

## Fifth Grade Math: Superak and Robertson

Please complete the following lessons from your Performance Coach math book and bring them back to school when we return. You can print them or answer the questions on a piece of paper. Practice multiplication facts 10-15 minutes per day.

Lesson 3: Relating Numerical Expressions

Lesson 6: Read and Write Decimals

Lesson 8: Rounding Decimals

Lesson 10: Dividing Whole Numbers

Lesson 11: Adding and Subtracting Decimals

Lesson 12: Multiplying Decimals

Lesson 13: Dividing Decimals

You can use the following links for math videos.

Khan Academy <https://www.khanacademy.org/>

Math Antics <https://mathantics.com/>

Math Fox <https://www.mathfox.com/5th-grade-videos/>

Songs

<https://www.youtube.com/playlist?list=PLWphMREEQDriAj3ctbUKHz4DIKf3fGjxk>

You can also use study island lessons and videos for help.



# Relating Numerical Expressions

## 1 GETTING THE IDEA

A pattern is a **sequence** of numbers in an ordered list. Each number in the pattern is called a **term**. The first 5 terms of a pattern are shown below.

8, 16, 24, 32, 40, ...

You can generate numerical patterns using given rules, identify relationships of the **corresponding terms** between two patterns, and graph the patterns on a **coordinate plane**.

### Example 1

Write a rule for each pattern. Then identify the relationship between the two patterns.

4, 8, 12, 16, 20, ...

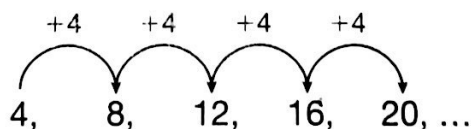
12, 24, 36, 48, 60, ...

**Strategy** Compare terms to identify rules and relationships in the patterns.

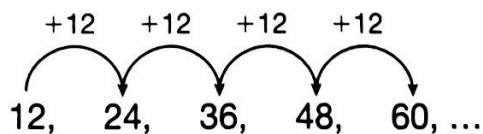
**Step 1** Identify a rule in each pattern.

Determine what you can do to the first term to get the second term.

Check that the rule applies to every term in the pattern.



You can add 4 to a term to get the next term. The rule is add 4.



You can add 12 to a term to get the next term. The rule is add 12.

**Step 2** Identify corresponding terms in each pattern.

You can list the sets of corresponding terms.

4	8	12	16	20	}	4, 12	8, 24	12, 36	16, 48	20, 60
12	24	36	48	60						

**Step 3** Compare corresponding terms.

Compare the terms in the second pattern to the corresponding terms in the first pattern.

12 and 4: 12 is 3 times 4 or 8 more than 4.

24 and 8: 24 is 3 times 8, but not 8 more than 8.

**Step 4** Check the remaining terms and identify a relationship.

Terms in the second pattern are 3 times the corresponding terms in the first pattern.

**Solution** The rule is add 4 for the first pattern and add 12 for the second pattern. The terms in the second pattern are 3 times the corresponding terms in the first pattern.

## Example 2

Use the given rules and the starting numbers to generate the first 5 terms in two different numerical patterns. Then identify the relationship between corresponding terms in the patterns.

First pattern: Add 2, starting with 2.

Second pattern: Add 8, starting with 8.

**Strategy** Use counting by multiples to generate the patterns. Then compare the corresponding terms.

**Step 1** Generate the numerical patterns.

Count by multiples of 2 for the first pattern: 2, 4, 6, 8, 10

Count by multiples of 8 for the second pattern: 8, 16, 24, 32, 40

**Step 2** List the corresponding terms in the two patterns.

2, 8   4, 16   6, 24   8, 32   10, 40

**Step 3**

Identify the relationship between corresponding terms.

In the first two corresponding terms, 8 is  $4 \times 2$  and 16 is  $4 \times 4$ .

Check each of the corresponding terms to make sure the relationship applies to all of the terms.

The terms in the second pattern are 4 times the corresponding terms in the first pattern.

**Solution** The two numerical patterns are 2, 4, 6, 8, 10 and 8, 16, 24, 32, 40. The terms in the second pattern are 4 times the corresponding terms in the first pattern.

An **ordered pair** is used to locate a point on the coordinate plane. The ordered pair (2, 5) is located 2 units to the right of the origin and 5 units up. You can make ordered pairs from corresponding terms of two patterns to graph the patterns.

**Example 3**

The table shows the cost of buying screen-print T-shirts in packs of three.

<b>Number of T-shirts</b>	3	6	9	12	15
<b>Cost (\$)</b>	15	30	45	60	75

Identify the relationship between the cost of the T-shirts and the number of T-shirts. Form ordered pairs for the relationship and then graph the relationship on a coordinate plane.

**Strategy** Use the numbers in the table to identify the relationship, write ordered pairs, and graph the ordered pairs.

**Step 1**

Identify the relationship between the cost of T-shirts and the number of T-shirts.

Identify a relationship between the corresponding terms for the first two terms in the pattern.

15 is 5 times 3 T-shirts. }  
 30 is 5 times 6 T-shirts. } The cost of T-shirts in dollars is  
 5 times the number of T-shirts.

Check that the remaining terms have the same relationship.

45 is 5 times 9 T-shirts.

60 is 5 times 12 T-shirts.

75 is 5 times 15 T-shirts.

**Step 2** Form ordered pairs.

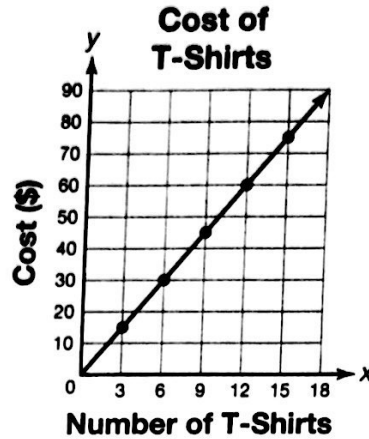
Write ordered pairs for the corresponding terms in the table:  
(number of T-shirts, cost).

The ordered pairs are (3, 15), (6, 30), (9, 45), (12, 60), (15, 75).

**Step 3** Graph the ordered pairs on the coordinate plane.

Plot a point for each of the ordered pairs.

Draw a line through the points.



**Solution** The relationship between the corresponding terms in the patterns is that the cost in dollars is 5 times the number of T-shirts. The ordered pairs are (3, 15), (6, 30), (9, 45), (12, 60), (15, 75). The graph is shown in Step 3.

## 2 COACHED EXAMPLE

The table shows the number of basil leaves and amount of tomato sauce used in a pasta recipe.

<b>Number of Basil Leaves</b>	4	8	12	16	20
<b>Tomato Sauce (in fl oz)</b>	8	16	24	32	40

Identify the relationship between the amount of tomato sauce and the number of basil leaves in the recipe. Form ordered pairs for the relationship, and graph the ordered pairs on the coordinate plane.

Identify a relationship between the corresponding terms for the first two terms in the pattern.

8 fl oz of tomato sauce is \_\_\_\_ times 4 basil leaves.

16 fl oz of tomato sauce is \_\_\_\_ times 8 basil leaves.

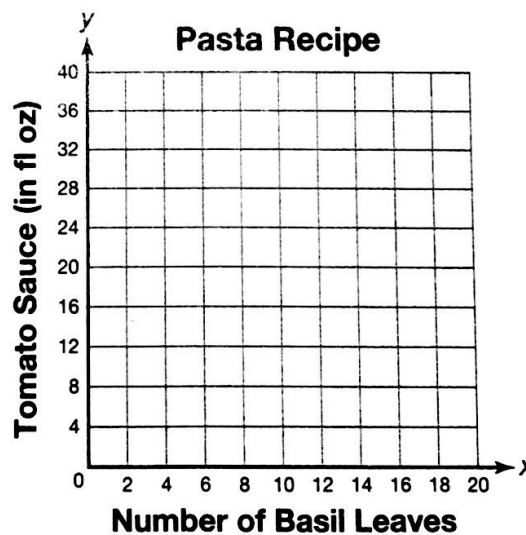
The terms in the pattern for tomato sauce are \_\_\_\_ times the corresponding terms in the pattern for basil leaves.

The amount of tomato sauce in fluid ounces is \_\_\_\_ times the number of basil leaves.

Form ordered pairs. (basil leaves, tomato sauce)

The ordered pairs are (\_\_\_\_, \_\_\_\_), (\_\_\_\_, \_\_\_\_), (\_\_\_\_, \_\_\_\_), (\_\_\_\_, \_\_\_\_), (\_\_\_\_, \_\_\_\_).

Graph the ordered pairs on a coordinate plane.



### 3 LESSON PRACTICE

- 1 What is the relationship between Will's pattern and Rashida's pattern?

Will's pattern: 5, 10, 15, 20, ...

Rashida's pattern: 15, 30, 45, 60, ...

- A. The terms in Rashida's pattern are 10 more than the corresponding terms in Will's pattern.
- B. The terms in Rashida's pattern are 15 times the corresponding terms in Will's pattern.
- C. The terms in Rashida's pattern are 3 times the corresponding terms in Will's pattern.
- D. The terms in Rashida's pattern are 10 times the corresponding terms in Will's pattern.

- 2 Identify the relationship between the patterns below.

Pattern A: 2, 4, 6, 8, ...

Pattern B: 20, 40, 60, 80, ...

- A. The terms in Pattern B are twice the corresponding terms in Pattern A.
- B. The terms in Pattern B are 10 times the corresponding terms in Pattern A.
- C. The terms in Pattern B are half the corresponding terms in Pattern A.
- D. The terms in Pattern B are 10 more than the corresponding terms in Pattern A.

- 3 Which pair of numbers in Elsie and Thomas' patterns are corresponding terms?

Elsie: 33, 66, 99, 132, 165, ...

Thomas: 11, 22, 33, 44, 55, ...

- A. 1 and 3
- B. 132 and 44
- C. 33 and 66
- D. 11 and 22

- 4 Mandy makes turquoise paint by mixing drops of green tint and blue tint in jars of white paint. The table shows how many drops Mandy uses.

<b>Drops of Green Tint</b>	2	4	6	8	10
<b>Drops of Blue Tint</b>	4	8	12	16	20

Which of the following statements identifies the relationship between the two colors of tint?

- A. Mandy uses twice as much blue tint as green tint.
- B. Mandy uses half as much blue tint as green tint.
- C. Mandy uses 4 times as much blue tint as green tint.
- D. Mandy always uses 2 more drops of blue tint than she does green tin.



- 5 Use each rule and starting number to write the first five terms in two numerical patterns.

**Part A**

Pattern A: Add 3, starting with 0.

Pattern B: Add 18, starting with 0.

**Part B**

Identify the relationship between the two patterns.

The terms in Pattern A are  times the corresponding terms in Pattern B.

- 6 Complete the statements about the two number patterns.

25, 50, 75, 100, 125, ...

50, 100, 150, 200, 250, ...

The rule for the first pattern is add .

The rule for the second pattern is add .

The terms in the second pattern are  times the corresponding terms in the first pattern.

- 7 Identify the relationship between the two numerical patterns.

3, 6, 9, 12, 15, ...

12, 24, 36, 48, 60, ...

The terms in the second pattern are  times the corresponding terms in the first pattern.

