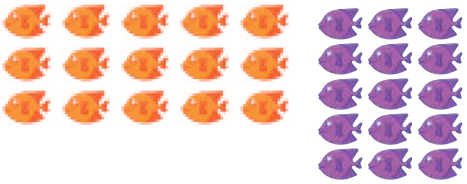
Check your understanding of important skills.

Name _____

Arrays Write a multiplication sentence for the array.

1. 

_____ _____

2. 

_____ _____

Multiplication Facts Find the product.

3. _____ = 9 × 6

4. _____ = 7 × 8

5. 8 × 4 = _____

Regroup Through Thousands

Regroup. Write the missing numbers.

6. 9 tens 10 ones = _____ hundred

7. 60 hundreds = _____ thousands

8. 25 tens = _____ hundreds 5 tens

9. 14 ones = _____ ten _____ ones

10. 3 tens 12 ones = _____ tens 2 ones

The Arctic Lion's Mane Jellyfish is one of the largest known animals. Its tentacles can be as long as 120 feet. Be a Math Detective to find how this length compares to your height. Round your height to the nearest foot.
120 feet is _____ times as long as _____ feet.

Vocabulary Builder

Review Words			Preview Words
✓ estimate	✓ place value	✓ rounding	Distributive Property
expanded form	product		partial product
factor	✓ regroup		

Visualize It

Complete the flow map, using the words with a ✓.

Multiplying

What can you do?	What can you use?	What are some examples?
_____ products.	Use _____ and mental math.	3 × 48 = ■ ↓ ↓ 3 × 50 = 150
_____ ones as tens.	Use _____.	12 ones = 1 ten 2 ones

Understand Vocabulary

Complete the sentences.

1. The _____ states that multiplying a sum by a number is the same as multiplying each addend by the number and then adding the products.

2. A number that is multiplied by another number to find a product is called a _____.

3. A method of multiplying in which the ones, tens, hundreds, and so on are multiplied separately and then the products are added together is called the _____ method.

Name _____

Multiplication Comparisons

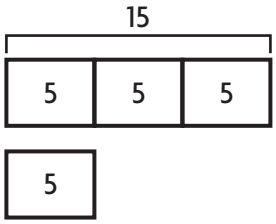
Essential Question How can you model multiplication comparisons?

Operations and Algebraic Thinking—4.OA.1

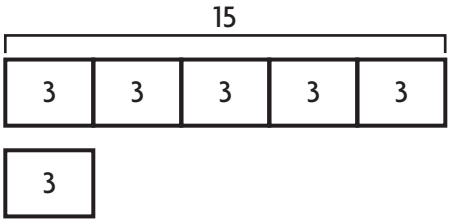
MATHEMATICAL PRACTICES
MP.1, MP.4, MP.7

You can use multiplication to compare amounts. For example, you can think of $15 = 3 \times 5$ as a comparison in two ways:

15 is 3 times as many as 5.



15 is 5 times as many as 3.



Remember

The Commutative Property states that you can multiply two factors in any order and get the same product.

Unlock the Problem

Carly has 9 pennies. Jack has 4 times as many pennies as Carly. How many pennies does Jack have?

- What do you need to compare?

_____

_____

Draw a model and write an equation to solve.

MODEL

Carly ☐

Jack ☐☐☐☐

☐

RECORD

Use the model to write an equation and solve.

$n =$ _____ $\times$ _____

$n =$ _____

The value of n is 36.

Think: *n* is how many pennies Jack has.

So, Jack has _____ pennies.

Math Talk **Mathematical Practices**

Describe what is being compared and explain how the comparison model relates to the equation.

- **THINK SMARTER** Explain how the equation for *4 is 2 more than 2* is different from the equation for *4 is 2 times as many as 2*.

_____

_____

_____

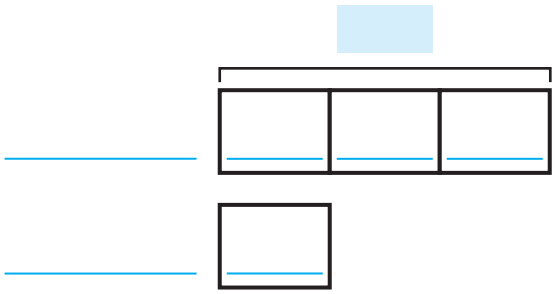
Example Draw a model and write an equation to solve.

Miguel has 3 times as many rabbits as Sara. Miguel has 6 rabbits. How many rabbits does Sara have?

- How many rabbits does Miguel have? ____
- How many rabbits does Sara have?

MODEL

Think: You don't know how many rabbits Sara has. Use *n* for Sara's rabbits.



RECORD

Use the model to write an equation and solve.

6 = _____ × _____

6 = 3 × _____ **Think:** 3 times what number equals 6?

The value of *n* is 2.

Think: *n* is how many rabbits Sara has.

So, Sara has 2 rabbits.

Try This! Write an equation or a comparison sentence.

A Write an equation.

21 is 7 times as many as 3.

_____ = _____ × _____

B Write a comparison sentence.

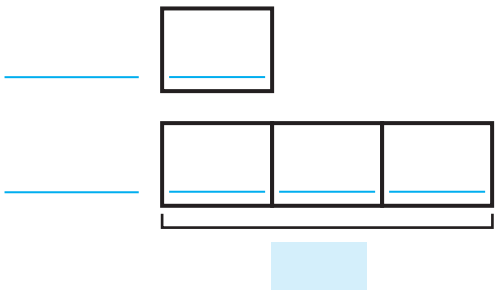
8 × 5 = 40

_____ times as many as _____ is _____.

Share and Show

MATH BOARD

1. There are 8 students in the art club. There are 3 times as many students in chorus. How many students are in chorus?



Write an equation and solve.

n = _____ × _____

n = _____

The value of *n* is _____.

So, there are _____ students in chorus.

Math Talk **Mathematical Practices**

Could you write the equation a different way? **Explain.**

Name _____

Draw a model and write an equation.

2. 6 times as many as 2 is 12.

_____ _____ _____ _____ _____ _____

_____

_____

3. 20 is 4 times as many as 5.

_____ _____ _____ _____

_____

_____

Write a comparison sentence.

4. $18 = 9 \times 2$

_____ is _____ times as many as _____.

5. $8 \times 4 = 32$

_____ times as many as _____ is _____.

On Your Own

Write a comparison sentence.

6. $5 \times 7 = 35$

_____ times as many as _____ is _____.

7. $54 = 6 \times 9$

_____ is _____ times as many as _____.

Write an equation.

8. 3 times as many as 7 is 21.

_____

9. 40 is 5 times as many as 8.

_____

10. GO DEEPER Nando has 4 goldfish. Jill has 3 goldfish. Cooper has 2 times as many goldfish as Nando and Jill combined. Write an equation that compares the number of goldfish Cooper has with the number of goldfish that Nando and Jill have.

_____

11. MATHEMATICAL PRACTICE 2 **Represent a Problem** Write a comparison sentence about pet food that could be represented using the equation $12 = 4 \times 3$.

_____

_____

_____

Unlock the Problem Real World

12. THINK SMARTER Luca has 72 baseball cards. This is 8 times as many cards as Han has. How many baseball cards does Han have?

a. What do you need to find? _____

_____

b. How can you use a model to find the number of cards Han has?

_____

c. Draw the model.

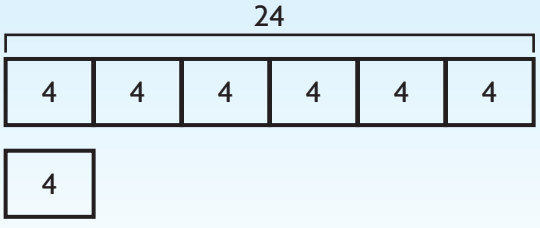
d. Write an equation and solve.

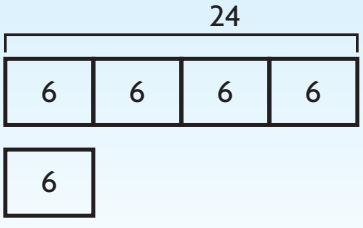
_____ = _____ × _____

_____ = _____

So, Han has _____ baseball cards.

13. THINK SMARTER Write a statement from the box to show what the model describes.





24 is ☐ times as many as ☐.

24 is ☐ times as many as ☐.

FOR MORE PRACTICE: Standards Practice Book

Name _____

Comparison Problems

Essential Question How does a model help you solve a comparison problem?

Operations and Algebraic Thinking—4.OA.2

MATHEMATICAL PRACTICES
MP.1, MP.3, MP.4, MP.7

Unlock the Problem

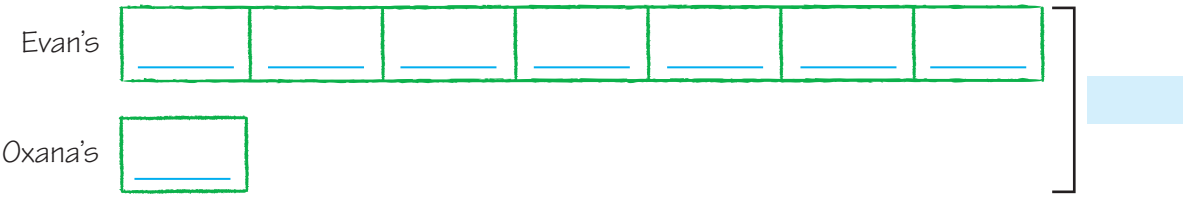
Real World

Evan's dog weighs 7 times as much as Oxana's dog. Together, the dogs weigh 72 pounds. How much does Evan's dog weigh?

Example 1 Use a multiplication model.

STEP 1 Draw a model. Let n represent the unknown.

Think: Let n represent how much Oxana's dog weighs. Together, the dogs weigh 72 pounds.



STEP 2 Use the model to write an equation. Find the value of n.

_____ × n = _____ **Think:** There are 8 parts. The parts together equal 72.

8 × _____ = 72 **Think:** What times 8 equals 72?

The value of n is 9.

n is how much _____ weighs.

STEP 3 Find how much Evan's dog weighs.

Think: Evan's dog weighs 7 times as much as Oxana's dog.

Evan's dog = _____ × _____ Multiply.

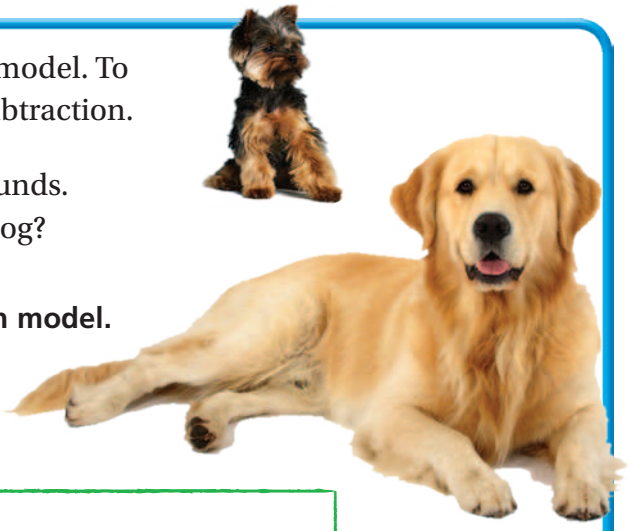
= _____

So, Evan's dog weighs 63 pounds.

Math Talk **Mathematical Practices**

Explain how you know you have found the weight of Evan's dog.

To find how many times as much, use a multiplication model. To find how many more or fewer, model the addition or subtraction.

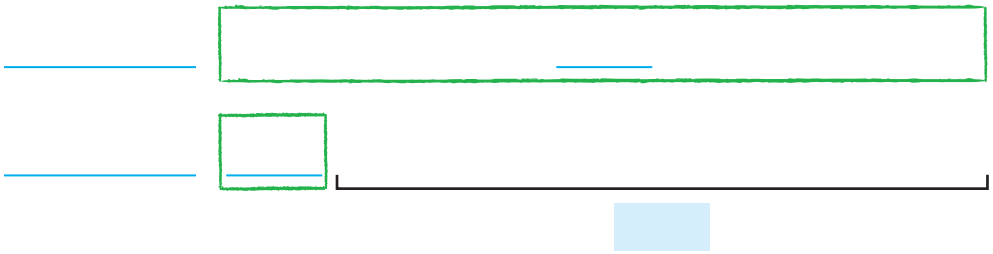


Evan's dog weighs 63 pounds. Oxana's dog weighs 9 pounds. How much more does Evan's dog weigh than Oxana's dog?

Example 2 Use an addition or subtraction model.

STEP 1 Draw a model. Let *n* represent the unknown.

Think: Let *n* represent the difference.



STEP 2 Use the model to write an equation. Find the value of *n*.

_____ − _____ = *n* **Think:** The model shows a difference.

63 − 9 = _____ Subtract.

The value of *n* is _____.

n is _____.

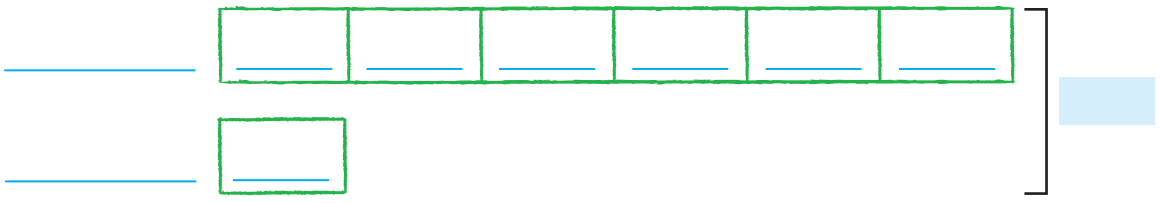
So, Evan's dog weighs 54 pounds more than Oxana's dog.

Share and Show

MATH BOARD

1. Maria's dog weighs 6 times as much as her rabbit. Together the pets weigh 56 pounds. What does Maria's dog weigh?

Draw a model. Let *n* represent the unknown.



Write an equation to find the value of *n*. 7 × *n* = _____. *n* is _____ pounds.

Multiply to find how much Maria's dog weighs. 8 × 6 = _____

So, Maria's dog weighs _____ pounds.

Math Talk **Mathematical Practices**

Explain how you can choose a model to help solve a comparison problem.

Name _____

Draw a model. Write an equation and solve.

2. Last month Kim trained 3 times as many dogs as cats. If the total number of cats and dogs she trained last month is 28, how many cats did Kim train?

Draw a model.

Write an equation and solve.

3. How many more dogs than cats did Kim train?

Draw a model.

Write an equation and solve.

On Your Own

Practice: Copy and Solve **Draw a model.**

Write an equation and solve.

4. At the dog show, there are 4 times as many boxers as spaniels. If there are a total of 30 dogs, how many dogs are spaniels?

5. There are 5 times as many yellow labs as terriers in the dog park. If there are a total of 18 dogs, how many dogs are terriers?

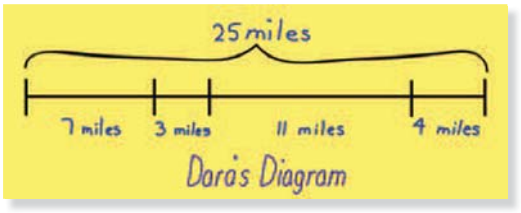
6. Ben has 3 times as many guppies as goldfish. If he has a total of 20 fish, how many guppies does he have?

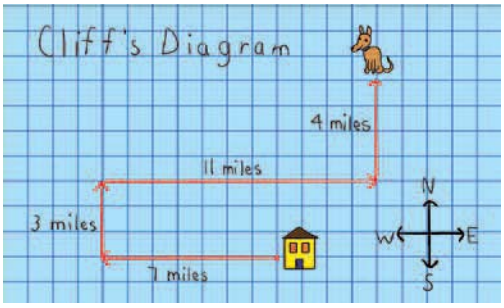
7. Carlita saw 5 times as many robins as cardinals while bird watching. She saw a total of 24 birds. How many more robins did she see than cardinals?

Problem Solving • Applications

8. GO DEEPER To get to a dog show, Mr. Luna first drives 7 miles west from his home and then 3 miles north. Next, he turns east and drives 11 miles. Finally, he turns north and drives 4 miles to the dog show. How far north of Mr. Luna's home is the dog show?

To solve the problem, Dara and Cliff drew diagrams. Which diagram is correct? Explain.



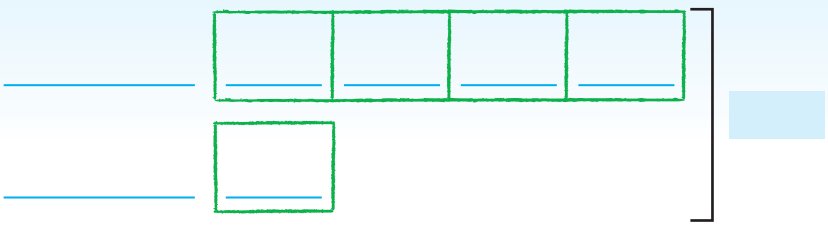


9. MATHEMATICAL PRACTICE 2 **Use Reasoning** Valerie and Bret have a total of 24 dog show ribbons. Bret has twice as many ribbons as Valerie. How many ribbons does each have?

WRITE Math
Show Your Work

10. THINK SMARTER Noah built a fenced dog run that is 8 yards long and 6 yards wide. He placed posts at every corner and every yard along the length and width of the run. How many posts did he use?

11. THINK SMARTER Last weekend, Mandy collected 4 times as many shells as Cameron. Together, they collected 40 shells. How many shells did Mandy collect? Complete the bar model. Then write an equation and solve.



FOR MORE PRACTICE:
Standards Practice Book

Name _____

Multiply Tens, Hundreds, and Thousands

Essential Question How does understanding place value help you multiply tens, hundreds, and thousands?

Number and Operations in Base Ten—4.NBT.5 *Also 4.NBT.1*

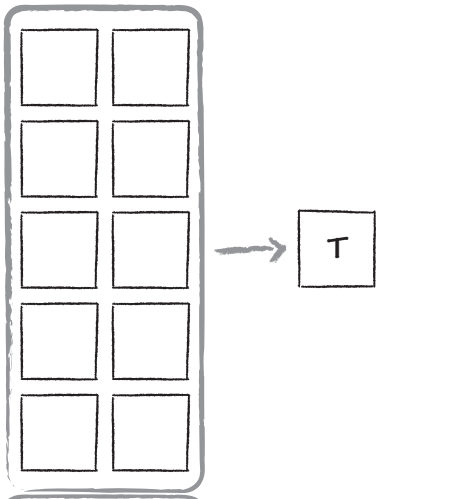
MATHEMATICAL PRACTICES
MP.4, MP.5, MP.7, MP.8

Unlock the Problem

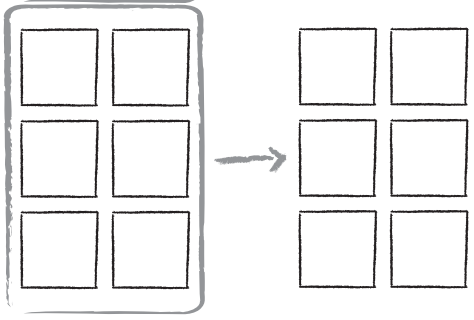
Each car on a train has 200 seats. How many seats are on a train with 8 cars?

Find 8×200.

One Way Draw a quick picture.



Think: 10 hundreds = 1,000



Think: 6 hundreds = 600

$1{,}000 + 600 =$ _____

Another Way Use place value.

$8 \times 200 = 8 \times$ _____ hundreds

$=$ _____ hundreds

$=$ _____ **Think:** 16 hundreds is 1 thousand, 6 hundreds.

So, there are _____ seats on a train with 8 cars.

Math Talk **Mathematical Practices**

Explain how finding 8×2 can help you find 8×200.

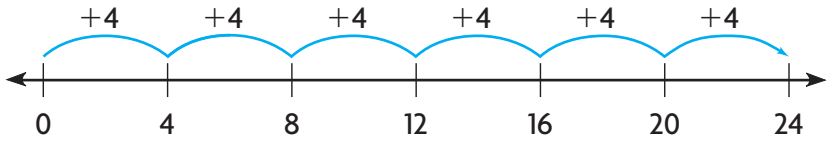
Other Ways

A **Use a number line.**

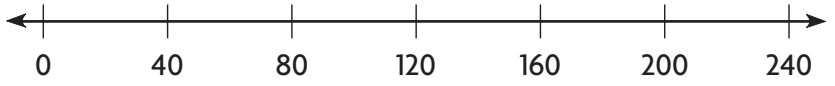
Bob's Sled Shop rents 4,000 sleds each month.
How many sleds does the store rent in 6 months?

Find 6 × 4,000.

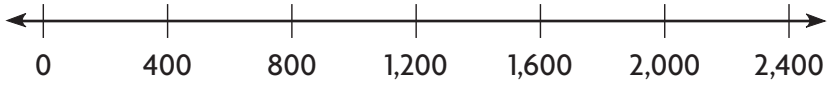
Multiplication can be thought of as repeated addition.
Draw jumps to show the product.



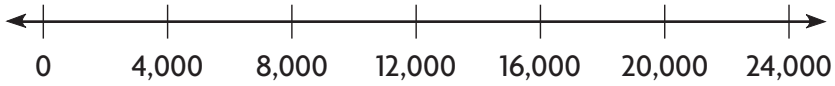
$6 \times 4 = 24$ ← basic fact



$6 \times 40 = 240$



$6 \times 400 = 2{,}400$



$6 \times 4{,}000 = 24{,}000$

So, Bob's Sled Shop rents _____ sleds in 6 months.

B **Use patterns.**

Basic fact:

$3 \times 7 = 21$ ← basic fact

$3 \times 70 = 210$

$3 \times 700 =$ _____

$3 \times 7{,}000 =$ _____

Basic fact with a zero:

$8 \times 5 = 40$ ← basic fact

$8 \times 50 = 400$

$8 \times 500 =$ _____

$8 \times 5{,}000 =$ _____

- How does the number of zeros in the product of 8 and 5,000 compare to the number of zeros in the factors? Explain.

_____

_____

Math Talk **Mathematical Practices**

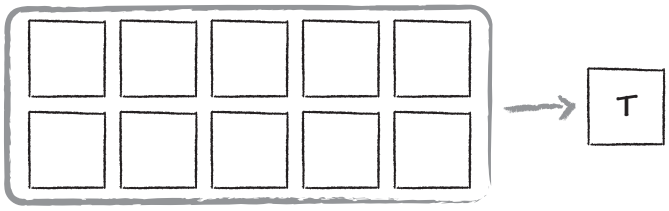
Describe how the number of zeros in the factors and products changes in Example B.

Name _____

Share and Show

MATH BOARD

1. Use the drawing to find 2×500.



$2 \times 500 =$ _____

Math Talk **Mathematical Practices**

Explain how to use place value to find 2×500.

Complete the pattern.

2. $3 \times 8 = 24$

$3 \times 80 =$ _____

$3 \times 800 =$ _____

$3 \times 8{,}000 =$ _____

3. $6 \times 2 = 12$

$6 \times 20 =$ _____

$6 \times 200 =$ _____

$6 \times 2{,}000 =$ _____

4. $4 \times 5 =$ _____

$4 \times 50 =$ _____

$4 \times 500 =$ _____

$4 \times 5{,}000 =$ _____

Find the product.

5. $6 \times 500 = 6 \times$ _____ hundreds

$=$ _____ hundreds

$=$ _____

6. $9 \times 5{,}000 = 9 \times$ _____ thousands

$=$ _____ thousands

$=$ _____

On Your Own

Find the product.

7. $7 \times 6{,}000 =$ _____

8. $4 \times 80 =$ _____

9. $3 \times 500 =$ _____

MATHEMATICAL PRACTICE 2 **Use Reasoning** **Algebra** **Find the missing factor.**

10. _____ $\times 9{,}000 = 63{,}000$

11. $7 \times$ _____ $= 56{,}000$

12. $8 \times$ _____ $= 3{,}200$

13. MATHEMATICAL PRACTICE 5 **Communicate** How does the number of zeros in the product of 8 and 5,000 compare to the number of zeros in the factors? Explain.

_____

_____

Unlock the Problem Real World

14. THINK SMARTER Joe's Fun and Sun rents beach chairs. The store rented 300 beach chairs each month in April and in May. The store rented 600 beach chairs each month from June through September. How many beach chairs did the store rent during the 6 months?

a. What do you need to know? _____

_____

b. How will you find the number of beach chairs? _____

_____

c. Show the steps you use to solve the problem.

d. Complete the sentences.

For April and May, a total of _____ beach chairs were rented.

For June through September, a total of _____ beach chairs were rented.

Joe's Fun and Sun rented _____ beach chairs during the 6 months.

15. GO DEEPER Mariah makes bead necklaces. Beads are packaged in bags of 50 and bags of 200. Mariah bought 4 bags of 50 beads and 3 bags of 200 beads. How many beads did Mariah buy? _____

16. THINK SMARTER Carmen has three books of 20 stamps and five books of 10 stamps. How many stamps does Carmen have? Complete the equation using the numbers on the tiles.

_____ × 20 + _____ × 10 = _____

3	5
110	50
60	100

FOR MORE PRACTICE: Standards Practice Book

Name _____

Estimate Products

Essential Question How can you estimate products by rounding and determine if exact answers are reasonable?

Number and Operations in Base Ten—4.NBT.5 *Also 4.NBT.3*

MATHEMATICAL PRACTICES
MP.1, MP.6, MP.7, MP.8

Unlock the Problem

Real World

An elephant can reach as high as 23 feet with its trunk. It uses its trunk to pick up objects that weigh up to 3 times as much as a 165-pound person. About how much weight can an African elephant pick up with its trunk?

- Cross out the information you will not use.
- Circle the numbers you will use.
- How will you use the numbers to solve the problem?

_____

An African elephant is the largest living land mammal.

One Way Estimate by rounding.

STEP 1 Round the greater factor to the nearest hundred.

3×165

$\downarrow$

3×200

STEP 2 Use mental math.

Think: $3 \times 200 = 3 \times 2$ hundreds

$= 6$ hundreds

$=$ _____

So, an African elephant can pick up about 600 pounds with its trunk.

Another Way Estimate by finding two numbers the exact answer is between.

3×165

$\downarrow$

$3 \times 100 =$ _____

3×165

$\downarrow$

$3 \times 200 =$ _____

Think: 165 is between 100 and 200. Use those numbers to estimate.

So, the African elephant can pick up between 300 and 600 pounds.

1. Is 200 less than or greater than 165? _____
2. So, would the product of 3 and 165 be less than or greater than 600? _____

Math Talk **Mathematical Practices**

Is the exact answer closer to 300 or 600? Why?

Describe Reasonableness You can estimate a product to find whether an exact answer is reasonable.

Tell whether an exact answer is reasonable.

Eva's horse eats 86 pounds each week. Eva solved the equation below to find how much feed she needs for 4 weeks.

$4 \times 86 = \square$

Eva says she needs 344 pounds of feed.
Is her answer reasonable?

One Way **Estimate.**

4×86

↓ **Think:** Round to the nearest ten.

_____ × _____ = _____

344 is close to 360.

Another Way **Find two numbers the exact answer is between.**

4×86

↓

_____ × _____ = _____

4×86

↓

_____ × _____ = _____

_____ is between _____ and _____.

So, 344 pounds of feed is reasonable.

Share and Show

MATH BOARD

1. Estimate the product by rounding.

$5 \times 2{,}213$

↓

_____ × _____ = _____

2. Estimate the product by finding two numbers the exact answer is between.

$5 \times 2{,}213$

_____ × _____ = _____

$5 \times 2{,}213$

_____ × _____ = _____

Math Talk **Mathematical Practices**

Is an exact answer of 11,065 reasonable? **Explain.**

Name _____

Tell whether the exact answer is reasonable.

3. Kira needs to make color copies of a horse show flyer. The printer can make 24 copies in 1 minute. Kira says the printer makes 114 copies in 6 minutes.

4. Jones Elementary is having a car wash to raise money for a community horse trail. Each car wash ticket costs $8. Tiara says the school will receive $1,000 if 125 tickets are sold.

On Your Own

Tell whether the exact answer is reasonable.

5. MATHEMATICAL PRACTICE 1 **Evaluate Reasonableness** Mrs. Hense sells a roll of coastal Bermuda horse hay for $58. She says she will make $174 if she sells 3 rolls.

6. Mr. Brown sells horse supplies. A pair of riding gloves sells for $16. He says he will make $144 if he sells 9 pairs.

7. A walking path for horses is 94 feet long. Carlos says that if a horse walks the length of the path 3 times, it will have walked 500 feet.

8. THINK SMARTER Students in the third grade sell 265 tickets to the school play. Students in the fourth grade sell 3 times as many tickets as the third grade students. Estimate the number of tickets the fourth grade students sold. Choose the two numbers the exact answer is between.

The students sold between

0	and	300	tickets.
300		600	
600		900	
900		1,200	

Connect to Reading

Make Predictions

As you read a story, you make predictions about what might happen next or about how the story will end.

When you solve a math problem, you make predictions about what your answer might be.

An *estimate* is a prediction because it helps you to determine whether your answer is correct. For some problems, it is helpful to make two estimates—one that is less than the exact answer and one that is greater.

Predict whether the exact answer will be *less than* or *greater than* the estimate. Explain your answer.

9. THINK SMARTER The food stand at the zoo sold 2,514 pounds of hamburger last month. The average cost of a pound of hamburger is $2. Jeremy estimates that about $6,000 worth of hamburger was sold last month.

10. GO DEEPER A zoo bought 2,240 pounds of fresh food for the bears this month. The average cost of a pound of food is $4. Jeremy estimates that about $8,000 was spent on fresh food for the bears this month.

FOR MORE PRACTICE:
Standards Practice Book

Name _____

Multiply Using the Distributive Property

Essential Question How can you use the Distributive Property to multiply a 2-digit number by a 1-digit number?

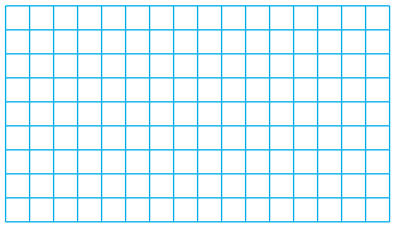
Number and Operations in Base Ten—4.NBT.5

MATHEMATICAL PRACTICES
MP.1, MP.7

Investigate

Hands On

Materials ■ color pencils, grid paper

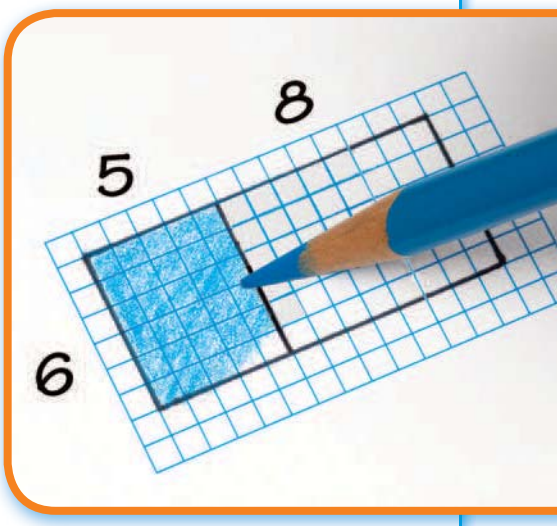


You can use the Distributive Property to break apart numbers to make them easier to multiply.

The **Distributive Property** states that multiplying a sum by a number is the same as multiplying each addend by the number and then adding the products.

A. Outline a rectangle on the grid to model 6×13.

B. Think of 13 as $5 + 8$. Break apart the model to show $6 \times (5 + 8)$. Label and shade the smaller rectangles. Use two different colors.



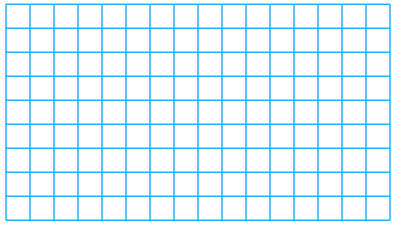
Use the Distributive Property. Find the product each smaller rectangle represents. Then find the sum of the products. Record your answers.

_____ × _____ = _____

_____ × _____ = _____

_____ + _____ = _____

C. Model 6×13 again. Think of 13 as a different sum. Break apart the model to show $6 \times$ (_____ + _____). Find the product each smaller rectangle represents. Then find the sum of the products. Record your answers.



_____ × _____ = _____

_____ × _____ = _____

_____ + _____ = _____

Draw Conclusions

1. Explain how you found the total number of squares in each model in Steps B and C.

2. Compare the sums of the products in Steps B and C with those of your classmates. What can you conclude?

3. THINK SMARTER To find 7×23, is it easier to break apart the factor, 23, as $20 + 3$ or $15 + 8$? Explain.

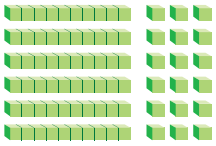
Make Connections

Hands On

Another way to model the problem is to use base-ten blocks to show tens and ones.

STEP 1

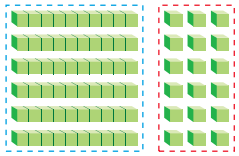
Use base-ten blocks to model 6×13.



6 rows of 1 ten 3 ones

STEP 2

Break the model into tens and ones.

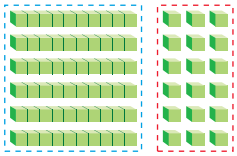


$(6 \times 1 \text{ ten})$ $(6 \times 3 \text{ ones})$

(6×10) (6×3)

STEP 3

Add the tens and the ones to find the product.



