

CHAPTER
1

Multiply and Divide Decimals

The **★ BIG Idea**

Solve real-world problems involving multiplication and division of decimals.

FOLDABLES
Study Organizer

Make this Foldable to help you organize your notes. Begin with two sheets of paper.



- Stack the pages, placing the sheets of paper $\frac{3}{4}$ inch apart.
- Crease and staple along the fold.



- Roll up bottom edges. All tabs should be the same size.
- Label the tabs with the topics from the chapter.



Review Vocabulary

divisor (Prior Grade) **divisor** the number by which the dividend is being divided

$$15 \div 3 = 5 \qquad 3 \overline{)15}$$

↑ ↑
divisor divisor

factors (Prior Grade) **factores** numbers that are multiplied together

$$3 \times 5 = 15$$

↑ ↑
factors

Key Vocabulary

	English	Español
p. 44	compatible numbers	números compatibles

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When Will I Use This?



David and Raj's Money Challenge

This car wash job is great!
Great idea!

Especially for \$5.50 an hour!

What are you going to do with your money?

I'm saving for a new video game system!

\$200

How much is it?

Wow! That's a lot of money!
I know, but I really want it.

And I've already saved \$68!

The question is...

How many more hours do I have to work until I can buy the new game system?

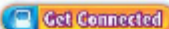
Your Turn!
You will solve this problem in Chapter 1.

Are You Ready for Chapter 1?

You have two options for checking prerequisite skills for this chapter.

Text Option Take the Quick Check below. Refer to the Quick Review for help.

QUICK Check	QUICK Review								
<p>Multiply. (Prior Grade)</p> <p>1. 15×20 2. 21×18 3. 42×16 4. 19×51 5. 94×30 6. 49×22</p> <p>7. SHOPPING Sandra bought 2 dresses for \$46 each. How much did Sandra spend for both dresses?</p> <p>8. MAGAZINES Jackson sold 12 magazine subscriptions. Each subscription costs \$22. What is the total cost?</p> <p>9. TRAVEL The Stevens family drove 258 miles a day for 3 days. How many miles did they drive in all?</p>	<p>EXAMPLE 1</p> <p>Multiply 13×15.</p> $\begin{array}{r} 13 \\ \times 15 \\ \hline 65 \text{ Multiply the ones.} \\ + 130 \text{ Multiply the tens.} \\ \hline 195 \text{ Add.} \end{array}$ <p>EXAMPLE 2</p> <p>The table shows the cost per week to rent a dirt bike, moped, and scooter. How much does it cost to rent a moped for 4 weeks?</p> <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Vehicle</th> <th>Cost per Week (\$)</th> </tr> </thead> <tbody> <tr> <td>Dirt bike</td> <td>15</td> </tr> <tr> <td>Moped</td> <td>23</td> </tr> <tr> <td>Scooter</td> <td>10</td> </tr> </tbody> </table> $\begin{array}{r} 23 \\ \times 4 \\ \hline 92 \end{array}$ <p>It costs \$92 to rent a moped for 4 weeks.</p>	Vehicle	Cost per Week (\$)	Dirt bike	15	Moped	23	Scooter	10
Vehicle	Cost per Week (\$)								
Dirt bike	15								
Moped	23								
Scooter	10								
<p>Divide. (Prior Grade)</p> <p>10. $112 \div 8$ 11. $204 \div 6$ 12. $539 \div 11$ 13. $779 \div 19$</p> <p>14. MUSIC A musician sold 64 million albums in 16 months. She sold the same amount in each month. How many albums did she sell in each month?</p>	<p>EXAMPLE 3</p> <p>Divide $323 \div 17$.</p> $\begin{array}{r} 19 \\ 17 \overline{)323} \\ \underline{-17} \text{ Divide the tens.} \\ 153 \\ \underline{-153} \text{ Divide the ones.} \\ 0 \end{array}$								

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Multi-Part Lesson
1-1 Multiply Decimals
 PART A B C D E

Main Idea

Estimate the product of decimals and judge the reasonableness of the results.

NGSSS

MA.6.A.5.3 Estimate the results of computations with fractions, decimals, and percents and judge the reasonableness of the results.



Estimate Products

SKATEBOARDING The record for the greatest distance traveled on skateboard in 24 hours was set by James Peters in 2007. He traveled about 7.6 miles per hour.



1. Round 7.6 to the nearest whole number.
2. Estimate how many miles James Peters traveled in 24 hours.
3. Is your estimate higher or lower than the actual distance he traveled? Explain.

To estimate products of decimals, round each number. Then multiply.

Key Concept

Round Decimals

To round a decimal, first underline the digit to be rounded. Then look at the digit to the right of the place being rounded.

- If the digit is 4 or less, the underlined digit remains the same.
- If the digit is 5 or greater, add 1 to the underlined digit.
- After rounding, change all digits after the underlined digit to zeros.

EXAMPLE Estimate Products Using Rounding

1 Estimate 8.7×2.8 .

Round to the nearest whole number to make it easier to compute mentally.

$$\begin{array}{r} 8.7 \rightarrow 9 \quad \text{Round 8.7 to 9.} \\ \times 2.8 \rightarrow \underline{\times 3} \quad \text{Round 2.8 to 3.} \\ \hline 27 \end{array}$$

The product is about 27.

CHECK Your Progress

Estimate each product.

- a. 9.6×1.8 b. 8.7×2.9 c. 68.4×21.3



Real-World EXAMPLE

- 2 DOGS** A greyhound can travel 39.3 miles per hour. At this speed, about how far could a greyhound travel in 6.5 hours?

$$\begin{array}{r} 39.3 \rightarrow 40 \quad \text{Round 39.3 to 40.} \\ \times 6.5 \rightarrow \times 7 \quad \text{Round 6.5 to 7.} \\ \hline 280 \end{array}$$

The greyhound could travel about 280 miles in 6.5 hours.