- 8 Ed generated two numerical patterns. The rules are add 4, starting with 0 for the first pattern, and add 8, starting with 0 for the second pattern:

0, 4, 8, 12, 16, ...

0, 8, 12, 20, 28, ...

Did Ed generate correct patterns? Use words or numbers to justify your answer.

- 9 A company sells bags of marbles in sets. Each set contains 2 bags and 40 marbles.

**Part A**

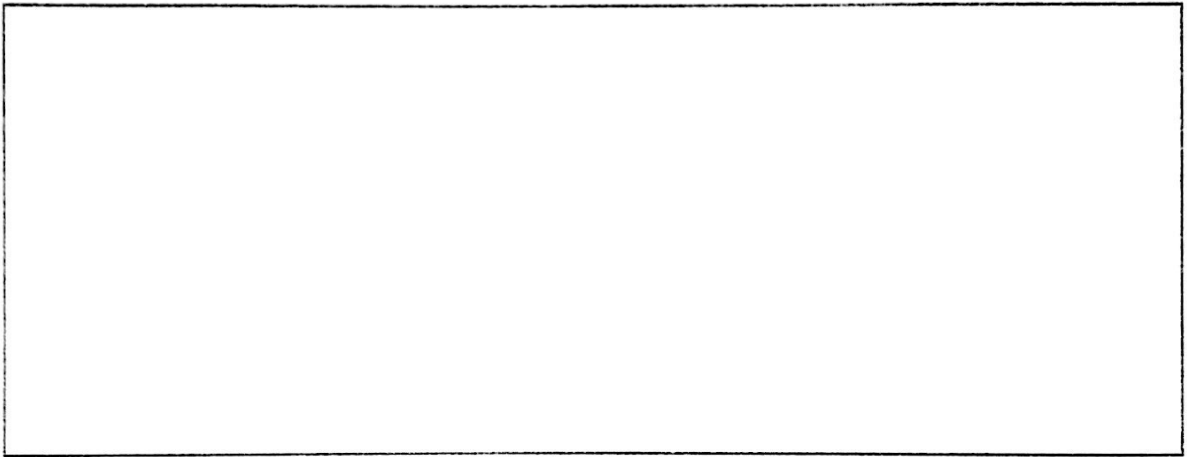
Generate two numerical patterns using the rules for the number of bags and the number of marbles in a set. The starting number for each is given.

Number of bags: 2, , , , , ...

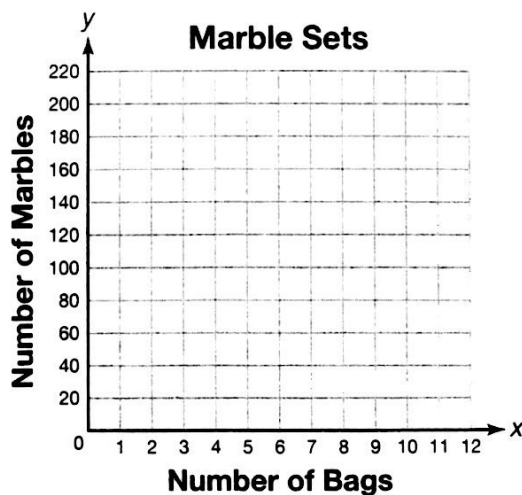
Number of marbles: 40, , , , , ...

**Part B**

Write ordered pairs for the two numerical patterns. Graph the ordered pairs on a coordinate plane.



**Part C**



# Reading and Writing Decimals

## 1 GETTING THE IDEA

Decimals can be written in different ways, just like whole numbers.

**Standard form**     25.347

**Word form**         twenty-five and three hundred forty-seven thousandths

**Expanded form**     $2 \times 10 + 5 \times 1 + 3 \times \frac{1}{10} + 4 \times \frac{1}{100} + 7 \times \frac{1}{1,000}$

Remember that expanded form is a way of writing a number as a sum of the values of its digits.

You can use place value to help you write a decimal in different ways.

### Example 1

The Seikan Tunnel in Japan is the longest underwater tunnel in the world. It is 53.108 kilometers long. Write the word form for 53.108 kilometers.

**Strategy**     Use a place-value chart.

**Step 1**         Write the number in a place-value chart.

Hundreds	Tens	Ones	·	Tenths	Hundredths	Thousandths
	5	3	·	1	0	8

**Step 2**         Write the word form for the whole-number part. Write *and* for the decimal point.

fifty-three and

**Step 3**         Write the word form for the decimal part. Use the name of the last decimal place to name the decimal.

fifty-three and one hundred eight thousandths

**Solution**     The word form for 53.108 kilometers is **fifty-three and one hundred eight thousandths kilometers**.

## Example 2

Write the standard form and expanded form of two hundred forty-five and thirteen thousandths.

**Strategy** Use a place-value chart.

**Step 1** Write the decimal in a place-value chart.

The word *thousandths* tells you that the last digit is in the thousandths place. Use a zero as a placeholder for tenths. Use a decimal point for the word *and*.

Hundreds	Tens	Ones	·	Tenths	Hundredths	Thousandths
2	4	5	·	0	1	3

**Step 2** Write the value of each digit in the place-value chart.

Hundreds	Tens	Ones	·	Tenths	Hundredths	Thousandths
2	4	5	·	0	1	3
$2 \times 100$	$4 \times 10$	$5 \times 1$		$0 \times \frac{1}{10}$	$1 \times \frac{1}{100}$	$3 \times \frac{1}{1,000}$

**Step 3** Write the decimal in expanded form as the sum of the values of the digits.

$$2 \times 100 + 4 \times 10 + 5 \times 1 + 1 \times \frac{1}{100} + 3 \times \frac{1}{1,000}$$

It is not necessary to write the value of a zero in a number.

**Solution** In standard form, the decimal is 245.013. In expanded form, it is

$$2 \times 100 + 4 \times 10 + 5 \times 1 + 1 \times \frac{1}{100} + 3 \times \frac{1}{1,000}$$

## Example 3

A number written in expanded form is  $3 \times 10 + 8 \times 1 + 9 \times \frac{1}{10} + 2 \times \frac{1}{1,000}$ . Which of the following shows the standard form?

38.92    30.892    38.902    3,892

**Strategy** Interpret the expanded form.

**Step 1** Determine the value of each addend in the expanded form.

$$3 \times 10 + 8 \times 1 + 9 \times \frac{1}{10} + 2 \times \frac{1}{1,000}$$

↑            ↑            ↑            ↑

3 tens    8 ones    9 tenths    2 thousandths

**Step 2** Check if there are any missing place values.

No hundredths are shown between tenths and thousandths.  
So, there are 0 hundredths.

**Step 3** Write the number that has the digits with the same values.

The number 38.902 has 3 tens, 8 ones, 9 tenths, 0 hundredths,  
and 2 thousandths.

**Solution** The standard form of  $3 \times 10 + 8 \times 1 + 9 \times \frac{1}{10} + 2 \times \frac{1}{1,000}$  is 38.902.

## 2 COACHED EXAMPLE

A bakery produced 163.584 kilograms of bread on Monday. Write the word form and expanded form for this number.

First, write the word form for 163.584.

The word form for the whole-number part is \_\_\_\_\_.

Write the word \_\_\_\_\_ for the decimal point.

The last digit in 163.584 is in the \_\_\_\_\_ place.

So, the word form for the decimal part is \_\_\_\_\_.

Next, write the expanded form of 163.584.

Complete the place-value chart.

Hundreds	Tens	Ones	•	Tenths	Hundredths	Thousandths
<input type="text"/>	<input type="text"/>	<input type="text"/>		<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/> × 100	<input type="text"/> × 10	<input type="text"/> × 1		<input type="text"/> × $\frac{1}{10}$	<input type="text"/> × $\frac{1}{100}$	<input type="text"/> × $\frac{1}{1,000}$

The word form for 163.584 is \_\_\_\_\_

\_\_\_\_\_

The expanded form for 163.584 is \_\_\_\_\_

\_\_\_\_\_

### 3 LESSON PRACTICE

- 1 Which is the standard form of the number below?
- $$4 \times 100 + 1 \times \frac{1}{10} + 2 \times \frac{1}{1,000}$$
- A. 400.102       C. 401.2  
 B. 400.12       D. 412
- 2 What is the expanded form of the number 50.02?
- A.  $5 \times 1 + 2 \times \frac{1}{100}$   
 B.  $5 \times 10 + 2 \times 1$   
 C.  $5 \times 10 + 2 \times \frac{1}{10}$   
 D.  $5 \times 10 + 2 \times \frac{1}{100}$
- 3 What is the word form of 3.051?
- A. three thousand fifty-one  
 B. three and fifty-one hundredths  
 C. three and fifty-one tenths  
 D. three and fifty-one thousandths
- 4 What is the standard form of the number below?
- twenty-six and thirty-four hundredths
- A. 26.034  
 B. 26.304  
 C. 26.34  
 D. 26,340.0

- 5 Which is another way to write the decimal 30.425?
- A.  $30 \times 10 + 4 \times 100 + 2 \times 10 + 5 \times 1$   
 B. thirty and four hundred twenty-five thousandths  
 C.  $3 \times 10 + 4 \times 1 + 2 \times \frac{1}{10} + 5 \times \frac{1}{100}$   
 D. thirty and four hundred twenty-five
- 6 Which is a true statement?
- A. three hundred twenty-four and sixty-eight hundredths is equal to 324.068
- B.  $596.104 = 5 \times 100 + 9 \times 10 + 6 \times 1 + 4 \times \frac{1}{1,000}$
- C.  $2 \times 100 + 7 \times 10 + 5 \times 1 + 3 \times \frac{1}{100} + 6 \times \frac{1}{1,000}$  is equal to two hundred seventy-five and 306 thousandths
- D. 803.542 is equal to eight hundred three and five hundred forty-two thousandths

- 7 The longest snake in captivity has a weight of about three hundred fifty and ninety-four thousandths pounds. Write the weight of the snake in standard form.

pounds

- 8 Determine whether each word form or expanded form represents a 5-digit decimal or a 6-digit decimal. Write the word form or expression in the correct box.

forty-two and six thousandths

$$3 \times 100 + 7 \times 1 + 1 \times \frac{1}{10} + 9 \times \frac{1}{100}$$

one hundred eighty and thirty-two thousandths

$$2 \times 10 + 6 \times 1 + 5 \times \frac{1}{10} + 4 \times \frac{1}{1,000}$$

5-Digit Decimals	6-Digit Decimals

- 9 Dan is writing a report on snowfall in Alaska. Valdez, Alaska, receives an average of 305.8 inches of snow each year. Dan found that this measurement is the same as 776.732 centimeters. Write the number of centimeters in word form.



- 10 Which of the following shows the values of the digits in six hundred three and five hundred eighty-two thousandths? Mark all that apply.

- A.  $5 \times \frac{1}{10}$
- B.  $6 \times 100$
- C.  $8 \times 10$
- D.  $2 \times \frac{1}{1,000}$
- E.  $3 \times 1$
- F.  $8 \times \frac{1}{100}$

- 11 Yoshi wrote the standard form for three hundred sixty and nine hundred seven thousandths. Kim wrote a number with 3 more ones and 7 less tenths. What number did Kim write?

Use the place-value chart to help you write the number.