$(6 \times 10) + (6 \times 3)$

$60 + 18$

So, $6 \times 13 = 78$.

In Step 2, the model is broken into two parts. Each part shows a **partial product**. The partial products are 60 and 18.

Math Talk Mathematical Practices

How does breaking apart the model into tens and ones make finding the product easier?

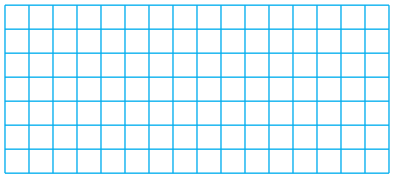
Name _____

Share and Show

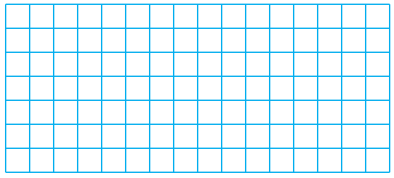
MATH BOARD

Model the product on the grid. Record the product.

1. $3 \times 13 =$ _____

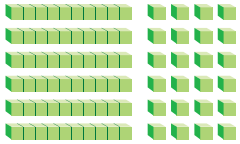


2. $5 \times 14 =$ _____

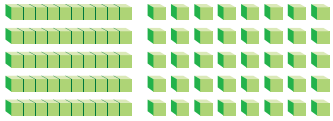


Find the product.

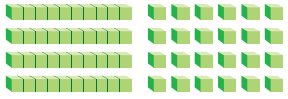
3. $6 \times 14 =$ _____



4. $5 \times 18 =$ _____



5. $4 \times 16 =$ _____



Use grid paper or base-ten blocks to model the product. Then record the product.

6. $7 \times 12 =$ _____

7. $5 \times 16 =$ _____

8. $9 \times 13 =$ _____

Problem Solving • Applications

Real World

9. MATHEMATICAL PRACTICE 6 **Explain** how modeling partial products can be used to find the products of greater numbers.

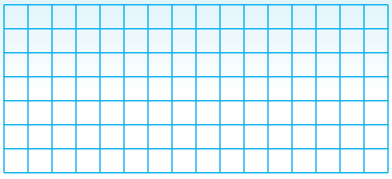
_____

_____

_____

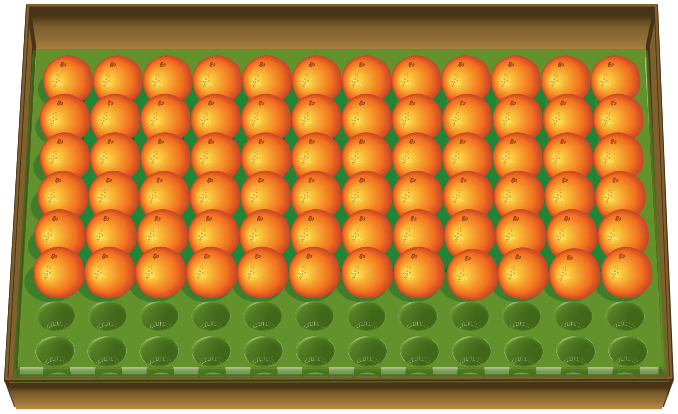
10. THINK SMARTER Use the Distributive Property to model the product on the grid. Record the product.

$5 \times 14 =$ _____



11. THINK SMARTER Kyle went to a fruit market. The market sells a wide variety of fruits and vegetables. The picture at the right shows a display of oranges.

Write a problem that can be solved using the picture.



Pose a problem.

Solve your problem.

- GO DEEPER Describe how you could change the problem by changing the number of rows of oranges and the number of empty spaces in the picture. Then solve the problem.

FOR MORE PRACTICE:
Standards Practice Book

Name _____

Multiply Using Expanded Form

Essential Question How can you use expanded form to multiply a multidigit number by a 1-digit number?

Number and Operations in Base Ten—4.NBT.5

MATHEMATICAL PRACTICES
MP.1, MP.2, MP.4

Unlock the Problem

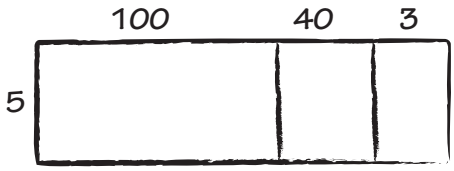
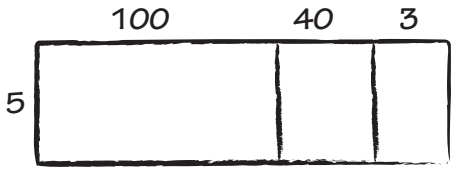
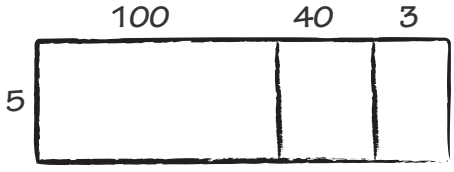
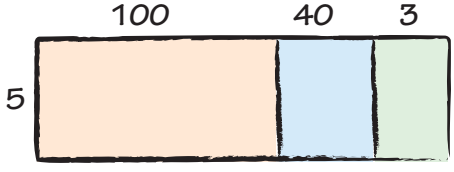
Real World

Example 1 Use expanded form.

Multiply. 5×143

$5 \times 143 = 5 \times (\_\_\_\_ + \_\_\_\_ + \_\_\_\_)$ Write 143 in expanded form.

$= (5 \times 100) + (\_\_\_\_ \times \_\_\_\_) + (\_\_\_\_ \times \_\_\_\_)$ Use the Distributive Property.

	SHADE THE MODEL	THINK AND RECORD
STEP 1		Multiply the hundreds. $(5 \times 100) + (5 \times 40) + (5 \times 3)$ $\_\_\_\_ + (5 \times 40) + (5 \times 3)$
STEP 2		Multiply the tens. $(5 \times 100) + (5 \times 40) + (5 \times 3)$ $500 + \_\_\_\_ + (5 \times 3)$
STEP 3		Multiply the ones. $(5 \times 100) + (5 \times 40) + (5 \times 3)$ $500 + 200 + \_\_\_\_$
STEP 4		Add the partial products. 500 200 + 15

So, $5 \times 143 = \_\_\_\_$.

Math Talk **Mathematical Practices**

Is your answer reasonable? **Explain.**

Example 2 Use expanded form.

The gift shop at the animal park orders 3 boxes of toy animals. Each box has 1,250 toy animals. How many toy animals does the shop order?

Multiply. $3 \times 1{,}250$

STEP 1

Write 1,250 in expanded form. Use the Distributive Property.

$3 \times 1{,}250 = 3 \times (\_\_\_\_ + \_\_\_\_ + \_\_\_\_)$

$= (3 \times 1{,}000) + (\_\_\_\_ \times \_\_\_\_) + (\_\_\_\_ \times \_\_\_\_)$

STEP 2

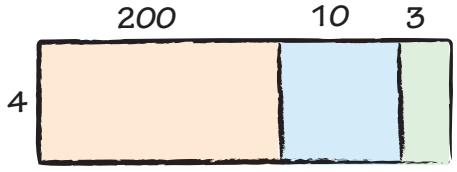
Add the partial products.

So, the shop ordered _____ animals.

Share and Show

MATH BOARD

1. Find 4×213. Use expanded form.



$4 \times 213 = \_\_\_\_ \times (\_\_\_\_ + \_\_\_\_ + \_\_\_\_)$

$= (\_\_\_\_ \times \_\_\_\_) + (\_\_\_\_ \times \_\_\_\_) + (\_\_\_\_ \times \_\_\_\_)$ Use the Distributive Property.

$= \_\_\_\_ + \_\_\_\_ + \_\_\_\_$

$= \_\_\_\_$

Record the product. Use expanded form to help.

2. $4 \times 59 = \_\_\_\_$

3. $3 \times 288 = \_\_\_\_$

Math Talk **Mathematical Practices**

Explain how using expanded form makes finding the product easier.

Name _____

On Your Own

Record the product. Use expanded form to help.

4. $4 \times 21 =$ _____

5. $6 \times 35 =$ _____

6. $5 \times 479 =$ _____

7. $6 \times 4{,}121 =$ _____

WRITE Math
Show Your Work

8. A jeweler has 36 inches of silver chain. She needs 5 times that much to make some necklaces. How much silver chain does the jeweler need to make her necklaces?

_____

9. Gretchen walks her dog 3 times a day. Each time she walks the dog, she walks 1,760 yards. How many yards does she walk her dog in 1 day?

_____

10. MATHEMATICAL PRACTICE 4 **Write an Expression** Which expression could you write to show how to multiply 9×856 using place value and expanded form?

_____

11. GO DEEPER Jennifer bought 4 packages of tacks. There are 48 tacks in a package. She used 160 of the tacks to put up posters. How many tacks does she have left? Explain.

_____

_____

_____

_____

Problem Solving • Applications

Use the table for 12–13.

Sacco Nursery Plant Sale

Tree	Regular Price	Discounted Price (4 or more)
Flowering Cherry	$59	$51
Italian Cypress	$79	$67
Muskogee Crape Myrtle	$39	$34
Royal Empress	$29	$25

12. What is the total cost of 3 Italian cypress trees?

13. THINK SMARTER **What's the Error?**

Tanya says that the difference in the cost of 4 flowering cherry trees and 4 Muskogee crape myrtles is $80. Is she correct? Explain.

WRITE Math • Show Your Work

14. WRITE Math What is the greatest possible product of a 2-digit number and a 1-digit number? Explain how you know.

15. THINK SMARTER Multiply 5×381 using place value and expanded form. Select a number from each box to complete the expression.

$(5 \times \boxed{\begin{matrix}30\\300\end{matrix}}) + (5 \times \boxed{\begin{matrix}8\\80\end{matrix}}) + (5 \times \boxed{\begin{matrix}1\\10\end{matrix}})$

FOR MORE PRACTICE: Standards Practice Book

Name _____

Multiply Using Partial Products

Essential Question How can you use place value and partial products to multiply by a 1-digit number?

Number and Operations in Base Ten—4.NBT.5

MATHEMATICAL PRACTICES
MP.1, MP.7

Unlock the Problem

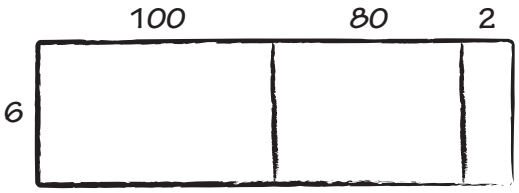
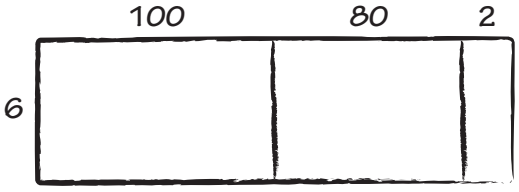
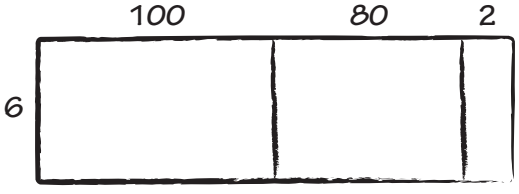
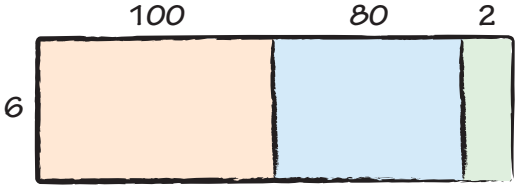
CONNECT How can you use what you know about the Distributive Property to break apart numbers to find products of 3-digit and 1-digit numbers?

- How can you write 182 as a sum of hundreds, tens, and ones?

_____

Use place value and partial products.

Multiply. 6×182 **Estimate.** $6 \times 200 =$ _____

	SHADE THE MODEL	THINK AND RECORD
STEP 1		182 × 6 _____ ← Multiply the hundreds. 6 × 1 hundred = 6 hundreds
STEP 2		182 × 6 600 ← Multiply the tens. 6 × 8 tens = 48 tens
STEP 3		182 × 6 600 480 ← Multiply the ones. 6 × 2 ones = 12 ones
STEP 4		182 × 6 600 480 + 12 _____ ← Add the partial products.

So, $6 \times 182 = 1{,}092$. Since 1,092 is close to the estimate of 1,200, it is reasonable.

Math Talk **Mathematical Practices**

How can you use the Distributive Property to find 4×257?

Example

Use place value and partial products.

Multiply. $2 \times 4{,}572$. **Estimate.** $2 \times 5{,}000 =$ _____

$$\begin{array}{r} 4{,}572 \\ \times \quad 2 \\ \hline \\ \\ \\ + \\ \hline \\ \end{array}$$

← 2×4 thousands $=$ 8 thousands

← 2×5 hundreds $=$ 1 thousand

← 2×7 tens $=$ 1 hundred, 4 tens

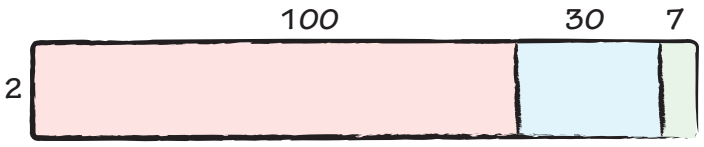
← 2×2 ones $=$ 4 ones

← Add the partial products.

Share and Show

MATH BOARD

1. Use the model to find 2×137.



$$\begin{array}{r} 137 \\ \times \quad 2 \\ \hline \\ \\ + \\ \hline \\ \hline \end{array}$$

Estimate. Then record the product.

2. Estimate: _____

$$\begin{array}{r} 190 \\ \times \quad 3 \\ \hline \\ \\ + \\ \hline \\ \end{array}$$

3. Estimate: _____

$$\begin{array}{r} 471 \\ \times \quad 4 \\ \hline \\ \\ + \\ \hline \\ \end{array}$$

4. Estimate: _____

$$\begin{array}{r} \$3{,}439 \\ \times \quad 7 \\ \hline \\ \\ \\ + \\ \hline \\ \end{array}$$

Math Talk **Mathematical Practices**

Explain how using place value and expanded form makes it easier to find products.

Name _____

On Your Own

Estimate. Then record the product.

5. Estimate: _____

$$\begin{array}{r} \$53 \\ \times \quad 4 \\ \hline \square \\ + \square \\ \hline \square \end{array}$$

6. Estimate: _____

$$\begin{array}{r} \$473 \\ \times \quad 9 \\ \hline \square \\ \square \\ + \square \\ \hline \square \end{array}$$

7. Estimate: _____

$$\begin{array}{r} 608 \\ \times \quad 6 \\ \hline \square \\ \square \\ + \square \\ \hline \square \end{array}$$

Practice: Copy and Solve **Estimate. Then record the product.**

8. 2×78

9. $2 \times \$210$

10. $9 \times \$682$

11. $8 \times 8{,}145$

MATHEMATICAL PRACTICE 2 **Use Reasoning** **Algebra** **Find the missing digit.**

12.
$$\begin{array}{r} \square 5 \\ \times \quad 7 \\ \hline 455 \end{array}$$

13.
$$\begin{array}{r} 248 \\ \times \quad 3 \\ \hline \square 44 \end{array}$$

14.
$$\begin{array}{r} \$395 \\ \times \quad \square \\ \hline \$2{,}370 \end{array}$$

15.
$$\begin{array}{r} 3{,}748 \\ \times \quad 4 \\ \hline 1\,\square{,}992 \end{array}$$

16. A store bought 9 cases of light bulbs. There are 48 light bulbs in a case. How many light bulbs does the store buy?

_____

17. Hugo drives 208 miles to and from work each week. How many miles does he drive in 4 weeks?

_____

18. Coach Ramirez bought 8 cases of bottled water for a road race. There are 24 bottles in each case. After the race, 34 bottles of water were left. How many bottles were used at the race? Explain.

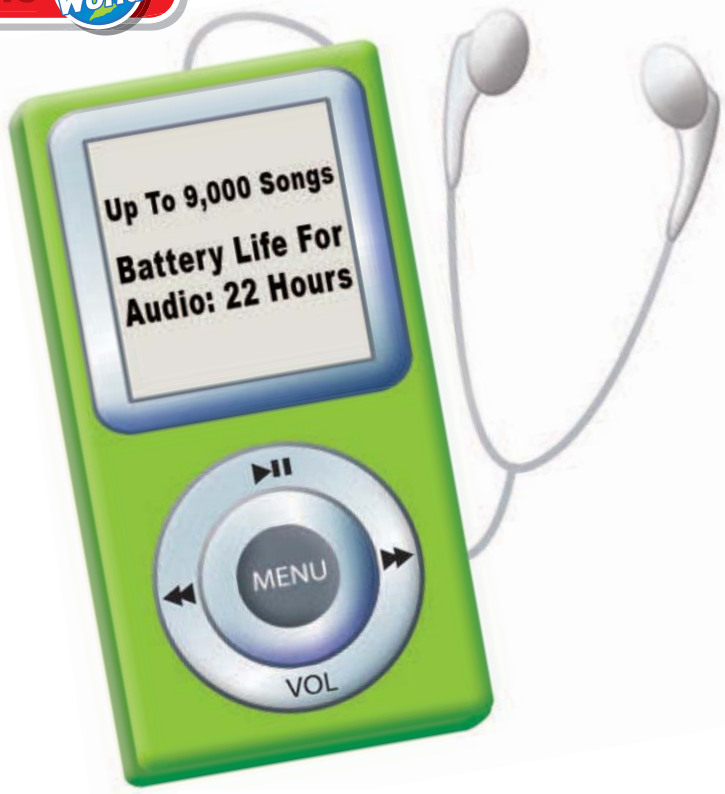
_____

_____

_____

Problem Solving • Applications Real World

19. MATHEMATICAL PRACTICE 4 **Use Diagrams** Look at the picture. Kylie has 832 songs on her portable media player. Lance has 3 times as many songs. How many fewer songs can Lance add to his player than Kylie can add to hers?



20. GO DEEPER James wants to buy the new portable media player shown. He has 5 times as many songs as Susan. Susan has 1,146 songs. Will all of his songs fit on the portable media player? How many songs does James have?

WRITE Math • Show Your Work

21. THINK SMARTER The sum of a 3-digit number and a 1-digit number is 217. The product of the numbers is 642. If one number is between 200 and 225, what are the numbers?

22. THINK SMARTER Mrs. Jackson bought 6 gallons of juice for a party. Each gallon has 16 cups. After the party, 3 cups of juice were left over. At the party, how many cups did people drink? Show your work and explain how you found your answer.

FOR MORE PRACTICE: Standards Practice Book

Name _____

Mid-Chapter Checkpoint

Vocabulary

Choose the best term from the box to complete the sentence.

Vocabulary
Distributive Property
factor
partial products

1. To find the product of a two-digit number and a 1-digit number, you can multiply the tens, multiply the ones, and find the sum of each _____. (p. 64)

2. The _____ states that multiplying a sum by a number is the same as multiplying each addend by the number and then adding the products. (p. 63)

Concepts and Skills

Write a comparison sentence. (4.OA.1)

3. $5 \times 9 = 45$

_____ times as many as _____ is _____.

4. $24 = 6 \times 4$

_____ is _____ times as many as _____.

5. $54 = 6 \times 9$

_____ is _____ times as many as _____.

6. $8 \times 6 = 48$

_____ times as many as _____ is _____.

Estimate. Then record the product. (4.NBT.5)

7. Estimate: _____

$$\begin{array}{r} 75 \\ \times\ 5 \\ \hline \end{array}$$

8. Estimate: _____

$$\begin{array}{r} 12 \\ \times\ 6 \\ \hline \end{array}$$

9. Estimate: _____

$$\begin{array}{r} 28 \\ \times\ 3 \\ \hline \end{array}$$

10. Estimate: _____

$$\begin{array}{r} \$43 \\ \times\ \ 6 \\ \hline \end{array}$$

Record the product. Use expanded form to help. (4.NBT.5)

11. $5 \times 64 =$ _____

12. $3 \times 272 =$ _____

13. There are 6 times as many dogs as cats. If the total number of dogs and cats is 21, how many dogs are there? (4.OA.2)

14. The table below shows the number of calories in 1 cup of different kinds of berries. How many calories are in 4 cups of blackberries? (4.NBT.5)

Berry Nutrition

Berry	Number of Calories in 1 Cup
Blackberries	62
Blueberries	83
Raspberries	64
Strawberries	46

15. The skating rink rents 200 pairs of skates in a month. How many pairs of skates does the rink rent in 4 months? (4.NBT.5)

Name _____

Multiply Using Mental Math

Essential Question How can you use mental math and properties to help you multiply numbers?

Number and Operations in Base Ten—4.NBT.5

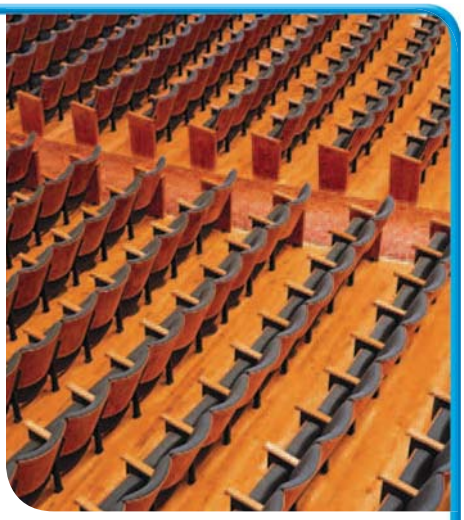
MATHEMATICAL PRACTICES
MP.1, MP.7, MP.8

Unlock the Problem

Real World

Properties of Multiplication can make multiplication easier.

There are 4 sections of seats in the Playhouse Theater. Each section has 7 groups of seats. Each group has 25 seats. How many seats are there in the theater?



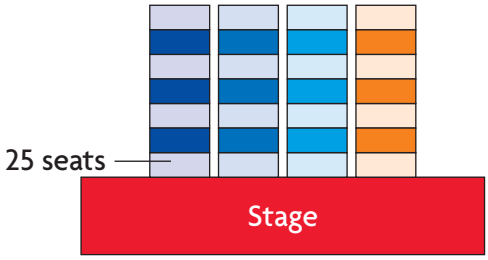
Find $4 \times 7 \times 25$.

$4 \times 7 \times 25 = 4 \times 25 \times 7$ Commutative Property

$= \_\_\_\_\_ \times 7$ **Think:** $4 \times 25 = 100$

$= \_\_\_\_\_$ **Think:** $100 \times 7 = 700$

So, there are 700 seats in the theater.



Math Talk Mathematical Practices

How could knowing 4×25 help you find 6×25?

Try This! Use mental math and properties.

A **Find $(6 \times 10) \times 10$.**

$(6 \times 10) \times 10 = 6 \times (10 \times 10)$ Associative Property

$= 6 \times \_\_\_\_\_$

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

B **Find $(4 \times 9) \times 250$.**

$(4 \times 9) \times 250 = 250 \times (4 \times 9)$ Commutative Property

$= (250 \times 4) \times 9$ Associative Property

$= \_\_\_\_\_ \times 9$

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

Remember

The Associative Property states that you can group factors in different ways and get the same product. Use parentheses to group the factors you multiply first.

More Strategies Choose the strategy that works best with the numbers in the problems.

Examples

A **Use friendly numbers.**

Multiply. 24×250

Think: $24 = 6 \times 4$ and $4 \times 250 = 1{,}000$

$24 \times 250 = 6 \times 4 \times 250$

$= 6 \times$ _____

$=$ _____

B **Use halving and doubling.**

Multiply. 16×50

Think: 16 can be divided evenly by 2.

$16 \div 2 = 8$ Find half of 16.

$8 \times 50 =$ _____ Multiply.

$2 \times 400 =$ _____ Double 400.

C **Use addition.**

Multiply. 4×625

Think: 625 is 600 plus 25.

$4 \times 625 = 4 \times (600 + 25)$

$= (4 \times 600) + (4 \times 25)$

$=$ _____ $+$ _____

$=$ _____

D **Use subtraction.**

Multiply. 5×398

Think: 398 is 2 less than 400.

$5 \times 398 = 5 \times (400 - 2)$

$= (5 \times$ _____$) - (5 \times 2)$

$= 2{,}000 -$ _____

$=$ _____

- What property is being used in Examples C and D? _____

Share and Show

1. Break apart the factor 112 to find 7×112 by using mental math and addition.

$7 \times 112 = 7 \times ($_____ $+ 12)$

$=$ _____

$=$ _____

$=$ _____

Name _____

Find the product. Tell which strategy you used.

2. $4 \times 6 \times 50$

3. 5×420

4. 6×298

On Your Own

Math Talk **Mathematical Practices**

Explain how using an addition strategy is related to using a subtraction strategy.

Find the product. Tell which strategy you used.

5. 14×50

6. 32×25

7. $14 \times 25 \times 4$

8. $4 \times 15 \times 25$

9. 5×198

10. 5×250

Practice: Copy and Solve **Use a strategy to find the product.**

11. 16×400

12. $3 \times 31 \times 10$

13. 3×199

14. $3 \times 1{,}021$

MATHEMATICAL PRACTICE 7 **Identify Relationships** **Algebra** **Use mental math to find the unknown number.**

15. $21 \times 40 = 840$, so $21 \times 42 =$ _____.

16. $9 \times 60 = 540$, so $18 \times 30 =$ _____.

Problem Solving • Applications

Use the table for 17–19.

17. GO DEEPER Three thousand, forty-three people buy tickets at the gate for Section N and one hundred people buy tickets at the gate for Section L. How much money is collected for Section N and Section L at the gate?

18. MATHEMATICAL PRACTICE 1 **Use Diagrams** Tina and 3 of her friends buy the full season plan for Section M. If there are 45 games in the full season, how much money do they spend?

19. THINK SMARTER When the full season tickets first went on sale, 2,000 Full Season tickets sold for Section N. Two weeks after the tickets first went on sale, another 1,500 full season tickets were sold for Section N. How much money was spent on full season tickets for Section N in total? How much more money was spent when the tickets first went on sale than after the first two weeks?

Arena Ticket Prices Per Game

Section	Full Season	15-Game Plan	Gate Price
K	$44	$46	$48
L	$30	$32	$35
M	$25	$27	$30
N	$20	$22	$25

WRITE Math • Show Your Work

Personal Math Trainer

20. THINK SMARTER + Find 6×407. Show your work and explain why the strategy you chose works best with the factors.

FOR MORE PRACTICE: Standards Practice Book

Name _____

Problem Solving • Multistep Multiplication Problems

Essential Question When can you use the *draw a diagram* strategy to solve a multistep multiplication problem?

Operations and Algebraic Thinking—4.OA.3 *Also 4.NBT.5*

MATHEMATICAL PRACTICES
MP.1, MP.4, MP.8

Unlock the Problem

At the sea park, one section in the stadium has 9 rows with 18 seats in each row. In the center of each of the first 6 rows, 8 seats are in the splash zone. How many seats are not in the splash zone?

Use the graphic organizer to help you solve the problem.

Read the Problem

What do I need to find?

I need to find the number of seats that

_____ in the splash zone.

What information do I need to use?

There are 9 rows with _____ seats in each row of the section.

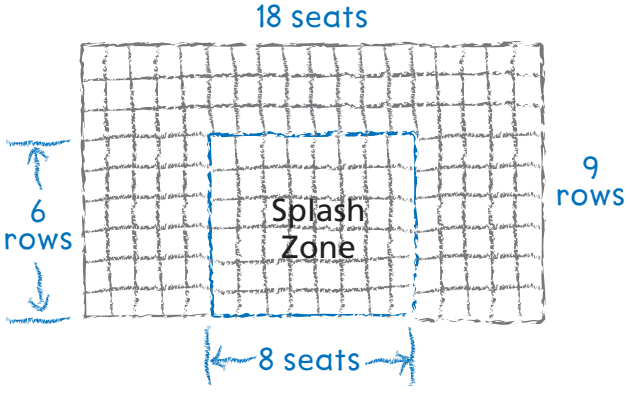
There are 6 rows with _____ seats in each row of the splash zone.

How will I use the information?

I can _____ to find both the number of seats in the section and the number of seats in the splash zone.

Solve the Problem

I drew a diagram of the section to show 9 rows of 18 seats. In the center, I outlined a section to show the 6 rows of 8 seats in the splash zone.



$$\begin{array}{r} 18 \\ \times\ 9 \\ \hline \end{array}$$ ← total number of seats in the section

$$\begin{array}{r} 8 \\ \times 6 \\ \hline \end{array}$$ ← seats in the splash zone

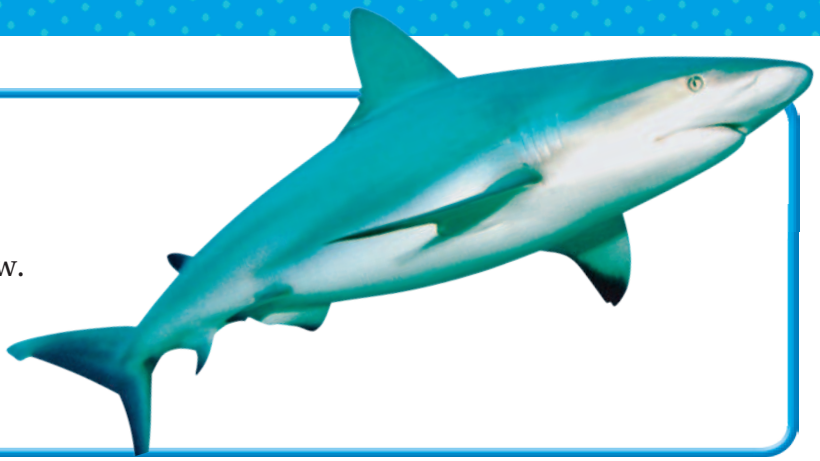
1. What else do you need to do to solve the problem?

_____

_____

Try Another Problem

At the sea park, one section of the shark theater has 8 rows with 14 seats in each row. In the middle of the section, 4 rows of 6 seats are reserved. How many seats are not reserved?



Read the Problem	Solve the Problem
What do I need to find?	
What information do I need to use?	
How will I use the information?	

2. How did your diagram help you solve the problem?

_____

_____

Math Talk

Mathematical Practices

Explain how you can check your answer.

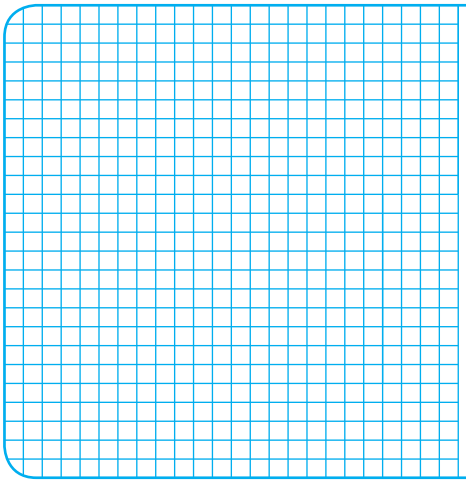
Name _____

Share and Show

MATH BOARD

1. The seats in Sections A and B of the stadium are all taken for the last show. Section A has 8 rows of 14 seats each. Section B has 6 rows of 16 seats each. How many people are seated in Sections A and B for the last show?

First, draw and label a diagram. **Next**, find the number of seats in each section.



Section A **Section B**

Last, find the total number of seats. _____ + _____ = _____

There are _____ people seated in Sections A and B for the last show.

2. What if Sections A and B each had 7 rows? How many people would have been seated in Sections A and B?

_____

3. Brenda's vegetable garden has 13 rows with 8 plants in each row. Brenda plans to plant peppers in the first 2 rows and the last 2 rows of the garden. The rest of the rows will be tomatoes. How many tomato plants will Brenda plant?

_____

4. There are 8 rows of 22 chairs set up for an awards ceremony at the school. In each row, the 2 chairs on each end are reserved for students receiving awards. The rest of the chairs are for guests. How many chairs are there for guests?

_____

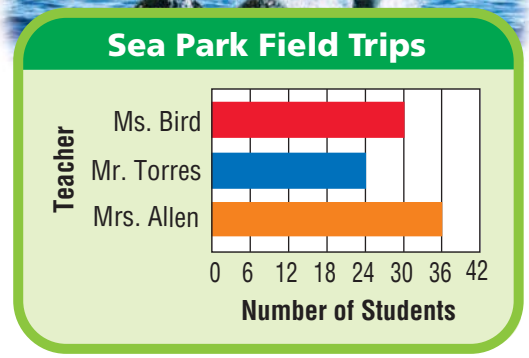
Unlock the Problem

- Use the Problem Solving MathBoard
- Underline important facts.
- Choose a strategy you know.

WRITE Math
Show Your Work

On Your Own

Use the graph for 5–6.



5. GO DEEPER Mr. Torres took his students to the dolphin show. Each row in the stadium had 11 seats. One adult sat at each end of a row, and each group of 4 students was seated between 2 adults. Mr. Torres sat by himself. How many adults were there?

6. WRITE Math Another stadium section has 24 rows of 10 seats each. Describe at least two ways Mrs. Allen's class can sit if an equal number of students sits in each row.

WRITE Math • Show Your Work

7. THINK SMARTER Carol, Ann, and Liz each bought a toy fish. Carol's fish is 10 inches longer than Ann's fish. Liz's fish is 2 inches longer than twice the length of Ann's fish. Ann's fish is 12 inches long. Find the length of each toy fish.

8. MATHEMATICAL PRACTICE 1 **Evaluate Relationships** Nell made a secret code. Each code word has 2 letters. Each word begins with a consonant and ends with a vowel. How many code words can Nell make with 3 consonants and 2 vowels?

9. THINK SMARTER Allie is building a patio. The patio will have 8 tiles in each of 13 rows. Allie built the center section with 4 tiles in each of 7 rows. How many tiles are needed to complete the patio? Show your work.