Study Tip

Rounding Decimals When rounding decimals, such as 99.96 to the tenths, the 9 must round up. So, 99.96 rounded to the nearest tenth is 100.0.

CHECK Your Progress

- d. **MONEY** Suppose one U.S. dollar is equal to 5.3 Egyptian pounds. About how many Egyptian pounds would you receive for \$48.50?
- e. **ASTRONOMY** The Earth is rotating around the Sun about 18.6 miles per second. About how many miles does it travel in 4.8 seconds?

Real-World EXAMPLE

- 3 SCHOOL SUPPLIES** Patrice has \$20 to buy 5 binders for her classes. She found binders that cost \$4.29 each. Does she have enough money to buy these binders? Explain your reasoning.



Estimate.

$$5 \times \$4 = \$20 \quad \text{Estimate 4.29 as 4.}$$

$$5 \times \$5 = \$25 \quad \text{Estimate 4.29 as 5.}$$

The actual cost of the binders is between \$20 and \$25. So, Patrice does not have enough money to buy the binders.

CHECK Your Progress

- f. **PROFIT** The art club makes a profit of \$1.75 on every batch of cookies they sell at a bake sale. The goal is to earn at least \$50 selling batches of cookies. They estimate they will need to sell at least 30 batches. Is this estimate reasonable? Explain your reasoning.



CHECK Your Understanding

Example 1 Estimate each product.

(p. 27)

1. 5.8×4

2. 27.3×9

3. 57.1×32

4. 3.5×1.8

5. 13.92×2.7

6. 94.89×3.11

Example 2
(p. 28)

7. **MONEY** A grocery store sells American cheese for \$3.89 per pound. About how much would 1.89 pounds of the cheese cost?

Example 3
(p. 28)

8. **MEMORY** Greg has 52 megabytes of free space left on his MP3 player. He wants to download 7 songs that each use 7.9 megabytes of memory. He estimates that he will need 56 megabytes of memory. Explain why his estimate is reasonable.



Practice and Problem Solving

= Step-by-Step Solutions begin on page R1.
Extra Practice is on page EP2.

Example 1 Estimate each product.

(p. 27)

9. 9.7×3.3

10. 3.4×5.6

11. 17.5×8.4

$$\begin{array}{r} 26.3 \\ \times 9.7 \\ \hline \end{array}$$

$$\begin{array}{r} 33.6 \\ \times 82.1 \\ \hline \end{array}$$

$$\begin{array}{r} 99.1 \\ \times 11.2 \\ \hline \end{array}$$

15. 44.8×5.1

16. 28.21×8.02

17. 71.92×2.01

Example 2
(p. 28)

18. **FRUIT** On average, the U.S. produces 36.5 million tons of fruit each year. About how much fruit does it produce in 2.25 years?

19. **SCIENCE** A single year on Saturn is equal to 29.4 years on Earth. About how many Earth-years are equal to 3.2 years on Saturn?

Example 3
(p. 28)

20. **CRAFTS** Lisha is making headbands using ribbon. She would like to make 12 headbands. Each one requires 15.5 inches of ribbon. She estimates that she will need to buy 160 inches of ribbon. Is her estimate reasonable? Explain your reasoning.

21. **GIFT CARDS** Miguel received a \$50 gift card to a bookstore. He would like to buy 3 books that cost \$15.75 each. He estimates that he cannot buy all three books because each book costs about \$20, and all three books would cost \$60. Is his estimate reasonable? Explain your reasoning.

Use estimation to determine whether each answer is reasonable. If the answer is reasonable, write *yes*. If not, write *no* and provide a reasonable estimate.

22. $22.8 \times 4.7 = 107.16$

23. $2.1 \times 4.9 \times 7.2 = 105.84$

24. $7.8 \times 1.1 \times 4.2 = 50$

25. $43.8 \times 2.8 \times 3.1 = 371.8$



26. **GRAPHIC NOVEL** Refer to the graphic novel frame below for Exercises a–b.



- How much more does Raj need until he has enough to buy the video game system?
- If he works for 25 hours, will he have enough to buy the video game system?

27. **MONEY** Hannah’s hourly wage at the ice cream shop is \$5.85. The table shows the number of hours she worked. She estimates her earnings to be \$120. Without calculating her actual earnings, determine if her estimate is more or less than her actual earnings. Explain your reasoning.

Day	Hours Worked
Monday	3.5
Tuesday	4.25
Wednesday	3.75
Thursday	2.5
Friday	4.75

28. **FUEL** A car releases 19.6 pounds of carbon dioxide for every 1 gallon of gasoline burned. Estimate the number of pounds of carbon dioxide released if 14.5 gallons is burned.

REASONING The accuracy of an estimate depends on the place value the numbers are rounded to. For each exercise, round the first factor to the tens and then the ones before estimating. Which way gives an estimate that is closer to the actual product?

29. 35.1×8 30. 94.1×4 31. 58.8×6

32. **NUTRITION** The table shows some nutritional facts about orange juice. Estimate each value for 1 quart of orange juice. (*Hint:* 4 cups is equal to 1 quart.)

Orange Juice (1 cup)	
Calories	112
Vitamin C	96.9 mg
Carbohydrates	26.8 g
Calcium	22.4 mg

33. **TREES** A King Palm can grow about 2.1 feet a year. Estimate the height of the King Palm, in yards, after 15 years.

REASONING Estimate each product to determine if each calculator answer is correct. Explain your reasoning.