Hundreds	Tens	Ones	•	Tenths	Hundredths	Thousandths

Kim wrote

- 12 Kate wrote *nine hundred twenty and forty-seven hundredths* as the word form for 920.047. Is her work correct? Explain why or why not.

- 13 Suzi races on her bicycle. She recorded her times for 3 sprints.

Sprint	Time (in seconds)
1	fifty and five hundred sixty-four thousandths seconds
2	2 hundredths of a second slower than Sprint 1
3	3 tenths of a second faster than Sprint 2

**Part A**

Write the expanded form of Suzi's first sprint.

**Part B**

Explain how to use the expanded form of the time from Suzi's first sprint to find Suzi's time on her second sprint.

**Part C**

What was Suzi's time for her third sprint? Explain how you found your answer.

# Rounding Decimals

## 1 GETTING THE IDEA

When you **round** a number, you are finding a number close to the exact number.

To round 9,367 to the nearest thousand, first find the digit in the rounding place. Then look at the digit to the right of the rounding place. Underline that digit.

- If that digit is less than 5, then the digit in the rounding place stays the same. Change the digits to the right to 0s.
- If that digit is 5 or greater, then the digit in the rounding place is increased by 1. Change the digits to the right to 0s.

Thousands	Hundreds	Tens	Ones
9	<u>3</u>	6	7

Because 3 is less than 5, the digit in the thousands place stays the same. So, 9,367 rounded to the nearest thousand is 9,000.

This same process can be used to round decimals.

### Example 1

The largest grasshopper in Australia is the Giant Grasshopper. It can grow to a length of 3.457 inches. Round the length of the Giant Grasshopper to the nearest inch.

**Strategy** Use a place-value chart.

**Step 1** Determine to which place you need to round.

When you round to the nearest inch, you want a whole number measurement. Rounding to the nearest inch means to round to the ones place.

**Step 2** Write the number in a place-value chart.

Hundreds	Tens	Ones	.	Tenths	Hundredths	Thousandths
		3	.	4	5	7

**Step 3** Find the digit in the rounding place. Underline the digit to the right of the rounding place.

Hundreds	Tens	Ones	.	Tenths	Hundredths	Thousandths
		3	.	<u>4</u>	5	7

**Step 4** Look at the underlined digit. Decide what to do with the digit in the rounding place.

Because 4 is less than 5, the digit in the rounding place stays the same.

Then change digits to the right to 0s or drop the digits.

3.457 rounded to the nearest whole number is 3.000 or 3.

**Solution** The length of the Giant Grasshopper rounded to the nearest inch is 3 inches.

## Example 2

A grasshopper can jump up to 20 times the length of its body. One grasshopper jumped 508.97 centimeters. What is the length of this jump to the nearest tenth of a centimeter?

**Strategy** Use place value.

**Step 1** Find the digit in the rounding place. Underline the digit to the right of the rounding place.

508.97

**Step 2** Look at the underlined digit. Decide what to do with the digit in the rounding place.

Because 7 is greater than 5, increase the digit in the rounding place by 1.

9 tenths + 1 tenth = 10 tenths, or 1 one

Add 1 to the ones digit and change the digits to the right to 0s, or drop the hundredths digit.

508.97 rounded to the nearest tenth is 509.00 or 509.0.

**Solution** The length the grasshopper jumped rounded to the nearest tenth of a centimeter is 509.0 centimeters.

### Example 3

Round 39.635 to the nearest tenth and to the nearest hundredth. How do the rounded numbers compare?

**Step 1** Round 39.635 to the nearest tenth.

39.635       $3 < 5$ , so the tenths digit stays the same.  
Drop the digits to the right.

39.635 rounded to the nearest tenth is 39.6.

**Step 2** Round 39.635 to the nearest hundredth.

39.635      The underlined digit is 5, so increase the hundredths digit by 1.  
Drop the digit to the right.

39.635 rounded to the nearest hundredth is 39.64.

**Step 3** Compare the rounded numbers.

Rounded to the nearest tenth				Rounded to the nearest hundredth
↓				↓
39.6	<	39.635	<	39.64

When rounded to the nearest tenth, 39.635 rounds to a lesser number.

When rounded to the nearest hundredth, 39.635 rounds to a greater number.

Both numbers are close to 39.635.

39.64 is closer to 39.635 than 39.6 is.

**Solution** 39.635 rounded to the nearest tenth is 39.6, and 39.635 rounded to the nearest hundredth is 39.64. Rounding to the nearest hundredth results in a number closer to the original number than rounding to the nearest tenth.

## 2 COACHED EXAMPLE

Round 18.706 to the nearest whole number and to the nearest hundredth.  
How do the rounded numbers compare?

Rounding to the nearest whole number is the same as rounding to the \_\_\_\_\_ place.

To round 18.706 to the nearest whole number, find the digit in the \_\_\_\_\_ place.

Underline the digit in the \_\_\_\_\_ place.

\_\_\_\_\_ 7 5, so \_\_\_\_\_.

18.706 rounded to the nearest whole number is \_\_\_\_\_.

To round 18.706 to the nearest hundredth, find the digit in the \_\_\_\_\_ place.

Underline the digit in the \_\_\_\_\_ place.

\_\_\_\_\_ 0 5, so \_\_\_\_\_.

18.706 rounded to the nearest hundredth is \_\_\_\_\_.

18.706 rounded to the nearest whole number is \_\_\_\_\_.

18.706 rounded to the nearest hundredth is \_\_\_\_\_.

18.706 rounded to the nearest \_\_\_\_\_ is closer to 18.706 than the number rounded to the nearest \_\_\_\_\_.

### 3 LESSON PRACTICE

- 1 An elephant at an African wildlife reserve weighed 237.584 pounds at birth. Which statement about the weight of the elephant is **not** true?
- A. The weight rounded to the nearest hundredth is 237.58.
  - B. The weight rounded to the nearest ten is 240.
  - C. The weight rounded to the nearest tenth is 237.5.
  - D. The weight rounded to the nearest hundred is 200.
- 2 Which decimal represents 43.597 rounded to the nearest hundredth?
- A. 43.50
  - B. 43.598
  - C. 43.6
  - D. 43.59
- 3 What is 62.465 rounded to the nearest tenth?
- A. 62.4
  - B. 62.5
  - C. 62.46
  - D. 62.47
- 4 Ta'rel is picking apples at a local orchard. The orchard charges for the apples by rounding to the nearest whole pound. What is the largest possible weight of apples that Ta'rel could pick if he wants to pay for no more than 4 pounds of apples?
- A. 4.5
  - B. 3.59
  - C. 3.9
  - D. 4.49
- 5 Which is 201.571 rounded to the nearest hundredth?
- A. 200
  - B. 201.6
  - C. 201.57
  - D. 201.58
- 6 Which of the following would **not** round to 1.2 when rounded to the nearest tenth?
- A. 1.149
  - B. 1.209
  - C. 1.22
  - D. 1.18

7 Ethan won a fishing tournament by catching a bass that weighed 10.735 pounds. He wrote an article about it for the school paper. He correctly used a rounded number in the headline. Select a headline he could have used. Mark all that apply.

- A. Winning Bass Weighs 10.8 Pounds
- B. 11-Pound Bass Caught
- C. 10.74-Pound Bass Is Tops
- D. Ethan Wins with 11.73-Pound Bass
- E. 10.7-Pound Bass Is Biggest Catch of the Day
- F. 10.73 Pounds Wins Bass Tournament

8 Mr. Chin wrote the rounded number below on the board.

82.6

Select the boxes in the table to show whether each number could be the number that Mr. Chin started with.

	82.642	82.59	82.507	82.63	81.6
Yes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
No	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

9 Two clues in a number game are shown.

- The number has 3 decimal places.
- The number rounded to the nearest hundredth is 84.72.

The greatest number that matches these clues is



- 10 Write the rounded number to the given place value for each number in the table.

Exact Number	Rounded Numbers	
	Nearest Tenth	Nearest Hundredth
71.894		
71.955		
72.088		
71.906		

- 11 Ellie is a runner. She keeps track of winning times for women's long-distance races. The table shows the winning times that Ellie found for the women's 10,000-meter race in four Olympic games.

**Olympic Results  
Women's 10,000 Meters**

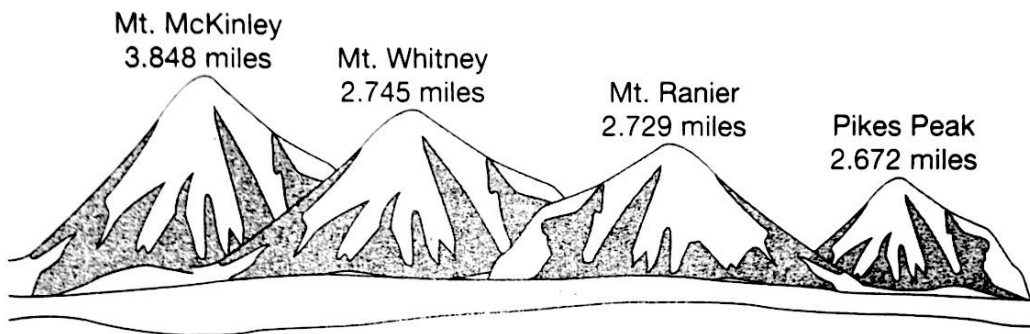
Year	Time (in minutes)
2012	30.346
2008	29.911
2004	30.406
2000	30.292

Suppose Ellie rounds each time to the nearest tenth. In which two years would the winning times appear to be the same? Explain.

- 12 Bahir's science class grew sunflowers for an experiment. The tallest sunflower grew to 2.387 meters. Bahir made a sketch of the sunflower in his notebook. He will label its height with a rounded decimal that will make the sunflower appear as tall as possible.

Should Bahir use a decimal rounded to the nearest meter, nearest tenth meter, or nearest hundredth meter? Explain your reasoning.

- 13 This diagram shows the heights of some tall mountains in the United States.



**Part A**

What happens when you round the heights of each mountain to the nearest mile? Suggest another way to round the heights of the mountains in order to compare them.

**Part B**

Find two more rounded heights for Mt. Rainier. How do these rounded measures compare to rounded measures of the other three mountains?

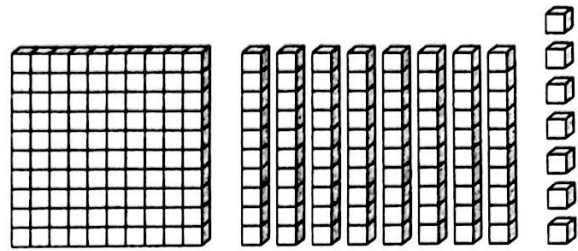
## Dividing Whole Numbers

### 1 GETTING THE IDEA

You can use models to help you divide.

Find  $187 \div 11$ .

Model the **dividend** 187 as 1 hundred, 8 tens, and 7 ones. The **divisor** is 11. Regroup the hundred and tens. There are 17 groups of 11 in 187. The **quotient** is 17. So,  $187 \div 11 = 17$ .



### Example 1

Mr. Chen paid \$168 for 14 student tickets to the history museum. What is the cost of 1 ticket?