FOR MORE PRACTICE: Standards Practice Book

Name _____

Multiply 2-Digit Numbers with Regrouping

Essential Question How can you use regrouping to multiply a 2-digit number by a 1-digit number?

Number and Operations in Base Ten—4.NBT.5 *Also 4.OA.3*

MATHEMATICAL PRACTICES
MP.1, MP.4. MP.7

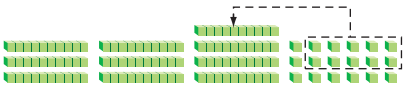
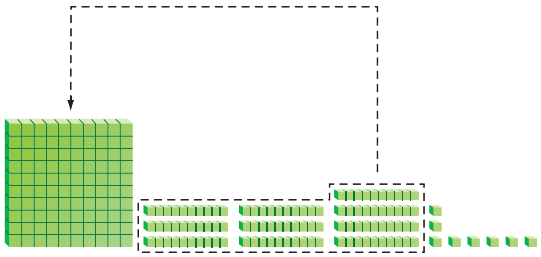
Unlock the Problem

A Thoroughbred racehorse can run at speeds of up to 60 feet per second. During practice, Celia's horse runs at a speed of 36 feet per second. How far does her horse run in 3 seconds?

- Underline important information.
- Is there information you will not use? If so, cross out the information.

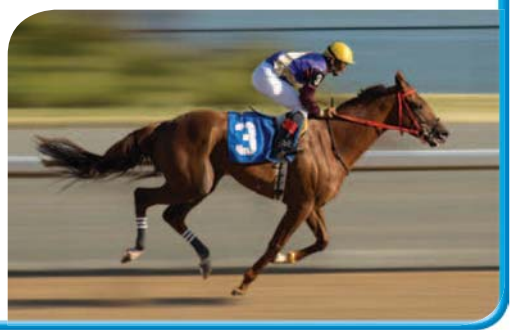
Example 1

Multiply. 3×36 **Estimate.** $3 \times 40 =$ _____

MODEL	THINK	RECORD
STEP 1 	Multiply the ones. 3×6 ones $= 18$ ones Regroup the 18 ones.	$\begin{array}{r} {\scriptstyle 1} \\ 36 \\ \times\ 3 \\ \hline 8 \end{array}$ Regroup 18 ones as 1 ten 8 ones.
STEP 2 	Multiply the tens. 3×3 tens $= 9$ tens Add the regrouped ten. 9 tens + 1 ten = 10 tens	$\begin{array}{r} {\scriptstyle 1} \\ 36 \\ \times\ 3 \\ \hline 108 \end{array}$ 10 tens is the same as 1 hundred 0 tens.

So, Celia's racehorse runs _____ feet in 3 seconds.

Since _____ is close to the estimate of _____, the answer is reasonable.

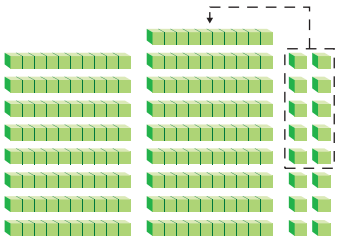
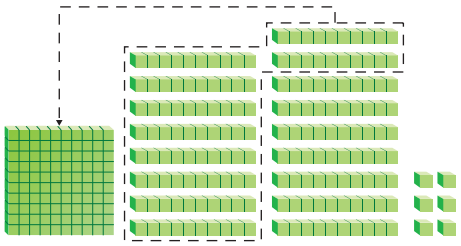


Math Talk **Mathematical Practices**

Look at Step 1. **Explain** how the blocks show the regrouping of the 18 ones.

Example 2

Multiply. 8×22 **Estimate.** $8 \times 20 =$ _____

MODEL	THINK	RECORD
STEP 1 	Multiply the ones. 8×2 ones $= 16$ ones Regroup the 16 ones.	$\begin{array}{r} {\scriptstyle 1} \\ 22 \\ \times\ 8 \\ \hline 6 \end{array}$ Regroup 16 ones as 1 ten 6 ones.
STEP 2 	Multiply the tens. 8×2 tens $= 16$ tens Add the regrouped ten. 16 tens $+$ 1 ten $=$ 17 tens	$\begin{array}{r} {\scriptstyle 1} \\ 22 \\ \times\ 8 \\ \hline 176 \end{array}$ 17 tens is the same as 1 hundred 7 tens.

So, $8 \times 22 =$ _____. Since _____ is close to the estimate of _____, it is reasonable.

Try This! **Multiply.** $7 \times \$68$

Estimate. $7 \times \$68$

Use partial products.

$$\begin{array}{r} \$68 \\ \times\ \ 7 \\ \hline \end{array}$$

Use regrouping.

$$\begin{array}{r} \$68 \\ \times\ \ 7 \\ \hline \end{array}$$

- MATHEMATICAL PRACTICE 7 **Identify Relationships** Look at the partial products and regrouping methods above. How are the partial products 420 and 56 related to 476?

_____

Name _____

Share and Show

MATH BOARD

1. Use the model to find the product.

$2 \times 36 =$ _____

Estimate. Then record the product.

2. Estimate: _____

$$\begin{array}{r} 42 \\ \times\ 4 \\ \hline \end{array}$$

3. Estimate: _____

$$\begin{array}{r} 32 \\ \times\ 2 \\ \hline \end{array}$$

4. Estimate: _____

$$\begin{array}{r} 81 \\ \times\ 5 \\ \hline \end{array}$$

5. Estimate: _____

$$\begin{array}{r} \$63 \\ \times\ 7 \\ \hline \end{array}$$

Math Talk **Mathematical Practices**

Describe the steps for using place value and regrouping to find 3×78.

On Your Own

Estimate. Then record the product.

6. Estimate: _____

$$\begin{array}{r} 33 \\ \times\ 2 \\ \hline \end{array}$$

7. Estimate: _____

$$\begin{array}{r} \$25 \\ \times\ 3 \\ \hline \end{array}$$

8. Estimate: _____

$$\begin{array}{r} 36 \\ \times\ 8 \\ \hline \end{array}$$

9. Estimate: _____

$$\begin{array}{r} \$94 \\ \times\ 5 \\ \hline \end{array}$$

Practice: Copy and Solve **Estimate. Then record the product.**

10. 3×82 **11.** 9×41 **12.** 6×75 **13.** $7 \times \$23$ **14.** $8 \times \$54$

15. 5×49 **16.** 8×97 **17.** 4×68 **18.** $9 \times \$68$ **19.** $6 \times \$73$

MATHEMATICAL PRACTICE 7 **Identify Relationships** **Algebra** **Write a rule. Find the unknown numbers.**

20.

Carton	____	1	2	3	4	5
Eggs	____	12	24		48	

21.

Row	____	2	3	4	5	6
Seats	____	32	48	64		

Problem Solving • Applications Real World

Use the table for 22–23.

22. At the speeds shown, how much farther could a black-tailed jackrabbit run than a desert cottontail in 7 seconds?

_____

23. A black-tailed jackrabbit hops about 7 feet in a single hop. How far can it hop in 5 seconds?

_____

Running Speeds

Animal	Speed (feet per second)
Black-tailed Jackrabbit	51
Desert Cottontail	22

▲ Desert Cottontail

24. GO DEEPER Mr. Wright bought a 3-pound bag of cat food and a 5-pound bag of dog food. There are 16 ounces in each pound. How many ounces of pet food did Mr. Wright buy?

WRITE Math
Show Your Work

_____

25. THINK SMARTER The sum of two numbers is 31. The product of the two numbers is 150. What are the numbers?

_____

26. MATHEMATICAL PRACTICE 2 **Use Reasoning** 6×87 is greater than 5×87. How much greater? Explain how you know without multiplying.

_____

_____

27. THINK SMARTER Multiply 6×73. For 27a–27d, select True or False for each statement.

27a.	A reasonable estimate of the product is $420.	○ True	○ False
27b.	Using partial products, the products are 42 and 180.	○ True	○ False
27c.	Using regrouping, 18 ones are regrouped as 8 tens and 1 one.	○ True	○ False
27d.	The product is 438.	○ True	○ False

FOR MORE PRACTICE: Standards Practice Book

Name _____

Multiply 3-Digit and 4-Digit Numbers with Regrouping

Essential Question How can you use regrouping to multiply?

Number and Operations in Base Ten—4.NBT.5

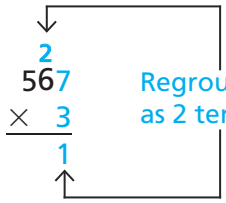
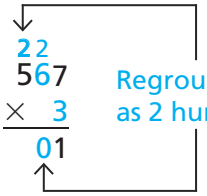
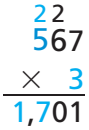
MATHEMATICAL PRACTICES
MP.4, MP.8

Unlock the Problem

Alley Spring, in Missouri, produces an average of 567 million gallons of water per week. How many million gallons of water do the springs produce in 3 weeks?

Multiply. 3 × 567

Estimate. 3 × _____ = _____

THINK	RECORD
STEP 1 Multiply the ones. 3 × 7 ones = _____ ones Regroup the 21 ones.	 Regroup the 21 ones as 2 tens and 1 one.
STEP 2 Multiply the tens. 3 × 6 tens = _____ tens Add the regroued tens. 18 tens + 2 tens = 20 tens Regroup the 20 tens.	 Regroup 20 tens as 2 hundreds 0 tens.
STEP 3 Multiply the hundreds. 3 × 5 hundreds = _____ hundreds Add the regrouped hundreds. 15 hundreds + 2 hundreds = 17 hundreds	 17 hundreds is the same as 1 thousand 7 hundreds.

So, Alley Spring produces _____ million gallons of water in 3 weeks.

Example

Use an estimate or an exact answer.

The table shows the prices of three vacation packages. Jake, his parents, and his sister want to choose a package.

Lakefront Vacations

	Adult	Child
Package A	$1,299	$619
Package B	$849	$699
Package C	$699	$484

A About how much would Package C cost Jake's family?

STEP 1

Estimate the cost for 2 adults.

$2 \times \$699$

↓

$2 \times \$700 =$ _____

STEP 2

Estimate the cost for 2 children.

$2 \times \$484$

↓

$2 \times \$500 =$ _____

STEP 3

Add to estimate the total cost.

$$\begin{array}{r} \square \\ + \quad \square \\ \hline \square \end{array}$$

So, Package C would cost Jake's family about $2,400.

Math Talk Mathematical Practices

Explain how you know you can use an estimate.

B Jake's family wants to compare the total costs of Packages A and C. Which plan costs more? How much more does it cost?

Package A

Adults	Children	Total Cost
$\$1{,}299$	$\$619$	
$\times \quad 2$	$\times \quad 2$	$+$

Package C

Adults	Children	Total Cost
$\$699$	$\$484$	
$\times \quad 2$	$\times \quad 2$	$+$

Subtract to compare the total costs of the packages.

$$\begin{array}{r} \$3{,}836 \\ -\ \$2{,}366 \\ \hline \square \end{array}$$

So, Package _____ would cost _____ more than Package _____.

Math Talk Mathematical Practices

Explain why you need an exact answer.

Name _____

Share and Show

1. Tell what is happening in Step 1 of the problem.

_____

_____

STEP 1	STEP 2	STEP 3	STEP 4
$\overset{2}{1,274} \times 6 = 4$	$\overset{42}{1,274} \times 6 = 44$	$\overset{142}{1,274} \times 6 = 644$	$\overset{142}{1,274} \times 6 = 7,644$

Estimate. Then find the product.

2. Estimate: _____

$$603 \times 4$$

3. Estimate: _____

$$1,935 \times 7$$

4. Estimate: _____

$$\$8,326 \times 5$$

Math Talk **Mathematical Practices**

Explain how you can use estimation to find how many digits the product $4 \times 1,861$ will have.

On Your Own

Estimate. Then find the product.

5. Estimate: _____

$$\$3,316 \times 8$$

6. Estimate: _____

$$\$2,900 \times 7$$

7. Estimate: _____

$$\$4,123 \times 6$$

8. Estimate: _____

$$\$1,893 \times 4$$

9. Estimate: _____

$$\$9,042 \times 8$$

10. Estimate: _____

$$3,286 \times 5$$

Practice: Copy and Solve **Compare. Write <, >, or =.**

11. $5 \times 352 \bigcirc 4 \times 440$

12. $6 \times 8,167 \bigcirc 9,834 \times 5$

13. $3,956 \times 4 \bigcirc 5 \times 7,692$

14. $740 \times 7 \bigcirc 8 \times 658$

15. $4 \times 3,645 \bigcirc 5 \times 2,834$

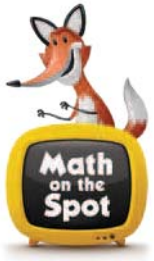
16. $6,573 \times 2 \bigcirc 4,365 \times 3$

Problem Solving • Applications

WRITE Math • Show Your Work

17. GO DEEPER Airplane tickets to Fairbanks, Alaska, will cost $958 each. Airplane tickets to Vancouver, Canada, will cost $734. How much can the four members of the Harrison family save on airfare by vacationing in Vancouver?

18. THINK SMARTER Philadelphia, Pennsylvania, is 2,147 miles from Salt Lake City, Utah, and 2,868 miles from Portland, Oregon. What is the difference in the round-trip distances between Philadelphia and each of the other two cities? Explain whether you need an estimate or an exact answer.



19. MATHEMATICAL PRACTICE 3 **Verify the Reasoning of Others**
Joe says that the product of a 4-digit number and a 1-digit number is always a 4-digit number. Does Joe's statement make sense? Explain.

20. THINK SMARTER What number is 150 more than the product of 5 and 4,892? Explain how you found the answer.

FOR MORE PRACTICE:
Standards Practice Book

Name _____

Solve Multistep Problems Using Equations

Essential Question How can you represent and solve multistep problems using equations?

Operations and Algebraic Thinking—4.OA.3

MATHEMATICAL PRACTICES
MP.2, MP.4, MP.7

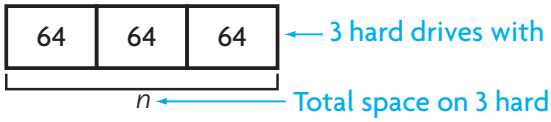
Unlock the Problem

Crismari's computer has 3 hard drives with 64 gigabytes of space each and 2 hard drives with 16 gigabytes of space each. The files on her computer use 78 gigabytes of space. How much hard drive space does her computer have left?

- Underline the important information.

One Way Use multiple single-step equations.

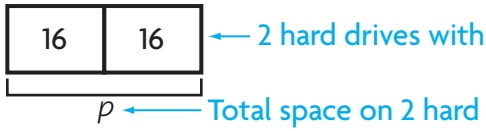
STEP 1 Find how much hard drive space is on 3 hard drives with 64 gigabytes of space each.



$3 \times 64 = n$

_____ $= n$

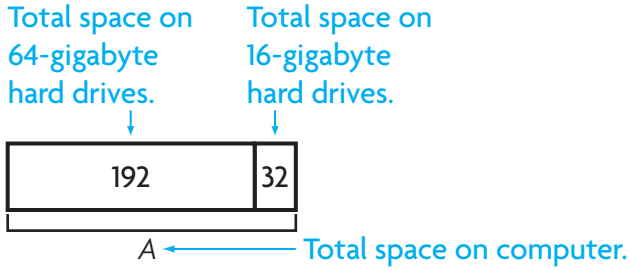
STEP 2 Find how much hard drive space is on 2 hard drives with 16 gigabytes of space.



$2 \times 16 = p$

_____ $= p$

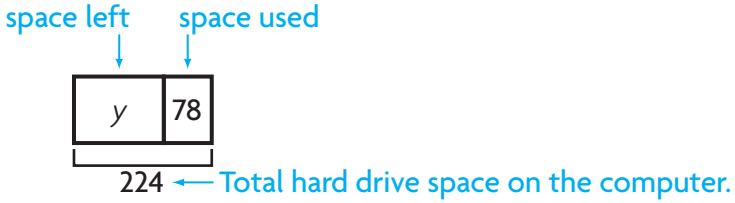
STEP 3 Find the total hard drive space on the computer.



$192 + 32 = A$

_____ $= A$

STEP 4 The files use 78 gigabytes of space. Find how much hard drive space the computer has left.



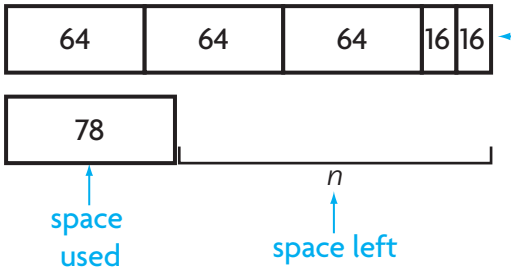
$224 - 78 = y$

_____ $= y$

So, Crismari has _____ gigabytes of hard drive space left on her computer.

Order of Operations The Order of Operations is a special set of rules that gives the order in which calculations are done in an expression. First, multiply and divide from left to right. Then, add and subtract from left to right.

Another Way Use one multistep equation.



$3 \times 64 + 2 \times 16 - 78 = n$

$\_\_\_\_ + \_\_\_\_ \times \_\_\_\_ - \_\_\_\_ = n$

$\_\_\_\_ + \_\_\_\_ - \_\_\_\_ = n$

$\_\_\_\_ - \_\_\_\_ = n$

$\_\_\_\_ = n$

Share and Show

MATH BOARD

1. Use the order of operations to find the value of n.

$5 \times 17 + 5 \times 20 - 32 = n$

$\_\_\_\_ + \_\_\_\_ \times \_\_\_\_ - \_\_\_\_ = n$ ← First, multiply 5×17.

$\_\_\_\_ + \_\_\_\_ - \_\_\_\_ = n$ ← Next, multiply 5×20.

$\_\_\_\_ - \_\_\_\_ = n$ ← Then, add the two products.

$\_\_\_\_ = n$ ← Finally, subtract to find n.

Find the value of n.

2. $3 \times 22 + 7 \times 41 - 24 = n$

$\_\_\_\_ = n$

3. $4 \times 34 + 6 \times 40 - 66 = n$

$\_\_\_\_ = n$

4. $2 \times 62 + 8 \times 22 - 53 = n$

$\_\_\_\_ = n$

5. $6 \times 13 + 9 \times 34 - 22 = n$

$\_\_\_\_ = n$

Math Talk **Mathematical Practices**

If you add before multiplying, will you get the same answer? **Explain**.

Name _____

On Your Own

Find the value of *n*.

6. $8 \times 42 + 3 \times 59 - 62 = n$

_____ $= n$

7. $6 \times 27 + 2 \times 47 - 83 = n$

_____ $= n$

Problem Solving • Applications

8. GO DEEPER Maggie has 3 binders with 25 stamps in each binder. She has 5 binders with 24 baseball cards in each binder. If she gives 35 stamps to a friend, how many stamps and cards does she have left?

WRITE Math
Show Your Work

_____

9. MATHEMATICAL PRACTICE 1 **Evaluate** Maddox has 4 boxes with 32 marbles in each box. He has 7 boxes with 18 shells in each box. If he gets 20 marbles from a friend, how many marbles and shells does he have?

_____

Personal Math Trainer

10. THINK SMARTER + The soccer team sells 54 bagels with cream cheese for $2 each and 36 muffins for $1 each during a bake sale. The coach uses the bake sale money to buy socks for the 14 players at $6 a pair. How much money does the coach have left? Explain how you found your answer.

_____

_____

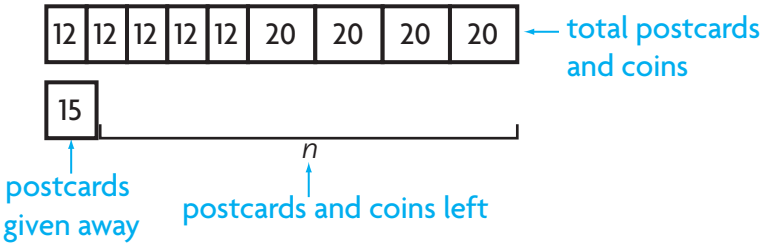
_____

_____

_____

11. **THINK SMARTER What's the Error?** Dominic has 5 books with 12 postcards in each book. He has 4 boxes with 20 coins in each box. If he gives 15 post cards to a friend, how many postcards and coins does he have?

Dominic drew this model.



Dominic used these steps to solve.

$5 \times 12 + 4 \times 20 - 15 = n$

$60 + 4 \times 20 - 15 = n$

$64 \times 20 - 15 = n$

$1{,}280 - 15 = n$

$1{,}265 = n$

Look at the steps Dominic used to solve this problem. Find and describe his error.

Use the correct steps to solve the problem.

So, there are _____ postcards and coins left.

FOR MORE PRACTICE: Standards Practice Book

Name _____

Chapter 2 Review/Test

For 1–3, use the table.

Prices for Trees					
Tree	**Regular Price**	**Price for 3 or more**	**Tree**	**Regular Price**	**Price for 3 or more**
Ivory Silk Lilac	$25	$22	Hazelnut	$9	$8
White Pine	$40	$37	Red Maple	$9	$8
Bur Oak	$35	$32	Birch	$9	$8

1. What is the cost of 3 Bur Oak trees? Show your work.

2. Mr. Tan buys 4 White Pine trees and 5 Birch trees. What is the cost of the trees? Show your work and explain how you found the answer.

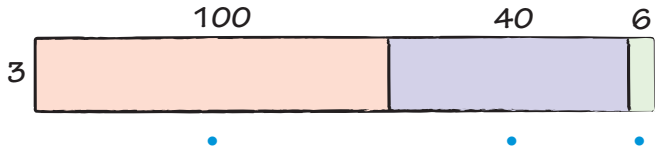
3. Rudy will buy 3 Ivory Silk Lilac trees or 2 Bur Oak trees. He wants to buy the trees that cost less. What trees will he buy? How much will he save? Show your work.

4. For numbers 4a–4d, select True or False for each equation.

4a.	$7 \times 194 = 1{,}338$	○ True	○ False
4b.	$5 \times 5{,}126 = 25{,}630$	○ True	○ False
4c.	$8 \times 367 = 2{,}926$	○ True	○ False
4d.	$4 \times 3{,}952 = 15{,}808$	○ True	○ False

5. Part A

Draw a line to match each section in the model to the partial product it represents.



3×6 3×100 3×40

Part B

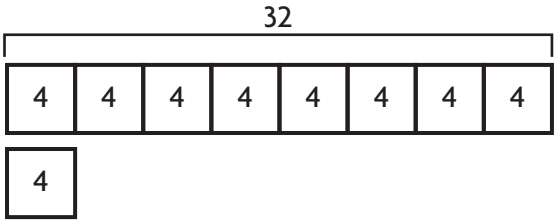
Then find 3×146. Show your work and explain.

Name _____

6. For numbers 6a–6c, write an equation or a comparison sentence using the numbers on the tiles.

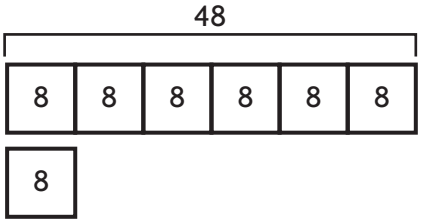
3	4	6	8	8
9	27	32	48	

6a.



☐ times as many as ☐ is ☐.

6b.



☐ × ☐ = ☐

6c. $9 \times 3 = 27$

☐ times as many as ☐ is ☐.

7. Multiply 7×43. For 7a–7d, select True or False for each statement.

7a.	A reasonable estimate of the product is 280.	○ True	○ False
7b.	Using partial products, the products are 21 and 28.	○ True	○ False
7c.	Using regrouping, 21 ones are regrouped as 1 ten and 2 ones.	○ True	○ False
7d.	The product is 301.	○ True	○ False

8. It costs 9,328 points to build each apartment building in the computer game *Big City Building*. What is the cost to build 5 apartment buildings? Show your work.

9. Multiply 7×462 using place value and expanded form.
Choose the number from the box to complete the expression.

$(7 \times$ [4 / 40 / 400] $) + (7 \times$ [600 / 60 / 6] $) + (7 \times$ [2 / 20 / 200] $)$

10. For numbers 10a–10b, use place value to find the product.

10a. $3 \times 600 = 3 \times$ ☐ hundreds

$=$ ☐ hundreds

$=$ ☐

10b. $5 \times 400 = 5 \times$ ☐ hundreds

$=$ ☐ hundreds

$=$ ☐

11. Liam has 3 boxes of baseball cards with 50 cards in each box. He also has 5 boxes with 40 basketball cards in each box. If Liam goes to the store and buys 50 more baseball cards, how many baseball and basketball cards does Liam have? Show your work.

Name _____

12. There is a book sale at the library. The price for each book is $4. Which expression can be used to show how much money the library will make if it sells 289 books? Use the numbers on the tiles to complete your answer.

2	4	8	9
80	90	200	

$(4 \times \_\_\_\_\_) + (4 \times \_\_\_\_\_) + (4 \times \_\_\_\_\_)$

13. Find 8×397. Show your work and explain why the strategy you chose works best with the factors.

14. A clown bought 6 bags of round balloons with 24 balloons in each bag. The clown also bought 3 bags of long balloons with 36 balloons in each bag.

Part A

How many more long balloons than round balloons did the clown buy? Show your work.

Part B

The clown also bought 5 bags of heart-shaped balloons with 14 balloons in each bag. When the clown blew up all of the round, long, and heart-shaped balloons, 23 balloons burst. How many blown-up balloons were left? Explain your answer.

15. Hector planted 185 flowers in 2 days. There were 5 volunteers, including Hector, who each planted about the same number of flowers. About how many flowers did they plant?

185

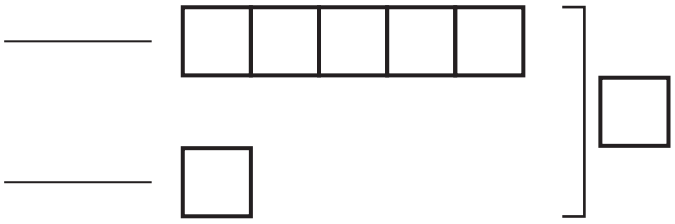
400

500

1,000

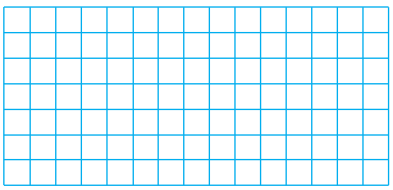
16. Jay and Blair went fishing. Together, they caught 27 fish. Jay caught 2 times as many fish as Blair. How many fish did Jay and Blair each catch? Write an equation and solve. Explain your work.

17. At the pet fair, Darlene's dog weighed 5 times as much as Leah's dog. Together, the dogs weighed 84 pounds. How much did each dog weigh? Complete the bar model. Write an equation and solve.



18. Use the Distributive Property to model the product on the grid. Record the product.

$4 \times 12 =$ _____



Chapter 3

Multiply 2-Digit Numbers

Show What You Know

Check your understanding of important skills.

Name _____

Practice Multiplication Facts

Find the product.

1. $8 \times 7 =$ _____
   $7 \times 8 =$ _____

2. $3 \times (2 \times 4) =$ _____
   $(3 \times 2) \times 4 =$ _____

2-Digit by 1-Digit Multiplication

Find the product.

3. $\begin{array}{r} 28 \\ \times\ 3 \\ \hline \end{array}$

4. $\begin{array}{r} 56 \\ \times\ 6 \\ \hline \end{array}$

5. $\begin{array}{r} 71 \\ \times\ 5 \\ \hline \end{array}$

6. $\begin{array}{r} 69 \\ \times\ 8 \\ \hline \end{array}$

7. $\begin{array}{r} 36 \\ \times\ 4 \\ \hline \end{array}$

Multiply by 1-Digit Numbers

Find the product.

8. $\begin{array}{r} 72 \\ \times\ 4 \\ \hline \end{array}$

9. $\begin{array}{r} 456 \\ \times\ 5 \\ \hline \end{array}$

10. $\begin{array}{r} 804 \\ \times\ 7 \\ \hline \end{array}$

11. $\begin{array}{r} 1{,}341 \\ \times\ 9 \\ \hline \end{array}$

12. $\begin{array}{r} 65 \\ \times\ 6 \\ \hline \end{array}$

13. $\begin{array}{r} 392 \\ \times\ 8 \\ \hline \end{array}$

14. $\begin{array}{r} 1{,}478 \\ \times\ 3 \\ \hline \end{array}$

15. $\begin{array}{r} \$1{,}627 \\ \times\ 2 \\ \hline \end{array}$

16. $\begin{array}{r} 584 \\ \times\ 7 \\ \hline \end{array}$

17. $\begin{array}{r} 2{,}837 \\ \times\ 4 \\ \hline \end{array}$

Math Detective

Yellowstone National Park, which is located in Wyoming, Montana, and Idaho, was America's first National Park. The park has over 500 geysers. Grand Geyser erupts about every 8 hours.

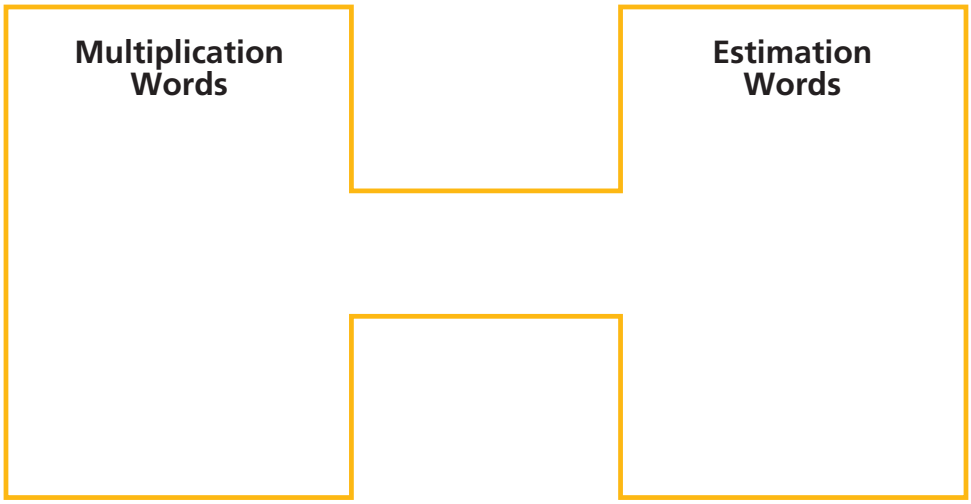
Be a Math Detective. Based on this estimate, how many times would you see this geyser erupt if you could watch it for 1 year? There are 24 hours in a day and 365 days in a year.

Personal Math Trainer
Online Assessment and Intervention

Vocabulary Builder

Visualize It

Complete the H-diagram using the words with a ✓.



Review Words

Associative Property of Multiplication
Commutative Property of Multiplication
✓ estimate
✓ factor
✓ partial product
✓ place value
✓ product
regroup
✓ round

Preview Words

✓ compatible numbers

Understand Vocabulary

Draw a line to match each word or phrase with its definition.

Word	Definition
1. Commutative Property of Multiplication	• A number that is multiplied by another number to find a product
2. estimate	• To exchange amounts of equal value to rename a number
3. compatible numbers	• To find an answer that is close to the exact amount
4. factor	• Numbers that are easy to compute mentally
5. regroup	• The property that states when the order of two factors is changed, the product is the same.

Name _____

Multiply by Tens

Essential Question What strategies can you use to multiply by tens?

Number and Operations in Base Ten—4.NBT.5 *Also 4.NBT.1*

MATHEMATICAL PRACTICES
MP.1, MP.4, MP.7

Unlock the Problem

Real World

Animation for a computer-drawn cartoon requires about 20 frames per second. How many frames would need to be drawn for a 30-second cartoon?

- The phrase "20 frames per second" means 20 frames are needed for each second of animation. How does this help you know what operation to use?

_____

_____

One Way Use place value.

Multiply. 20×30

You can think of 30 as 3 tens.

$20 \times 30 = 20 \times$ _____ tens

$=$ _____ tens

$= 600$

Remember

The Associative Property states that you can group factors in different ways and get the same product. Use parentheses to group the factors you multiply first.

Another Way Use the Associative Property.

You can think of 30 as 3×10.

$20 \times 30 = 20 \times (3 \times 10)$

$= (20 \times 3) \times 10$

$=$ _____ $\times$ _____

$=$ _____

So, _____ frames would need to be drawn.

Math Talk **Mathematical Practices**

How can you use place value to tell why $60 \times 10 = 600$? **Explain**.

- Compare the number of zeros in each factor to the number of zeros in the product. What do you notice?

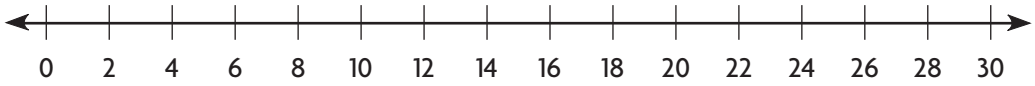
_____

_____

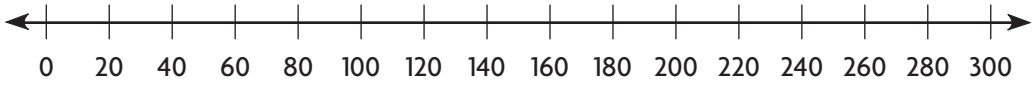
Other Ways

A **Use a number line and a pattern to multiply 15 × 20.**

Draw jumps to show the product.



$15 \times 2 =$ _____



$15 \times 20 =$ _____

B **Use mental math to find 14 × 30.**

Use the halving-and-doubling strategy.