34. 46.85×9.75 ; 456.7875 35. 90.8×3.1 ; 217.18



H.O.T. Problems

- 36. **OPEN ENDED** Name three decimals with a product that is about 40.
- 37. **CHALLENGE** A scooter can travel between 22 and 28 miles on each gallon of gasoline. If one gallon of gasoline costs between \$3.75 and \$3.95 per gallon, about how much will it cost to travel 75 miles?
- 38. **Write MATH** Suppose your friend multiplied 1.2 and 2.6 and got 31.2 as the product. Is your friend's answer reasonable? Justify your response.



NGSSS Practice

MA.6.A.5.3

- 39. Green peppers are on sale for \$2.89 per pound. Mrs. Moseley bought 1.75 pounds of peppers. About how much did she pay for the peppers?
 - A. less than \$4
 - B. between \$5 and \$6
 - C. between \$6 and \$7
 - D. more than \$7
- 40. Medina's school lunch menu is shown.

Friday			
Pizza	\$1.75	Fruit Punch	\$0.75
Fish and Fries	\$2.25	Milk	\$0.80
Salad	\$1.15	Pudding	\$0.85

- Which of the following is a reasonable estimate for the cost of two slices of pizza, a salad, and fruit punch?
- F. \$4
 - G. \$6
 - H. \$8
 - I. \$10

- 41. Mario and Andrew's hourly charge for mowing lawns is shown.

Mario	Andrew
\$8.25/hr	\$5.85/hr

Suppose Mario and Andrew each worked 20 hours. About how much more money did Mario earn?

- A. \$30
 - B. \$40
 - C. \$60
 - D. \$70
- 42. **SHORT RESPONSE** Javier bought 4 pencil toppers at the school store for \$3.69 each. He estimated how much he needs to pay and gave the cashier \$16. Is Javier's estimation reasonable? Explain your reasoning.

Spiral Review

DIVING The table gives the scores for the Men's Synchronized 10-Meter Diving at the 2008 Olympics. (Lesson 0-2)

- 43. How many more points did China earn than Germany?
- 44. What is the difference in the points China and the United States earned?

Country	Points
China	468.18
Germany	450.42
Russian Federation	445.26
Australia	444.84
United States	440.64



Multi-Part Lesson

1-1

Multiply Decimals

PART

A

B

C

D

E

Explore

Main Idea

Use models to multiply a decimal by a whole number.

NGSSS

MA.6.A.1.1 Explain and justify procedures for multiplying and dividing fractions and decimals.

MA.6.A.1.2 Multiply and divide fractions and decimals efficiently.



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Multiply Decimals by Whole Numbers

The table shows the relationship between decimals and base-ten blocks. You can use base-ten blocks to multiply decimals.

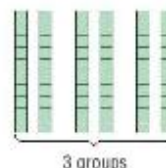
Ones (1.0)	Tenths (0.1)	Hundredths (0.01)
One 10-by-10 flat represents 1 or 1.0.	One 1-by-10 rod represents 0.1.	One 1-by-1 cube represents 0.01.

ACTIVITY

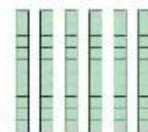
1 WALKING Louisa walked her dog 0.2 mile on Monday, Wednesday, and Friday. Find the total distance Louisa walked all week.

What do you need to find? the total distance Louisa walked

STEP 1 Just as 3×2 means 3 groups of 2, 3×0.2 means 3 groups of 2 tenths. Model three groups of two tenths using base-ten blocks.



STEP 2 Combine the tenths. There are six tenths.



So, $3 \times 0.2 = 0.6$. Louisa walked a total of 0.6 mile.

Practice and Apply

Use base-ten blocks to find each product.

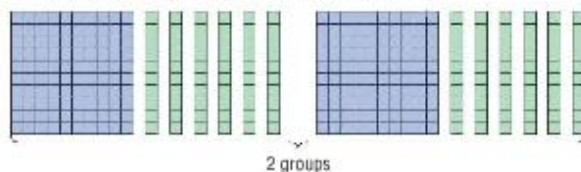
- | | | | |
|-------------------|-------------------|--------------------|--------------------|
| 1. 3×0.3 | 2. 2×0.4 | 3. 4×0.02 | 4. 5×0.01 |
| 5. 3×0.5 | 6. 4×0.6 | 7. 2×0.08 | 8. 8×0.04 |



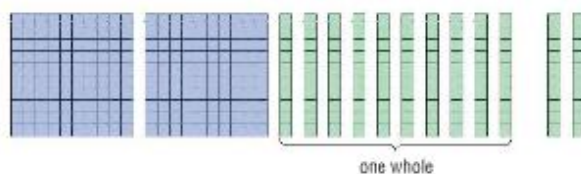
ACTIVITY

2 Model 2×1.6 to find the product.

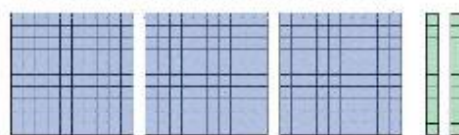
STEP 1 Model two groups of one and six tenths.



STEP 2 Combine the ones. Then combine the tenths.



STEP 3 Combine the 10 tenths into 1 whole.



So, $2 \times 1.6 = 3.2$.

Practice and Apply

Use base-ten blocks to find each product.