**Strategy** Use place value and models to divide.

**Step 1** Find  $\$168 \div 14$ . Place the first digit in the quotient.

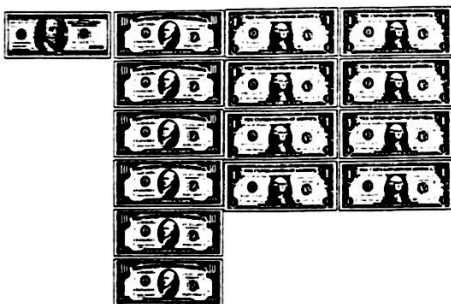
You cannot divide 1 hundred by 14.

You can divide 16 tens by 14.

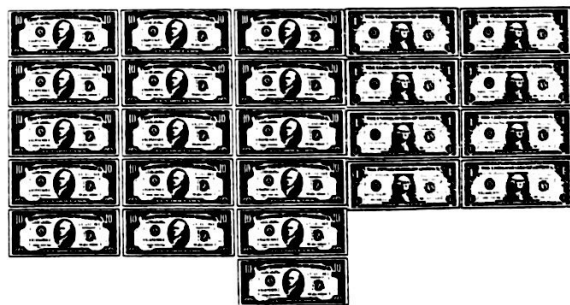
The first digit of the quotient is above the tens place.

$$\begin{array}{r} \square \\ 14 \overline{)168} \end{array}$$

1 hundred 6 tens 8 ones



16 tens 8 ones

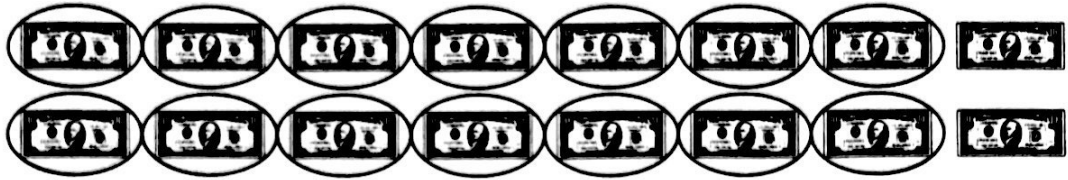


**Step 2** Divide the tens by 14.

$$\begin{array}{r} 1 \\ 14 \overline{)168} \\ - 14 \\ \hline 2 \end{array}$$

16 tens  $\div$  14  
 $14 \times 1$  ten  
 16 tens  $-$  14 tens

There are 14 groups of 1 ten-dollar bill. There are 2 tens left over.

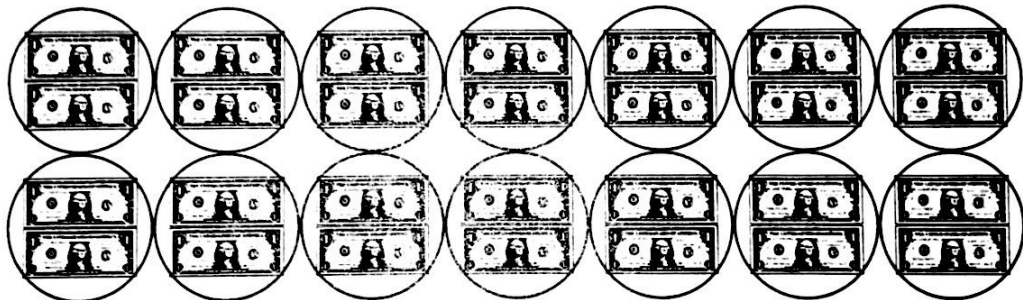


**Step 3** Divide the ones by 14.

$$\begin{array}{r} 12 \\ 14 \overline{)168} \\ - 14 \downarrow \\ \hline 28 \\ - 28 \\ \hline 0 \end{array}$$

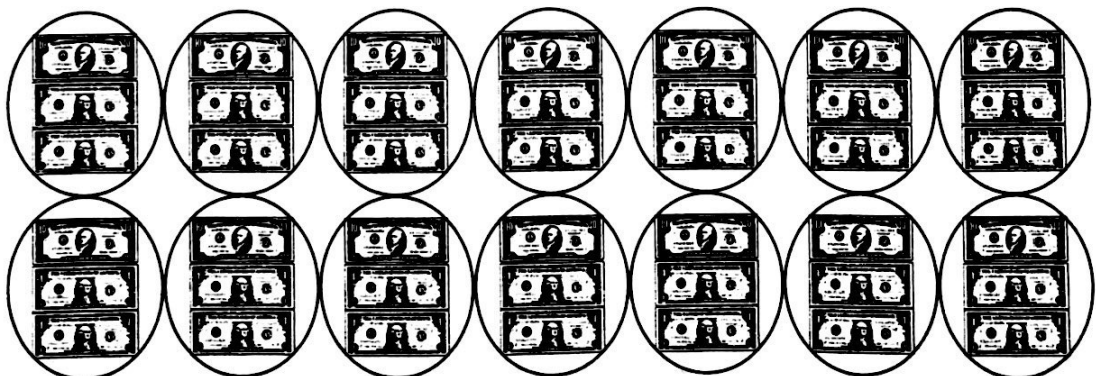
Bring down 8 ones.  
 28 ones  $\div$  14  
 $14 \times 2$  ones  
 28 ones  $-$  28 ones

Regroup 2 ten-dollar bills as 20 one-dollar bills. There are 28 ones.  
 There are 14 groups of 2 one-dollar bills.



**Step 4** Find the quotient.

There are 14 groups of 1 ten-dollar bill and 2 one-dollar bills, or \$12.  
 $\$168 \div 14 = \$12$



**Step 5** Use multiplication to check your answer.

Multiply the quotient by the divisor.  $12 \times 14 = 168$   
The product matches the dividend. The solution is correct.

**Solution** The cost of one ticket is \$12.

## Example 2

A company ships puzzles in cartons of 18 puzzles each. How many cartons does the company need for 3,672 puzzles?

**Strategy** Use place value to divide.

**Step 1** Find  $3,672 \div 18$ . Place the first digit in the quotient.

You cannot divide 3 thousands by 18.  
You can divide 36 hundreds by 18.  
The first digit of the quotient is above the hundreds place.

$$\begin{array}{r} \square \\ 18 \overline{)3,672} \end{array}$$

**Step 2** Divide the hundreds by 18.

$$\begin{array}{r} 2 \\ 18 \overline{)3,672} \\ - 36 \\ \hline 0 \end{array}$$

$36 \text{ hundreds} \div 18$   
 $18 \times 2 \text{ hundreds}$   
 $36 \text{ hundreds} - 36 \text{ hundreds}$

**Step 3** Divide the tens by 18.

$$\begin{array}{r} 20 \\ 18 \overline{)3,672} \\ - 36 \downarrow \\ \hline 7 \\ - 0 \\ \hline 7 \end{array}$$

Bring down the tens.  
You cannot divide 7 tens by 18. Place 0 in the quotient.  
 $18 \times 0 \text{ tens}$   
 $7 \text{ tens} - 0 \text{ tens}$

**Step 4** Divide the ones by 18.

$$\begin{array}{r} 204 \\ 18 \overline{)3,672} \\ - 36 \downarrow \\ \hline 7 \downarrow \\ - 0 \downarrow \\ \hline 72 \\ - 72 \\ \hline 0 \end{array}$$

Bring down 2 ones.  
 $72 \text{ ones} \div 18$   
 $18 \times 4 \text{ ones}$   
 $72 \text{ ones} - 72 \text{ ones}$

**Solution** The company needs 204 cartons to ship 3,672 puzzles.

Sometimes there will be a **remainder** after you complete the division.

### Example 3

Find  $1,115 \div 3$ .

**Strategy** Use place value to divide.

**Step 1** Place the first digit in the quotient.

$$\begin{array}{r} 3 \overline{)1,115} \end{array}$$

You cannot divide 1 thousand by 3.

$$\begin{array}{r} 3 \overline{)1,115} \end{array}$$

You can divide 11 hundreds by 3.

The first digit of the quotient is above the hundreds place.

**Step 2** Divide the hundreds by 3.

$$\begin{array}{r} 3 \\ 3 \overline{)1,115} \\ - 9 \\ \hline 2 \end{array}$$

11 hundreds  $\div$  3

$3 \times 3$  hundreds

11 hundreds  $-$  9 hundreds

**Step 3** Divide the tens by 3.

$$\begin{array}{r} 37 \\ 3 \overline{)1,115} \\ - 9 \downarrow \\ \hline 21 \\ - 21 \\ \hline 0 \end{array}$$

Bring down 1 ten.

21 tens  $\div$  3

$3 \times 7$  tens

21 tens  $-$  21 tens

**Step 4** Divide the ones by 3.

$$\begin{array}{r} 371 \\ 3 \overline{)1,115} \\ - 9 \downarrow \\ \hline 21 \downarrow \\ - 21 \downarrow \\ \hline 5 \\ - 3 \\ \hline 2 \end{array}$$

Bring down 5 ones.

5 ones  $\div$  3

$3 \times 1$  ones

5 ones  $-$  3 ones

You cannot divide the remaining 2 ones by 3. The remainder is 2.

**Solution**  $1,115 \div 3 = 371 \text{ R}2$

## Example 4

There are 2,045 students in a national research project. The project leaders formed teams of 15 students. How many teams did they form?

**Strategy** Use place value to divide.

**Step 1** Find  $2,045 \div 15$ . Place the first digit in the quotient.

You cannot divide 2 thousands by 15.

You can divide 20 hundreds by 15.

The first digit of the quotient is above the hundreds place.

**Step 2** Divide the hundreds by 15.

$$\begin{array}{r} 1 \\ 15 \overline{)2,045} \\ - 15 \\ \hline 5 \end{array}$$

20 hundreds  $\div$  15

$15 \times 1$  hundreds

20 hundreds  $-$  15 hundreds

**Step 3** Divide the tens by 15.

$$\begin{array}{r} 13 \\ 15 \overline{)2,045} \\ - 15 \downarrow \\ \hline 54 \\ - 45 \\ \hline 9 \end{array}$$

Bring down the tens.

54 tens  $\div$  15

$15 \times 3$  tens

54 tens  $-$  45 tens

**Step 4** Divide the ones by 15.

$$\begin{array}{r} 136 \\ 15 \overline{)2,045} \\ - 15 \downarrow \\ \hline 54 \downarrow \\ - 45 \downarrow \\ \hline 95 \\ - 90 \\ \hline 5 \end{array}$$

Bring down the ones.

95 ones  $\div$  15

$15 \times 6$  ones

95 ones  $-$  90 ones

You cannot divide 5 ones by 15. The remainder is 5. This means that there are 5 students left after 136 teams are formed.

$$2,045 \div 15 = 136 \text{ R}5$$

**Step 5** Check your answer.

Use multiplication. Add the remainder to the product.

$$136 \times 15 = 2,040$$

$$2,040 + 5 = 2,045$$

The answer is correct because 2,045 matches the dividend.

**Solution** The leaders formed 136 teams of 15 students each.

## 2 COACHED EXAMPLE

Find  $1,236 \div 19$ .

You cannot divide 1 \_\_\_\_\_ by 19.

You cannot divide 12 \_\_\_\_\_ by 19.

You can divide 123 \_\_\_\_\_ by 19.