STEP 1 Find half of 14 to make the problem simpler.

Think: To find half of a number, divide by 2.

$14 \div 2 =$ _____

STEP 2 Multiply.

$7 \times 30 =$ _____

STEP 3 Double 210.

Think: To double a number, multiply by 2.

$2 \times 210 =$ _____

So, $14 \times 30 = 420$.

Try This! **Multiply.**

Use mental math to find 12 × 40.

Use place value to find 12 × 40.

Share and Show

MATH BOARD

1. Find 20×27. Tell which method you chose. Explain what happens in each step.

_____

_____

Name _____

Choose a method. Then find the product.

2. 10×12

3. 20×20

4. 40×24

5. 11×60

Math Talk

Mathematical Practices

Explain how you can use $30 \times 10 = 300$ to find 30×12.

On Your Own

Choose a method. Then find the product.

6. 70×55

7. 17×30

8. 30×60

9. 12×90

MATHEMATICAL PRACTICE 2 **Reason Quantitatively Algebra** **Find the unknown digit in the number.**

10. $64 \times 40 = 2{,}56\square$

$\square$ = _____

11. $29 \times 50 = 1{,}\pentagon 50$

$\pentagon$ = _____

12. $3\diamond \times 47 = 1{,}410$

$\diamond$ = _____

13. A factory makes 80 bicycles a day. How many bicycles do they make in 22 days?

14. Malala has 20 vases. She puts 12 flowers into each vase. How many flowers does she use?

Problem Solving • Applications

Use the table for 15–16.

15. MATHEMATICAL PRACTICE 4 **Use Graphs** How many frames did it take to produce 50 seconds of *Pinocchio*?

16. GO DEEPER Are there fewer frames in 10 seconds of *The Flintstones* or in 14 seconds of *The Enchanted Drawing*? What is the difference in the number of frames?

17. THINK SMARTER The product of my number and twice my number is 128. What is half my number? Explain how you solved the problem.

18. THINK SMARTER Tanya says that the product of a multiple of ten and a multiple of ten will always have only one zero. Is she correct? Explain.

Animated Productions

Title	Date Released	Frames per Second
The Enchanted Drawing©	1900	20
Little Nemo©	1911	16
Snow White and the Seven Dwarfs©	1937	24
Pinocchio©	1940	19
The Flintstones™	1960–1966	24

WRITE Math
Show Your Work

19. THINK SMARTER For numbers 19a–19e, select Yes or No to tell whether the answer is correct.

19a.	$28 \times 10 = 280$	○ Yes	○ No
19b.	$15 \times 20 = 300$	○ Yes	○ No
19c.	$17 \times 10 = 17$	○ Yes	○ No
19d.	$80 \times 10 = 800$	○ Yes	○ No
19e.	$16 \times 30 = 1{,}800$	○ Yes	○ No

FOR MORE PRACTICE:
Standards Practice Book

Name _____

Estimate Products

Essential Question What strategies can you use to estimate products?

Number and Operations in Base Ten—4.NBT.5 *Also 4.NBT.3*

MATHEMATICAL PRACTICES
MP.1, MP.2, MP.5, MP.7

Unlock the Problem

Real World

The Smith family opens the door of their refrigerator 32 times in one day. There are 31 days in May. About how many times is it opened in May?

- Underline any information you will need.

One Way Use rounding and mental math.

Estimate. 32 × 31

STEP 1 Round each factor.

32 × 31

↓ ↓

30 × 30

STEP 2 Use mental math.

3 × 3 = 9 ← basic fact

30 × 30 = _____

So, the Smith family opens the refrigerator door about 900 times during the month of May.

Math Talk

Mathematical Practices

Will the actual number of times the refrigerator is opened in a year be greater than or less than 900? **Explain**.

1. On average, a refrigerator door is opened 38 times each day. About how many fewer times in May is the Smith family's refrigerator door opened than the average refrigerator door?

Show your work.

All 24 light bulbs in the Park family's home are CFL light bulbs. Each CFL light bulb uses 28 watts to produce light. About how many watts will the light bulbs use when turned on all at the same time?

Another Way Use mental math and compatible numbers.

Compatible numbers are numbers that are easy to compute mentally.

Estimate. 24×28

STEP 1 Use compatible numbers.

24×28

$\downarrow \quad \downarrow$

25×30 Think: $25 \times 3 = 75$

So, about 750 watts are used.

STEP 2 Use mental math.

$25 \times 3 = 75$

$25 \times 30 =$ _____

Try This! Estimate $26 \times \$79$.

A Round to the nearest ten

26 × $79

↓ ↓

_____ × _____ = _____

26 × $79 is about _____.

B Compatible numbers

26 × $79 Think: How can you use $25 \times 4 = 100$ to help find 25×8?

↓ ↓

25 × $80 = _____

26 × $79 is about _____.

2. Explain why $2,400 and $2,000 are both reasonable estimates.

3. In what situation might you choose to find an estimate rather than an exact answer?

Share and Show

MATH BOARD

1. To estimate the product of 62 and 28 by rounding, how would you round the factors? What would the estimated product be?

Name _____

Estimate the product. Choose a method.

2. 96×34

3. $47 \times \$39$

4. 78×72

Math Talk **Mathematical Practices**

Describe how you know if an estimated product will be greater than or less than the exact answer.

On Your Own

Estimate the product. Choose a method.

5. 41×78

6. 51×73

7. 34×80

8. 84×23

9. $27 \times \$56$

10. 45×22

Practice: Copy and Solve **Estimate the product. Choose a method.**

11. 61×31

12. 52×68

13. 26×44

14. $57 \times \$69$

15. 55×39

16. 51×81

17. $47 \times \$32$

18. 49×64

THINK SMARTER **Find two possible factors for the estimated product.**

19. 2,800

20. 8,100

21. 5,600

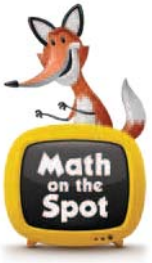
22. 2,400

Problem Solving • Applications Real World

23. GO DEEPER On average, a refrigerator door is opened 38 times each day. Len has two refrigerators in his house. Based on this average, about how many times in a 3-week period are the refrigerator doors opened?

24. The cost to run a refrigerator is about $57 each year. About how much will it have cost to run by the time it is 15 years old?

25. THINK SMARTER If Mel opens his refrigerator door 36 times every day, about how many times will it be opened in April? Will the exact answer be more than or less than the estimate? Explain.



26. MATHEMATICAL PRACTICE 2 **Represent a Problem** What question could you write for this answer? The estimated product of two numbers, that are not multiples of ten, is 2,800.

WRITE Math • Show Your Work

27. THINK SMARTER Which is a reasonable estimate for the product? Write the estimate. An estimate may be used more than once.

30 × 20	25 × 50	20 × 20

26 × 48		28 × 21	
21 × 22		51 × 26	

FOR MORE PRACTICE: Standards Practice Book

Name _____

Area Models and Partial Products

Essential Question How can you use area models and partial products to multiply 2-digit numbers?

Number and Operations in Base Ten—4.NBT.5

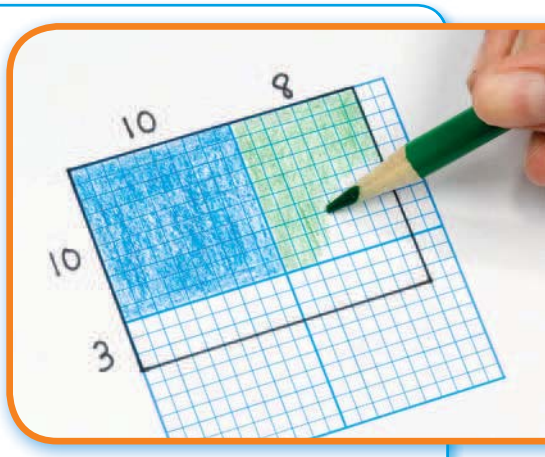
MATHEMATICAL PRACTICES
MP.2, MP.4, MP.5, MP.8

Investigate

Hands On

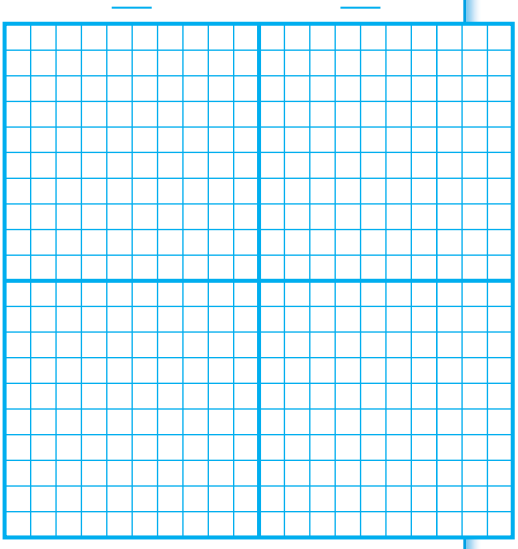
Materials ■ color pencils

How can you use a model to break apart factors and make them easier to multiply?



A. Outline a rectangle on the grid to model 13 × 18. Break apart the model into smaller rectangles to show factors broken into tens and ones. Label and shade the smaller rectangles. Use the colors below.

B. Find the product of each smaller rectangle. Then, find the sum of the partial products. Record your answers.



_____ = 10 × 10

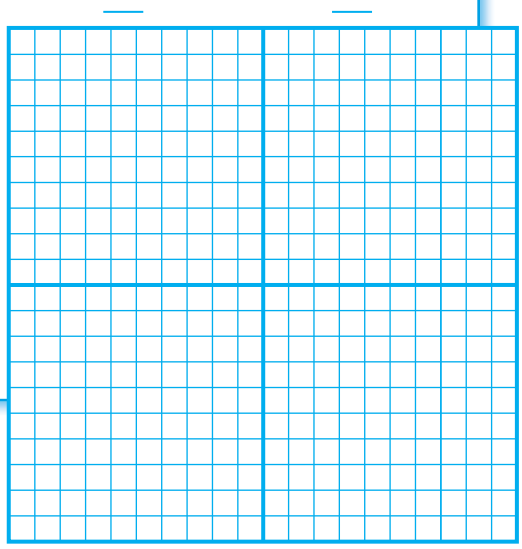
_____ = 10 × 8

_____ = 3 × 10

_____ = 3 × 8

100 + _____ + _____ + _____ = _____

C. Draw the model again. Break apart the whole model to show factors different from those shown the first time. Label and shade the four smaller rectangles and find their products. Record the sum of the partial products to represent the product of the whole model.



_____ + _____ + _____ + _____ = _____

Draw Conclusions

1. Explain how you found the total number of squares in the whole model.

2. Compare the two models and their products. What can you conclude? Explain.

3. To find the product of 10 and 33, which is the easier computation, $(10 \times 11) + (10 \times 11) + (10 \times 11)$ or $(10 \times 30) + (10 \times 3)$? Explain.

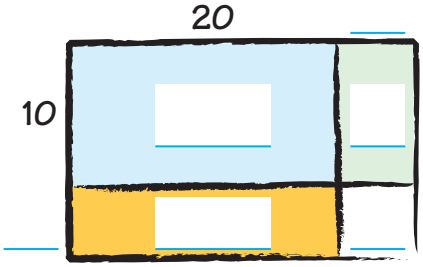
Make Connections

You can draw a simple diagram to model and break apart factors to find a product. Find 15×24.

Remember

24 is 2 tens 4 ones.

STEP 1 Draw a model to show 15×24. Break apart the factors into tens and ones to show the partial products.



STEP 2 Write the product for each of the smaller rectangles.

$(10 \times 2 \text{ tens})$	$(10 \times 4 \text{ ones})$	$(5 \times 2 \text{ tens})$	$(5 \times 4 \text{ ones})$
(10×20)	(10×4)	(5×20)	(5×4)
____	____	____	____

STEP 3 Add to find the product for the whole model.

____ + ____ + ____ + ____ = ____

So, $15 \times 24 = 360$.

The model shows four parts. Each part represents a partial product. The partial products are 200, 40, 100, and 20.

Math Talk **Mathematical Practices**

Explain how breaking apart the factors into tens and ones makes finding the product easier.

Name _____

Share and Show

MATH BOARD

Find the product.

1. $16 \times 19 =$ _____

	10	9
10	100	90
6	60	54

2. $18 \times 26 =$ _____

	20	6
10		
8		

3. $27 \times 39 =$ _____

	30	9
20		
7		

Draw a model to represent the product.
Then record the product.

4. $14 \times 16 =$ _____

5. $23 \times 25 =$ _____

Problem Solving • Applications

Real World

6. MATHEMATICAL PRACTICE 6 **Explain** how modeling partial products can be used to find the products of greater numbers.

_____

_____

7. GO DEEPER Emma bought 16 packages of rolls for a party. There were 12 rolls in a package. After the party there were 8 rolls left over. How many rolls were eaten? Explain.

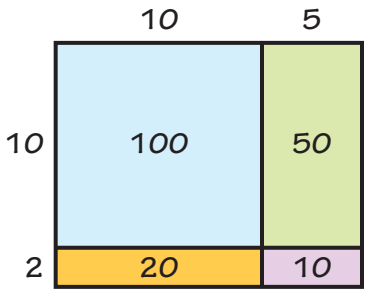
_____

_____

Sense or Nonsense?

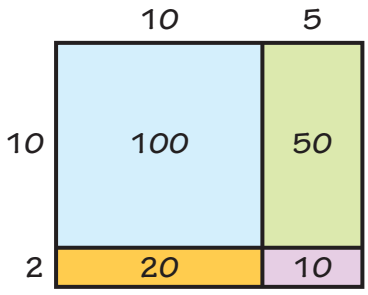
8. THINK SMARTER Jamal and Kim used different ways to solve 12×15 by using partial products. Whose answer makes sense? Whose answer is nonsense? Explain your reasoning.

Jamal's Work



$100 + 20 + 10 = 130$

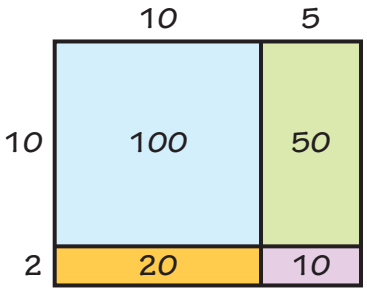
Kim's Work



$120 + 60 = 180$

a. For the answer that is nonsense, write an answer that makes sense.

b. Look at Kim's method. Can you think of another way Kim could use the model to find the product? Explain.



9. THINK SMARTER Look at the model in 8b. How would the partial products change if the product was 22×15? Explain why you think the products changed.

FOR MORE PRACTICE:
Standards Practice Book

Name _____

Multiply Using Partial Products

Essential Question How can you use place value and partial products to multiply 2-digit numbers?

Number and Operations in Base Ten—4.NBT.5

MATHEMATICAL PRACTICES
MP.4, MP.7, MP.8

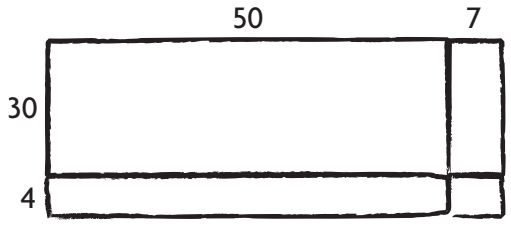
Unlock the Problem

CONNECT You know how to break apart a model to find partial products. How can you use what you know to find and record a product?

Multiply. 34×57 **Estimate.** $30 \times 60 =$ _____

SHADE THE MODEL | **THINK AND RECORD**

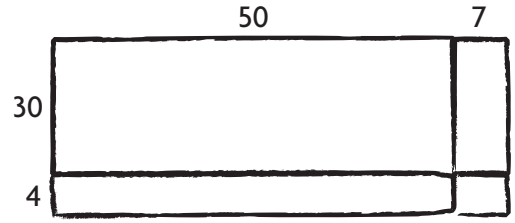
STEP 1



$$\begin{array}{r} 57 \\ \times\ 34 \\ \hline \end{array}$$

← Multiply the tens by the tens.
30×5 tens $= 150$ tens

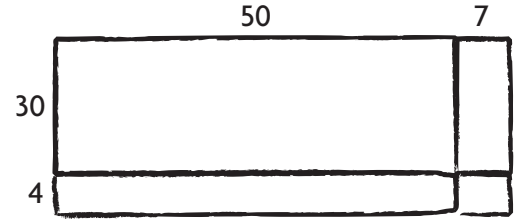
STEP 2



$$\begin{array}{r} 57 \\ \times 34 \\ \hline 1{,}500 \end{array}$$

← Multiply the ones by the tens.
30×7 ones $= 210$ ones

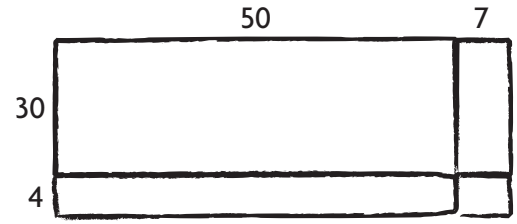
STEP 3



$$\begin{array}{r} 57 \\ \times 34 \\ \hline 1{,}500 \\ 210 \end{array}$$

← Multiply the tens by the ones.
4×5 tens $= 20$ tens

STEP 4



$$\begin{array}{r} 57 \\ \times 34 \\ \hline 1{,}500 \\ 210 \\ 200 \\ + \quad\ \ \\ \hline \end{array}$$

← Multiply the ones by the ones.
4×7 ones $= 28$ ones
← Add the partial products.

So, $34 \times 57 = 1{,}938$. Since 1,938 is close to the estimate of 1,800, it is reasonable.

Math Talk **Mathematical Practices**

You can write 10×4 ones $= 40$ ones as $10 \times 4 = 40$. What is another way to write 10×3 tens $= 30$ tens?

Example

The apples from each tree in an orchard can fill 23 bushel baskets. If 1 row of the orchard has 48 trees, how many baskets of apples can be filled?

Multiply. 48×23 **Estimate.** $50 \times 20 =$ _____

THINK	RECORD
STEP 1 Multiply the tens by the tens.	23 × 48 _____ ← 40 × _____ tens = _____ tens
STEP 2 Multiply the ones by the tens.	23 × 48 800 _____ ← 40 × _____ ones = _____ ones
STEP 3 Multiply the tens by the ones.	23 × 48 800 120 _____ ← 8 × _____ tens = _____ tens
STEP 4 Multiply the ones by the ones. Then add the partial products.	23 × 48 800 120 160 + _____ _____ ← 8 × _____ ones = _____ ones

So, 1,104 baskets can be filled.

Math Talk **Mathematical Practices**

How do you know your answer is reasonable?

Share and Show

MATH BOARD

1. Find 24×34.

	30	4
20	600	80
4	120	16

			3	4	
		×	2	4	

Name _____

Record the product.

2. 12×12

3. 31×24

4. 25×43

5. 37×26

Math Talk **Mathematical Practices**

Explain how to model and record 74×25.

On Your Own

Record the product.

6. 54×15

7. 87×16

8. 62×56

9. 49×63

Practice: Copy and Solve **Record the product.**

10. 38×47

11. 46×27

12. 72×53

13. 98×69

14. 53×68

15. 76×84

16. 92×48

17. 37×79

MATHEMATICAL PRACTICE 2 **Reason Abstractly** **Algebra** **Find the unknown digits. Complete the problem.**

18.

$$\begin{array}{r} \square 6 \\ \times \square 4 \\ \hline 1{,}400 \\ 120 \\ 280 \\ + \quad 24 \\ \hline \end{array}$$

19.

$$\begin{array}{r} \square 2 \\ \times \square 7 \\ \hline 7{,}200 \\ 180 \\ 560 \\ + \quad 14 \\ \hline \end{array}$$

20.

$$\begin{array}{r} \square 6 \\ \times 5 \square \\ \hline 1{,}500 \\ 300 \\ 90 \\ + \quad 18 \\ \hline \end{array}$$

21.

$$\begin{array}{r} 3 \square \\ \times \square 8 \\ \hline 600 \\ 80 \\ 240 \\ + \quad 32 \\ \hline \end{array}$$

Problem Solving • Applications

Use the pictograph for 22–24.

Pounds of Citrus Fruit per Box

Citrus Fruit	Weight per Box (in pounds)
Grapefruit	8 whole, 1 half
Orange	9 whole
Tangelo	9 whole
Tangerine	9 whole, 1 half

Key: Each = 10 pounds.

22. MATHEMATICAL PRACTICE 4 **Use Graphs** A fruit-packing warehouse is shipping 15 boxes of grapefruit to a store in Santa Rosa, California. What is the total weight of the shipment?

_____

23. How much less do 13 boxes of tangelos weigh than 18 boxes of tangerines?

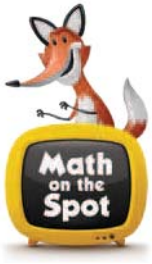
_____

24. What is the weight of 12 boxes of oranges?

_____

WRITE Math • Show Your Work

25. THINK SMARTER Each person in the United States eats about 65 fresh apples each year. Based on this estimate, how many apples do 3 families of 4 eat each year?



_____

26. GO DEEPER The product 26×93 is more than 25×93. How much more? Explain how you know without multiplying.

_____

_____

_____

27. THINK SMARTER Margot wants to use partial products to find 22×17. Write the numbers in the boxes to show 22×17.

$$(\square \times \square) + (\square \times \square) + (\square \times \square) + (\square \times \square)$$

FOR MORE PRACTICE: Standards Practice Book

Name _____

Mid-Chapter Checkpoint

Concepts and Skills

1. Explain how to find 40×50 using mental math. (4.NBT.5)

_____

_____

2. What is the first step in estimating 56×27? (4.NBT.5)

_____

Choose a method. Then find the product. (4.NBT.5)

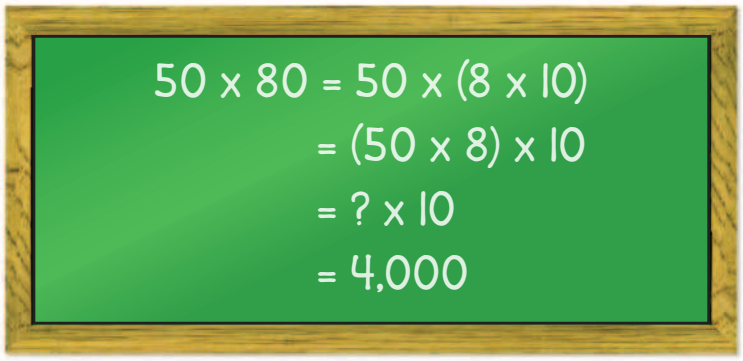
3. 35×10 _____
4. 19×20 _____
5. 12×80 _____
6. 70×50 _____
7. 58×40 _____
8. 30×40 _____
9. 14×60 _____
10. 20×30 _____
11. 16×90 _____

Estimate the product. Choose a method. (4.NBT.5)

12. 81×38 _____
13. $16 \times \$59$ _____
14. 43×25 _____
15. 76×45 _____
16. $65 \times \$79$ _____
17. 92×38 _____
18. 37×31 _____
19. $26 \times \$59$ _____
20. 54×26 _____
21. 52×87 _____
22. 39×27 _____
23. 63×58 _____

24. Ms. Traynor's class is taking a field trip to the zoo. The trip will cost $26 for each student. There are 22 students in her class. What is a good estimate for the cost of the students' field trip? (4.NBT.5)

25. Tito wrote the following on the board. What is the unknown number? (4.NBT.5)



26. What are the partial products that result from multiplying 15×32? (4.NBT.5)

27. The cost of a ski-lift ticket is $31. How much will 17 tickets cost? (4.NBT.5)

Name _____

Multiply with Regrouping

Essential Question How can you use regrouping to multiply 2-digit numbers?

Number and Operations in Base Ten—4.NBT.5 *Also 4.OA.3*

MATHEMATICAL PRACTICES
MP.2, MP.7, MP.8

Unlock the Problem

Real World

By 1914, Henry Ford had streamlined his assembly line to make a Model T Ford car in 93 minutes. How many minutes did it take to make 25 Model Ts?

▲ The first production Model T Ford was assembled on October 1, 1908.

Use place value and regrouping.

Multiply. 93×25 **Estimate.** $90 \times 30 =$ _____

THINK	RECORD
STEP 1 • Think of 93 as 9 tens and 3 ones. • Multiply 25 by 3 ones.	$\begin{array}{r} {\scriptstyle 1} \\ 25 \\ \times\ 93 \\ \hline \end{array}$ ← 3×25
STEP 2 • Multiply 25 by 9 tens.	$\begin{array}{r} {\scriptstyle 4} \\ {\scriptstyle 1} \\ 25 \\ \times\ 93 \\ \hline 75 \end{array}$ ← 90×25
STEP 3 • Add the partial products.	$\begin{array}{r} {\scriptstyle 4} \\ {\scriptstyle 1} \\ 25 \\ \times\ 93 \\ \hline 75 \\ 2{,}250 \\ \hline \end{array}$

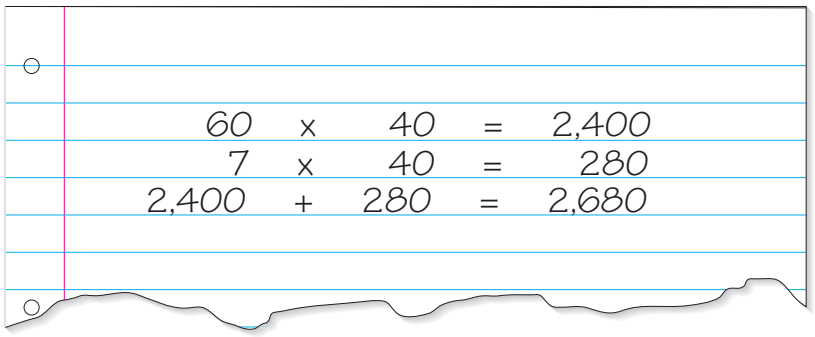
So, 93×25 is 2,325. Since _____ is close to the estimate of _____, the answer is reasonable.

Math Talk **Mathematical Practices**

Explain why you will get the same answer whether you multiply 93×25 or 25×93.

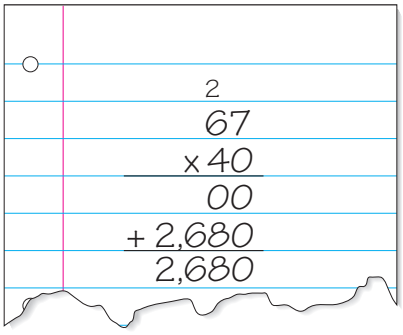
Different Ways to Multiply You can use different ways to multiply and still get the correct answer. Shawn and Patty both solved 67 × 40 correctly, but they used different ways.

Look at Shawn's paper.



So, Shawn's answer is 67 × 40 = 2,680.

Look at Patty's paper.



So, Patty also found 67 × 40 = 2,680.

1. What method did Shawn use to solve the problem?

_____

2. What method did Patty use to solve the problem?

_____

Share and Show

MATH BOARD

1. Look at the problem. Complete the sentences.

Multiply _____ and _____ to get 0.

Multiply _____ and _____ to get 1,620.

Add the partial products.

0 + 1,620 = _____

$$\begin{array}{r} {}^{4}27 \\ \times 60 \\ \hline 0 \\ +1{,}620 \\ \hline \end{array}$$

Name _____

Estimate. Then find the product.

2. Estimate: _____

$$\begin{array}{r} 68 \\ \times\ 53 \\ \hline \end{array}$$

3. Estimate: _____

$$\begin{array}{r} 61 \\ \times\ 54 \\ \hline \end{array}$$

4. Estimate: _____

$$\begin{array}{r} 90 \\ \times\ 27 \\ \hline \end{array}$$

Math Talk **Mathematical Practices**

Explain why you can omit zeros of the first partial product when you multiply 20×34.

On Your Own

Estimate. Then find the product.

5. Estimate: _____

$$\begin{array}{r} 30 \\ \times\ 47 \\ \hline \end{array}$$

6. Estimate: _____

$$\begin{array}{r} 78 \\ \times\ 56 \\ \hline \end{array}$$

7. Estimate: _____

$$\begin{array}{r} 27 \\ \times\ 25 \\ \hline \end{array}$$

Practice: Copy and Solve **Estimate. Then find the product.**

8. 34×65 **9.** $42 \times \$13$ **10.** 60×17 **11.** 62×45 **12.** $57 \times \$98$

13. $92 \times \$54$ **14.** 75×20 **15.** 66×55 **16.** $73 \times \$68$ **17.** 72×40

MATHEMATICAL PRACTICE 7 **Look for a Pattern** **Algebra** **Write a rule for the pattern. Use your rule to find the unknown numbers.**

18.

Hours	*h*	5	10	15	20	25
Minutes	*m*	300	600	900		

Rule: _____

19.

Minutes	*m*	12	14	16	18	20
Seconds	*s*	720	840		1,080	

Rule: _____

Unlock the Problem Real World

20. THINK SMARTER Machine A can label 11 bottles in 1 minute. Machine B can label 12 bottles in 1 minute. How many bottles can both machines label in 15 minutes?

a. What do you need to know? _____

_____

b. What numbers will you use? _____

c. Tell why you might use more than one operation to solve the problem.

_____

_____

_____

d. Solve the problem.

So, both machines can label _____ bottles in _____ minutes.

21. MATHEMATICAL PRACTICE 1 **Make Sense of Problems**
A toy company makes wooden blocks. A carton holds 85 blocks. How many blocks can 19 cartons hold?

_____

22. GO DEEPER A company is packing cartons of candles. Each carton can hold 75 candles. So far, 50 cartons have been packed, but only 30 cartons have been loaded on a truck. How many more candles are left to load on the truck?

_____

Personal Math Trainer

23. THINK SMARTER + Mr. Garcia's class raised money for a field trip to the zoo. There are 23 students in his class. The cost of the trip will be $17 for each student. What is the cost for all the students? Explain how you found your answer.

_____

_____

FOR MORE PRACTICE:
Standards Practice Book

Name _____

Choose a Multiplication Method

Essential Question How can you find and record products of two 2-digit numbers?

Number and Operations in Base Ten—4.NBT.5

MATHEMATICAL PRACTICES
MP.2, MP.3, MP.8

Unlock the Problem

Real World

Did you know using math can help prevent you from getting a sunburn?

The time it takes to burn without sunscreen multiplied by the SPF, or sun protection factor, is the time you can stay in the sun safely with sunscreen.

If today's UV index is 8, Erin will burn in 15 minutes without sunscreen. If Erin puts on lotion with an SPF of 25, how long will she be protected?

- Underline the sentence that tells you how to find the answer.
- Circle the numbers you need to use. What operation will you use?

_____

▲ Sunscreen helps to prevent sunburn.

One Way Use partial products to find 15 × 25.

	25	
	× 15	
		← 10 × 2 tens = 20 tens
		← 10 × 5 ones = 50 ones
		← 5 × 2 tens = 10 tens
+		← 5 × 5 ones = 25 ones
		← Add.

Draw a picture to check your work.

Math Talk Mathematical Practices

The product is 375. **Explain** what 375 means for Erin.

Another Way Use regrouping to find 15 × 25.

Estimate. 20 × 20 = _____

STEP 1

Think of 15 as 1 ten 5 ones.
Multiply 25 by 5 ones, or 5.

$$\begin{array}{r} {\scriptstyle 2}\,25 \\ \times\ 15 \\ \hline \square \end{array} \leftarrow 5 \times 25$$

STEP 2

Multiply 25 by 1 ten, or 10.

$$\begin{array}{r} {\scriptstyle 2}\,25 \\ \times\ 15 \\ \hline 125 \\ \square \end{array} \leftarrow 10 \times 25$$

STEP 3

Add the partial products.

$$\begin{array}{r} {\scriptstyle 2}\,25 \\ \times\ 15 \\ \hline 125 \\ +\ 250 \\ \hline \square \end{array}$$

Try This! Multiply. 57 × $43

Estimate. 57 × $43

Use partial products.

				$	4	3	
			×		5	7	

Use regrouping.

				$	4	3	
			×		5	7	

1. How do you know your answer is reasonable?

_____

_____

2. Look at the partial products and regrouping methods above. How are the partial products 2,000 and 150 related to 2,150?

_____

How are the partial products 280 and 21 related to 301?

_____

Name _____

Share and Show

MATH BOARD

1. Find the product.

			5	4	
	×		2	9	

Math Talk **Mathematical Practices**

Explain why you begin with the ones place when you use the regrouping method to multiply.

Estimate. Then choose a method to find the product.

2. Estimate: _____

$$\begin{array}{r} 36 \\ \times\ 14 \\ \hline \end{array}$$

3. Estimate: _____

$$\begin{array}{r} 63 \\ \times\ 42 \\ \hline \end{array}$$

4. Estimate: _____

$$\begin{array}{r} 84 \\ \times\ 53 \\ \hline \end{array}$$

5. Estimate: _____

$$\begin{array}{r} 71 \\ \times\ 13 \\ \hline \end{array}$$

On Your Own

Practice: Copy and Solve **Estimate. Find the product.**

6. $29 \times \$82$

7. 57×79

8. 80×27

9. $32 \times \$75$

10. 55×48

11. $19 \times \$82$

12. $25 \times \$25$

13. 41×98

MATHEMATICAL PRACTICE 7 **Identify Relationships** **Algebra** **Use mental math to find the number.**

14. $30 \times 14 = 420$, so $30 \times 15 =$ _____.

15. $25 \times 12 = 300$, so $25 \times$ _____ $= 350$.

16. MATHEMATICAL PRACTICE 6 The town conservation manager bought 16 maple trees for $26 each. She paid with five $100 bills. How much change will the manager receive? **Explain**.