- | | | | |
|--------------------|--------------------|---------------------|---------------------|
| 9. 2×1.3 | 10. 3×1.1 | 11. 4×1.02 | 12. 6×2.01 |
| 13. 5×2.5 | 14. 2×3.8 | 15. 5×1.09 | 16. 4×3.07 |

Analyze the Results

- Compare and contrast 2×16 and 2×1.6 . How are the products the same? different?
- MAKE A CONJECTURE** Explain how to find 5×1.4 without using base-ten blocks. Justify your procedure. Then check your answer using base-ten blocks.
- MAKE A CONJECTURE** Suppose you multiply a whole number by a decimal greater than one. Is the product *less than*, *greater than*, or *equal to* the whole number? Explain your answer.
- Write MATH** Write a rule that you can use to multiply a whole number by a decimal without using base-ten blocks.



Multi-Part Lesson

1-1

Multiply Decimals

PART

A

B

C

D

E

Main Idea

Estimate and find the product of decimals and whole numbers.

NGSSS

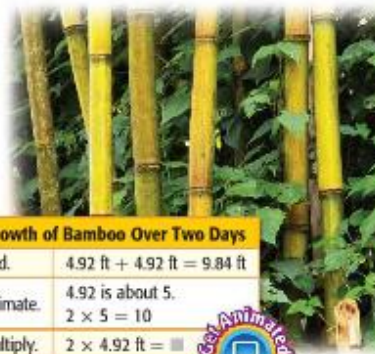
MA.6.A.1.1
 Explain and justify procedures for multiplying and dividing fractions and decimals.

MA.6.A.1.2 Multiply and divide fractions and decimals efficiently.
 Also addresses MA.6.A.1.3, MA.6.A.5.3.



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Multiply Decimals by Whole Numbers



Add.	$4.92 \text{ ft} + 4.92 \text{ ft} = 9.84 \text{ ft}$
Estimate.	4.92 is about 5 . $2 \times 5 = 10$
Multiply.	$2 \times 4.92 \text{ ft} = \square$



PLANTS Bamboo can grow about 4.92 feet in height per day. The table shows different ways to find the total height a bamboo plant can grow in two days.

- Use the addition problem and the estimate to find 2×4.92 .
- Write an addition problem, an estimate, and a multiplication problem to find the total growth over 3 days, 4 days, and 5 days.
- MAKE A CONJECTURE** Explain how to find 6×4.92 .

Using repeated addition can help you place the decimal point in the product of a whole number and a decimal. The whole number represents the number of times the decimal is used as an addend. So, place the decimal point in the product the same number of places from the right as the decimal factor.

EXAMPLES Multiply Decimals

1

Find 4×0.83 .

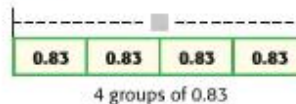
Estimate $4 \times 1 = 4$

0.83 ← two decimal places

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

3.32 Place the decimal point two places from the right.

Check for Reasonableness $3.32 \approx 4$ ✓



4 groups of 0.83

2

Find 3×14.2 .

Estimate $3 \times 14 = 42$

14.2 ← one decimal place

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

42.6 Place the decimal point one place from the right.

Check for Reasonableness $42.6 \approx 42$ ✓



3 groups of 14.2



CHECK Your Progress

a. 5×0.25

b. 8×4.47

c. 9×2.63



Vocabulary Link

Everyday Use

Annex to add something

Math Use

Annex to annex a zero means to place a zero at the beginning or end of a decimal

EXAMPLE Annex Zeros in the Product

3 Find 2×0.018 .

$$\begin{array}{r} 0.018 \\ \times 2 \\ \hline 0.036 \end{array}$$

Annotations:
 - Above the 8 in 0.018: 1
 - Arrow from 1 to 0.018: three decimal places
 - Arrow from 0.036 to the left: Annex a zero on the left of 36 to make three decimal places.

Check by Adding $0.018 + 0.018 = 0.036$ ✓

CHECK Your Progress

- d. 3×0.02 e. 0.12×8 f. 11×0.045

Real-World EXAMPLE

4 **TRAIL MIX** A batch of trail mix calls for 1.2 pounds of dry cereal. Nigela is making 5 batches of trail mix. She already has 2.2 pounds of cereal. How many more pounds of dry cereal does she need?



Step 1 Multiply.

$$\begin{array}{r} 1.2 \\ \times 5 \\ \hline 6.0 \end{array}$$

Annotations:
 - Arrow from 1.2 to the right: one decimal place
 - Arrow from 6.0 to the right: one decimal place

Step 2 Subtract.

$$\begin{array}{r} 6.0 \\ - 2.2 \\ \hline 3.8 \end{array}$$

So, Nigela will need 3.8 more pounds of dry cereal.

CHECK Your Progress

- g. **BIRDS** A bee hummingbird has a mass of 1.8 grams. How many grams are 6 hummingbirds and a 4-gram nest?
 h. **MONEY** Rafael has saved \$45 for a new computer screen. He is saving \$8.75 a week for 5 weeks for the remaining amount. What is the total cost of the computer screen?

QUICK Review

Subtracting Decimals

When subtracting decimals, remember to line up the decimal points.



CHECK Your Understanding

Examples 1–3
(pp. 34–35)

Multiply.

1. 2.7×6 2. 1.4×4 3. 0.52×3 4. $\$0.83 \times 6$
 5. 5×0.09 6. 4×0.012 7. 0.065×18 8. 0.015×23

Example 4
(p. 35)

9. **VACATIONS** The table shows the number of gallons of gasoline the Beckleys purchased on their road trip. What was the total cost for gas for the trip? Justify your procedure.

Fuel	
Number of Gallons	Cost per Gallon (\$)
12	4.89
17	4.72
15	5.09

Practice and Problem Solving

= Step-by-Step Solutions begin on page R1.
Extra Practice is on page EP2.

Examples 1–3
(pp. 34–35)

Multiply.