The first digit of the quotient is above the \_\_\_\_\_ place.

$$19 \overline{)1,236}$$

Check the answer: \_\_\_\_\_  $\times$  \_\_\_\_\_ = \_\_\_\_\_

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

$$1,236 \div 19 = \underline{\hspace{2cm}}$$



### 3 LESSON PRACTICE

- 1 Pria uses 16 red sequins on each costume that she makes. What is the greatest number of costumes she can make if she has 3,208 sequins?

A. 199  
 B. 200  
 C. 201  
 D. 205

- 2 Stefan correctly solved the division problem below.

$$2,071 \div 19$$

Which of the following statements about his quotient is correct?

- A. The first digit in the quotient is in the hundreds place.  
 B. The quotient has a remainder.  
 C. The quotient has 2 digits.  
 D. The quotient is less than the divisor.

- 3 Which of the following has a quotient of 46?

A.  $855 \div 19$   
 B.  $1,068 \div 23$   
 C.  $598 \div 13$   
 D.  $360 \div 12$

- 4 Find the quotient  $5,045 \div 23$ .

A. 219  
 B. 219 R3  
 C. 219 R8  
 D. 220

- 5 A company made 1,918 bars of handmade soap. It packed 8 bars of soap in each gift box. Which statement correctly describes the number of gift boxes the company made?

A. The company packed 238 gift boxes with 4 bars left over.  
 B. The company packed 239 gift boxes with 6 bars left over.  
 C. The company packed 240 gift boxes with no bars left over.  
 D. The company packed 240 gift boxes with 2 bars left over.

- 6 Which of the following would **not** have a remainder?

A.  $785 \div 10$   
 B.  $1,234 \div 25$   
 C.  $156 \div 14$   
 D.  $4,335 \div 17$

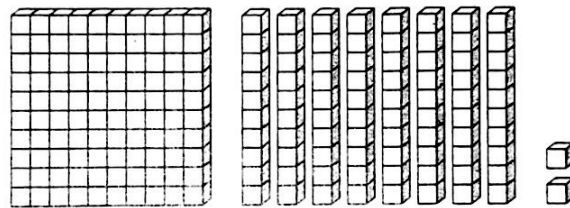
- 7 Write the quotient for each division problem in the table.

Division Expression	Quotient
$3,155 \div 15$	
$3,314 \div 16$	
$2,484 \div 12$	
$2,310 \div 11$	

- 8 Select the boxes in the table to show whether each expression has a quotient of 43 R5.

	$607 \div 14$	$735 \div 17$	$994 \div 23$	$1,548 \div 36$	$1,726 \div 40$
Yes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
No	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- 9 Emily used place-value models to find  $182 \div 13$ .



Explain how Emily could have used the models to divide. Then find the quotient.

10 Schools, classrooms, and students received equal numbers of flyers about the state fair. Which solution is true? Mark all that apply.

- A. 18 classrooms received 5,850 flyers. Each classroom received 325 flyers.
- B. 6 schools received 8,160 flyers. Each school received 136 flyers.
- C. 23 students shared 416 flyers. Each student received 18 flyers. 2 flyers were left over.
- D. 3 schools received 1,774 flyers. Each school received 591 flyers. 3 flyers were left over.
- E. A teacher handed out 532 flyers to 19 students. Each student received 28 flyers.

11 Find the quotient to each division problem. Write the problem in the correct box.

$1,445 \div 17$

$1,500 \div 20$

$1,050 \div 14$

$1,350 \div 18$

75	85

12 Ricardo has 1,234 comics. He wants to put all of his comics into plastic sleeves. Each sleeve holds 4 comics. How many sleeves does he need?

- 13 Mandy and Jake worked together on the division problem below.

$$1,260 \div 28$$

Mandy said the first digit in the quotient is in the hundreds place. Jake said the first digit is in the tens place. Which student is correct? Describe a possible error that one of the students could have made.

- 14 A kite company made 2,872 kites for a kite festival. It made an equal number of 8 different types of kites.

**Part A**

How many of each type did the shop make?

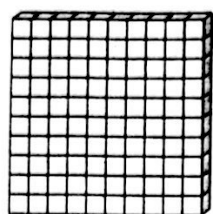
**Part B**

The company received kite orders from 13 different stores. It sent the same number of kites to each store. What is the greatest number of kites the company could have sent to each store? Explain your reasoning.

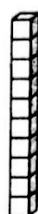
# Adding and Subtracting Decimals

## 1 GETTING THE IDEA

You can use place-value models to add and subtract decimals.



1  
one



0.1  
one tenth



0.01  
one hundredth

You can combine ones, tenths, and hundredths to show addition. You can remove hundredths, tenths, and ones from a model to show subtraction.

### Example 1

Elsa rode her bicycle 1.28 kilometers to the park. She rode 2.55 kilometers around the park. How many kilometers did Elsa ride her bicycle?

**Strategy** Use models to add.

**Step 1** Write a problem you can use to solve.

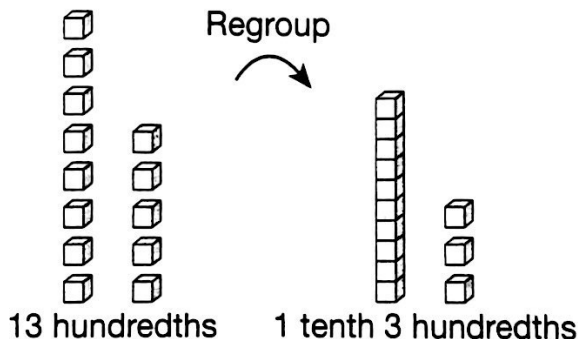
You want to know how many kilometers Elsa rode in all.  
Add to find the total.

$$1.28 + 2.55$$

**Step 2** Add the hundredths.

$8 + 5 = 13$  hundredths  
Regroup 13 hundredths as  
1 tenth 3 hundredths.

$$\begin{array}{r} 1 \\ 1.28 \\ + 2.55 \\ \hline 3 \end{array}$$



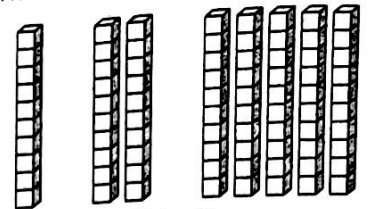
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**Step 3** Add the tenths. Remember to add the regrouped tenth.

$$1 + 2 + 5 = 8 \text{ tenths}$$

Write the decimal point in the sum.

$$\begin{array}{r} 1 \\ 1.28 \\ + 2.55 \\ \hline 3.83 \end{array}$$

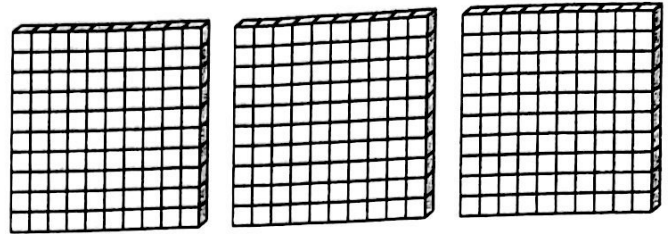


8 tenths

**Step 4** Add the ones.

$$1 + 2 = 3 \text{ ones}$$

$$\begin{array}{r} 1 \\ 1.28 \\ + 2.55 \\ \hline 3.83 \end{array}$$



3 ones

**Solution** Elsa rode her bicycle 3.83 kilometers.

## Example 2

Emilio bought cheddar cheese and Swiss cheese to make grilled cheese sandwiches. The cheddar weighed 4.56 pounds. The Swiss weighed 2.79 pounds. How many more pounds did the cheddar cheese weigh than the Swiss cheese?

**Strategy** Use models to subtract.

**Step 1** Write a problem you can use to solve.

You want to know how many more pounds the cheddar cheese weighed than the Swiss cheese. Subtract to find how much more.

$$4.56 - 2.79$$

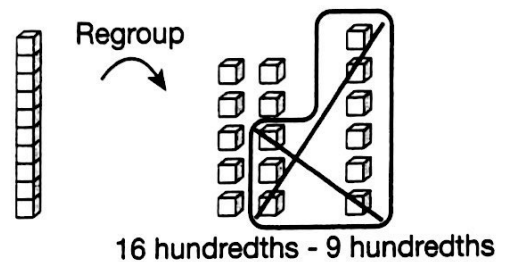
**Step 2** Subtract the hundredths.

There are not enough hundredths to subtract 9.

Regroup 1 tenth as 10 hundredths.

$$16 - 9 = 7 \text{ hundredths}$$

$$\begin{array}{r} 416 \\ 4.56 \\ - 2.79 \\ \hline 1.77 \end{array}$$



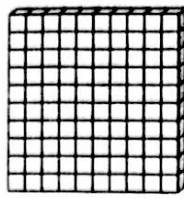
**Step 3** Subtract the tenths.

There are not enough tenths to subtract 7 tenths.  
Regroup 1 whole as 10 tenths.

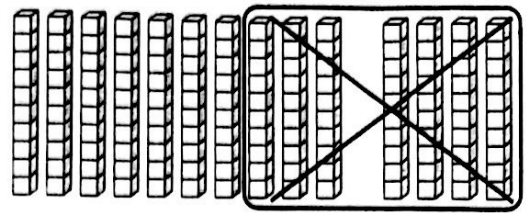
$$14 - 7 = 7 \text{ tenths}$$

Write the decimal point in the sum.

$$\begin{array}{r} 14 \\ 3 \cancel{\times} 16 \\ \underline{4.56} \\ - 2.79 \\ \hline .77 \end{array}$$



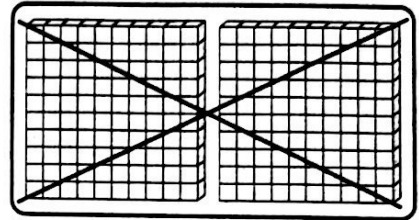
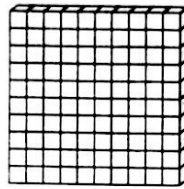
Regroup



**Step 4** Subtract the ones.

$$3 - 2 = 1 \text{ one}$$

$$\begin{array}{r} 14 \\ 3 \cancel{\times} 16 \\ \underline{4.56} \\ - 2.79 \\ \hline 1.77 \end{array}$$



**Step 5** Check the answer using addition.

Add the difference to 2.79. The sum should be 4.56.

$$\begin{array}{r} 11 \\ 1.77 \\ + 2.79 \\ \hline 4.56 \end{array}$$

The sum is 4.56. The answer is correct.

**Solution** The cheddar cheese weighed 1.77 pounds more than the Swiss cheese.

### Example 3

Subtract  $40 - 15.47$ .

**Strategy** Use place value to subtract.

**Step 1** Write the problem in vertical form.

Write 40 as an equivalent decimal in hundredths.

$$40 = 40.00$$

Align the decimal points.

$$\begin{array}{r} 40.00 \\ - 15.47 \\ \hline \end{array}$$

**Step 2** Subtract the hundredths.

You cannot subtract 7 hundredths from 0 hundredths.

Regroup 1 ten as 10 ones. Record 3 in the tens place.

Record 10 in the ones place.

Regroup 1 one as 10 tenths. Record 9 in the ones place.

Record 10 in the tenths place.

Regroup 1 tenth as 10 hundredths. Record 9 in the tenths place.