_____

_____

17. GO DEEPER Each of 25 students in Group A read for 45 minutes. Each of 21 students in Group B read for 48 minutes. Which group read for more minutes? Explain.

_____

Unlock the Problem Real World

18. THINK SMARTER Martin collects stamps. He counted 48 pages in his collector's album. The first 20 pages each have 35 stamps in 5 rows. The rest of the pages each have 54 stamps. How many stamps does Martin have in his album?

a. What do you need to know? _____

_____

b. How will you use multiplication to find the number of stamps? _____

_____

c. Tell why you might use addition and subtraction to help solve the problem.

_____

_____

d. Show the steps to solve the problem.

e. Complete the sentences.

Martin has a total of _____ stamps on the first 20 pages.

There are _____ more pages after the first 20 pages in Martin's album.

There are _____ stamps on the rest of the pages.

There are _____ stamps in the album.

19. THINK SMARTER Select the expressions that have the same product as 35×17. Mark all that apply.

- ○ $(30 \times 10) + (30 \times 7) + (5 \times 10) + (5 \times 7)$
- ○ $(35 \times 30) + (35 \times 5) + (35 \times 10) + (35 \times 7)$
- ○ $(35 \times 10) + (30 \times 10) + (5 \times 10) + (5 \times 7)$
- ○ $(30 \times 17) + (5 \times 17)$
- ○ $(35 \times 10) + (35 \times 7)$
- ○ $(35 \times 30) + (35 \times 5)$

FOR MORE PRACTICE: Standards Practice Book

Name _____

Problem Solving • Multiply 2-Digit Numbers

Essential Question How can you use the strategy *draw a diagram* to solve multistep multiplication problems?

Operations and Algebraic Thinking—4.OA.3 *Also 4.NBT.5*

MATHEMATICAL PRACTICES
MP.1, MP.2, MP.5

Unlock the Problem

During the 2010 Great Backyard Bird Count, an average of 42 bald eagles were counted in each of 20 locations throughout Alaska. In 2009, an average of 32 bald eagles were counted in each of 26 locations throughout Alaska. Based on this data, how many more bald eagles were counted in 2010 than in 2009?

Use the graphic organizer to help you solve the problem.

Read the Problem

What do I need to find?

I need to find _____ bald eagles were counted in 2010 than in 2009.

What information do I need to use?

In 2010, _____ locations counted an average of _____ bald eagles each.

In 2009 _____ locations counted an average of _____ bald eagles each.

How will I use the information?

I can solve simpler problems.

Find the number of bald eagles counted in _____.

Find the number of bald eagles counted in _____.

Then draw a bar model to compare the _____ count to the _____ count.

Solve the Problem

- First, find the total number of bald eagles counted in 2010.

  _____ × _____

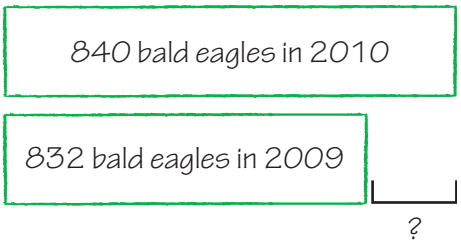
  = _____ bald eagles counted in 2010

- Next, find the total number of bald eagles counted in 2009.

  = _____ × _____

  = _____ bald eagles counted in 2009

- Last, draw a bar model. I need to subtract.



840 − 832 = _____

So, there were _____ more bald eagles counted in 2010 than in 2009.

Try Another Problem

Prescott Valley, Arizona, reported a total of 29 mourning doves in the Great Backyard Bird Count. Mesa, Arizona, reported 20 times as many mourning doves as Prescott Valley. If Chandler reported a total of 760 mourning doves, how many more mourning doves were reported in Chandler than in Mesa?

Mourning dove ▲

Read the Problem	Solve the Problem
What do I need to find?	
What information do I need to use?	760 mourning doves in Chandler 580 mourning doves in Mesa
How will I use the information?	?

- Is your answer reasonable? Explain. _____

_____

_____

Math Talk **Mathematical Practices**

Describe another way you could solve this problem.

Name _____

Share and Show

MATH BOARD

1. An average of 74 reports with bird counts were turned in each day in June. An average of 89 were turned in each day in July. How many reports were turned in for both months? (Hint: There are 30 days in June and 31 days in July.)

First, write the problem for June.

_____

Next, write the problem for July.

_____

Last, find and add the two products.

_____ reports were turned in for both months.

2. What if an average of 98 reports were turned in each day for the month of June? How many reports were turned in for June? Describe how your answer for June would be different.

_____

_____

_____

3. There are 48 crayons in a box. There are 12 boxes in a carton. Mr. Johnson ordered 6 cartons of crayons for the school. How many crayons did he get?

_____

4. MATHEMATICAL PRACTICE 1 **Make Sense of Problems** Each of 5 bird-watchers reported seeing 15 roseate spoonbills in a day. If they each reported seeing the same number of roseate spoonbills over 14 days, how many would be reported?

_____

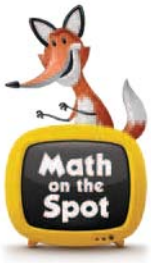
Unlock the Problem

- Underline important facts.
- Choose a strategy.
- Use the Problem Solving MathBoard.

WRITE Math • Show Your Work

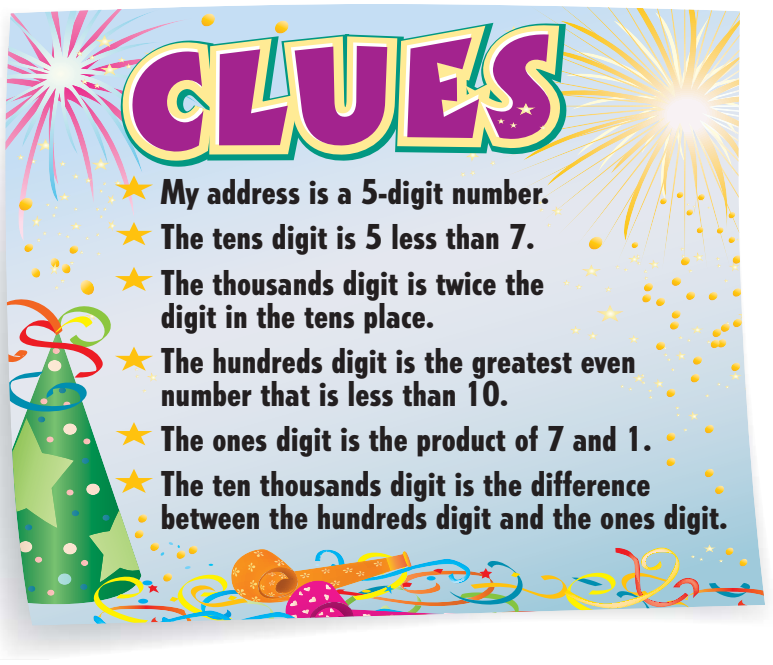
On Your Own

5. THINK SMARTER On each of Maggie's bird-watching trips, she has seen at least 24 birds. If she has taken 4 of these trips each year over the past 16 years, at least how many birds has Maggie seen?



6. MATHEMATICAL PRACTICE 1 **Make Sense of Problems**
There are 12 inches in a foot. In September, Mrs. Harris orders 32 feet of ribbon for the Crafts Club. In January, she orders 9 fewer feet. How many inches of ribbon does Mrs. Harris order? Explain how you found your answer.

7. GO DEEPER Lydia is having a party on Saturday. She decides to write a riddle on her invitations to describe her house number on Cypress Street. Use the clues to find Lydia's address.



Personal Math Trainer

8. THINK SMARTER + A school is adding 4 rows of seats to the auditorium. There are 7 seats in each row. Each new seat costs $99. What is the total cost for the new seats? Show your work.

Name _____

Chapter 3 Review/Test

1. Explain how to find 40×50 using mental math.

2. Mrs. Traynor's class is taking a field trip to the zoo. The trip will cost $26 for each student. There are 22 students in her class.

Part A

Round each factor to estimate the total cost of the students' field trip.

Part B

Use compatible numbers to estimate the total cost of the field trip.

Part C

Which do you think is the better estimate? Explain.

3. For numbers 3a–3e, select Yes or No to show if the answer is correct.

3a.	$35 \times 10 = 350$	○ Yes	○ No
3b.	$19 \times 20 = 380$	○ Yes	○ No
3c.	$12 \times 100 = 120$	○ Yes	○ No
3d.	$70 \times 100 = 7{,}000$	○ Yes	○ No
3e.	$28 \times 30 = 2{,}100$	○ Yes	○ No

4. There are 23 boxes of pencils in Mr. Shaw's supply cabinet. Each box contains 100 pencils. How many pencils are in the supply cabinet?

_____ pencils

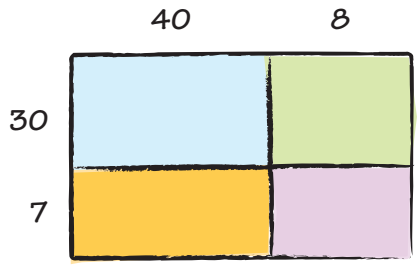
5. Which would provide a reasonable estimate for each product? Write the estimate beside the product. An estimate may be used more than once.

50×20	25×40	30×30

23×38		46×18	
31×32		39×21	

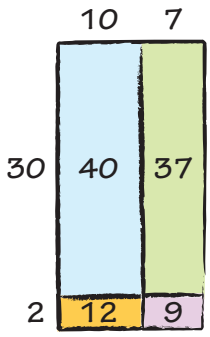
6. There are 26 baseball teams in the league. Each team has 18 players. Write a number sentence that will provide a reasonable estimate for the number of players in the league. Explain how you found your estimate.

7. The model shows 48×37. Write the partial products.



Name _____

8. Jess made this model to find the product 32×17. Her model is incorrect.



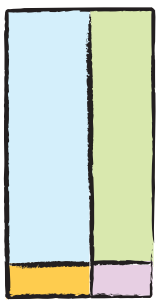
$32 \times 17 = 98$

Part A

What did Jess do wrong?

Part B

Redraw the model so that it is correct.



Part C

What is the actual product 32×17?

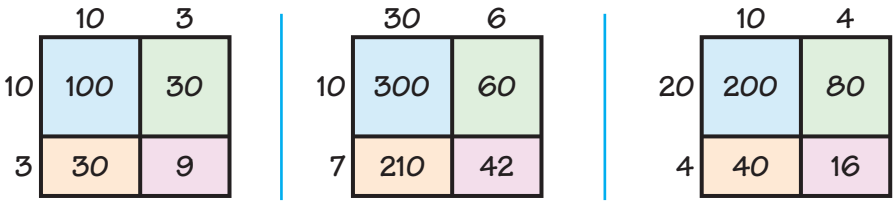
_____

9. Tatum wants to use partial products to find 15×32. Write the numbers in the boxes to show 15×32.

$$(\square \times \square) + (\square \times \square) + (\square \times \square) + (\square \times \square)$$

10. Which product is shown by the model? Write the letter of the product on the line below the model.

Ⓐ 17×36 Ⓑ 24×14 Ⓒ 13×13



_____ _____ _____

11. Mrs. Jones places 3 orders for school T-shirts. Each order has 16 boxes of shirts and each box holds 17 shirts. How many T-shirts does Mrs. Jones order? Use partial products to help you.

12. Write the unknown digits. Use each digit exactly once.

1	2	4	6	8

$$\begin{array}{r} 46 \\ \times\ 93 \\ \hline 3,\square 00 \\ 5\square 0 \\ \square 20 \\ +\ 1\square \\ \hline 4,\square 78 \end{array}$$

13. Mike has 16 baseball cards. Niko has 17 times as many baseball cards as Mike does. How many baseball cards does Niko have?

_____ baseball cards

14. Multiply.

$36 \times 28 =$ _____

Name _____

15. A farmer planted 42 rows of tomatoes with 13 plants in each row. How many tomato plants did the farmer grow?

$42 \times 13 =$ _____ tomato plants

16. Select another way to show 25×18. Mark all that apply.

- ○ $(20 \times 10) + (20 \times 8) + (5 \times 10) + (5 \times 8)$
- ○ $(25 \times 20) + (25 \times 5) + (25 \times 10) + (25 \times 8)$
- ○ $(20 \times 18) + (5 \times 10) + (5 \times 8)$
- ○ $(25 \times 10) + (25 \times 8)$
- ○ $(25 \times 20) + (25 \times 5)$

17. Terrell runs 15 sprints. Each sprint is 65 meters. How many meters does Terrell run? Show your work.

18. There are 3 new seats in each row in a school auditorium. There are 15 rows in the auditorium. Each new seat cost $74. What is the cost for the new seats? Explain how you found your answer.

19. Ray and Ella helped move their school library to a new building. Ray packed 27 boxes with 25 books in each box. Ella packed 23 boxes with 30 books in each box. How many more books did Ella pack? Show your work.

20. Julius and Walt are finding the product of 25 and 16.

Julius	Walt
25 × 16 150 + 250 500	25 × 16 200 50 120 + 300 670

Part A

Julius' answer is incorrect. What did Julius do wrong?

Part B

What did Walt do wrong?

Part C

What is the correct product?

21. A clothing store sells 26 shirts and 22 pairs of jeans. Each item of clothing costs $32.

Part A

What is a reasonable estimate for the total cost of the clothing? Show or explain how you found your answer.

Part B

What is the exact answer for the total cost of the clothing? Show or explain how you found your answer.

Chapter 4

Divide by 1-Digit Numbers

Show What You Know

Check your understanding of important skills.

Name _____

Use Arrays to Divide

Draw to complete each array. Then complete the number sentence.

1. 

$8 \div 4 =$ _____

2. 

$21 \div 3 =$ _____

Multiples

Write the first six multiples of the number.

3. 4: _____

4. 10: _____

Subtract Through 4-Digit Numbers

Find the difference.

5. $\begin{array}{r} 626 \\ -\ \ 8 \\ \hline \end{array}$

6. $\begin{array}{r} 744 \\ -\ 36 \\ \hline \end{array}$

7. $\begin{array}{r} 5{,}413 \\ -2{,}037 \\ \hline \end{array}$

8. $\begin{array}{r} 8{,}681 \\ -\ 422 \\ \hline \end{array}$

Math Detective

Each digit in the division example has been replaced with the same letter throughout. (r stands for remainder.) The digits used were 1, 2, 3, 4, 5, 7, and 9. Be a Math Detective and find the numbers. Clue: U is 5.

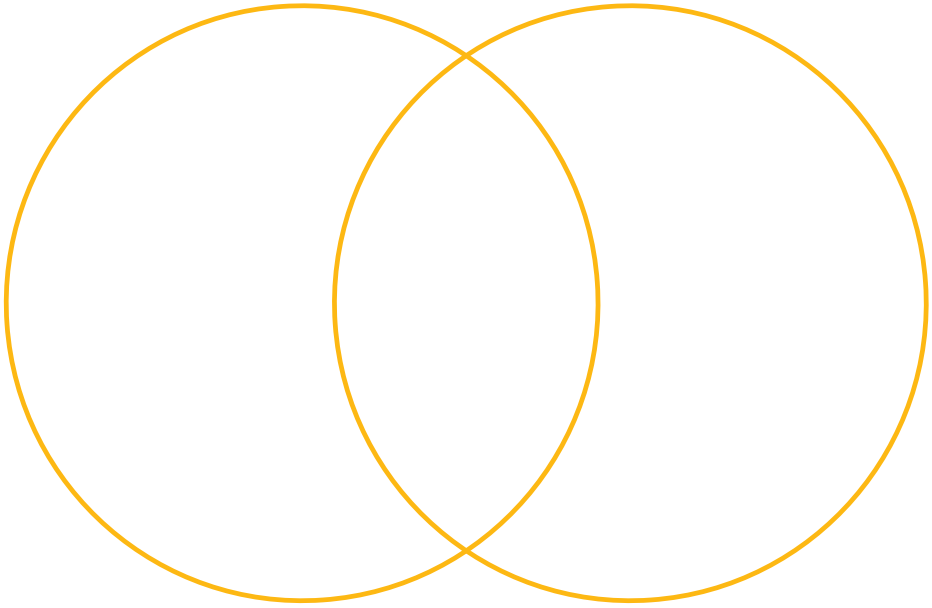
$$\begin{array}{r} \text{SU rE} \\ \text{U}\overline{)\text{CAN}} \\ -\text{CU} \\ \hline \text{I N} \\ -\text{I U} \\ \hline \text{E} \end{array}$$

Personal Math Trainer
Online Assessment and Intervention

Vocabulary Builder

Visualize It

Sort the words into the Venn diagram.



Multiplication Words **Division Words**

Review Words
Distributive Property
divide
dividend
division
divisor
factor
multiplication
product
quotient

Preview Words
compatible numbers
multiple
partial quotient
remainder

Understand Vocabulary

Write the word that answers the riddle.

1. I am the method of dividing in which multiples of the divisor are subtracted from the dividend and then the quotients are added together.

   _____

2. I am the number that is to be divided in a division problem.

   _____

3. I am the amount left over when a number cannot be divided equally. _____

4. I am the number that divided the dividend.

   _____

Name _____

Estimate Quotients Using Multiples

Essential Question How can you use multiples to estimate quotients?

Number and Operations in Base Ten—4.NBT.6

MATHEMATICAL PRACTICES

MP.2, MP.5, MP.7

Unlock the Problem (Real World)

The bakery made 110 pumpkin muffins. They will be packed in boxes with 8 muffins in each box. About how many boxes will there be?

You can use multiples to estimate.

A **multiple** of a number is the product of a number and a counting number. 1, 2, 3, 4, and so on, are counting numbers.

Estimate. 110 ÷ 8

Think: What number multiplied by 8 is about 110?

STEP 1 List the multiples of 8 until you reach 110 or greater.

Counting number	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Multiple of 8	8	16	24	32			56	64				96		112

STEP 2 Find the multiples of 8 that 110 is between.

$13 \times 8 =$ _____

$14 \times 8 =$ _____

110 is between _____ and _____, so 110 ÷ 8 is between 13 and 14.

110 is closest to _____, so 110 ÷ 8 is about _____.

So, there will be about _____ boxes.

Math Talk

Mathematical Practices

When estimating a quotient, how do you know which two numbers it is between? **Explain**.

Try This!

List the next 8 multiples of 10.

10, 20, _____

List the next 7 multiples of 100.

100, 200, _____

Example Estimate 196 ÷ 4

Think: What number times 4 is about 196?

STEP 1 List the next 6 multiples of 4.

4, 8, 12, 16, _____

Are any multiples close to 196? _____

_____

Think: If I multiply by multiples of 10, the products will be greater. Using multiples of 10 will get me to 196 faster.

STEP 2 Multiply 4 by multiples of 10.

$10 \times 4 = 40$

$20 \times 4 = 80$

$30 \times 4 =$ _____

$40 \times 4 =$ _____

$50 \times 4 =$ _____

The quotient is between 40 and 50.

_____ $\times$ 4 is closest to _____, so 196 ÷ 4 is about _____.

Share and Show

1. A restaurant has 68 chairs. There are six chairs at each table. About how many tables are in the restaurant?

Estimate. 68 ÷ 6

Think: What number times 6 is about 68?

$10 \times 6 =$ _____

$11 \times 6 =$ _____

$12 \times 6 =$ _____

68 is closest to _____, so the best estimate is about _____ tables are in the restaurant.

Mathematical Practices

When do you multiply the divisor by multiples of 10 to estimate a quotient? **Explain**.

Name _____

Find two numbers the quotient is between. Then estimate the quotient.

2. $41 \div 3$

3. $192 \div 5$

On Your Own

Find two numbers the quotient is between. Then estimate the quotient.

4. $90 \div 7$

5. $67 \div 4$

6. $281 \div 9$

7. $102 \div 7$

8. $85 \div 6$

9. $220 \div 8$

10. $443 \div 5$

11. $95 \div 8$

12. $49 \div 3$

Decide whether the actual quotient is greater than or less than the estimate given. Write < or >.

13. $83 \div 8 \bigcirc 10$

14. $155 \div 4 \bigcirc 40$

15. $70 \div 6 \bigcirc 11$

16. What's the Question? A dolphin's heart beats 688 times in 6 minutes. Answer: about 100 times.

17. MATHEMATICAL PRACTICE 1 **Analyze** A mother bottlenose ate about 278 pounds of food in one week. About how much food did she eat in a day?

Problem Solving • Applications

18. THINK SMARTER If a bottlenose dolphin can eat 175 pounds of fish, squid, and shrimp in a week, about how many pounds of food does it eat in a day? Milo says the answer is about 20 pounds. Leah says the answer is about 30 pounds. Who is correct? Explain.

19. GO DEEPER Four families went out for lunch. The total food bill came to $167. The families also left a $30 tip for the waitress. If each family spent the same amount, about how much did each family spend on dinner? Explain how you found your answer.

WRITE Math
Show Your Work

20. THINK SMARTER There are 6 showings of a film about Van Gogh at the Art Museum. A total of 459 people saw the film. The same number of people were at each showing. About how many people were at each showing? Circle the numbers the quotient is between. Then explain how you found your answer.

40 50 60 70 80

FOR MORE PRACTICE:
Standards Practice Book

Name _____

Remainders

Essential Question How can you use models to divide whole numbers that do not divide evenly?

Number and Operations in Base Ten—4.NBT.6

MATHEMATICAL PRACTICES

MP.4, MP.5

Investigate

Hands On

Materials ■ counters

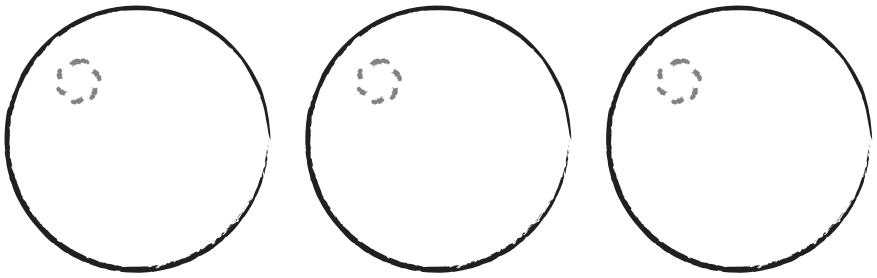
Andrea and 2 friends are playing a game of dominoes. There are 28 dominoes in the set. Andrea wants each player to receive the same number of dominoes. Can she divide them equally among the 3 players? Why or why not?

You can use division to find the number of dominoes each player will receive.

A. Use 28 counters to represent the 28 dominoes. Then draw 3 circles to represent the 3 players.

B. Share the counters equally among the 3 groups by placing them in the circles.

Draw a quick picture to show your work.



C. Find the number of counters in each group and the number of counters left over. Record your answer.

_____ counters in each group

_____ counter left over

Draw Conclusions

1. How many dominoes does each player receive? _____

   How many dominoes are left over? _____

2. THINK SMARTER Explain how the model helped you find the number of dominoes each player receives. Why is 1 counter left outside the equal groups?

3. Use counters to represent a set of 28 dominoes. How many players can play dominoes if each player receives 9 dominoes? Will any dominoes be left over? Explain.

Make Connections

Hands On

When a number cannot be divided evenly, the amount left over is called the **remainder**.

Use counters to find 39 ÷ 5.

- Use 39 counters.
- Share the counters equally among 5 groups. The number of counters left over is the remainder.

Draw a quick picture to show your work.

Math Talk

Mathematical Practices

How do you know when there will be a remainder in a division problem?

For 39 ÷ 5, the quotient is _____ and the remainder is _____, or 7 r4.

Name _____

Share and Show

MATH BOARD

Use counters to find the quotient and remainder.

1. $10 \div 3$

2. $28 \div 5$

3. $15 \div 6$

4. $11 \div 3$

5. $29 \div 4$

6. $34 \div 5$

7. $25 \div 3$

8. $7\overline{)20}$

Divide. Draw a quick picture to help.

9. $4\overline{)35}$

10. $23 \div 8$

Problem Solving • Applications

Real World

11. MATHEMATICAL PRACTICE 6 **Explain** how you use a quick picture to find the quotient and remainder.

12. GO DEEPER Alyson has 46 beads to make bracelets. Each bracelet has 5 beads. How many more beads does Alyson need so that all the beads she has are used? Explain.

13. THINK SMARTER For 13a–13d, choose Yes or No to tell whether the division expression has a remainder.

13a.	$36 \div 9$	○ Yes	○ No
13b.	$25 \div 3$	○ Yes	○ No
13c.	$82 \div 9$	○ Yes	○ No
13d.	$28 \div 7$	○ Yes	○ No

What's the Error?

14. THINK SMARTER Macy, Kayley, Maddie, and Rachel collected 13 marbles. They want to share the marbles equally. How many marbles will each of the 4 girls get? How many marbles will be left over?

Oscar used a model to solve this problem. He says his model represents $4\overline{)13}$. What is his error?

Look at the way Oscar solved this problem. Find and describe his error.

Draw a correct model and solve the problem.

So, each of the 4 girls will get _____ marbles and _____ marble will be left over.

FOR MORE PRACTICE: Standards Practice Book

Name _____

Interpret the Remainder

Essential Question How can you use remainders in division problems?

Operations and Algebraic Thinking—4.OA.3 *Also 4.NBT.6*

MATHEMATICAL PRACTICES
MP.2, MP.7, MP.8

Unlock the Problem

Real World

Magda has some leftover wallpaper 73 inches long. She wants to cut it into 8 pieces to use around the photos in her scrapbook. Each piece will have equal length. How long will each piece be?

When you solve a division problem with a remainder, the way you interpret the remainder depends on the situation and the question.

One Way Write the remainder as a fraction.

The divisor is _____ pieces.

The _____ is 73 inches.

Divide to find the quotient and remainder. $8\overline{)73}$ $\begin{matrix}9\\ \text{r1}\end{matrix}$

The remainder represents 1 inch left over, which can also be divided into 8 equal parts and written as a fraction.

$$\frac{\text{remainder}}{\text{divisor}} = \frac{\quad}{\quad}$$

Write the quotient with the remainder written as a fraction. _____

So, each piece will be _____ inches long.

Remember

You can use multiples, counters, or draw a quick picture to divide.

Try This!

Daniel made 32 ounces of soup for 5 people. How many ounces will each person get? Complete the division.

$5\overline{)32}$ $\frac{\quad}{\quad}$

Each person gets _____ ounces.

Math Talk **Mathematical Practices**

Explain what the 2 in the answer represents.

Other Ways

A **Use only the quotient.**

Ben is a tour guide at a glass-blowing studio. He can take no more than 7 people at a time on a tour. If 80 people want to see the glass-blowing demonstration, how many groups of 7 people will Ben show around?

First, divide to find the quotient and remainder.
Then, decide how to use the quotient and remainder.

The quotient is _____.

$$7\overline{)80} \quad \begin{matrix} 11 \\ \text{r } \square \end{matrix}$$

The remainder is _____.

Ben can give tours to 7 people at a time. The quotient is the number of tour groups of exactly 7 people he can show around.

So, Ben gives tours to _____ groups of 7 people.

B **Add 1 to the quotient.**

If Ben gives tours to all 80 people, how many tours will he give? A tour can have no more than 7 people. To show all 80 people around, Ben will have to give 1 more tour.

So, Ben will give _____ tours in all for 80 people.

C **Use only the remainder.**

Ben gives tours to all 80 people. After he completes the tours for groups of 7 people, how many people are in his last tour?

The remainder is 3.

So, Ben's last tour will have _____ people.

Math Talk

Mathematical Practices

Explain why you would not write the remainder as a fraction when you find the number of vans needed.

Try This!

Students are driven to soccer games in vans. Each van holds 9 students. How many vans are needed for 31 students?

Divide. 31 ÷ 9 _____

Since there are _____ students left over, _____ vans are needed to carry 31 students.

Name _____

Share and Show

MATH BOARD

1. Olivia baked 53 mini-loaves of banana bread to be sliced for snacks at a craft fair. She will place an equal number of loaves in 6 different locations. How many loaves will be at each location?

   a. Divide to find the quotient and remainder.

   b. Decide how to use the quotient and remainder to answer the question.

$$6\overline{)53} \quad \square \text{ r } \square$$

_____

Interpret the remainder to solve.

2. What if Olivia wants to put only whole loaves at each location? How many loaves will be at each location?

3. Ed carves 22 small wooden animals to sell at the craft fair. He displays them in rows with 4 animals in a row. How many animals will not be in equal rows?

On Your Own

Interpret the remainder to solve.

4. Myra has a 17-foot roll of crepe paper to make 8 streamers to decorate for a party. How long will each streamer be if she cuts the roll into equal pieces?

5. THINK SMARTER Juan has a piano recital next month. Last week he practiced for 8 hours in the morning and 7 hours in the afternoon. Each practice session is 2 hours long. How many full practice sessions did Juan complete?

6. A total of 25 students sign up to be hosts on Parent's Night. Teams of 3 students greet parents. How many students cannot be on a team? Explain.

_____

_____

_____

Problem Solving • Applications

Use the picture for 7–9.

7. Teresa is making sock puppets just like the one in the picture. If she has 53 buttons, how many puppets can she make?

8. THINK SMARTER Write a question about Teresa and the sock puppets for which the answer is 3. Explain the answer.

9. MATHEMATICAL PRACTICE 3 **Interpret a Result** How many more buttons will Teresa need if she wants to make 12 puppets? Explain.

WRITE Math
Show Your Work

10. GO DEEPER A total of 56 students signed up to play in a flag football league. If each team has 10 students, how many more students will need to sign up so all of the students can be on a team?

Personal Math Trainer

11. THINK SMARTER + A teacher plans for groups of her students to eat lunch at tables. She has 34 students in her class. Each group will have 7 students. How many tables will she need? Explain how to use the quotient and remainder to answer the question.

FOR MORE PRACTICE:
Standards Practice Book

Name _____

Divide Tens, Hundreds, and Thousands

Essential Question How can you divide numbers through thousands by whole numbers through 10?

Number and Operations in Base Ten—4.NBT.6 *Also 4.NBT.1*

MATHEMATICAL PRACTICES
MP.2, MP.7, MP.8

Unlock the Problem

Dustin is packing apples in gift boxes. Each gift box holds 4 apples. How many boxes can Dustin pack with 120 apples?

You can divide using basic facts and place value.

Example 1 Divide. 120 ÷ 4

STEP 1 Identify the basic fact. 12 ÷ 4

STEP 2 Use place value. 120 = _____ tens

STEP 3 Divide. 12 tens ÷ 4 = _____ tens ← **Think:** 4 × 3 tens = 12 tens

= _____

120 ÷ 4 = 30

So, Dustin can pack _____ boxes.

Example 2 Divide. 1,200 ÷ 4

STEP 1 Identify the basic fact. 12 ÷ 4

STEP 2 Use place value. 1,200 = _____ hundreds

STEP 3 Divide. 12 hundreds ÷ 4 = _____ hundreds ← **Think:** 4 × 3 hundreds = 12 hundreds

= _____

1,200 ÷ 4 = 300

Math Talk

Mathematical Practices

Describe the pattern in the place value of the dividends and quotients.

- **MATHEMATICAL PRACTICE 6** **Explain** how to use a basic fact and place value to divide 4,000 ÷ 5.

_____

_____

Share and Show

MATH BOARD

1. Divide. 2,800 ÷ 7

What basic fact can you use? _____

2,800 = 28 _____

28 hundreds ÷ 7 = _____

2,800 ÷ 7 = _____

2. Divide. 280 ÷ 7

What basic fact can you use? _____

280 = 28 _____

28 tens ÷ _____ = 4 _____

280 ÷ 7 = _____

Math Talk

Mathematical Practices

Explain how Exercises 1 and 2 are alike and different.

Use basic facts and place value to find the quotient.

3. 360 ÷ 6 = _____

4. 2,000 ÷ 5 = _____

5. 4,500 ÷ 9 = _____

On Your Own

Use basic facts and place value to find the quotient.

6. 560 ÷ 8 = _____

7. 200 ÷ 5 = _____

8. 240 ÷ 4 = _____

9. 810 ÷ 9 = _____

10. 6,400 ÷ 8 = _____

11. 3,500 ÷ 7 = _____

12. 5,000 ÷ 5 = _____

13. 9,000 ÷ 3 = _____

14. 3,000 ÷ 5 = _____

MATHEMATICAL PRACTICE 5 **Use Patterns** **Algebra** **Find the unknown number.**

15. 420 ÷ ■ = 60 _____

16. ■ ÷ 4 = 30 _____

17. 810 ÷ ■ = 90 _____

18. THINK SMARTER Divide 400 ÷ 40. Explain how patterns and place value can help.

_____

_____

_____

Name _____

Problem Solving • Applications

19. Jamal put 600 pennies into 6 equal rolls. How many pennies were in each roll?

20. Sela has 6 times as many coins now as she had 4 months ago. If Sela has 240 coins now, how many did she have 4 months ago?

21. THINK SMARTER Chip collected 2,090 dimes. Sue collected 1,910 dimes. They divided all their dimes into 8 equal stacks. How many dimes are in each stack?

22. MATHEMATICAL PRACTICE 5 **Communicate** Mr. Roberts sees a rare 1937 penny. The cost of the penny is $210. If he saves $3 a week, will Mr. Roberts have enough money to buy the penny in one year? Explain.

WRITE Math • **Show Your Work**

23. GO DEEPER Mrs. Roberts sold each of 5 coins for the same dollar amount. She received a total of $300. Each coin cost her $32. How much money did she make on each coin? Explain how you got your answer.