10. 1.2×7 11. 1.7×5 12. 0.7×9 13. 0.9×4
 14. 2×1.3 15. 2.4×8 16. 0.8×9 17. 3×0.5
 18. 3×0.02 19. 7×0.012 20. 0.0036×19 21. 0.0198×75

22. **MEASUREMENT** Asher recently bought the poster shown at the right. What is its area? (Hint: Use $A = bh$.)



23. **MEASUREMENT** The height of Mount Everest, in meters, can be found by multiplying 8.85 by 1,000. Find the height of Mount Everest. Explain your answer.

Example 4
(p. 35)

24. **SCHOOL SUPPLIES** Sharon buys 14 folders for \$0.75 each. How much change will she receive if she pays with \$15?

25. **TEMPERATURE** The hottest temperature recorded in the world, in degrees Fahrenheit, can be found by multiplying 13.46 by 10. Find this temperature. Justify your procedure.

26. **MEASUREMENT** The thickness of each type of coin is shown in the table. How much thicker is a stack of a dollar's worth of nickels than a dollar's worth of quarters? Explain your answer.

Coin	Thickness (mm)
penny	1.55
nickel	1.95
dime	1.35
quarter	1.75





H.O.T. Problems

27. **OPEN ENDED** Write a real-world problem involving multiplication by a decimal factor. Then solve the problem.
28. **CHALLENGE** Discuss two different ways to find the value of the expression $5.4 \times 1.17 \times 100$ that do not require you to first multiply 5.4×1.17 .
29. **REASONING** Use the product of 123×47 to find the product of 123×0.47 . Explain the difference in the two products.
30. **Write MATH** Your friend thinks that $1.5 \times 8 = 1.20$ because you do not count the zero when placing the decimal point. Is your friend correct? Justify your reasoning.



NGSSS Practice

MA.6.A.1.3

31. **GRIDDED RESPONSE** The school store is selling the following items.

Item	Price
Pennant	\$2.49
Bumper Sticker	\$1.79
Magnet	\$0.89

If Miguel buys two pennants, two bumper stickers, and four magnets, how much in dollars will he spend for all the items?

32. The table shows the admission prices to an amusement park.

Admission Prices	One-Day Pass	Two-Day Pass
Adult	\$39.59	\$43.99
Child (ages 3–9)	\$30.59	\$33.99

What is the total price of one-day passes for two adults and three children?

- A. \$140.36 C. \$179.95
 B. \$170.95 D. \$189.95

Spiral Review

Estimate. (Lesson 1-1A)

33. 47.2×1.8 34. 3.86×5.19 35. 108.39×72.9

36. **SPORTS** Kaitlyn recorded the number of hours that she practiced soccer drills. What was the total time she practiced? (Lesson 0-5)

Day	Hours Practiced
Monday	$2\frac{1}{3}$
Wednesday	$1\frac{1}{3}$
Friday	$1\frac{3}{4}$

37. **GEOMETRY** Find the perimeter of a triangle with side lengths 2.12 centimeters, 2.03 centimeters, and 1.98 centimeters. (Lesson 0-2)



Multi-Part Lesson

1-1

Multiply Decimals

PART

A

B

C

D


E

Explore

Main Idea

Use decimal models to multiply decimals.

NGSSS

-  **MA.6.A.1.1** Explain and justify procedures for multiplying and dividing fractions and decimals.
- MA.6.A.1.2** Multiply and divide fractions and decimals efficiently.



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Multiply Decimals by Decimals

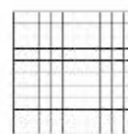


You can also model decimals on a 10-by-10 grid.

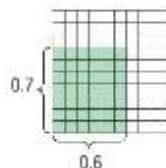
ACTIVITY

1 Find 0.7×0.6 . Use decimal models.

STEP 1 Draw a 10-by-10 decimal model. Recall that each small square represents 0.01.



STEP 2 Shade a rectangle that is 7 tenths units wide and 6 tenths units long.



STEP 3 Count the number of shaded squares.

There are *forty-two hundredths* in the shaded region. So, $0.7 \times 0.6 = 0.42$.

Practice and Apply

Use decimal models to show each product.

1. 0.3×0.3 2. 0.4×0.9 3. 0.9×0.5

Analyze the Results

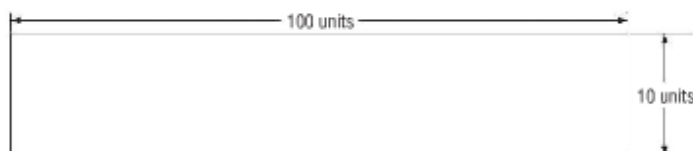
4. Tell how many decimal places are in each factor and in each product of Exercises 1–3 above.
5. Is 0.2×0.3 equal to 0.6 or 0.06? Justify your reasoning with a model.
6. **MAKE A CONJECTURE** Use the pattern you discovered in Exercise 4 to find 0.6×0.2 . Check your conjecture with a model or a calculator.
7. Find two decimals with a product of 0.24.



ACTIVITY

2 Model 0.8×0.16 . Use an area model.

STEP 1 Since you are multiplying tenths by hundredths, think about a 10-by-100 grid. There are 1,000 squares in all, but you will not draw them.



STEP 2 Draw and shade 8 tenths of the height to model 0.8 and shade 16 hundredths across to model 0.16.



STEP 3 Find the number of squares shaded. Each square represents one thousandth of the full rectangle.

There are 128 out of 1,000 squares, or 128 thousandths, shaded.
So, $0.8 \times 0.16 = 0.128$.

Practice and Apply

Use decimal models to show each product.