Record 10 in the hundredths place.

$$10 - 7 = 3 \text{ hundredths}$$

$$\begin{array}{r} 99 \\ 3101010 \\ 40.00 \\ - 15.47 \\ \hline .3 \end{array}$$

**Step 3** Subtract the tenths.

$$9 - 4 = 5 \text{ tenths}$$

$$\begin{array}{r} 99 \\ 3101010 \\ 40.00 \\ - 15.47 \\ \hline .53 \end{array}$$



**Step 4** Subtract the ones.

$$9 - 5 = 4 \text{ ones}$$

$$\begin{array}{r} 99 \\ 3\cancel{1}\cancel{0}\cancel{1}0 \\ \cancel{4}0.\cancel{0}\cancel{0} \\ - 15.47 \\ \hline 4.53 \end{array}$$

**Step 5** Subtract the tens.

$$3 - 1 = 2 \text{ tens}$$

$$\begin{array}{r} 99 \\ 3\cancel{1}\cancel{0}\cancel{1}0 \\ \cancel{4}0.\cancel{0}\cancel{0} \\ - 15.47 \\ \hline 24.53 \end{array}$$

**Step 6** Check the answer using addition.

$$\begin{array}{r} 111 \\ 24.53 \\ + 15.47 \\ \hline 40.00 \end{array}$$

The sum is 40.00. The answer is correct.

**Solution**  $40 - 15.47 = 24.53$

## 2 COACHED EXAMPLE

Maya bought a scarf and hat from two different stores. The scarf cost \$32.18. The hat cost \$19.86. How much did Maya pay in all for the scarf and hat?

Write a problem you can use to solve.

$$\underline{\quad\quad} + \underline{\quad\quad} = \square$$

Write the problem in vertical form.

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

First, I add the \_\_\_\_\_.

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

Regroup \_\_\_\_\_ as \_\_\_\_\_.

Second, I add the \_\_\_\_\_.

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

Regroup \_\_\_\_\_ as \_\_\_\_\_.

Third, I add the \_\_\_\_\_.

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

Regroup \_\_\_\_\_ as \_\_\_\_\_.

Fourth, I add the \_\_\_\_\_.

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

Write \_\_\_\_\_ in the sum.

I can use \_\_\_\_\_ to check the answer.

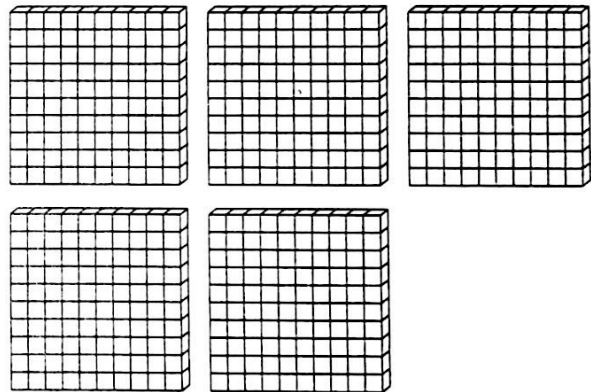
$$\begin{array}{r} \square \square . \square \square \\ - \square \square . \square \square \\ \hline \square \square . \square \square \end{array}$$

Maya paid \_\_\_\_\_ in all for the scarf and hat.

### 3 LESSON PRACTICE

- 1 What is the sum of 12.9 and 1.53?
- A. 1.443       C. 14.43
- B. 2.82       D. 28.2
- 2 Elise's bill at a diner was \$19.54. How much change should she receive if she paid with \$20?
- A. \$0.45
- B. \$0.46
- C. \$0.56
- D. \$1.56
- 3 William bought 3.9 pounds of red potatoes and 2.51 pounds of yellow potatoes. How many pounds of potatoes did he buy in all?
- A. 1.39 pounds
- B. 2.9 pounds
- C. 5.31 pounds
- D. 6.41 pounds
- 4 Find the difference  $14.76 - 3.3$ .
- A. 1.146
- B. 1.443
- C. 11.46
- D. 14.43

- 5 Which of the following would have the greatest sum?
- A.  $1.25 + 0.99$
- B.  $2.01 + 0.07$
- C.  $1.13 + 1.2$
- D.  $0.9 + 1.67$
- 6 Find the difference  $510 - 1.34$ .
- A. 376
- B. 508.66
- C. 509.34
- D. 511.34
- 7 Add  $1.27 + 2.94$ . You can use the models to help you.



- A. 0.421
- B. 4.21
- C. 42.1
- D. 421

- 8 James recorded the miles he walked each month in a spreadsheet.

	A	B
1	Month	Miles
2	January	15.73
3	February	14.8
4	March	11.04
5	April	10.6

Which statements are correct? Mark all that apply.

- A. James walked 29.53 miles in January and February.
- B. James walked 0.44 mile farther in March than in April.
- C. James walked 26.33 miles in January and April.
- D. James walked 24.4 miles in February and April.
- E. James walked 4.69 miles farther in January than in March.
- F. James walked 3.4 miles farther in February than in March.
- 9 Write the sum or difference for each addition or subtraction problem in the table.

Problem	Sum or Difference
$3.78 + 1.7$	
$5.2 + 1.93$	
$9.8 - 3.57$	
$7.25 - 2.4$	

- 10 How much faster was Jacques Fain's time than Dembe Usa's time?

**100-Meter Dash**

Runner	Time (seconds)
Jacques Fain	9.13
Lilah Jackson	9.05
Dembe Usa	8.93

seconds

- 11 A cashier received \$20 for each item.

Item	Cost
Binder	\$12.76
Box of Pencils	\$8.24
Markers	\$11.53
Padded Envelopes	\$15.97

Did the cashier give back the correct change for each item? Mark Yes or No.

	Box of Pencils: \$11.86	Binder: \$7.24	Padded Envelopes: \$4.03	Markers: \$9.57
Yes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
No	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- 12 The amount of sleep some animals get each day is shown in the table.

Animal	Sleep Time (hours)
Chimpanzee	9.7
Cow	3.9
Opossum	18
Rabbit	11.4

What is the difference between the longest and shortest amount of time that the animals listed in the table sleep?

hours

- 13** Hana is rollerblading along an 8-mile trail in Forest Park. She stopped for water after rollerblading 2.4 miles. After another 3.1 miles, she stopped for lunch. How much farther does she have to go to reach the end of the trail? Describe the steps you took to solve the problem.

- 14** Nami is wrapping packages with green and pink ribbon. She has 11.85 meters of green ribbon and 13.4 meters of pink ribbon.

**Part A**

How many meters of ribbon does Nami have in all? Show your work.

**Part B**

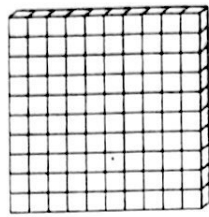
How many more meters of pink ribbon are there than green ribbon? Use words, numbers, or a model to justify your answer.

# Multiplying Decimals

## 1 GETTING THE IDEA

An **area model** is a rectangular model that shows a value in square units. You can use an area model to help you multiply decimals. Use the models below to show the value of the decimals.

One whole = 1



One tenth = 0.1

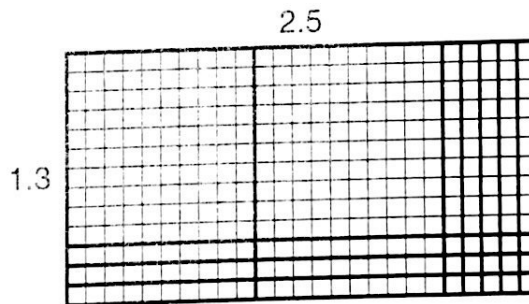


One hundredth = 0.01



To model any multiplication problem, you can draw a rectangle. Make the length and width of the two factors. The area of the rectangle shows the product.

Here is an area model that can be used to find the product of  $2.5 \times 1.3$ .  
 2.5 is the same as 2 wholes, 5 tenths. Notice that the length of the model is 2.5 units.  
 1.3 is the same as 1 whole and 3 tenths. Notice that the width of the model is 1.3 units.  
 The rest of the rectangle is filled with hundredths units.



Count the decimal models to find the product.  
 There are 2 wholes, 11 tenths, and 15 hundredths.  
 To simplify the product, regroup.

So 2 wholes, 11 tenths, and 15 hundredths = 3 wholes, 2 tenths, and 5 hundredths  
 $1.3 \times 2.5 = 3.25$

### Example 1

Multiply  $2 \times 1.4$

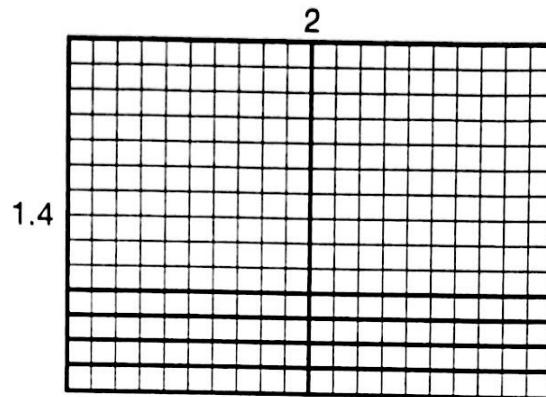
**Strategy** Draw an area model to show the product. Then use place value to multiply.

**Step 1**

Draw an area model.

Make the model with a length of 2 wholes and the width of 1 whole and 4 tenths.

This completes the rectangle.



**Step 2** Use place value to multiply.

First, multiply as you would with whole numbers.

$$\begin{array}{r} 1.4 \\ \times 2 \\ \hline 28 \end{array}$$

**Step 3** Place the decimal point in the product.

Add the number of decimal places in the two factors.

The product will have 1 decimal place.

$$\begin{array}{r} 1.4 \quad \leftarrow 1 \text{ decimal place} \\ \times 2 \quad \leftarrow 0 \text{ decimal places} \\ \hline 2.8 \quad \leftarrow 1 \text{ decimal place} \end{array}$$

Look at the model. The model shows 2 and 8 tenths, so the product is 2.8.

**Solution**  $1.4 \times 2 = 2.8$



## Example 2

Margo walked 1.2 times around a trail at her local park. The trail is 1.3 miles long. How far did Margo walk?

**Strategy** Use an area model and place value to find the product.

**Step 1** Write a problem you can use to solve.

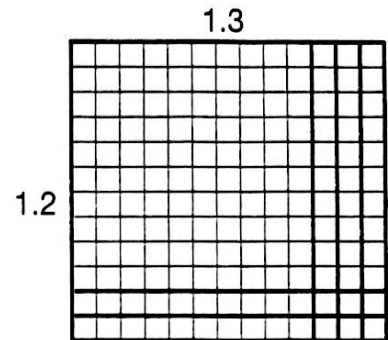
To find the total distance Margo walked, use multiplication.

$$1.2 \times 1.3$$

**Step 2** Draw an area model.

Make the model with a length of 1 whole and 3 tenths and the width of 1 whole and 2 tenths.

Fill in the model with hundredths to make a complete rectangle.