24. THINK SMARTER Which quotients are equal to 20? Mark all that apply.

- (A) 600 ÷ 2
- (B) 1,200 ÷ 6
- (C) 180 ÷ 9
- (D) 140 ÷ 7
- (E) 500 ÷ 5

Connect to Science

Insect Flight

True flight is shared only by insects, bats, and birds. Flight in insects varies from the clumsy flight of some beetles to the acrobatic moves of dragonflies.

The wings of insects are not moved by muscles attached to the wings. Muscles in the middle part of the body, or thorax, move the wings. The thorax changes shape as the wings move.

Insect Wing Beats in 3 Minutes

Insect	Approximate Number of Wing Beats
Aeschnid Dragonfly	6,900
Damselfly	2,700
Large White Butterfly	2,100
Scorpion Fly	5,000

25. About how many times does a damselfly's wings beat in 1 minute?

_____

26. About how many times do a scorpion fly's wings beat in 6 minutes?

_____

27. THINK SMARTER In one minute, about how many more times do a damselfly's wings beat than a large white butterfly's wings?

_____

28. **What's the Question?** The answer is about 2,300 times.

_____

_____

FOR MORE PRACTICE: Standards Practice Book

Name _____

Estimate Quotients Using Compatible Numbers

Essential Question How can you use compatible numbers to estimate quotients?

Number and Operations in Base Ten—4.NBT.6

MATHEMATICAL PRACTICES
MP.1, MP.5, MP.7

Unlock the Problem

A horse's heart beats 132 times in 3 minutes. About how many times does it beat in 1 minute?

You can use compatible numbers to estimate quotients.

Compatible numbers are numbers that are easy to compute mentally.

- Will a horse's heart beat more or fewer than 132 times in 1 minute?

_____

- What operation will you use to solve the problem?

_____

Example 1 Estimate. 132 ÷ 3

STEP 1 Find a number close to 132 that divides easily by 3. Use basic facts.

12 ÷ 3 is a basic fact. 120 divides easily by 3.

15 ÷ 3 is a basic fact. 150 divides easily by 3.

Think: Choose 120 because it is closer to 132.

STEP 2 Use place value.

120 = _____ tens

12 ÷ 3 = _____

12 tens ÷ 3 = _____ tens

120 ÷ 3 = _____

So, a horse's heart beats about _____ times a minute.

Example 2 Use compatible numbers to find two estimates that the quotient is between. 1,382 ÷ 5

STEP 1 Find two numbers close to 1,382 that divide easily by 5.

_____ ÷ 5 is a basic fact.
1,000 divides easily by 5.

_____ ÷ 5 is a basic fact.
1,500 divides easily by 5.

1,382 is between _____ and _____.

STEP 2 Divide each number by 5. Use place value.

1,000 ÷ 5

_____ hundreds ÷ 5 = _____ hundreds, or _____

1,500 ÷ 5

_____ hundreds ÷ 5 = _____ hundreds, or _____

So, 1,382 ÷ 5 is between _____ and _____.

Math Talk **Mathematical Practices**

Explain which estimate you think is more reasonable.

Share and Show

MATH BOARD

1. Estimate. 1,718 ÷ 4

Think: What number close to 1,718 is easy to divide by 4?

_____ is close to 1,718. What basic fact can you use? _____ ÷ 4

_____ is close to 1,718. What basic fact can you use? _____ ÷ 4

Choose 1,600 because _____ _____.

16 ÷ 4 = _____

1,600 ÷ _____ = _____

1,718 ÷ 7 is about _____

Math Talk Mathematical Practices

Explain how your estimate might change if the problem were 1,918 ÷ 4.

Use compatible numbers to estimate the quotient.

2. 455 ÷ 9

_____

3. 1,509 ÷ 3

_____

4. 176 ÷ 8

_____

5. 2,795 ÷ 7

_____

On Your Own

Use compatible numbers to estimate the quotient.

6. 163 ÷ 2

_____

7. 500 ÷ 7

_____

8. 1,421 ÷ 5

_____

9. 2,642 ÷ 8

_____

Use compatible numbers to find two estimates that the quotient is between.

10. 5,321 ÷ 6

_____

11. 1,765 ÷ 6

_____

12. 1,189 ÷ 3

_____

13. 2,110 ÷ 4

_____

MATHEMATICAL PRACTICE 2 **Reason Abstractly** **Algebra** **Estimate to compare. Write <, >, or =.**

14. 613 ÷ 3 ◯ 581 ÷ 2

_____ estimate _____ estimate

15. 364 ÷ 4 ◯ 117 ÷ 6

_____ estimate _____ estimate

16. 2,718 ÷ 8 ◯ 963 ÷ 2

_____ estimate _____ estimate

Name _____

Problem Solving • Applications (Real World)

Use the table for 17–19.

Animal Heartbeats in 5 Minutes

Animal	Number of Heartbeats
Whale	31
Cow	325
Pig	430
Dog	520
Chicken	1,375

17. About how many times does a chicken's heart beat in 1 minute?

_____

18. GO DEEPER About how many times does a cow's heart beat in 2 minutes?

_____

19. MATHEMATICAL PRACTICE 2 **Use Reasoning** About how many times faster does a cow's heart beat than a whale's?

_____

20. THINK SMARTER Martha had 154 stamps and her sister had 248 stamps. They combined their collections and put the stamps in an album. If they want to put 8 stamps on each page, about how many pages would they need?

_____

21. Jamie and his two brothers divided a package of 125 toy cars equally. About how many cars did each of them receive?

_____

WRITE Math • Show Your Work

22. THINK SMARTER Harold and his brother collected 2,019 cans over a 1-year period. Each boy collected the same number of cans. About how many cans did each boy collect? Explain how you found your answer.

_____

_____

_____

Connect to Reading

Cause and Effect

The reading skill *cause and effect* can help you understand how one detail in a problem is related to another detail.

Chet wants to buy a new bike that costs $276. Chet mows his neighbor's lawn for $15 each week. Since Chet does not have money saved, he needs to decide which layaway plan he can afford to buy the new bike.

Bike Shop Layaway Plans	
Plan A	3 months (3 equal payments)
Plan B	6 months (6 equal payments)

Cause:	→	**Effect:**
Chet does not have money saved to purchase the bike.		Chet will have to decide which layaway plan he can afford to purchase the bike.

Which plan should Chet choose?

3-month layaway:

$276 ÷ 3

Estimate.

$270 ÷ 3 _____

6-month layaway:

$276 ÷ 6

Estimate.

$300 ÷ 6 _____

Chet earns $15 each week. Since there are usually 4 weeks in a month, multiply to see which payment he can afford.

$15 × 4 = _____

So, Chet can afford the _____ layaway plan.

Use estimation to solve.

23. Sofia wants to buy a new bike that costs $214. Sofia helps her grandmother with chores each week for $18. Estimate to find which layaway plan Sofia should choose and why.

_____

_____

_____

_____

24. WRITE ▸ *Math* Describe a situation when you have used cause and effect to help you solve a math problem.

_____

_____

_____

_____

_____

FOR MORE PRACTICE: Standards Practice Book

Name _____

Division and the Distributive Property

Essential Question How can you use the Distributive Property to find quotients?

Number and Operations in Base Ten—4.NBT.6

MATHEMATICAL PRACTICES

MP.1, MP.4, MP.5

Investigate

Materials ■ color pencils ■ grid paper

You can use the Distributive Property to break apart numbers to make them easier to divide.

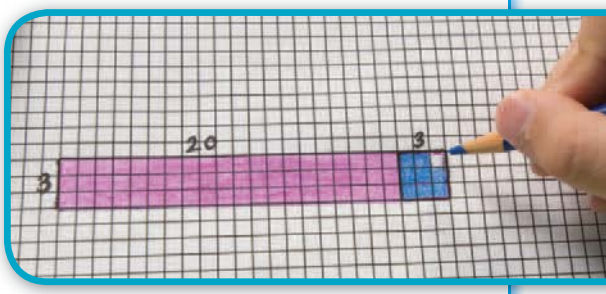
The Distributive Property of division says that dividing a sum by a number is the same as dividing each addend by the number and then adding the quotients.

A. Outline a rectangle on a grid to model $69 \div 3$.

Shade columns of 3 until you have 69 squares.

How many groups of 3 can you make? _____

B. Think of 69 as $60 + 9$. Break apart the model into two rectangles to show $(60 + 9) \div 3$. Label and shade the smaller rectangles. Use two different colors.



C. Each rectangle models a division.

$69 \div 3 = (\_\_\_\_ \div 3) + (\_\_\_\_ \div 3)$

$= \_\_\_\_ + \_\_\_\_$

$= \_\_\_\_$

D. Outline another model to show $68 \div 4$.

How many groups of 4 can you make? _____

E. Think of 68 as $40 + 28$. Break apart the model, label, and shade to show two divisions.

$68 \div 4 = (\_\_\_\_ \div 4) + (\_\_\_\_ \div 4)$

$= \_\_\_\_ + \_\_\_\_$

$= \_\_\_\_$

Draw Conclusions

1. Explain how each small rectangle models a quotient and a product in Step C.

2. Compare your answer in Step A to the final quotient in Step C. What can you conclude?

3. THINK SMARTER To find the quotient 91 ÷ 7, would you break up the dividend into 90 + 1 or 70 + 21? Explain.

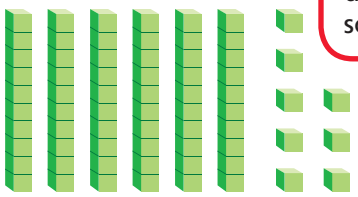
Make Connections

Hands On

You can also model 68 ÷ 4 using base-ten blocks.

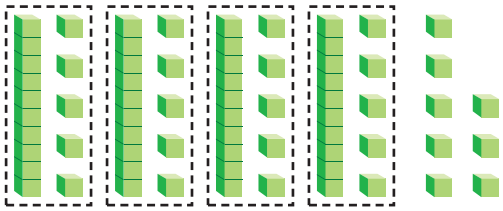
STEP 1 Model 68.

68 = _____ + _____



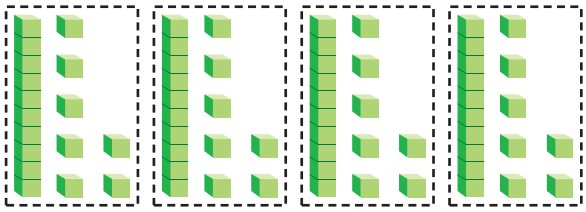
STEP 2 Divide the longs into 4 equal groups. 4 longs divide into 4 equal groups with 2 longs left. Regroup 2 longs as 20 small cubes. Divide them evenly among the 4 groups.

60 ÷ 4 = _____



STEP 3 Divide the 8 small cubes into the 4 equal groups.

8 ÷ 4 = _____



So, 68 ÷ 4 = (60 ÷ 4) + (8 ÷ 4) = _____ + _____ = _____

Math Talk Mathematical Practices

Describe another way you could use the Distributive Property to solve 68 ÷ 4.

Name _____

Share and Show

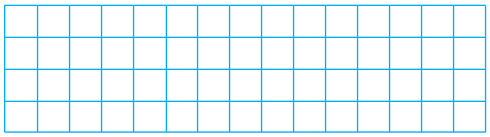
MATH BOARD

Model the division on the grid.

1. $26 \div 2 = (\_\_\_\_ \div 2) + (\_\_\_\_ \div 2)$

$= \_\_\_\_ + \_\_\_\_$

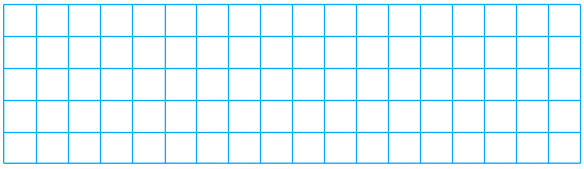
$= \_\_\_\_$



2. $45 \div 3 = (\_\_\_\_ \div 3) + (\_\_\_\_ \div 3)$

$= \_\_\_\_ + \_\_\_\_$

$= \_\_\_\_$



Find the quotient.

3. $86 \div 2$

$= (\_\_\_\_ \div 2) + (\_\_\_\_ \div 2)$

$= \_\_\_\_ + \_\_\_\_$

$= \_\_\_\_$

4. $208 \div 4$

$= (\_\_\_\_ \div 4) + (\_\_\_\_ \div 4)$

$= \_\_\_\_ + \_\_\_\_$

$= \_\_\_\_$

Use base-ten blocks to model the quotient. Then record the quotient.

5. $88 \div 4 = \_\_\_\_$

6. $36 \div 3 = \_\_\_\_$

7. $186 \div 6 = \_\_\_\_$

Problem Solving • Applications

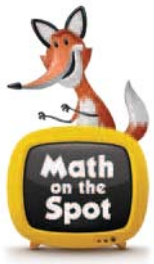
Real World

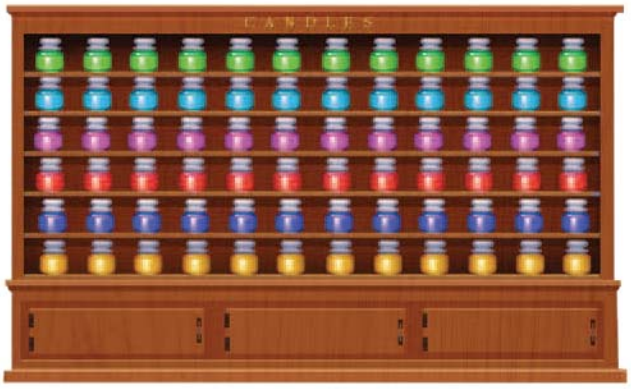
8. WRITE *Math* Explain how you can model finding quotients using the Distributive Property.

9. GO DEEPER Justin earned $50 mowing yards and $34 washing cars. He wants to divide his money into 3 equal accounts. How much will he put in each account? Explain.

Pose a Problem

10. THINK SMARTER Christelle went to a gift shop. The shop sells candles in a variety of sizes and colors. The picture shows a display of candles.





Write a problem that can be solved using the picture.

Pose a problem.

Solve your problem.

- MATHEMATICAL PRACTICE 1 **Describe** how you could change the problem by changing the number of rows of candles. Then solve the problem.

11. THINK SMARTER For 11a–11d, choose Yes or No to indicate if the expression shows a way to break apart the dividend to find the quotient 147 ÷ 7.

11a.	$(135 \div 7) + (12 \div 7)$	○ Yes	○ No
11b.	$(100 \div 7) + (47 \div 7)$	○ Yes	○ No
11c.	$(140 \div 7) + (7 \div 7)$	○ Yes	○ No
11d.	$(70 \div 7) + (77 \div 7)$	○ Yes	○ No

FOR MORE PRACTICE: Standards Practice Book

Name _____

Mid-Chapter Checkpoint

Vocabulary

Choose the best term from the box to complete the sentence.

Vocabulary
counting numbers
compatible numbers
multiple
remainder

1. A number that is the product of a number and a counting number is called a _____. (p. 143)
2. Numbers that are easy to compute mentally are called _____. (p. 159)
3. When a number cannot be divided evenly, the amount left over is called the _____. (p. 148)

Concepts and Skills

Divide. Draw a quick picture to help. (4.NBT.6)

4. $26 \div 3$ _____

5. $19 \div 4$ _____

Use basic facts and place value to find the quotient. (4.NBT.6)

6. $810 \div 9 =$ _____

7. $210 \div 7 =$ _____

8. $3{,}000 \div 6 =$ _____

Use compatible numbers to estimate the quotient. (4.NBT.6)

9. $635 \div 9$

_____

10. $412 \div 5$

_____

11. $490 \div 8$

_____

Use grid paper or base-ten blocks to model the quotient. Then record the quotient. (4.NBT.6)

12. $63 \div 3 =$ _____

13. $85 \div 5 =$ _____

14. $168 \div 8 =$ _____

15. Ana has 296 coins in her coin collection. She put the same number of coins in each of 7 jars. About how many coins are in each jar? (4.NBT.6)

16. Which two estimates is the quotient 345 ÷ 8 between? (4.NBT.6)

17. A peanut vendor had 640 bags of peanuts. She sold the same number of bags of peanuts at each of 8 baseball games. How many bags of peanuts did she sell at each game? (4.NBT.6)

18. There are 4 students on a team for a relay race. How many teams can be made from 27 students? (4.OA.3)

19. Eight teams of high school students helped clean up trash in the community. Afterwards, they shared 23 pizzas equally. How many pizzas did each team get? (4.OA.3)

Name _____

Divide Using Repeated Subtraction

Essential Question How can you use repeated subtraction and multiples to find quotients?

Number and Operations in Base Ten—4.NBT.6

MATHEMATICAL PRACTICES
MP.3, MP.6, MP.8

Investigate

Materials ■ counters ■ grid paper

John is building a backyard pizza oven with an arch opening. He has 72 bricks. He will place 6 bricks at a time as he builds the oven. If he arranges the bricks in piles of 6, how many piles will he have?

You can use repeated subtraction to divide 72 ÷ 6.

A. Begin with 72 counters. Subtract 6 counters.

How many are left? _____

B. Record the subtraction on grid paper as shown. Record the number of counters left and the number of times you subtracted.

		7	2	
	−		6	

1 time

_____ times

_____ times

C. Can you reach zero evenly? Explain.

_____

_____

D. Count the number of times you subtracted 6 counters. _____

So, there are _____ piles of 6 bricks.

Draw Conclusions

1. Explain the relationship between the divisor, the dividend, the quotient, and the number of times you subtracted the divisor from the dividend.

2. What happens if you subtract multiples of 6? Complete the example at the right.

$$6\overline{)72}$$
$$-60 \leftarrow \square \times 6 \quad 10$$
$$\square$$
$$-12 \leftarrow \square \times 6 + \square$$
$$\square \qquad \square$$

   - What multiples of 6 did you use? How did you use them?

   - What numbers did you add? Why?

   - How did using multiples of the divisor help you?

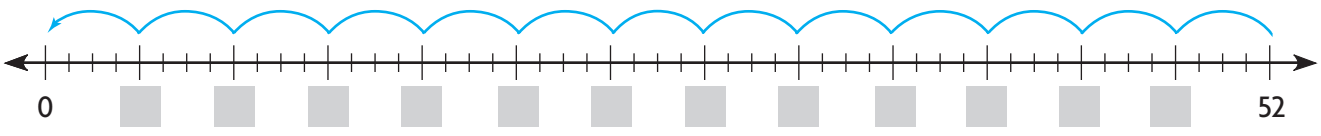
3. THINK SMARTER Why should you subtract 10×6 and not 9×6 or 20×6?

Math Talk **Mathematical Practices**

Explain subtracting counters and counting back on a number line help you divide.

Make Connections

Another way to divide by repeated subtraction is to use a number line. Count back by 4s from 52 to find $52 \div 4$.



How many equal groups of 4 did you subtract? _____

So, $52 \div 4 =$ _____.

Name _____

Share and Show

MATH BOARD

Use repeated subtraction to divide.

1. $84 \div 7$ _____

2. $60 \div 4$ _____

3. $91 \div 8$ _____

Draw a number line to divide.

4. $65 \div 5 =$ _____

Problem Solving • Applications

Real World

5. MATHEMATICAL PRACTICE 5 **Use Appropriate Tools** Can you divide 32 by 3 evenly? Use the number line to explain your answer.

6. GO DEEPER John has $40 to spend at the yard sale. He buys 6 books for $2 each. He would like to spend the rest of his money on model cars for his collection. If the cars cost $7 each, how many can he buy? Explain.

Unlock the Problem Real World

7. THINK SMARTER A new playground will be 108 feet long. Builders need to allow 9 feet of space for each piece of climbing equipment. They want to put as many climbers along the length of the playground as possible. How many climbers can they place?

a. What are you asked to find?

_____

b. How can you use repeated subtraction to solve the problem?

_____

_____

c. Tell why you might use multiples of the divisor to solve the problem.

_____

_____

d. Show steps to solve the problem.

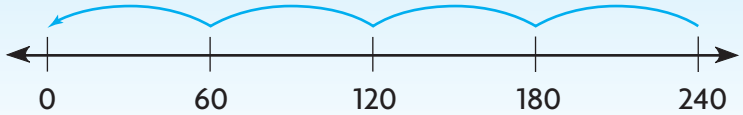
e. Complete the sentences.

There are _____ equal parts of the playground, each _____ feet long.

So, _____ climbers can fit along the length of the playground.

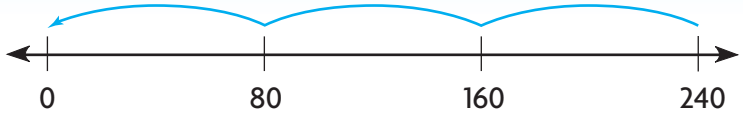
8. THINK SMARTER Which model matches each expression? Write the letter on the line next to the model.

(A) 240 ÷ 80



_____

(B) 240 ÷ 60



_____

Name _____

Divide Using Partial Quotients

Essential Question How can you use partial quotients to divide by 1-digit divisors?

Number and Operations in Base Ten—4.NBT.6

MATHEMATICAL PRACTICES
MP.2, MP.7, MP.8

Unlock the Problem

Real World

At camp, there are 5 players on each lacrosse team. If there are 125 people on lacrosse teams, how many teams are there?

- Underline what you are asked to find.
- Circle what you need to use.
- What operation can you use to find the number of teams?

_____

One Way Use partial quotients.

In the **partial quotient** method of dividing, multiples of the divisor are subtracted from the dividend and then the partial quotients are added together.

Divide. 125 ÷ 5 **Write.** $5\overline{)125}$

STEP 1

Start by subtracting a greater multiple, such as 10 times the divisor. For example, you know that you can make at least 10 teams of 5 players.

Continue subtracting until the remaining number is less than the multiple, 50.

STEP 2

Subtract smaller multiples, such as 5, 2, or 1 times the divisor until the remaining number is less than the divisor. In other words, keep going until you no longer have enough players to make a team.

Then add the partial quotients to find the quotient.

So, there are _____ lacrosse teams.

Partial Quotients

$5\overline{)125}$ ↓

− ☐ 10 × ____ 10

− ☐ 10 × ____ 10

− ☐ 5 × ____ +5

☐

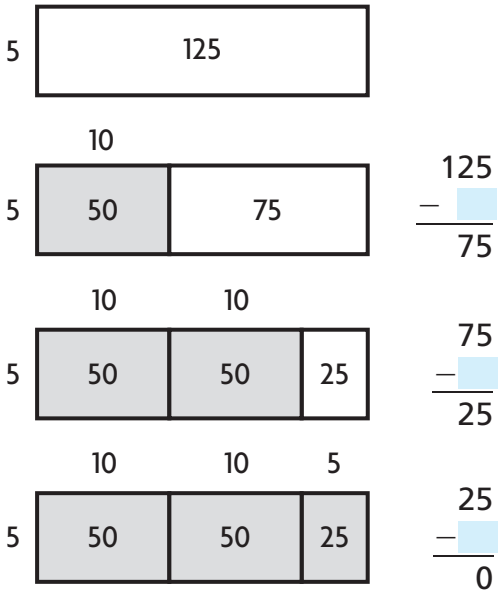
Math Talk **Mathematical Practices**

Explain how you found the total number of teams after finding the partial quotients.

Another Way Use rectangular models to record the partial quotients.

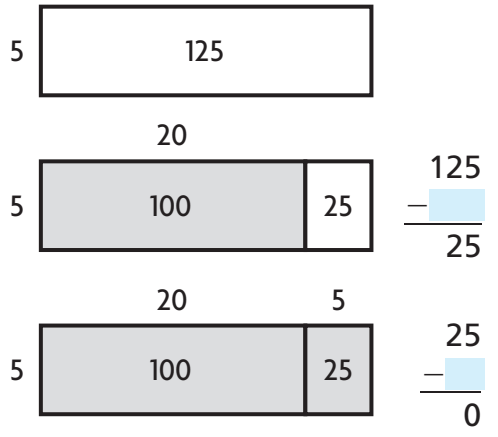
Jarod and Ana also found the number of teams using partial quotients. They recorded the partial quotients using rectangular models. They each still had 25 as the quotient.

Jarod



10 + 10 + 5 = _____

Ana



20 + 5 = _____

Math Talk **Mathematical Practices**

Explain why you might prefer to use one method rather than the other.

Share and Show

MATH BOARD

1. Lacrosse is played on a field 330 ft long. How many yards long is a lacrosse field? (3 feet = 1 yard)

Divide. Use partial quotients.

3)330

− ☐ 100 × ☐ 100

☐

☐ 10 × ☐ + 10

☐

So, the lacrosse field is _____ yards long.

Name _____

Divide. Use partial quotients.

2. $3\overline{)225}$

Divide. Use rectangular models to record the partial quotients.

3. $428 \div 4 =$ _____

Math Talk **Mathematical Practices**

Explain how you could solve Problems 2 and 3 a different way.

On Your Own

Divide. Use partial quotients.

4. $9\overline{)198}$

5. $7\overline{)259}$

6. $8\overline{)864}$

7. $6\overline{)738}$

Divide. Use rectangular models to record the partial quotients.

8. $328 \div 2 =$ _____

9. $475 \div 5 =$ _____

10. $219 \div 3 =$ _____

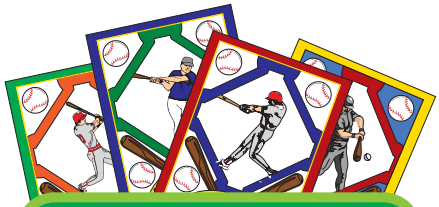
11. $488 \div 4 =$ _____

12. MATHEMATICAL PRACTICE 2 **Use Reasoning** What is the least number you can divide by 5 to get a three-digit quotient? Explain how you found your answer.

Problem Solving • Applications

Real World

Use the table for 13–15.



Rob's Sports Cards Collection

Sport	Number of Cards
Baseball	248
Basketball	189
Football	96
Hockey	64

13. Rob wants to put 8 baseball cards on each page in an album. How many pages will he fill?

14. Rob filled 9 plastic boxes with basketball cards with the same number of cards in each box. How many cards did he put in each box?

15. THINK SMARTER Rob filled 3 fewer plastic boxes with football cards than basketball cards. How many boxes did he fill? How many football cards were in each box?

16. GO DEEPER Marshall can buy 5 tee shirts for $60. If each shirt costs the same amount, what is the cost of 4 tee shirts?

WRITE Math • Show Your Work

17. THINK SMARTER Use partial quotients. Fill in the blanks.

$$5 \overline{)485}$$

$$-\ \square \qquad 80 \times 5 \qquad \square$$

$$-\ \square \qquad 10 \times 5 \qquad \square$$

$$-\ \square \qquad 7 \times 5 \qquad +\ \square$$

FOR MORE PRACTICE: Standards Practice Book

Name _____

Model Division with Regrouping

Essential Question How can you use base-ten blocks to model division with regrouping?

Number and Operations in Base Ten—4.NBT.6

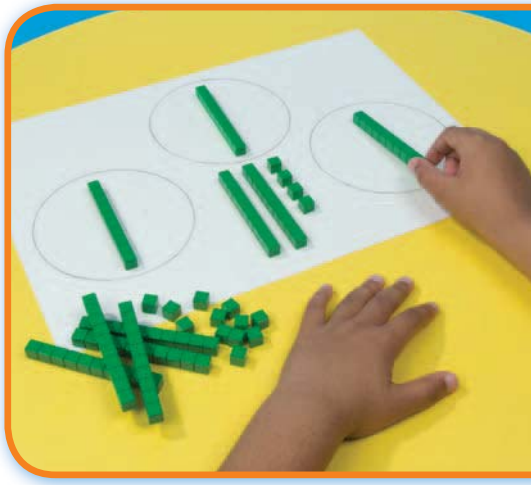
MATHEMATICAL PRACTICES
MP.2, MP.4, MP.6

Investigate

Hands On

Materials ■ base-ten blocks

The librarian wants to share 54 books equally among 3 classes. How many books will she give to each class?



A. Draw 3 circles to represent the classes. Then use base-ten blocks to model 54. Show 54 as 5 tens and 4 ones.

B. Share the tens equally among the 3 groups.

C. If there are any tens left, regroup them as ones. Share the ones equally among the 3 groups.

D. There are _____ ten(s) and _____ one(s) in each group.

So, the librarian will give _____ books to each class.

Draw Conclusions

MATH BOARD

1. THINK SMARTER Explain why you needed to regroup in Step C.

_____

_____

2. How you can use base-ten blocks to find the quotient of 92 ÷ 4?

_____

_____

_____

_____

Make Connections

Use the quick picture at the bottom of the page to help you divide.
Record each step.

Find 76 ÷ 3.

STEP 1

Model 76 as 7 tens 6 ones.
Draw three circles to represent equal groups.

$3\overline{)76}$

STEP 2

Share the 7 tens equally among the 3 groups.
Cross out the tens you use.

There are _____ tens in each group.

_____ tens were used. There is _____ ten left over.

tens in each group

$3\overline{)76}$

$-$ ← tens used

← ten left over

STEP 3

One ten cannot be shared among 3 groups without regrouping.
Regroup 1 ten by drawing 10 ones.

There are now _____ ones to share.

$3\overline{)76}$ → 2

-6

← ones to share

STEP 4

Share the ones equally among the 3 groups.
Cross out the ones you use.

There are _____ ones in each group.

_____ ones were used. There is _____ one left over.

ones in each group

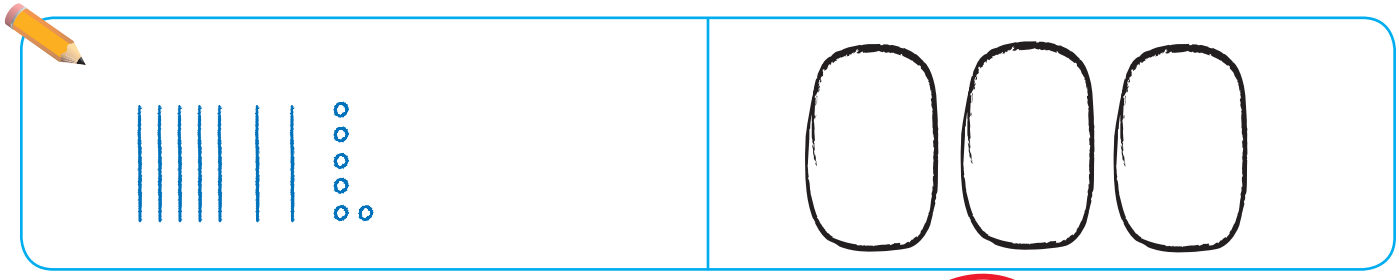
$3\overline{)76}$ → $2\_$

-6

16

$-$ ← ones used

← one left over



There are 3 groups of _____ and _____ left over.

So, for 76 ÷ 3, the quotient is _____ and the remainder is _____.

This can be written as _____.

Math Talk

Mathematical Practices

Why do you share tens equally among groups before sharing ones?

Name _____

Share and Show

MATH BOARD

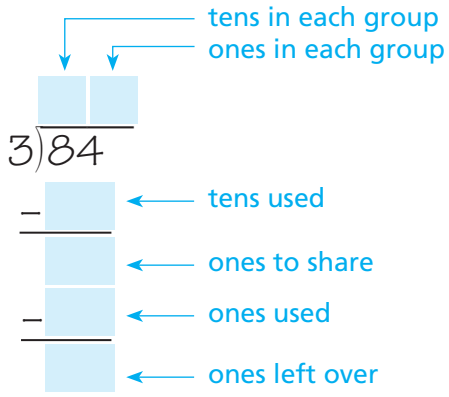
Divide. Use base-ten blocks.

1. 48 ÷ 3 _____

2. 84 ÷ 4 _____

3. 72 ÷ 5 _____

4. 84 ÷ 3 _____



Problem Solving • Applications

Real World

5. WRITE Math Explain why you did not need to regroup in Exercise 2.

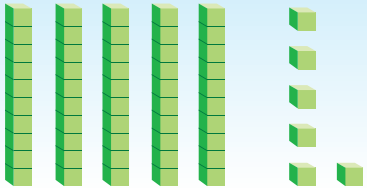
_____

6. GO DEEPER Mindy is preparing fruit boxes for gifts. She divides 36 apples evenly into 6 boxes. Then she divided 54 bananas evenly into the same 6 boxes. How many pieces of fruit are in each of Mindy's boxes?

_____

7. THINK SMARTER Ami needs to divide these base-ten blocks into 4 equal groups.

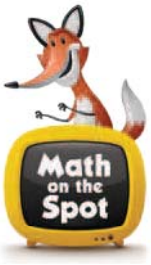
Describe a model that would show how many are in each group.



_____

Sense or Nonsense?

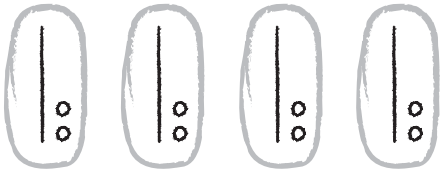
8. THINK SMARTER Angela and Zach drew quick pictures to find 68 ÷ 4. Whose quick picture makes sense? Whose quick picture is nonsense? Explain your reasoning.



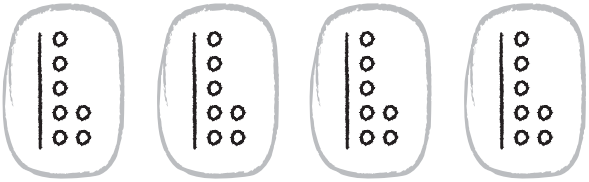
I drew 1 ten and 2 ones in each group.

I drew 1 ten and 7 ones in each group.