8. 0.3×0.14

9. 0.8×0.03

10. 0.5×0.04

Analyze the Results

11. **MAKE A CONJECTURE** Find the product of 0.04 and 0.08 without using a model.
12. Explain why $0.4 \times 0.5 = 0.2$.
13. **MAKE A CONJECTURE** How does the number of decimal places in the product relate to the number of decimal places in the factors?
14. Analyze each product.
 - a. Explain why the first product is less than 0.6.
 - b. Explain why the second product is equal to 0.6.
 - c. Explain why the third product is greater than 0.6.

First Factor	Second Factor	Product
0.9	$\times 0.6$	$= 0.54$
1.0	$\times 0.6$	$= 0.60$
1.5	$\times 0.6$	$= 0.90$



Multi-Part Lesson

1-1

Multiply Decimals

PART

A

B

C

D

E

Main Idea

Multiply decimals by decimals.

NGSSS

MA.6.A.1.1 Explain and justify procedures for multiplying and dividing fractions and decimals.

MA.6.A.1.2 Multiply and divide fractions and decimals efficiently.

Also addresses MA.6.A.1.3, MA.6.A.5.3.



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Multiply Decimals by Decimals

PLANETS The table shows the weight of a 1-pound object on each planet.

Planet	Weight (pounds)
Mercury	0.3
Venus	0.9
Mars	0.3
Earth	1
Jupiter	2.3
Saturn	1
Uranus	0.8
Neptune	1.1

1. A 0.5-pound object weighs one half as much as a 1-pound object. What would this object weigh on Jupiter?
2. What would an object that weighs 5 pounds on Earth weigh on Jupiter?
3. **MAKE A CONJECTURE** How can you use the results of Exercises 1 and 2 to find 0.5×2.3 ?

When multiplying a decimal by a decimal, multiply as with whole numbers. To place the decimal point, find the sum of the number of decimal places in each factor. The product has the same number of decimal places.

EXAMPLES Multiply Decimals

- 1** Find 4.2×6.7 . **Estimate** $4.2 \times 6.7 \rightarrow 4 \times 7$ or 28

$$\begin{array}{r}
 4.2 \quad \leftarrow \text{one decimal place} \\
 \times 6.7 \quad \leftarrow \text{one decimal place} \\
 \hline
 294 \\
 + 252 \\
 \hline
 28.14 \quad \leftarrow \text{two decimal places}
 \end{array}$$

The product is 28.14. Compared to the estimate, the product is reasonable.

- 2** Find 3.6×0.05 . **Estimate** $3.6 \times 0.05 \rightarrow 4 \times 0$ or 0

$$\begin{array}{r}
 3.6 \quad \leftarrow \text{one decimal place} \\
 \times 0.05 \quad \leftarrow \text{two decimal places} \\
 \hline
 0.180 \quad \leftarrow \text{three decimal places}
 \end{array}$$

The product is 0.180 or 0.18. Once you place the decimal point, you can drop the zero at the right.

CHECK Your Progress

- a. 5.7×2.8 b. 4.12×0.05 c. 0.014×3.7



EXAMPLE Annex a Zero

3 Find 1.4×0.067 .

$$\begin{array}{r} 0.067 \quad \leftarrow \text{three decimal places} \\ \times 1.4 \quad \leftarrow \text{one decimal place} \\ \hline 268 \\ + 67 \\ \hline 0.0938 \quad \leftarrow \text{Annex a zero to make four decimal places.} \end{array}$$

CHECK Your Progress

- d. 0.04×0.32 e. 0.26×0.205 f. 1.33×0.06

Real-World EXAMPLE



Real-World Link
A car that can travel 21 miles on one gallon of gasoline will cost about \$925 per year more, in gasoline costs alone, than a car that can travel 31 miles on one gallon of gasoline.

4 CARS A certain car can travel 28.45 miles with one gallon of gasoline. The gasoline tank can hold 11.5 gallons. How many miles can this car travel on a full tank of gas? Justify your answer.

Estimate $28.45 \times 11.5 \rightarrow 30 \times 12$ or 360

$$\begin{array}{r} 28.45 \quad \leftarrow \text{two decimal places} \\ \times 11.5 \quad \leftarrow \text{one decimal place} \\ \hline 14225 \\ 2845 \\ + 2845 \\ \hline 327.175 \quad \leftarrow \text{The product has three decimal places.} \end{array}$$

The car could travel 327.175 miles. Since $327.175 \approx 360$, the answer is reasonable.

CHECK Your Progress

g. NUTRITION FACTS A nutrition label indicates that one serving of apple crisp oatmeal has 2.5 grams of fat. How many grams of fat are there in 3.75 servings? Justify your answer.



CHECK Your Understanding

Examples 1–3
(pp. 40–41)

Multiply.

- | | | |
|----------------------|----------------------------|-------------------------|
| 1. 0.6×0.5 | 2. 1.4×2.56 | 3. 27.43×1.089 |
| 4. 0.3×2.4 | 5 0.52×2.1 | 6. 0.45×0.053 |
| 7. 2.7×1.35 | 8. 0.03×0.09 | 9. 0.04×2.12 |

Example 4
(p. 41)

10. MEASUREMENT A mile is equal to approximately 1.609 kilometers. How many kilometers is 2.5 miles? Justify your answer.



Practice and Problem Solving

Step-by-Step Solutions begin on page R1.
Extra Practice is on page EP2.