**Step 3** Use place value to multiply.

Multiply as you would with whole numbers.

$$\begin{array}{r} 1.2 \\ \times 1.3 \\ \hline 36 \quad \leftarrow 12 \times 3 \\ + 120 \quad \leftarrow 12 \times 10 \\ \hline 156 \quad \leftarrow 36 + 120 \end{array}$$

**Step 4** Place the decimal point in the product.

$$\begin{array}{r} 1.2 \quad \leftarrow \text{one decimal place} \\ \times 1.3 \quad \leftarrow \text{one decimal place} \\ \hline 36 \\ + 120 \\ \hline 1.56 \quad \leftarrow \text{two decimal places} \end{array}$$

Look at the model. The model shows 1 whole, 5 tenths, and 6 hundredths.

**Solution** Margo walked 1.56 miles.

### Example 3

Kayla feeds her dog 1.75 cups of food each day. How many cups of food does Kayla feed her dog each week?

**Strategy** Use place value.

**Step 1** Write a problem you can use to solve.

One week is 7 days. Multiply the number of cups of food by 7.

$$1.75 \times 7$$

**Step 2** Use place value to multiply.

Multiply as you would with whole numbers.

$$\begin{array}{r} 53 \\ 1.75 \\ \times 7 \\ \hline 1225 \end{array}$$

**Step 3** Place the decimal point in the product.

Add the number of decimal places in the two factors.

The product will have 2 decimal places.

$$\begin{array}{r} 1.75 \quad \leftarrow \text{two decimal places} \\ \times 7 \quad \leftarrow \text{zero decimal places} \\ \hline 12.25 \quad \leftarrow \text{two decimal places} \end{array}$$

**Step 4** Use estimation to check the reasonableness of your answer.

1.75 cups is about 2 cups.

$$7 \times 2 \text{ cups} = 14 \text{ cups}$$

The product of 12.25 cups is close to 14 cups. The product is reasonable.

**Solution** Kayla feeds her dog 12.25 cups of food each week.

## Example 4

Janette earns \$8.25 per hour babysitting. She babysat her neighbor's daughter for 4.5 hours. How much did Janette earn?

**Strategy** Use place value.

**Step 1** Write a problem you can use to solve.

Multiply the amount Janette earns per hour by the number of hours she babysits.

$$8.25 \times 4.5$$

**Step 2** Use place value to multiply.

Multiply as you would with whole numbers.

$$\begin{array}{r} 12 \\ 12 \\ 8.25 \\ \times 4.5 \\ \hline 4125 \\ + 33000 \\ \hline 37125 \end{array}$$

**Step 3** Place the decimal point in the product.

Add the number of decimal places in the two factors.

The product will have 3 decimal places.

$$\begin{array}{r} 8.25 \quad \leftarrow \text{two decimal places} \\ \times 4.5 \quad \leftarrow \text{one decimal place} \\ \hline 37.125 \quad \leftarrow \text{three decimal places} \end{array}$$

**Step 4** Compare your answer to the question asked.

Money can have only two decimal places, so the answer must be rounded to the nearest hundredth.

\$37.125 rounds to \$37.13.

**Step 5** Use estimation to check the reasonableness of your answer.

\$8.25 is about \$8.

4.5 is about 5.

$$8 \times 5 = 40$$

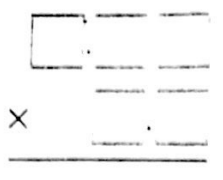
Because \$37.13 is close to \$40, the answer is reasonable.

**Solution** Janette earned \$37.13 babysitting.

**2 COACHED EXAMPLE**

Multiply  $4.71 \times 0.2$ .

First, multiply as you would with whole numbers.



4.71 has \_\_\_\_\_ decimal place(s).

0.2 has \_\_\_\_\_ decimal place(s).

So, the product will have \_\_\_\_\_ decimal place(s).

$4.71 \times 0.2 = \underline{\hspace{2cm}}$

### 3 LESSON PRACTICE

- 1 What number makes the equation true?

$$6.1 \times \square = 25.376$$

- A. 0.416
- B. 4.16
- C. 41.6
- D. 416

- 2 Derrick has a poster that measures 1.3 meters by 1.1 meters. What is the area of Derrick's poster?

- A. 0.26 square meters
- B. 1.43 square meters
- C. 2.6 square meters
- D. 14.3 square meters

- 3 Tasha made an error when she multiplied 4.21 and 8.3. Her work is shown below. What error did Tasha make?

$$\begin{array}{r} 4.21 \\ \times 8.3 \\ \hline 1263 \\ + 3368 \\ \hline 4.631 \end{array}$$

- A. Tasha should have lined up the decimal points before multiplying.
- B. Tasha made an addition error.
- C. Tasha should have put the decimal between the 6 and 3 in the product.
- D. Tasha should have placed a 0 in the ones place of the second partial product.

- 4 Multiply  $6.09 \times 0.88$ .

- A. 0.9744
- B. 5.3592
- C. 97.44
- D. 535.92

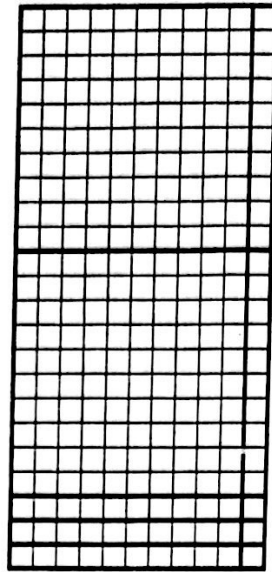
- 5 How many decimal places would be in the product of 3.12 and 4.9?

- A. 1
- B. 2
- C. 3
- D. 5

- 6 Raj has a chicken coop in his yard. He weighs one of the eggs that his chickens laid and it was 1.89 ounces. He estimates that a dozen eggs would weigh about 20 ounces. Is his estimate reasonable?

- A. The estimate is not reasonable because the whole number in 1.89 is 1 and 1 times 12 is only 12.
- B. The estimate is not reasonable because 12 eggs would weigh more than 24 ounces.
- C. The estimate is reasonable because 1.89 is close to, but not as much as 2, and 2 times 12 is 24.
- D. The estimate is not reasonable because 12 times 100 is 1,200.

- 7 Write an equation that is represented by the area model.




- 8 Find each product. Write the problem in the correct box.

$1.87 \times 3$

$3.1 \times 1.24$

$41.2 \times 0.2$

$2.06 \times 4$

$0.62 \times 6.2$

Product of 8.24	Product of 3.844	Product of 5.61

- 9 Yoshi multiplied two numbers. Her product contained 3 decimal places. Which pair of numbers could Yoshi have multiplied? Mark all that apply.

A.  $3.12 \times 4.1$

D.  $5.1 \times 3.12$

B.  $4.1 \times 6.2$

E.  $0.9 \times 0.55$

C.  $8.33 \times 9$

- 10 Ms. Nichols bought enough sandwiches to feed 28 people. Each sandwich serves 2 people. The cost of one sandwich is \$4.99. How much did Ms. Nichols pay for the sandwiches? Use words, numbers, or models to justify your answer.

- 11 Marvin wrote the following clues to describe a multiplication sentence.

- The product is close in value to 10.
- Both factors are decimal numbers.
- The product has three decimal places.
- One factor is greater than 1. The other factor is less than 1.

Write a multiplication equation that fits these clues. Explain how you created your answer.

- 12 Justine correctly multiplied the decimals shown. How can the product be correct without three decimal places?

$$8.5 \times 2.34 = 19.89$$

- 13 Luka is eating crackers. Each serving has 1.6 grams of fat. She ate 0.75 serving of crackers at lunch. She is now eating 1.5 servings of crackers as a snack. How many grams of fat did Luka eat all together? Explain how you found your answer.

- 14 Jin needs 0.8 gram of carbon for an experiment. She needs 4.15 times as much water. Jin says that she needs less than 4.15 grams of water.

**Part A**

Is Jin correct? Explain your reasoning.

**Part B**

How much water does Jin need for the experiment?

 grams

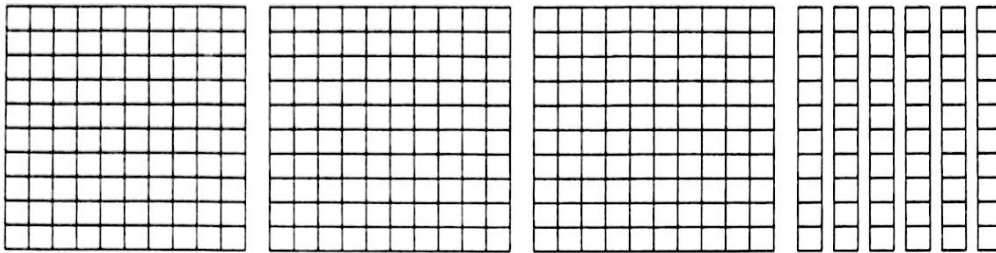


# Dividing Decimals

## 1 GETTING THE IDEA

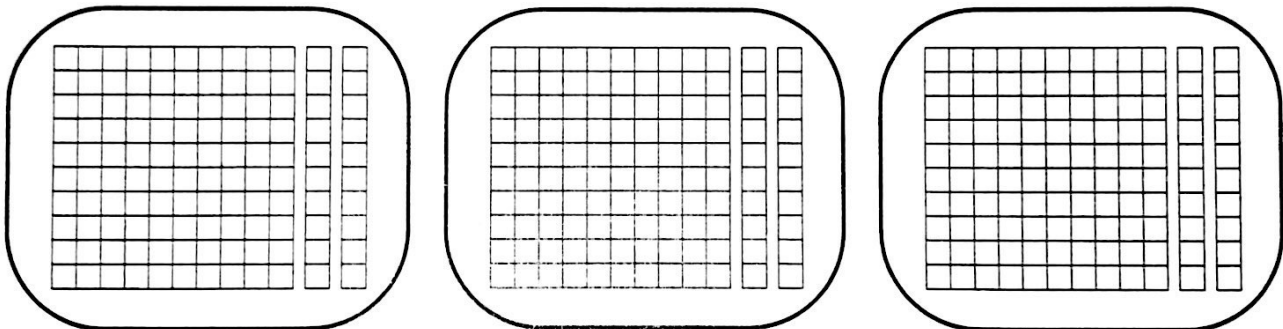
You can use decimal models to show decimal division.

Divide  $3.6 \div 3$ . Start by modeling 3.6.



Break the whole number part into 3 equal groups. Each group will have 1 whole.

Then break the 6 tenths into 3 equal groups. Each group will have 2 tenths.



Each group contains 1 whole and 2 tenths or 1.2.

So,  $3.6 \div 3 = 1.2$ .