Angela's Quick Picture



Zach's Quick Picture



9. MATHEMATICAL PRACTICE 1 **Analyze** What did Angela forget to do after she shared the tens equally among the 4 groups?

FOR MORE PRACTICE: Standards Practice Book

Name _____

Place the First Digit

Essential Question How can you use place value to know where to place the first digit in the quotient?

Number and Operations in Base Ten—4.NBT.6

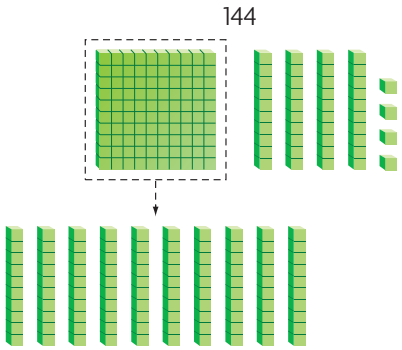
MATHEMATICAL PRACTICES
MP.2, MP.7, MP.8

Unlock the Problem

Victor took 144 photos on a digital camera.
The photos are to be placed equally in 6 photo albums.
How many photos will be in each album?

- Underline what you are asked to find.
- Circle what you need to use.

Example 1 Divide. 144 ÷ 6



STEP 1 Use place value to place the first digit.
Look at the hundreds in 144.
1 hundred cannot be shared among 6 groups without regrouping.
Regroup 1 hundred as 10 tens.

Now there are _____ tens to share among 6 groups.

The first digit of the quotient will be in the _____ place.

STEP 2 Divide the tens.

$$\begin{array}{r} 2 \\ 6\overline{)144} \\ -\square \\ \hline \square \end{array}$$

Divide. 14 tens ÷ 6

Multiply. 6 × 2 tens

Subtract. 14 tens − 12 tens

Check. 2 tens cannot be shared among 6 groups without regrouping.

STEP 3 Divide the ones.
Regroup 2 tens as 20 ones.

Now there are _____ ones to share among 6 groups.

$$\begin{array}{r} 24 \\ 6\overline{)144} \\ -12\downarrow \\ \hline 24 \\ -\square \\ \hline \square \end{array}$$

Divide. _____ ones ÷ _____

Multiply. _____ × _____ ones

Subtract. _____ ones − _____ ones

Check. 0 ones cannot be shared among 6 groups.

So, there will be _____ photos in each album.

Math Idea

After you divide each place, the remainder should be less than the divisor.

Math Talk

Mathematical Practices

Explain how the answer would change if Jaime had 146 photos.

Example 2 Divide. 287 ÷ 2

Omar has 287 photographs of animals. If he wants to put the photos into 2 groups of the same size, how many photos will be in each group?

STEP 1

Use place value to place the first digit.
Look at the hundreds in 287.
2 hundreds can be shared between 2 groups.

So, the first digit of the quotient will be in the _____ place.

STEP 2

Divide the hundreds.

$$\begin{array}{r} 1 \\ 2\overline{)287} \\ -\square \\ \hline \square \end{array}$$

Divide. 2 hundreds ÷ 2

Multiply. 2 × 1 hundred

Subtract. 2 hundreds − 2 hundreds.

0 hundreds are left.

STEP 3

Divide the tens.

$$\begin{array}{r} 14 \\ 2\overline{)287} \\ -2\downarrow \\ \hline 0\square \\ -\square \\ \hline \square \end{array}$$

Divide. _____ tens ÷ _____

Multiply. _____ × _____ tens

Subtract. _____ tens − _____ tens 0 tens are left.

STEP 4

Divide the ones.

$$\begin{array}{r} 143\ r1 \\ 2\overline{)287} \\ -2 \\ \hline 08 \\ -8\downarrow \\ \hline 07 \\ -\square \\ \hline \square \end{array}$$

Divide. _____ ones ÷ _____

Multiply. _____ × _____ ones

Subtract. _____ ones − _____ ones
1 one cannot be equally shared between 2 groups.

So, there will be _____ photos in each group with 1 photo left.

Name _____

Share and Show

MATH BOARD

1. There are 452 pictures of dogs in 4 equal groups. How many pictures are in each group? Explain how you can use place value to place the first digit in the quotient.

$4\overline{)452}$

Divide.

2. $4\overline{)166}$

3. $5\overline{)775}$

Math Talk **Mathematical Practices**

Explain how you placed the first digit of the quotient in Exercise 2.

On Your Own

Divide.

4. $4\overline{)284}$

5. $5\overline{)394}$

6. $3\overline{)465}$

7. $8\overline{)272}$

8. $2\overline{)988}$

9. $3\overline{)504}$

10. $6\overline{)734}$

11. $4\overline{)399}$

Practice: Copy and Solve **Divide.**

12. $516 \div 2$

13. $516 \div 3$

14. $516 \div 4$

15. $516 \div 5$

16. MATHEMATICAL PRACTICE 6 Look back at your answers to Exercises 12–15. What happens to the quotient when the divisor increases? **Explain**.

Unlock the Problem Real World

17. THINK SMARTER Nan wants to put 234 pictures in an album with a blue cover. How many full pages will she have in her album?

Photo Albums

Color of cover	Pictures per page
Blue	4
Green	6
Red	8

a. What do you need to find?

_____

b. How will you use division to find the number of full pages?

_____

_____

_____

c. Show the steps you will use to solve the problem.

d. Complete the following sentences.

Nan has _____ pictures.

She wants to put the pictures in an album with pages that each hold _____ pictures.

She will have an album with _____ full pages and _____ pictures on another page.

18. GO DEEPER Mr. Parsons bought 293 apples to make pies for his shop. Six apples are needed for each pie. If Mr. Parsons makes the most apple pies possible, how many apples will be left?

_____

19. THINK SMARTER Carol needs to divide 320 stickers equally among 4 classes. In which place is the first digit of the quotient? Choose the word that completes the sentence.

The first digit of the quotient is in the [ones / tens / hundreds / thousands] place.

FOR MORE PRACTICE: Standards Practice Book

Name _____

Divide by 1-Digit Numbers

Essential Question How can you divide multidigit numbers and check your answers?

Number and Operations in Base Ten—4.NBT.6

MATHEMATICAL PRACTICES
MP.2, MP.7, MP.8

Unlock the Problem

Students in the third, fourth, and fifth grades made 525 origami animals to display in the library. Each grade made the same number of animals. How many animals did each grade make?

Example 1 Divide. 525 ÷ 3

STEP 1 Use place value to place the first digit. Look at the hundreds in 525. 5 hundreds can be shared among 3 groups without regrouping. The first digit of the quotient will be in the _____ place.

Math Talk **Mathematical Practices**

At the checking step, what would you do if the number is greater than the divisor?

STEP 2 Divide the hundreds.

$$3\overline{)525}\quad 1$$
$$-\square$$
$$\square$$

Divide. Share _____ hundreds equally among _____ groups.

Multiply. _____ × _____

Subtract. _____ − _____.

Check. _____ hundreds cannot be shared among 3 groups without regrouping.

STEP 3 Divide the tens.

$$3\overline{)525}\quad 17$$
$$-3\downarrow$$
$$22$$
$$-\square$$
$$\square$$

Divide. Share _____ equally among _____ groups.

Multiply. _____

Subtract. _____ − _____

Check. _____

_____

_____.

STEP 4 Divide the ones.

$$3\overline{)525}\quad 175$$
$$-3\downarrow$$
$$22$$
$$-21\downarrow$$
$$15$$
$$-\square$$
$$\square$$

Divide. Share _____ equally among _____ groups.

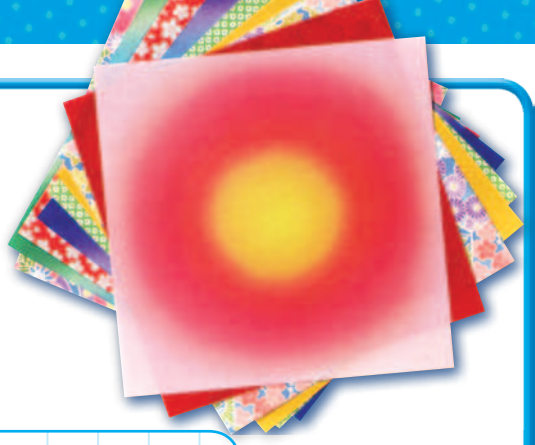
Multiply. _____

Subtract. _____ − _____

Check. _____ are left.

So, each class made _____ origami animals.

There are 8,523 sheets of origami paper to be divided equally among 8 schools. How many sheets of origami paper will each school get?



Example 2 Divide. 8,523 ÷ 8

STEP 1 Use place value to place the first digit.

Look at the thousands in 8,523.
8 thousands can be shared among 8 groups without regrouping.

The first digit of the quotient will be

in the _____ place.

STEP 2 Divide the thousands.

STEP 3 Divide the hundreds.

STEP 4 Divide the tens.

STEP 5 Divide the ones.

So, each school will get _____ sheets of origami paper.

There will be _____ sheets left.

$8\overline{)8,523}$

ERROR Alert

Place a zero in the quotient when a place in the dividend cannot be divided by the divisor.

CONNECT Division and multiplication are inverse operations. You can use multiplication to check your answer to a division problem.

Multiply the quotient by the divisor. If there is a remainder, add it to the product. The result should equal the dividend.

Divide.

quotient → 1,065 r3 ← remainder
divisor → $8\overline{)8,523}$ ← dividend

Check.

1,065 ← quotient
× 8 ← divisor
8,520
+ 3 ← remainder
8,523 ← dividend

The check shows that the division is correct.

Name _____

Share and Show

MATH BOARD

1. Ollie used 852 beads to make 4 bracelets. He put the same number of beads on each bracelet. How many beads does each bracelet have? Check your answer.

Divide.

$$4\overline{)852}$$

2

Check.

Math Talk **Mathematical Practices**

Explain how you could check if your quotient is correct.

So, each bracelet has _____ beads.

Divide and check.

2. $2\overline{)394}$

3. $2\overline{)803}$

4. $4\overline{)3{,}448}$

On Your Own

Divide and check.

5. $2\overline{)816}$

6. $4\overline{)709}$

7. $3\overline{)267}$

8. $6\overline{)1{,}302}$

9. $8\overline{)9{,}232}$

10. $9\overline{)1{,}020}$

Problem Solving • Applications Real World

Use the table for 11–13.

11. THINK SMARTER Four teachers bought 10 origami books and 100 packs of origami paper for their classrooms. They will share the cost of the items equally. How much should each teacher pay?

The Craft Store

Item	Price
Origami Book	$24 each
Origami Paper	$6 per pack
Origami Kit	$8 each

12. MATHEMATICAL PRACTICE 5 **Communicate** Six students shared equally the cost of 18 of one of the items in the chart. Each student paid $24. What item did they buy? Explain how you found your answer.

WRITE Math • **Show Your Work**

13. Ms. Alvarez has $1,482 to spend on origami paper. How many packs can she buy?

14. GO DEEPER Evan made origami cranes with red, blue, and yellow paper. The number of cranes in each color is the same. If there are 342 cranes, how many of them are blue or yellow?

15. THINK SMARTER On Monday 336 fourth graders went on a field trip to a local park. The teachers divided the students into 8 groups.

Use a basic fact. Estimate the number of students in each group. Show your work.

FOR MORE PRACTICE: Standards Practice Book

Name _____

Problem Solving • Multistep Division Problems

Essential Question How can you use the strategy *draw a diagram* to solve multistep division problems?

Operations and Algebraic Thinking—
4.OA.2 *Also 4.OA.3, 4.NBT.6*

MATHEMATICAL PRACTICES
MP.1, MP.2, MP.4

Unlock the Problem

Real World

Lucia picked 3 times as much corn as Eli. Together, they picked 96 ears of corn. Eli wants to divide the number of ears he picked equally among 8 bags. How many ears of corn will Eli put in each of the 8 bags?

Read the Problem

What do I need to find?

I need to find the number of _____ that will go in each bag.

What information do I need to use?

Lucia picked _____ times as much corn as Eli.

Together they picked _____ ears of corn. The number of ears Eli picked are divided equally among _____ bags.

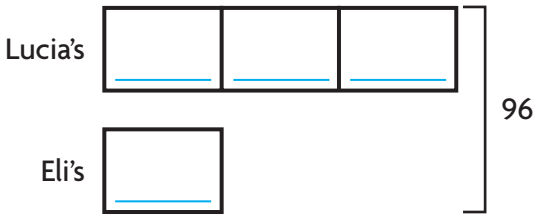
How will I use the information?

I will make a bar model for each step to visualize the information. Then I will _____ to find the number of ears Eli picked and _____ to find the number for each bag.

Solve the Problem

I can draw bar models to visualize the information given.

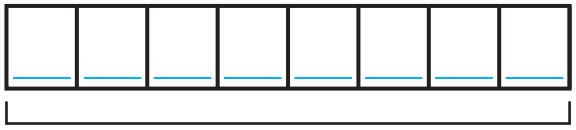
First, I will model and compare to find the number of ears of corn that Eli picked.



$96 \div 4 =$ _____

number of parts

Then I will model and divide to find how many ears of corn Eli will put in each bag.



1. How many ears of corn will Eli put in each bag? _____

2. How can you check your answers? _____

_____

Try Another Problem

There are 8 dinner rolls in a package. How many packages will be needed to feed 64 people if each person has 2 dinner rolls?

Read the Problem	Solve the Problem
What do I need to find?	
What information do I need to use?	
How will I use the information?	

3. How many packages of rolls will be needed? _____

4. How did drawing a bar model help you solve the problem?

_____

_____

_____

Math Talk

Mathematical Practices

Describe another method you could have used to solve the problem.

Name _____

Share and Show

MATH BOARD

1. A firehouse pantry has 52 cans of vegetables and 74 cans of soup. Each shelf holds 9 cans. What is the least number of shelves needed for all the cans?

   First, draw a bar model for the total number of cans.

   Next, add to find the total number of cans.

   Then, draw a bar model to show the number of shelves needed.

   Finally, divide to find the number of shelves needed.

So, _____ shelves are needed to hold all of the cans.

2. THINK SMARTER What if 18 cans fit on a shelf? What is the least number of shelves needed? Describe how your answer would be different.

3. Julio's dad bought 10 dozen potatoes. The potatoes were equally divided into 6 bags. How many potatoes are in each bag?

4. At the garden shop, each small tree costs $125 and each large tree costs $225. How much will 3 small trees and 1 large tree cost?

Unlock the Problem

- Use the Problem Solving MathBoard.
- Underline important facts.
- Choose a strategy you know.

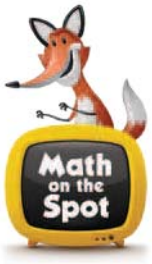
Math Talk — **Mathematical Practices**

Explain how you could check that your answer is correct.

WRITE Math
Show Your Work

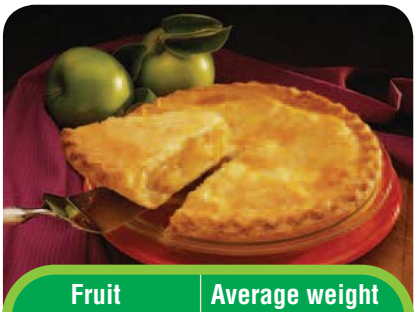
On Your Own

5. THINK SMARTER Ms. Johnson bought 6 bags of balloons. Each bag has 25 balloons. She fills all the balloons and puts 5 balloons in each bunch. How many bunches can she make?



6. THINK SMARTER An adult's dinner costs $8. A family of 2 adults and 2 children pays $26 for their dinners. How much does a child's dinner cost? Explain.

7. MATHEMATICAL PRACTICE 5 **Communicate** Use the table at the right. Maria bought 80 ounces of apples. She needs 10 apples to make a pie. How many apples will be left over? Explain.



Fruit	Average weight
Peach	6 ounces
Apple	5 ounces
Plum	2 ounces

8. GO DEEPER Taylor has 16 tacks. She buys 2 packages of 36 tacks each. How many garage sale posters can she put up if she uses 4 tacks for each poster?

Personal Math Trainer

9. THINK SMARTER + Ryan bought 8 dozen bandages for the track team first aid kit. The bandages were divided equally into 4 boxes.

How many bandages are in each box?

FOR MORE PRACTICE:
Standards Practice Book

Name _____

Chapter 4 Review/Test

1. There are 9 showings of a film about endangered species at the science museum. A total of 459 people saw the film. The same number of people were at each showing. About how many people were at each showing? Select the numbers the quotient is between.

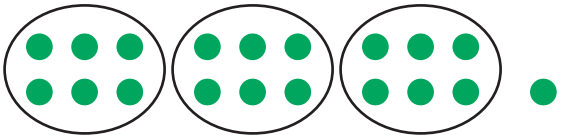
Ⓐ 40 Ⓑ 50 Ⓒ 60 Ⓓ 70 Ⓔ 80

2. Between which two numbers is the quotient of 87 ÷ 5? Write the numbers in the boxes.

5 10 15 20 25

The quotient is between ☐ and ☐.

3. Look at the model. What division does it show?



_____ ÷ _____ → _____ r _____

4. For 4a–4d, choose Yes or No to tell whether the division sentence has a remainder.

4a.	28 ÷ 4	○ Yes	○ No
4b.	35 ÷ 2	○ Yes	○ No
4c.	40 ÷ 9	○ Yes	○ No
4d.	45 ÷ 5	○ Yes	○ No

GO DIGITAL Assessment Options
Chapter Test

5. A park guide plans the swan boat rides for 40 people. Each boat can carry 6 people at a time. What is the best way to interpret the remainder in this situation so that everyone gets a ride?

_____

6. Nolan divides his 88 toy cars into boxes. Each box holds 9 cars. How many boxes does Nolan need to store all of his cars?

_____ boxes

7. A group of 140 tourists are going on a tour. The tour guide rents 15 vans. Each van holds 9 tourists.

Part A

Write a division problem that can be used to find the number of vans needed to carry the tourists. Then solve.

Part B

What does the remainder mean in the context of the problem?

Part C

How can you use your answer to determine if the tour guide rented enough vans? Explain.

8. Solve.

3,200 ÷ 8 = _____

Name _____

9. Which quotients are equal to 300? Mark all that apply.

Ⓐ 1,200 ÷ 4 Ⓒ 2,400 ÷ 8 Ⓔ 90 ÷ 3

Ⓑ 180 ÷ 9 Ⓓ 2,100 ÷ 7 Ⓕ 3,000 ÷ 3

10. Margo estimated 188 ÷ 5 to be between 30 and 40. Which basic facts did she use to help her estimate? Mark all that apply.

Ⓐ 10 ÷ 5 Ⓑ 15 ÷ 5 Ⓒ 20 ÷ 5 Ⓓ 25 ÷ 5

11. Mathias and his brother divided 2,029 marbles equally. About how many marbles did each of them receive?

12. For 12a–12d, choose Yes or No to show how to use the Distributive Property to break apart the dividend to find the quotient 132 ÷ 6.

12a.	(115 ÷ 6) + (17 ÷ 6)	○ Yes	○ No
12b.	(100 ÷ 6) + (32 ÷ 6)	○ Yes	○ No
12c.	(90 ÷ 6) + (42 ÷ 6)	○ Yes	○ No
12d.	(72 ÷ 6) + (60 ÷ 6)	○ Yes	○ No

13. There are 60 people waiting for a river raft ride. Each raft holds 15 people. Silvia used the work below to find the number of rafts needed. Explain how Silvia's work can be used to find the number of rafts needed.

$$\begin{array}{r} 15\overline{)60} \\ -15 \\ \hline 45 \\ -15 \\ \hline 30 \\ -15 \\ \hline 15 \\ -15 \\ \hline 0 \end{array}$$

14. A traveling circus brings along everything it needs for a show in big trucks.

Part A

The circus sets up chairs in rows with 9 seats in each row. How many rows will need to be set up if 513 people are expected to attend the show?

_____ rows

Part B

Can the rows be divided into a number of equal sections? Explain how you found your answer.

Part C

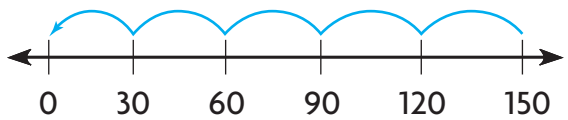
Circus horses eat about 250 pounds of horse food per week. About how many pounds of food does a circus horse eat each day? Explain.

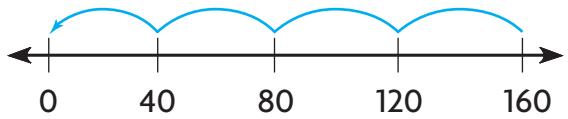
15. Hilda wants to save 825 digital photographs in an online album. Each folder of the album can save 6 photographs. She uses division to find out how may full folders she will have. In what place is the first digit of the quotient?

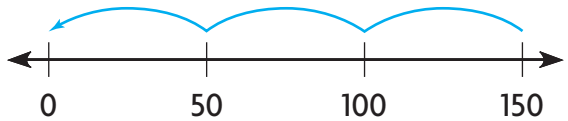
Name _____

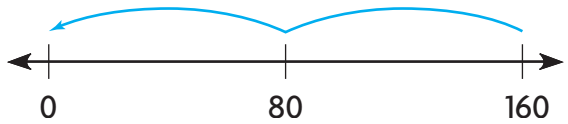
16. Which model matches each expression? Write the letter in the box next to the model.

(A) 160 ÷ 80 (B) 150 ÷ 30 (C) 160 ÷ 40 (D) 150 ÷ 50









17. Popcorn was donated for the school fair by 3 different popcorn vendors. They donated a total of 636 bags of popcorn. Each vendor donated the same number of bags. How many bags of popcorn did each vendor donate?

_____ bags

18. Use partial quotients. Fill in the blanks.

$8\overline{)832}$

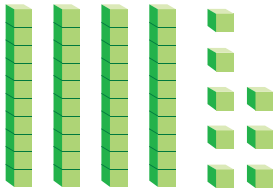
$-$ ☐ 100×8 ☐

☐

$-$ ☐ 4×8 ☐

☐

19. Zack needs to divide these base-ten blocks into 3 equal groups.



Draw or describe a model to show how many are in each group.

20. Jim needs to divide 750 coupon books equally among 9 stores. In which place is the first digit of the quotient? Choose the word that makes the sentence true.

The first digit of the quotient is in the

ones
tens
hundreds
thousands

place.

21. Ursula bought 9 dozen rolls of first aid tape for the health office. The rolls were divided equally into 4 boxes. How many rolls are in each box?

_____ rolls

22. There are 112 seats in the school auditorium. There are 7 seats in each row. There are 70 people seated, filling up full rows of seats. How many rows are empty?

_____ rows

Chapter 5

Factors, Multiples, and Patterns

Show What You Know

Check your understanding of important skills.

Name _____

Skip-Count

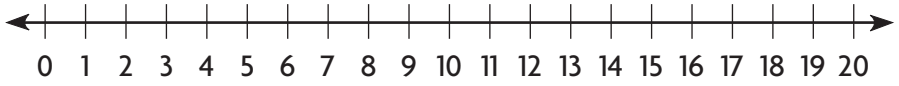
Skip-count to find the unknown numbers.

1. Skip count by 3s.

3 , _____ , _____ , _____

2. Skip count by 5s.

5 , _____ , _____ , _____



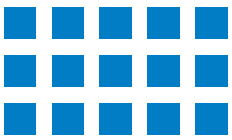
Arrays

Use the array to find the product.

3.

_____ rows of _____ = _____

4.



_____ rows of _____ = _____

Multiplication Facts

Find the product.

5. $4 \times 5 =$ _____

6. $9 \times 4 =$ _____

7. $6 \times 7 =$ _____

Math Detective

Recycled plastic helps keep people warm. Some factories use recycled plastic, combined with other fabrics, to make winter jackets. A warehouse has 46 truckloads of recycled plastic. They use 8 truckloads each day. When there are fewer than 16 truckloads, more needs to be ordered. Be a Math Detective. Figure out how many truckloads will be left after 2 days. After 3 days. When will more need to be ordered?

Personal Math Trainer
Online Assessment and Intervention

Vocabulary Builder

Visualize It

Complete the flow map by using the words with a ✓.

Multiplying

What is it?	What are some examples?
_____ →	$2 \times 4 = 8$
_____ →	$2 \times 4 = 8$
_____ →	

Review Words
✓ array
multiple
✓ product

Preview Words
common factor
common multiple
composite number
divisible
✓ factor
pattern
prime number
term

Understand Vocabulary

Complete the sentences by using preview words.

1. A number that is a factor of two or more numbers is a _____.
2. A number that is a multiple of two or more numbers is a _____.
3. A number that has exactly two factors, 1 and itself, is a _____.
4. A number that has more than two factors is a _____.
5. A number is _____ by another number if the quotient is a counting number and the remainder is 0.
6. An ordered set of numbers or objects is a _____.
7. Each number in a pattern is called a _____.

Name _____

Model Factors

Essential Question How can you use models to find factors?

Operations and Algebraic Thinking—4.OA.4

MATHEMATICAL PRACTICES
MP.1, MP.4

Unlock the Problem

A **factor** is a number multiplied by another number to find a product. Every whole number greater than 1 has at least two factors, that number and 1.

$18 = 1 \times 18$ $\quad 7 = 7 \times 1$ $\quad 342 = 1 \times 342$

(1 and 18: factor, factor)

Many numbers can be broken into factors in different ways.

$16 = 1 \times 16$ $\quad 16 = 4 \times 4$ $\quad 16 = 2 \times 8$

Math Idea

When you are asked to find factors of a whole number, only list factors that are also whole numbers.

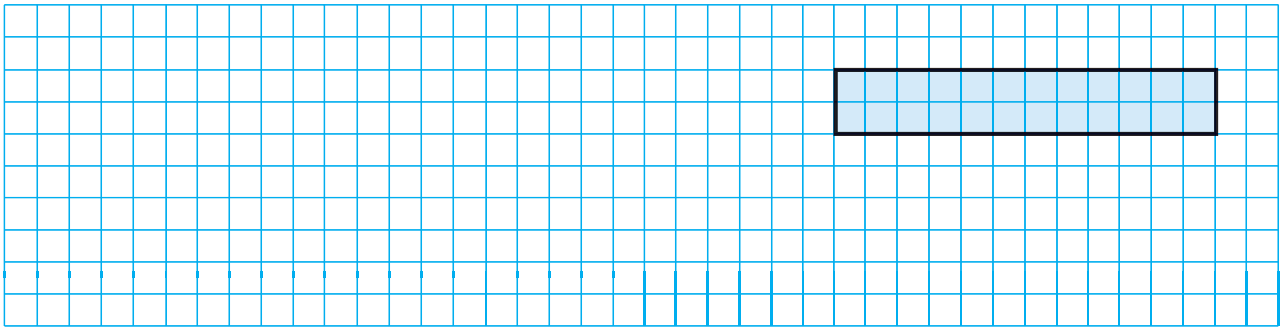
Activity Model and record the factors of 24.

Materials ■ square tiles

Use all 24 tiles to make as many different arrays as you can. Record the arrays in the grid, and write the factors modeled.

$2 \times 12 = 24$

Factors: _____, _____



_____ × _____ = 24 $\quad$ _____ × _____ = 24 $\quad$ _____ × _____ = 24

Factors: _____, _____ $\quad$ Factors: _____, _____ $\quad$ Factors: _____, _____

The factors of 24, from least to greatest, are

_____, _____, _____, _____, _____, _____, _____, and _____.

Two factors that make a product are sometimes called a factor pair. How many factor pairs does 24 have? Explain.

_____

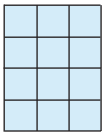
Math Talk **Mathematical Practices**

Can you arrange the tiles in each array another way and show the same factors? **Explain**.

Share and Show

MATH BOARD

1. Use the arrays to name the factors of 12.



_____ × _____ = 12 _____ × _____ = 12 _____ × _____ = 12

The factors of 12 are 1, _____, 3, _____, 6, and _____.

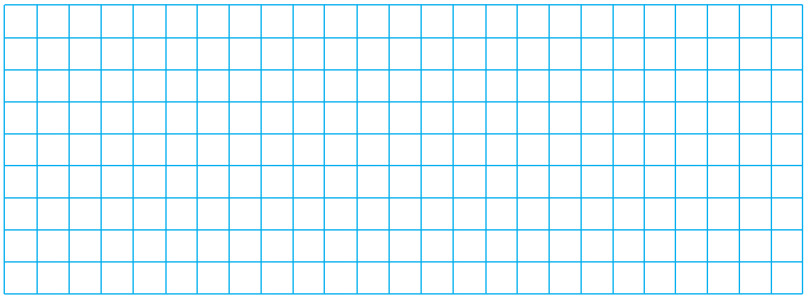
Math Talk

Mathematical Practices

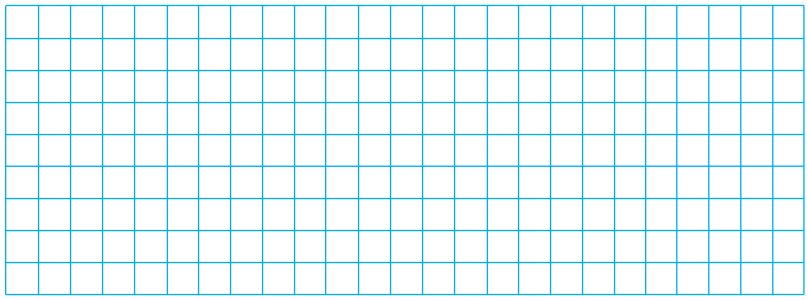
Explain how the numbers 3 and 12 are related. Use the word *factor* in your explanation.

Use tiles to find all the factors of the product. Record the arrays and write the factors shown.

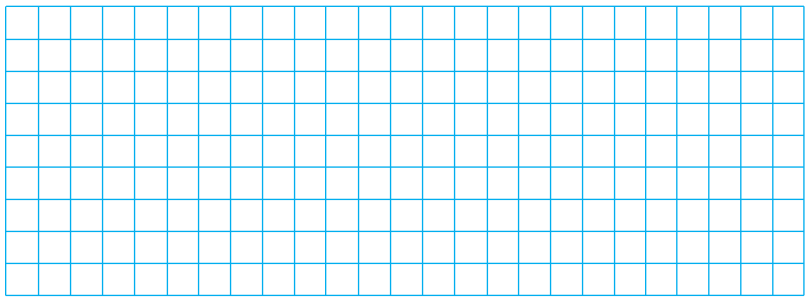
2. 5: _____



3. 20: _____



4. 25: _____



Name _____

On Your Own

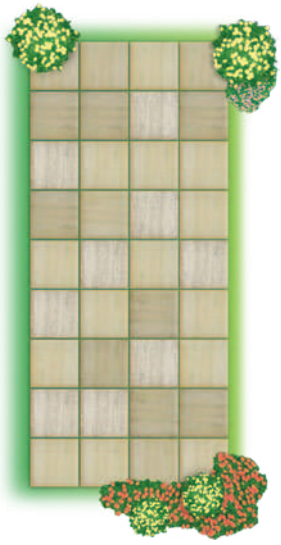
Practice: Copy and Solve **Use tiles to find all the factors of the product. Record the arrays on grid paper and write the factors shown.**

5. 9 **6.** 21 **7.** 17 **8.** 18

Problem Solving • Applications

Use the diagram for 9–10.

Pablo's Tiles



9. MATHEMATICAL PRACTICE 6 Pablo is using 36 tiles to make a patio. Can he arrange the tiles in another way and show the same factors? Draw a quick picture and **explain**.

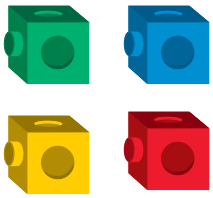
10. THINK SMARTER How many different rectangular arrays can Pablo make with all 36 tiles, so none of the arrays show the same factors?

11. If 6 is a factor of a number, what other numbers must be factors of the number?

12. Jean spent $16 on new T-shirts. If each shirt cost the same whole-dollar amount, how many could she have bought?

Unlock the Problem Real World

13. GO DEEPER Carmen has 18 connecting cubes. She wants to model a house shaped like a rectangle. If the model has a height of one connecting cube, how many different ways can Carmen model the house using all 18 connecting cubes?



a. What do you need to know? _____

_____

b. How is finding the number of ways to model a rectangular house related to finding factor pairs? _____

_____

_____

c. Why is finding the factor pairs only the first step in solving the problem? _____

_____

_____

d. Show the steps you used to solve the problem.

_____

_____

_____

_____

e. Complete the sentences. Factor pairs for 18 are _____

_____

There are _____ different ways Carmen can arrange the cubes to model the house.

14. THINK SMARTER Sarah was organizing vocabulary words using index cards. She arranged 40 index cards in the shape of a rectangle on a poster. For 14a–14e, choose Yes or No to tell whether a possible arrangement of cards is shown.

14a.	4 rows of 10 cards	○ Yes	○ No	14d.	40 rows of 1 card	○ Yes	○ No
14b.	6 rows of 8 cards	○ Yes	○ No	14e.	35 rows of 5 cards	○ Yes	○ No
14c.	20 rows of 2 cards	○ Yes	○ No				

FOR MORE PRACTICE: Standards Practice Book

Name _____

Factors and Divisibility

Essential Question How can you tell whether one number is a factor of another number?

Operations and Algebraic Thinking—4.OA.4

MATHEMATICAL PRACTICES
MP.2, MP.4, MP.6

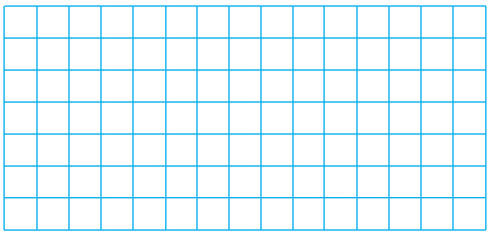
Unlock the Problem Real World

Students in Carlo's art class painted 32 square tiles for a mosaic. They will arrange the tiles to make a rectangle. Can the rectangle have 32 tiles arranged into 3 equal rows, without gaps or overlaps?