Examples 1–3 Multiply.
(pp. 40–41)

- | | | |
|-------------------------|------------------------|-------------------------|
| 11. 0.7×0.4 | 12. 1.5×2.7 | 13. 0.4×3.7 |
| 14. 3.1×0.8 | 15. 0.98×7.3 | 16. 2.4×3.48 |
| 17. 6.2×0.03 | 18. 5.04×3.2 | 19. 14.7×11.36 |
| 20. 27.4×33.68 | 21. 0.28×0.08 | 22. 0.45×0.05 |

Example 4
(p. 41)

23. **ANIMALS** A giraffe can run up to 46.93 feet per second. How far could a giraffe run in 1.8 seconds? Justify your answer.
24. **MEASUREMENT** Katelyn has a vegetable garden that measures 16.75 feet in length and 5.8 feet in width. Find the area of the garden. Justify your answer.

Multiply.

- | | | |
|--------------------------|-------------------------|-------------------------|
| 25. 25.04×3.005 | 26. 1.03×1.005 | 27. 5.12×4.001 |
|--------------------------|-------------------------|-------------------------|
28. **WALKING** Junnie walked for 2.5 hours at a speed of 3.2 miles per hour. Maurice walked for 1.8 hours at a speed of 4.1 miles per hour. (*Hint: distance equals speed times time.*)
- Who walked farther?
 - How much farther did that person walk?

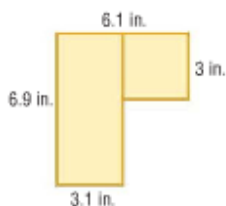
Read Math

Algebra To show multiplication with variables, the variables and/or numbers are placed next to each other.
 ab means $a \times b$.
 $6.023a$ means $6.023 \times a$.

ALGEBRA Evaluate each expression if $a = 1.3$, $b = 0.042$, and $c = 2.01$.

- | | |
|-----------------|------------------|
| 29. $ab + c$ | 30. $6.023a - c$ |
| 31. $3.25c + b$ | 32. abc |

33. **MEASUREMENT** Find the area of the figure at the right. Justify your procedure.
34. **ALGEBRA** Which of the three numbers 9.2, 9.5, or 9.7 is the correct solution of $2.65t = 25.705$? Explain your answer.



35. **GROCERY SHOPPING** Pears cost \$0.98 per pound and apples cost \$1.05 per pound. Mr. Bonilla bought 3.75 pounds of pears and 2.1 pounds of apples. How much did he pay for the pears and apples? Explain your answer.
36. **FIND THE DATA** Refer to the Data File on pages 2–5. Choose some data and write a real-world problem in which you would multiply decimals.

For each statement below, find two decimals a and b that make the statement true. Then find two decimals a and b that make the statement false. Explain your reasoning.

37. If $a > 1$ and $b < 1$, then $ab < 1$. 38. If $ab < 1$, then $a < 1$ and $b < 1$.



H.O.T. Problems

39. **OPEN ENDED** Write a multiplication problem in which the product is between 0.05 and 0.75.
40. **NUMBER SENSE** Place the decimal point in the answer to make it correct. Explain your reasoning. $3.9853 \times 8.032856 = 32013341\dots$
41. **REASONING** Determine whether the following statement is *always*, *sometimes*, or *never* true. Give examples to justify your answer.
The product of two decimals less than 1 is less than either of the factors.
42. **NUMBER SENSE** Is the product of 0.4×1.8 greater than or less than 0.4? Explain your reasoning.
- CHALLENGE** Evaluate each expression.
43. $0.3(3 - 0.5)$ 44. $0.16(7 - 2.8)$ 45. $1.06(2 + 0.58)$
46. **Write MATH** Describe two methods for determining where to place the decimal point in the product of two decimals.



NGSS Practice

MA.6.A.1.1, MA.6.A.1.2

47. What is the area of the rectangle?



- A. 14.04 cm^2 C. 8.992 cm^2
 B. 10.248 cm^2 D. 7.868 cm^2

48. **SHORT RESPONSE** A soccer ball and 12 golf balls weigh a total of 1 kilogram. Each golf ball weighs about 0.046 kilogram. What is the weight of the soccer ball? Explain your reasoning.

Spiral Review

Multiply. (Lesson 1-1C)

49. 45×0.27 50. 3.2×109 51. 24×5.6 52. 2.94×16

53. The distance around Earth at the equator is about 24,889.78 miles. The distance around Earth through the North Pole and South Pole is about 24,805.94 miles. (Lesson 1-1A)

- a. Estimate how many miles you would travel if you circled the equator 3 times.
 b. Estimate how many more miles you would travel if you circled the equator 10 times rather than 10 times around the poles.



Add or subtract. (Lesson 0-3)

54. $\frac{3}{10} + \frac{5}{10}$ 55. $\frac{2}{9} + \frac{7}{9}$ 56. $\frac{5}{8} - \frac{2}{8}$ 57. $\frac{10}{11} - \frac{7}{11}$



Real-World Link

Pacific Leatherback turtles are the only species of turtles that do not have a bony shell.

Real-World EXAMPLES

- 3 TURTLES** A Pacific Leatherback turtle can weigh up to 704.4 kilograms. An Olive Ridley turtle can weigh up to 49.9 kilograms. About how many times heavier is the Pacific Leatherback turtle? Explain why your answer is reasonable.

$$49.9 \overline{)704.4} \rightarrow 50 \overline{)700} \quad \begin{array}{r} 14 \\ \hline \end{array} \quad \text{Round 49.9 to 50 and 704.4 to 700.}$$

The Pacific Leatherback is about 14 times heavier than the Olive Ridley turtle.

Check for Reasonableness Since $50 \times 14 = 700$, and $700 \approx 704.4$, your answer is reasonable. ✓

- 4 TICKETS** The Jenkins family bought five tickets to a charity auction. The receipt shows the total cost of the tickets. Estimate the cost of each ticket. Justify your answer.



$$5 \overline{)61.25} \rightarrow 5 \overline{)60} \quad \begin{array}{r} 12 \\ \hline \end{array} \quad \text{Round 61.25 to 60.}$$

Each ticket costs around \$12. Since $5 \times 12 = 60$ and $60 \approx 61.25$, the answer is reasonable.