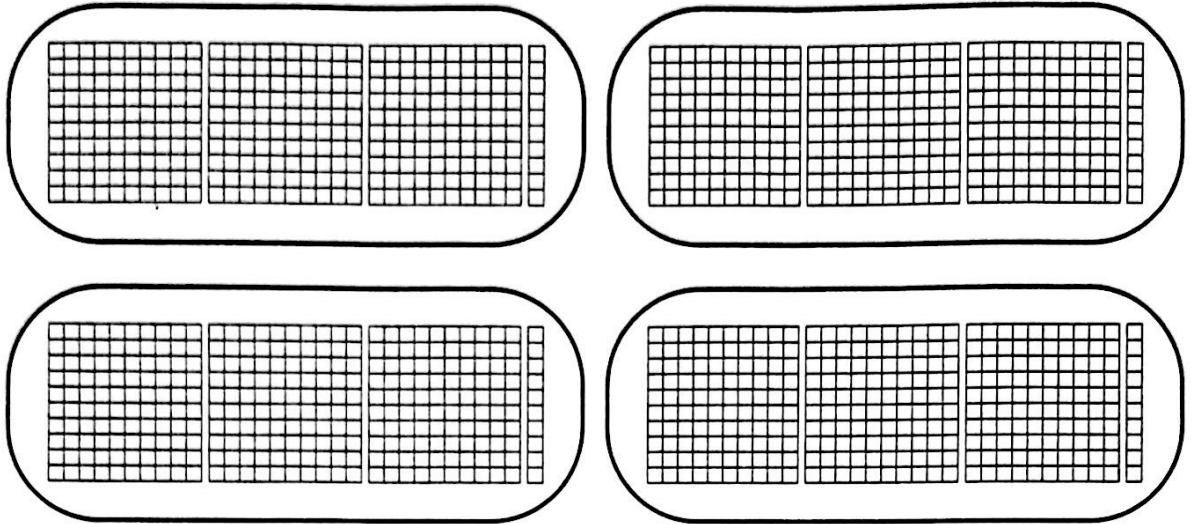
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## Example 1

Divide  $12.4 \div 4$ .

**Strategy** Make a model to find the quotient. Then use place value to divide.

**Step 1** Show 12.4. Divide the models into 4 equal groups.



Each group contains 3 wholes and 1 tenth.

**Step 2** Use place value to divide.

Divide as you would with whole numbers.

$$\begin{array}{r} 31 \\ 4 \overline{)12.4} \\ \underline{-12} \downarrow \\ 04 \\ \underline{-4} \\ 0 \end{array}$$

**Step 3** Place the decimal point in the quotient.

The decimal point in the quotient is directly above the decimal point in the dividend.

$$\begin{array}{r} 3.1 \\ 4 \overline{)12.4} \end{array}$$

The model shows the quotient is 3.1.

**Solution**  $12.4 \div 4 = 3.1$

## Example 2

Genevieve bought 9 bottles of apple juice for the school picnic. She spent a total of \$16.56 on apple juice. Each bottle of juice cost the same. What was the price for one bottle of juice?

**Strategy** Use place value to divide.

**Step 1** Write a problem you can use to solve.

Divide the total amount Genevieve spent by the number of bottles of juice she bought.

$$16.56 \div 9$$

**Step 2** Use place value. Divide as you would with whole numbers.

$$\begin{array}{r} 184 \\ 9 \overline{)16.56} \\ \underline{-9} \downarrow \\ 75 \\ \underline{-72} \downarrow \\ 36 \\ \underline{-36} \\ 0 \end{array}$$

**Step 3** Place the decimal point directly above the decimal point in the dividend.

$$\begin{array}{r} 1.84 \\ 9 \overline{)16.56} \end{array}$$

You can use estimation to check that the decimal point is in the right place.  
16.56 is about 17.

17 divided by 9 is more than 1 but not quite 2.

So it makes sense that the quotient is 1.84 not 18.4.

**Step 4** Use multiplication to check your answer.

Multiply the quotient by the divisor.

$$\begin{array}{r} 73 \\ 1.84 \\ \times 9 \\ \hline 16.56 \end{array}$$

The product is the same as the dividend. The answer is correct.

**Solution** Genevieve spent \$1.84 on each bottle of apple juice.

### Example 3

Mrs. Jarvis works at the school cafeteria. She has 87.5 ounces of ground beef. She is making meatballs that each weigh 2.5 ounces. How many meatballs can Mrs. Jarvis make?

**Strategy** Use place value. Change the divisor to a whole number.

**Step 1** Write a problem you can use to solve.

Divide the number of ounces of ground beef by the number of ounces per meatball.

$$87.5 \div 2.5$$

**Step 2** Change the divisor to a whole number.

Multiply the divisor by 10. Multiply the dividend by the same value.

$$87.5 \div 2.5$$

$$\begin{array}{ccc} \downarrow \times 10 & \downarrow & \times 10 \\ 875 \div & 25 & \end{array}$$

$$2.5 \overline{)87.5} \text{ becomes } 25 \overline{)875}$$

Multiplying by 10 moves the decimal point one place to the right. This makes the divisor a whole number.

**Step 3** Divide the new numbers.

$$\begin{array}{r} 35 \\ 25 \overline{)875} \\ - 75 \downarrow \\ \hline 125 \\ - 125 \\ \hline 0 \end{array}$$

$$87.5 \div 2.5 = 35$$

**Step 4** Use multiplication to check your answer.

Multiply the quotient by the divisor.

$$\begin{array}{r} 1 \\ 2 \\ 35 \\ \times 2.5 \\ \hline 175 \\ + 700 \\ \hline 87.5 \end{array}$$

The product is the same as the dividend. The answer is correct.

**Solution** Mrs. Jarvis can make 35 meatballs.

## Example 4

Divide  $38.58 \div 0.12$ .

**Strategy** Use place value. Change the divisor to a whole number.

**Step 1** Change the divisor to a whole number.

Multiply the divisor by 100. Multiply the dividend by the same value.

$$\begin{array}{r} 38.58 \div 0.12 \\ \downarrow \times 100 \quad \downarrow \times 100 \\ 3,858 \div 12 \end{array}$$

$$0.12 \overline{)38.58} \text{ becomes } 12 \overline{)3858}$$

↪ ↪

**Step 2** Divide the new numbers.

$$\begin{array}{r} 321 \\ 12 \overline{)3858} \\ - 36 \downarrow \\ \hline 25 \\ - 24 \downarrow \\ \hline 18 \\ - 12 \\ \hline 6 \end{array}$$

**Step 3** Continue to divide until there is no remainder.

Write a decimal point and zero to the right of the dividend.

Write the decimal point in the quotient and continue to divide.

Remember, 3,858 is the same as 3,858.0.

$$\begin{array}{r} 321.5 \\ 12 \overline{)3858.0} \\ - 36 \downarrow \\ \hline 25 \\ - 24 \downarrow \\ \hline 18 \\ - 12 \downarrow \\ \hline 60 \\ - 60 \\ \hline 0 \end{array}$$

$$38.58 \div 0.12 = 321.5$$

**Step 4** Use multiplication to check your answer.

Multiply the quotient by 0.12.

$$\begin{array}{r} 1 \\ 321.5 \\ \times 0.12 \\ \hline 6430 \\ + 32150 \\ \hline 38.580 \end{array}$$

Since 38.580 is the same as 38.58, the product is the same as the dividend.  
The answer is correct.

**Solution**  $38.58 \div 0.12 = 321.5$

## 2 COACHED EXAMPLE

Divide  $71.4 \div 2.8$ .

Change the divisor to a whole number.

Multiply the divisor by \_\_\_\_\_. Multiply the dividend by the same number.

71.4 becomes \_\_\_\_\_.

2.8 becomes \_\_\_\_\_.

Divide the new numbers. Divide until there is no remainder. Write a decimal point and a \_\_\_\_\_ to the right of the dividend to complete the division.

$\overline{) \quad \quad \quad}$

Use multiplication to check your answer.

Multiply \_\_\_\_\_ and \_\_\_\_\_.

The product matches the \_\_\_\_\_, so the answer is correct.

$71.4 \div 2.8 = \underline{\quad \quad \quad}$

- 1 Which multiplication problem could be used to check the quotient of  $28.84 \div 7.21 = 4$ ?
- A.  $4 \times 28.84 = 7.21$
- B.  $7.21 \times 28.84 = 4$
- C.  $28.84 \times 4 = 7.21$
- D.  $4 \times 7.21 = 28.84$
- 2 Which division problem is equivalent to  $0.3 \div 0.12$ ?
- A.  $3 \div 12$
- B.  $3 \div 120$
- C.  $30 \div 12$
- D.  $30 \div 1.2$
- 3 Divide  $10.35 \div 2.3$
- A. 0.45
- B. 4.5
- C. 45
- D. 450
- 4 Ester packed 9 boxes inside of a crate. Each box had the same mass. If the crate had a total mass of 92.16 kilograms, what was the mass of each box?
- A. 1.024 kilograms
- B. 10.24 kilograms
- C. 102.4 kilograms
- D. 1,024 kilograms
- 5 Which division problem has a quotient that is a whole number?
- A.  $4.5 \div 0.25$
- B.  $2.86 \div 1.3$
- C.  $0.28 \div 0.7$
- D.  $0.55 \div 0.5$
- 6 Dina has 12.4 feet of ribbon. She wants to cut the ribbon into pieces so that each piece is the same length. Into what length could she cut each piece if she wants each piece to be the same length with no ribbon left over?
- A. 2 feet
- B. 4.5 feet
- C. 0.8 feet
- D. 3.1 feet
- 7 Which does **not** have a quotient of 2?
- A.  $6.2 \div 3.1$
- B.  $12.4 \div 6.2$
- C.  $2.5 \div 1.25$
- D.  $5.6 \div 2.23$
- 8 Juliette and her two brothers spent \$45.75 on flowers for their grandmother. Each person will pay the same amount. How much will each person pay?
- A. \$1.53
- B. \$15.25
- C. \$22.88
- D. \$48.75

- 9 Gina saves quarters. She has \$17.75 in quarters. How many quarters does she have? Show your solution in two ways. Use division to show one way. Use words, numbers, or models for the second way.

- 10 Which division problem has a quotient of 4.2? Mark all that apply.

- A.  $15.4 \div 2.8$   
 B.  $25.2 \div 6$   
 C.  $27.3 \div 6.5$   
 D.  $43.2 \div 9.6$   
 E.  $44.1 \div 10.5$

- 11 Look at the two division problems below. Will they have the same quotient? Explain how you can find the answer without calculating.

$$7.4 \overline{)92.5}$$

$$74 \overline{)925}$$



- 12 Lilah completed the division problem below.

$$7.84 \div 2$$

Select the boxes in the table to show whether each statement is true or false.

Statement	True	False
The first step of the division is to multiply 7.84 and 2 by 10.	<input type="radio"/>	<input type="radio"/>
The quotient will be a whole number.	<input type="radio"/>	<input type="radio"/>
The quotient multiplied by 2 will equal 7.84.	<input type="radio"/>	<input type="radio"/>
The first digit of the quotient will be in the ones place.	<input type="radio"/>	<input type="radio"/>
The quotient will have two decimal places.	<input type="radio"/>	<input type="radio"/>

- 13 Marta and Jake worked together on the division problem below.

$$45.21 \div 8.22$$

- Marta said the dividend and divisor should be multiplied by 10 to make each number a whole number.
- Jake said that the dividend and divisor should be multiplied by 100 to make each number a whole number.

With which student do you agree? Explain your answer.

- 14 Nathaniel measured the height of one shelf on his bookcase. He wants to know which books will fit on the shelf. The shelf is 22.86 centimeters tall. He measured it again with an inch ruler. The shelf is 9 inches tall.

**Part A**

Write an equation you could use to find the number of centimeters in 1 inch.

**Part B**

Solve the equation you wrote in Part A. Show your work.

**Part C**

The top shelf of Nathaniel's bookcase is 12 inches tall. How many centimeters tall is the top shelf? Explain how you found your answer.