▲ Mosaics are decorative patterns made with pieces of glass or other materials.

One Way Draw a model.

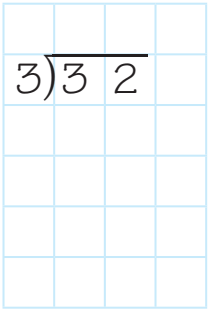
Think: Try to arrange the tiles into 3 equal rows to make a rectangle.



A rectangle _____ have 32 tiles arranged into 3 equal rows.

Another Way Use division.

If 3 is a factor of 32, then the unknown factor in 3 × ▢ = 32 is a whole number.



Think: Divide to see whether the unknown factor is a whole number.

The unknown factor in 3 × ▢ = 32 _____ a whole number.

So, a rectangle _____ have 32 tiles arranged in 3 rows.

Math Idea

A factor of a number divides the number evenly. This means the quotient is a whole number and the remainder is 0.

Math Talk

Mathematical Practices

Explain how the model relates to the quotient and remainder for 32 ÷ 3.

- Explain how you can tell if 4 is a factor of 30.

_____

_____

Divisibility Rules A number is **divisible** by another number if the quotient is a counting number and the remainder is 0.

Some numbers have a divisibility rule. You can use a divisibility rule to tell whether one number is a factor of another.

Is 6 a factor of 72?

Think: If 72 is divisible by 6, then 6 is a factor of 72.

Test for divisibility by 6:

Is 72 even? _____

What is the sum of the digits of 72?

_____ + _____ = _____

Is the sum of the digits divisible by 3?

_____

72 is divisible by _____.

So, 6 is a factor of 72.

Divisibility Rules

Number	Divisibility Rule
2	The number is even.
3	The sum of the digits is divisible by 3.
5	The last digit is 0 or 5.
6	The number is even and divisible by 3.
9	The sum of the digits is divisible by 9.

Try This! **List all the factor pairs for 72 in the table.**

Complete the table.

Factors of 72	
1 × 72 = 72	1, 72
_____ × _____ = _____	_____, _____
_____ × _____ = _____	_____, _____
_____ × _____ = _____	_____, _____
_____ × _____ = _____	_____, _____
_____ × _____ = _____	_____, _____

Show your work.

Math Talk **Mathematical Practices**

How are divisibility and factors related? **Explain**.

- How did you check if 7 is a factor of 72? Explain.

_____

_____

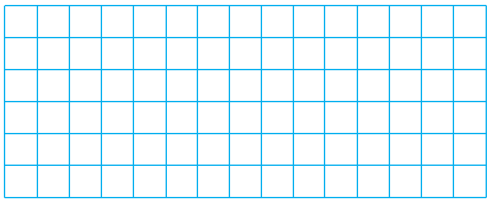
Name _____

Share and Show

MATH BOARD

1. Is 4 a factor of 28? Draw a model to help.

Think: Can you make a rectangle with 28 squares in 4 equal rows?



4 _____ a factor of 28.

Math Talk **Mathematical Practices**

If 3 is a factor of a number, is 6 always a factor of the number? **Explain**.

Is 5 a factor of the number? Write *yes* or *no*.

2. 27 _____

3. 30 _____

4. 36 _____

5. 53 _____

On Your Own

Is 9 a factor of the number? Write *yes* or *no*.

6. 54 _____

7. 63 _____

8. 67 _____

9. 93 _____

List all the factor pairs in the table.

10.

Factors of 24	
____ × ____ = ____	____, ____
____ × ____ = ____	____, ____
____ × ____ = ____	____, ____
____ × ____ = ____	____, ____

11.

Factors of 39	
____ × ____ = ____	____, ____
____ × ____ = ____	____, ____

Practice: Copy and Solve **List all the factor pairs for the number. Make a table to help.**

12. 56

13. 64

Problem Solving • Applications

Use the table to solve 14–15.

Stamps Sets	
Country	**Number of stamps**
Germany	90
Sweden	78
Japan	63
Canada	25

14. THINK SMARTER Dirk bought a set of stamps. The number of stamps in the set he bought is divisible by 2, 3, 5, 6, and 9. Which set is it?

15. GO DEEPER Geri wants to put 6 stamps on some pages in her stamp book and 9 stamps on other pages. Explain how she could do this with the stamp set for Sweden.

WRITE Math
Show Your Work

16. MATHEMATICAL PRACTICE 3 **Use Counterexamples** George said if 2 and 4 are factors of a number, then 8 is a factor of the number. Is he correct? Explain.

17. THINK SMARTER Classify the numbers. Some numbers may belong in more than one box.

27 45 54 72 81 84

Divisible by 5 and 9	Divisible by 3 and 9	Divisible by 2 and 6

FOR MORE PRACTICE:
Standards Practice Book

Name _____

Problem Solving • Common Factors

Essential Question How can you use the *make a list* strategy to solve problems with common factors?

Operations and Algebraic Thinking—4.OA.4

MATHEMATICAL PRACTICES
MP.1, MP.5

Unlock the Problem

Real World

Chuck has a coin collection with 30 pennies, 24 quarters, and 36 nickels. He wants to arrange the coins into rows. Each row will have the same number of coins, and all the coins in a row will be the same. How many coins can he put in each row?

The information in the graphic organizer below will help you solve the problem.

Read the Problem

What do I need to find?

I need to find _____ that can go in each row so that each row has

_____

_____.

What information do I need to use?

Chuck has _____

_____. Each row has _____

_____

_____.

How will I use the information?

I can make a list to find all the factors of

_____. Then I can use the list to find the common factors. A **common factor** is a factor of two or more numbers.

Solve the Problem

I can list all the factors of each number. Then I can circle the factors that are common to all three numbers.

Factors of: 30 24 36

The common factors are _____.

So, Chuck can put _____, _____, _____, or _____ coins in each row.

Try Another Problem

Ryan collects animal figures. He has 45 elephants, 36 zebras, and 18 tigers. He will arrange the figures into rows. Each row will have the same number of figures, and all the figures in a row will be the same. How many figures can be in each row?

Use the graphic organizer below to help you solve the problem.

Read the Problem	Solve the Problem
What do I need to find?	
What information do I need to use?	
How will I use the information?	

So, Ryan can put _____, _____, or _____ figures in each row.

Math Talk **Mathematical Practices**

How did making a list help you solve the problem?

Name _____

Share and Show

1. Lucy has 40 bean plants, 32 tomato plants, and 16 pepper plants. She wants to put the plants in rows with only one type of plant in each row. All rows will have the same number of plants. How many plants can Lucy put in each row?

First, read the problem and think about what you need to find. What information will you use? How will you use the information?

_____

_____

Next, make a list. Find the factors for each number in the problem.

_____

_____

_____

Finally, use the list. Circle the common factors.

So, Lucy can put _____, _____, _____, or _____ plants in each row.

2. What if Lucy has 64 bean plants instead of 40 bean plants? How many plants can Lucy put in each row?

_____

3. THINK SMARTER One common factor of two numbers is 40. Another common factor is 10. If both numbers are less than 100, what are the two numbers?

_____

4. The sum of two numbers is 136. One number is 51. What is the other number? What are the common factors of these two numbers?

_____

Unlock the Problem

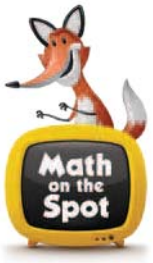
- Use the Problem-Solving MathBoard.
- Underline the important facts.

WRITE Math
Show Your Work

On Your Own

5. MATHEMATICAL PRACTICE 1 **Analyze** A number is called a *perfect number* if it equals the sum of all of its factors except itself. For instance, 6 is a perfect number because its factors are 1, 2, 3, and 6, and $1 + 2 + 3 = 6$. What is the next greater perfect number?

6. THINK SMARTER Sona knits 10 squares a day for 7 days. Can she sew together the squares to make 5 equal-sized blankets? Explain.



7. Julianne earned $296 working at a grocery store last week. She earns $8 per hour. How many hours did Julianne work?

WRITE Math
Show Your Work

8. GO DEEPER There are 266 students watching a play in the auditorium. There are 10 rows with 20 students in each row and 5 rows with 8 students in each row. How many students are sitting in each of the 2 remaining rows if each of those rows has an equal number of students?

Personal Math Trainer

9. THINK SMARTER + Ben is planting a garden with 36 zinnias, 18 marigolds, and 24 petunias. Each row will have only one type of plant. Ben says he can put 9 plants in each row. He listed the common factors of 36, 18 and 24 below to support his reasoning.

36: 1, 2, 3, 4, 6, 9, 12, 18, 36
18: 1, 2, 3, 6, 8, 9, 18
24: 1, 2, 3, 4, 6, 8, 9, 12, 24

Is he correct? Explain your answer. If his reasoning is incorrect, explain how he should have found the answer.

FOR MORE PRACTICE:
Standards Practice Book

Name _____

Mid-Chapter Checkpoint

Vocabulary

Choose the best term from the box.

Vocabulary
common factor
divisible
factor

1. A number that is multiplied by another number to find a product is called a _____. (p. 201)

2. A number is _____ by another number if the quotient is a counting number and the remainder is zero. (p. 206)

Concepts and Skills

List all the factors from least to greatest. (4.OA.4)

3. 8

_____

4. 14

_____

Is 6 a factor of the number? Write *yes* or *no*. (4.OA.4)

5. 81 _____

6. 45 _____

7. 42 _____

8. 56 _____

List all the factor pairs in the table. (4.OA.4)

9.

Factors of 64	
____ × ____ = ____	____, ____
____ × ____ = ____	____, ____
____ × ____ = ____	____, ____
____ × ____ = ____	____, ____

10.

Factors of 44	
____ × ____ = ____	____, ____
____ × ____ = ____	____, ____
____ × ____ = ____	____, ____

List the common factors of the numbers. (4.OA.4)

11. 9 and 18

_____

12. 20 and 50

_____

13. Sean places 28 tomato plants in rows. All rows contain the same number of plants. There are between 5 and 12 plants in each row. How many plants are in each row? (4.OA.4)

14. Ella bought some key chains and spent a total of $24. Each key chain cost the same whole-dollar amount. She bought between 7 and 11 key chains. How many key chains did Ella buy? (4.OA.4)

15. Sandy has 16 roses, 8 daisies, and 32 tulips. She wants to arrange all the flowers in bouquets. Each bouquet has the same number of flowers and the same type of flower. What is the greatest number of flowers that could be in a bouquet? (4.OA.4)

16. Amir arranged 9 photos on a bulletin board. He put the photos in rows. Each row contains the same number of photos. How many photos could be in each row? (4.OA.4)

Name _____

Factors and Multiples

Essential Question How are factors and multiples related?

Operations and Algebraic Thinking—4.OA.4

MATHEMATICAL PRACTICES
MP.6, MP.7

Unlock the Problem

Real World

Toy animals are sold in sets of 3, 5, 10, and 12. Mason wants to make a display with 3 animals in each row. Which sets could he buy, if he wants to display all of the animals?

- How many animals will be in each row?

_____

- How many animals are sold in each set?

_____

The product of two numbers is a multiple of each number. Factors and multiples are related.

$$3 \times 4 = 12$$

3 and 4: factor, factor; 12: multiple of 3, multiple of 4

One Way Find factors.

Tell whether 3 is a factor of each number.

Think: If a number is divisible by 3, then 3 is a factor of the number.

Is 3 a factor of 3? _____

Is 3 a factor of 5? _____

Is 3 a factor of 10? _____

Is 3 a factor of 12? _____

3 is a factor of _____ and _____.

Another Way Find multiples.

Multiply and make a list. 3, _____, _____, _____, _____, ...

1×3 2×3 3×3 4×3 5×3

_____ and _____ are multiples of 3.

So, Mason could buy sets of _____ and _____ toy animals.

Math Talk **Mathematical Practices**

Explain how you can use what you know about factors to determine whether one number is a multiple of another number.

Common Multiples A **common multiple** is a multiple of two or more numbers.

Example Find common multiples.

Tony works every 3 days and Amanda works every 5 days. If Tony works June 3 and Amanda works June 5, on what days in June will they work together?

Circle multiples of 3. Draw a box around multiples of 5.

June

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

Think: The common multiples have both a circle and a box.

The common multiples are _____ and _____.

So, Tony and Amanda will work together on June _____ and June _____.

Share and Show

MATH BOARD

1. Multiply to list the next five multiples of 4.

4, _____, _____, _____, _____, _____

1×4

Math Talk Mathematical Practices

How are the numbers 5 and 15 related? **Explain.**

Is the number a factor of 6? Write *yes* or *no*.

2. 3 _____ **3.** 6 _____ **4.** 16 _____ **5.** 18 _____

Is the number a multiple of 6? Write *yes* or *no*.

6. 3 _____ **7.** 6 _____ **8.** 16 _____ **9.** 18 _____

Name _____

On Your Own

Is the number a multiple of 3? Write *yes* or *no*.

10. 4 _____

11. 8 _____

12. 24 _____

13. 38 _____

14. List the next nine multiples of each number. Find the common multiples.

Multiples of 2: 2, _____

Multiples of 8: 8, _____

Common multiples: _____

MATHEMATICAL PRACTICE 8 **Generalize Algebra Find the unknown number.**

15. 12, 24, 36, _____

16. 25, 50, 75, 100, _____

Tell whether 20 is a factor or multiple of the number. Write *factor, multiple,* or *neither*.

17. 10 _____

18. 20 _____

19. 30 _____

THINK SMARTER **Write *true* or *false*. Explain.**

20. Every whole number is a multiple of 1.

_____

_____

21. Every whole number is a factor of 1.

_____

_____

22. THINK SMARTER Julio wears a blue shirt every 3 days. Larry wears a blue shirt every 4 days. On April 12, both Julio and Larry wore a blue shirt. What is the next date that they will both wear a blue shirt?

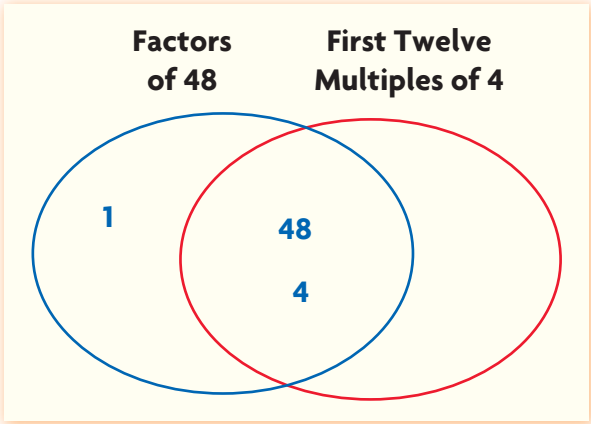
_____

April

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

Problem Solving • Applications

Complete the Venn diagram. Then use it to solve 23–25.



23. What multiples of 4 are not factors of 48?

24. What factors of 48 are multiples of 4?

25. GO DEEPER **Pose a Problem** Look back at Problem 24. Write a similar problem by changing the numbers. Then solve.

WRITE Math
Show Your Work

26. Kia paid $10 for two charms. The price of each charm was a multiple of $2. What are the possible prices of the charms?

27. MATHEMATICAL PRACTICE 7 **Look for Structure** The answer is 9, 18, 27, 36, 45. What is the question?

28. WRITE Math How do you know whether a number is a multiple of another number?

29. THINK SMARTER For numbers 29a–29e, select True or False for each statement.

29a.	The number 45 is a multiple of 9.	○ True	○ False
29b.	The number 4 is a multiple of 16.	○ True	○ False
29c.	The number 28 is a multiple of 4.	○ True	○ False
29d.	The number 4 is a factor of 28.	○ True	○ False
29e.	The number 32 is a factor of 8.	○ True	○ False

FOR MORE PRACTICE: Standards Practice Book

Name _____

Prime and Composite Numbers

Essential Question How can you tell whether a number is prime or composite?

Operations and Algebraic Thinking—4.OA.4

MATHEMATICAL PRACTICES
MP.4, MP.6, MP.7

Unlock the Problem

Real World

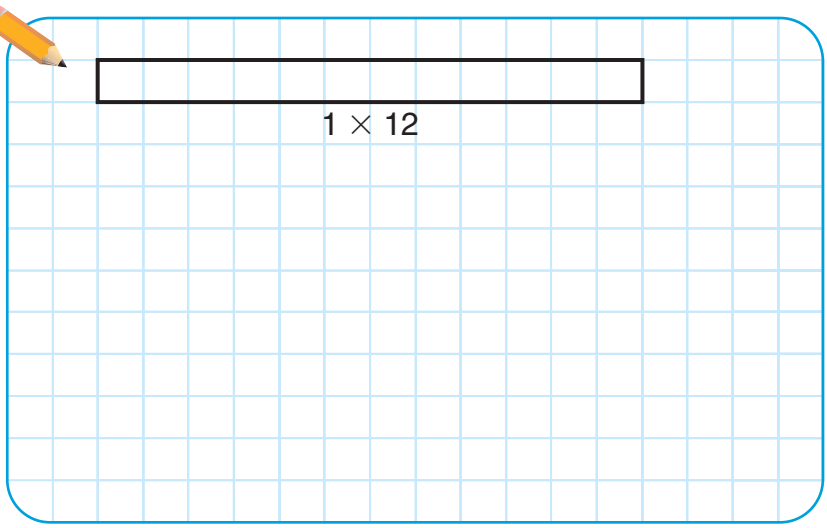
Students are arranging square tables to make one larger, rectangular table. The students want to have several ways to arrange the tables. Should they use 12 or 13 tables?

- What are the factors of 12?

_____

Use a grid to show all the possible arrangements of 12 and 13 tables.

Draw all of the possible arrangements of 12 tables and 13 tables. Label each drawing with the factors modeled.



ERROR Alert

The same factors in a different order should be counted only once. For example, 3 × 4 and 4 × 3 are the same factor pair.

So, there are more ways to arrange _____ tables.

Math Talk

Mathematical Practices

Explain how knowing whether 12 and 13 are prime or composite could have helped you solve the problem above.

- A **prime number** is a whole number greater than 1 that has exactly two factors, 1 and itself.
- A **composite number** is a whole number greater than 1 that has more than two factors.

Factors of 12: _____ , _____ , _____ , _____ , _____ , _____

Factors of 13: _____ , _____

12 is a _____ number, and 13 is a _____ number.

Divisibility You can use divisibility rules to help tell whether a number is prime or composite. If a number is divisible by any number other than 1 and itself, then the number is composite.

Tell whether 51 is *prime* or *composite*.

Is 51 divisible by 2?

_____

Is 51 divisible by 3?

_____

Think: 51 is divisible by a number other than 1 and 51.
51 has more than two factors.

So, 51 is _____.

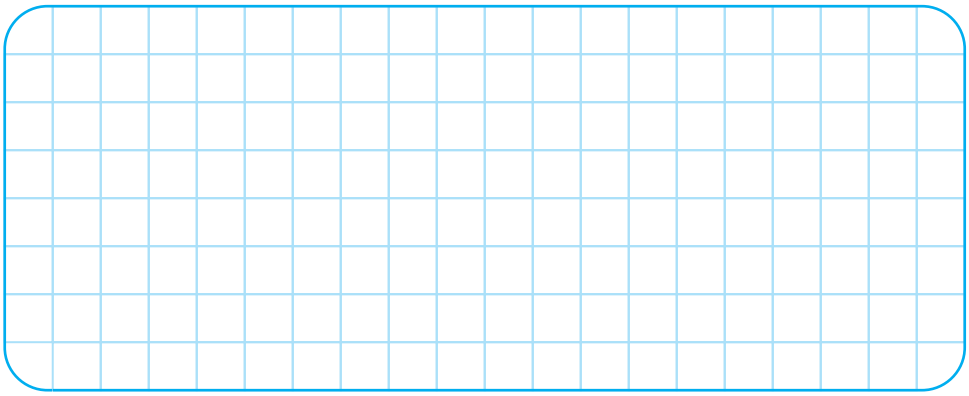
Math Idea

The number 1 is neither prime nor composite, since it has only one factor: 1.

Share and Show

MATH BOARD

1. Use the grid to model the factors of 18. Tell whether 18 is *prime* or *composite*.



Factors of 18: _____, _____, _____, _____, _____, _____

Think: 18 has more than two factors.

So, 18 is _____.

Math Talk **Mathematical Practices**

Is the product of two prime numbers prime or composite? **Explain.**

Tell whether the number is *prime* or *composite*.

2. 11

Think: Does 11 have other factors besides 1 and itself?

_____

3. 73

_____

4. 69

_____

5. 42

_____

Name _____

On Your Own

Tell whether the number is *prime* or *composite*.

6. 18 _____

7. 49 _____

8. 29 _____

9. 64 _____

10. 33 _____

11. 89 _____

12. 52 _____

13. 76 _____

Write *true* or *false* for each statement. Explain or give an example to support your answer.

14. Only odd numbers are prime numbers.

_____

_____

15. THINK SMARTER A composite number cannot have three factors.

_____

_____

Problem Solving • Applications

Real World

16. GO DEEPER I am a number between 60 and 100. My ones digit is two less than my tens digit. I am a prime number. What number am I?

_____

_____

17. Name a 2-digit odd number that is prime. Name a 2-digit odd number that is composite.

_____

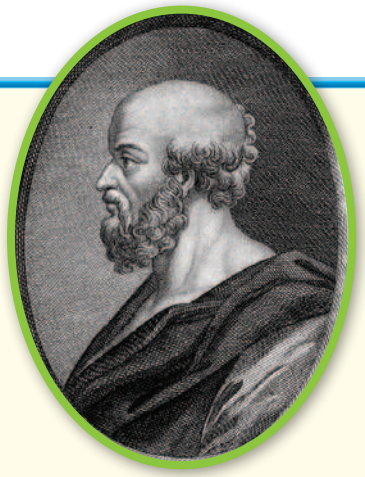
_____

18. THINK SMARTER Choose the words that correctly complete the sentence.

The number 9 is [prime / composite] because it has [exactly / more than] two factors.

Connect to Social Studies

The Sieve of Eratosthenes



Eratosthenes was a Greek mathematician who lived more than 2,200 years ago. He invented a method of finding prime numbers, which is now called the Sieve of Eratosthenes.

19. Follow the steps below to circle all prime numbers less than 100. Then list the prime numbers.

STEP 1

Cross out 1, since 1 is not prime

STEP 2

Circle 2, since it is prime. Cross out all other multiples of 2.

STEP 3

Circle the next number that is not crossed out. This number is prime. Cross out all the multiples of this number.

STEP 4

Repeat Step 3 until every number is either circled or crossed out.

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

So, the prime numbers less than 100 are

_____

_____

_____

_____

_____

_____

_____

20. MATHEMATICAL PRACTICE 6 **Explain** why the multiples of any number other than 1 are not prime numbers.

_____

FOR MORE PRACTICE: Standards Practice Book

Name _____

Number Patterns

Essential Question How can you make and describe patterns?

Operations and Algebraic Thinking—4.OA.5

MATHEMATICAL PRACTICES
MP.1, MP.4, MP.5, MP.7

Unlock the Problem

Real World

Daryl is making a pattern for a quilt. The pattern shows 40 squares. Every fourth square is blue. How many blue squares are in the pattern?

- Underline what you are asked to find.
- Circle what you need to use.

A **pattern** is an ordered set of numbers or objects. Each number or object in the pattern is called a **term**.

Activity Find a pattern.

Materials ■ color pencils

Shade the squares that are blue.

	1	2	3	4	5	6	7	8	9	10	
	11	12	13	14	15	16	17	18	19	20	
	21	22	23	24	25	26	27	28	29	30	
	31	32	33	34	35	36	37	38	39	40	

Math Talk Mathematical Practices

Describe another number pattern in Daryl's quilt.

Which squares are blue? _____

So, there are _____ blue squares in the pattern.

1. What patterns do you see in the arrangement of the blue squares?

_____

_____

2. What patterns do you see in the numbers of the blue squares?

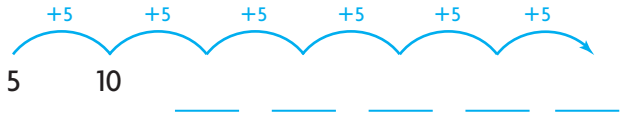
_____

_____

Example Find and describe a pattern.

The rule for the pattern is *add* 5. The first term in the pattern is 5.

A **Use the rule to write the numbers in the pattern.**



5, 10, _____, _____, _____, _____, _____, _____, _____, …

B **Describe other patterns in the numbers.**

What do you notice about the digits in the ones place?

_____

_____

Describe the pattern using the words *odd* and *even*.

_____

_____

Describe the pattern using the word *multiples*.

_____

_____

Try This! Find and describe a pattern.

The rule for the pattern is *add* 3, *subtract* 1. The first term in the pattern is 6.

Describe another pattern in the numbers.

_____

_____

_____

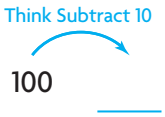
Name _____

Share and Show

MATH BOARD

Use the rule to write the numbers in the pattern.

1. Rule: Subtract 10. First term: 100



100, _____, _____, _____, _____, …

Use the rule to write the numbers in the pattern. Describe another pattern in the numbers.

2. Rule: Multiply by 2. First term: 4

4, _____, _____, _____, _____, …

_____

3. Rule: Skip-count by 6. First term: 12

12, _____, _____, _____, _____, …

_____

On Your Own

Use the rule to write the first twelve numbers in the pattern. Describe another pattern in the numbers.

4. Rule: Add 7. First term: 3

_____

_____

5. Rule: Add 2, add 1. First term: 12

_____

_____

6. MATHEMATICAL PRACTICE 5 **Use Patterns** Marcie likes to collect stickers, but she also likes to give them away. Currently, Marcie has 87 stickers in her collection. If Marcie collects 5 new stickers each week and gives away 3 stickers each week, how many stickers will Marcie have in her collection after 5 weeks?

_____

Math Talk — **Mathematical Practices**

Explain how the first term in a pattern helps you find the next term.

Problem Solving • Applications

7. THINK SMARTER John is saving for his trip to see the Alamo. He started With $24 in his savings account. Every week he earns $15 for baby sitting. Out of that, he spends $8 and saves the rest. John uses the rule *add 7* to find out how much money he has at the end of each week. What are the first 8 numbers in the pattern?

_____

Personal Math Trainer

8. THINK SMARTER + Draw a check under the column that describes the number.

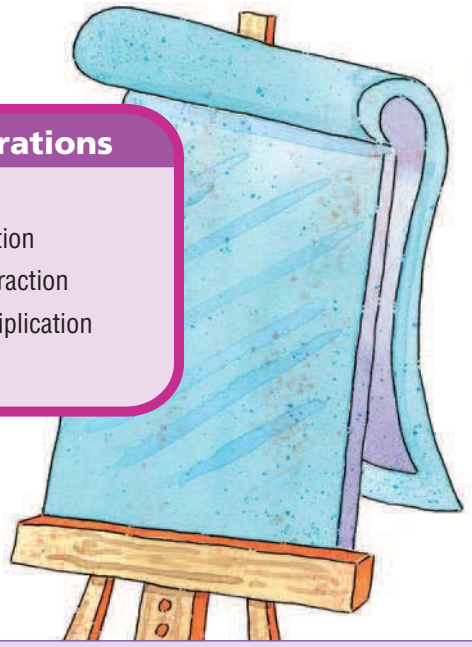
	Prime	Composite
81		
29		
31		
62		

Pose a Problem

9. GO DEEPER An activity at the Math Fair shows two charts.

Numbers
2
3
5
6
10

Operations
addition
subtraction
multiplication



Use at least two of the numbers and an operation from the charts to write a pattern problem. Include the first five terms of your pattern in the solution to your problem.

Pose a problem.	Solve your problem.

- Describe other patterns in the terms you wrote.

_____

FOR MORE PRACTICE: Standards Practice Book

Name _____

Chapter 5 Review/Test

1. List all the factors of the number.

14: _____

2. Select the numbers that have a factor of 5. Mark all that apply.

(A) 15

(B) 3

(C) 45

(D) 5

(E) 50

(F) 31

3. Jackson was making a poster for his room. He arranged 50 trading cards in the shape of a rectangle on the poster. For 3a–3e, choose Yes or No to tell whether a possible arrangement of cards is shown.

3a.	5 rows of 10 cards	○ Yes	○ No
3b.	7 rows of 8 cards	○ Yes	○ No
3c.	25 rows of 2 cards	○ Yes	○ No
3d.	50 rows of 1 card	○ Yes	○ No
3e.	45 rows of 5 cards	○ Yes	○ No

4. List all the factor pairs in the table.

Factors of 48	
_____ × _____ = _____	_____, _____
_____ × _____ = _____	_____, _____
_____ × _____ = _____	_____, _____
_____ × _____ = _____	_____, _____
_____ × _____ = _____	_____, _____

GO DIGITAL Assessment Options
Chapter Test

5. Classify the numbers. Some numbers may belong in more than one box.

54	72	84	90	96

Divisible by 5 and 9	Divisible by 6 and 9	Divisible by 2 and 6

6. James works in a flower shop. He will put 36 tulips in vases for a wedding. He must use the same number of tulips in each vase. The number of tulips in each vase must be greater than 1 and less than 10. How many tulips could be in each vase?

_____ tulips

7. Brady has a card collection with 64 basketball cards, 32 football cards, and 24 baseball cards. He wants to arrange the cards in equal piles, with only one type of card in each pile. How many cards can he put in each pile? Mark all that apply.

(A) 1 (B) 2 (C) 3 (D) 4 (E) 8 (F) 32

8. The Garden Club is designing a garden with 24 cosmos, 32 pansies, and 36 marigolds. Each row will have only one type of plant in each row. Ben says he can put 6 plants in each row. He listed the common factors of 24, 32, and 36 below to support his reasoning.

24: 1, 2, 3, 4, 6, 8, 12, 24

32: 1, 2, 4, 6, 9, 16, 32

36: 1, 2, 3, 4, 6, 8, 12, 18, 36

Is he correct? Explain your answer. If his reasoning is incorrect, explain how he should have found the answer.

Name _____

9. The number of pieces of art at a museum is shown in the table.

Art	
Type of Art	**Number of Pieces**
Oil paintings	30
Photographs	24
Sketches	21

Part A

The museum is hosting a show for July that features the oil paintings by different artists. All artists show the same number of paintings and each will show more than 1 painting. How many artists could be featured in the show?

_____ artists

Part B

The museum wants to display all the art pieces in rows. Each row has the same number of pieces and the same type of pieces. How many pieces could be in each row? Explain how you found your answer.

10. Charles was skip counting at the Math Club meeting. He started to count by 8s. He said 8, 16, 24, 32, 40, and 48. What number will he say next?

_____

11. Jill wrote the number 40. If her rule is *add 7*, what is the fourth number in Jill's pattern? How can you check your answer?

12. For numbers 12a–12e, select True or False for each statement.

12a.	The number 36 is a multiple of 9.	○ True	○ False
12b.	The number 3 is a multiple of 9.	○ True	○ False
12c.	The number 54 is a multiple of 9.	○ True	○ False
12d.	The number 3 is a factor of 9.	○ True	○ False
12e.	The number 27 is a factor of 9.	○ True	○ False

13. What multiple of 7 is also a factor of 7?

_____

14. Manny makes dinner using 1 box of pasta and 1 jar of sauce. If pasta is sold in packages of 6 boxes and sauce is sold in packages of 3 jars, what is the least number of dinners that Manny can make without any supplies leftover?

_____ dinners

15. Serena has several packages of raisins. Each package contains 3 boxes of raisins. Which could be the number of boxes of raisins Serena has? Mark all that apply.

Ⓐ 9 Ⓑ 18 Ⓒ 23 Ⓓ 27 Ⓔ 32

16. Choose the words that make the sentence true.

The number 7 is [prime / composite] because it has [exactly / more than] two factors.

Name _____

17. Winnie wrote the following riddle: I am a number between 60 and 100. My ones digit is two less than my tens digit. I am a prime number.

Part A

What number does Winnie's riddle describe? Explain.

Part B

Winnie's friend Marco guessed that her riddle was about the number 79. Why can't 79 be the answer to Winnie's riddle? Explain.

18. Classify the numbers as prime or composite.

Prime	Composite

37 65 71 82

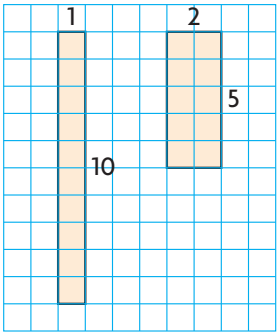
19. Erica knits 18 squares on Monday. She knits 7 more squares each day from Tuesday through Thursday. How many squares does Erica knit on Friday?

_____ squares

20. Use the rule to write the first five terms of the pattern.

Rule: Add 10, subtract 5 First term: 11

21. Elina had 10 tiles to arrange in a rectangular design. She drew a model of the rectangles she could make with the ten tiles.



Part A

How does Elina's drawing show that the number 10 is a composite number?

Part B

Suppose Elina used 15 tiles to make the rectangular design. How many different rectangles could she make with the 15 tiles? Write a list or draw a picture to show the number and dimensions of the rectangles she could make.

Part C

Elina's friend Luke said that he could make more rectangles with 24 tiles than with Elina's 10 tiles. Do you agree with Luke? Explain.