CHECK Your Progress

- e. CARS** There are approximately 250.9 million cars in the United States. Spain has approximately 25.1 million cars. About how many times more cars does the U.S. have than Spain? Explain why your answer is reasonable.
- f. TICKETS** Suppose the Jenkins family decided to purchase 6 tickets for a total price of \$76.50 using a discount. Estimate the cost of each ticket. Justify your answer.

CHECK Your Understanding

Examples 1 and 2
(p. 44)

Estimate each quotient.

1. $25 \div 4.7$

2. $40.79 \div 7$

3. $38.1 \overline{)984.76}$

Examples 3 and 4
(p. 45)

- 4. WEATHER** The average yearly precipitation for Gulfport, Mississippi, is 65.3 inches. About how much precipitation does the area receive each month? Explain why your answer is reasonable.

- 5. FOOD** A recipe for a smoothie calls for 0.75 pound of strawberries. If Kerry has 3.15 pounds of strawberries, how many batches of the recipe can she make?



Practice and Problem Solving

Step-by-Step Solutions begin on page R1.
Extra Practice is on page EP2.

Examples 1 and 2
(p. 44)

Estimate each quotient.

6. $32.4 \div 3$

7. $54 \div 9.4$

8. $76.2 \div 18.4$

9. $45.8 \div 23.6$

10. $11.4 \overline{)35.7}$

11. $23.3 \overline{)119}$

Examples 3 and 4
(p. 45)

12. SEWING Mauricio bought 6.75 yards of fabric for a total of \$47.50. About how much was the cost per yard? Explain why your answer is reasonable.

13. MONEY Emily spent a total of \$38.04 on four CDs. If each CD cost the same amount, what is a reasonable amount for the cost of each CD? Explain why your answer is reasonable.

Use estimation to determine whether each answer is reasonable. If the answer is reasonable, write *yes*. If not, provide a reasonable estimate.

14. $36.75 \div 7.5 = 4.9$

15. $74.5 \div 23.8 = 7.26$

16. $108.9 \div 19.8 = 5.5$

17. $84.62 \div 22.5 = 1.54$

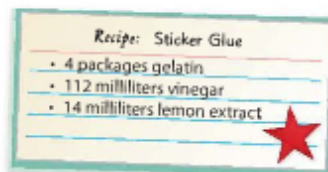
18. PROFIT For each handmade greeting card Jacqui sells, she makes a profit of \$0.35. In one week, she made a profit of \$42. She sells the cards for \$0.75 each.

- a. How many greeting cards did Jacqui sell that week?
- b. How much did she earn before paying expenses?



19. STICKERS Melanie is making homemade stickers. She uses the recipe shown to create the glue for the stickers.

- a. She has 545 milliliters of vinegar. Which is a more reasonable estimate for the number of batches she can make, 5 or 7? Explain your answer.
- b. About how many times as many milliliters of vinegar are needed than lemon extract?



20. GASOLINE When full, a 22-gallon gas tank holds 129.8 pounds of gasoline. Estimate the weight of one gallon of gasoline. If it costs \$91.30 to fill the gas tank, estimate the cost per gallon.

21. MILK The average cow produces about 53 pounds of milk per day. If one gallon of milk weighs about 8.5 pounds, estimate the number of gallons of milk a cow produces each day. Explain why your estimate is reasonable.



Real-World Link
Hamsters have poor eyesight and depth perception. They can only see about 6 inches in front of them.

CURRENCY The table shows different currencies and their equivalence to 1 U.S. dollar. Divide to estimate the cost of each item in U.S. dollars.

Currency	\$1 U.S. equals . . .
Canada dollar	1.288
Japan yen	95.24
Mexico peso	13.22
Russia rubles	27.29

22. DVD; 1,333.36 Japanese yen
23. jeans; 654.96 Russian rubles
24. box of cereal; 56.185 Mexican pesos
25. MP3 player; 161 Canadian dollars

26. **PETS** Use estimation and mental math to find the four missing values from the receipt.

Precious Pets			Receipt
Qty	Description	Unit Price	Total
	Hamster cage	\$35.99	\$35.99
	Exercise wheel	\$5.29	\$10.58
	Softwood bedding	\$6.29	\$25.16
	Hamster food	\$4.59	\$36.72
Total			\$108.45

NUMBER SENSE Use estimation to place the decimal point in the quotient for each division sentence.

27. $337.692 \div 52.6 = 642$
28. $78.28 \div 8.24 = 95$
29. $1,873.715 \div 25.1 = 7465$
30. $2,219.856 \div 164.8 = 1347$

31. **SAVING** Aurelia would like to save \$474.72 in a year to purchase a new video camera. She estimates she needs to save \$40 per month. Explain why her estimate is reasonable.

32. **WEIGHT** A piggy bank containing only quarters has a mass of 850 grams when empty and 7,822 grams when filled. If a quarter weighs 5.6 grams, estimate the amount of money inside the piggy bank.

H.O.T. Problems

33. **OPEN ENDED** Write a real-world division problem involving decimals in which you would use compatible numbers to estimate the quotient.

34. **REASONING** Is 15 a reasonable estimate of $73.87 \div 6.89$? Explain your answer.

35. **CHALLENGE** Determine where to place the decimal point in each number so that the quotient is between 23 and 25.

$$16023 \div 654$$

36. **Write MATH** Explain how you know which compatible numbers to use when estimating a decimal quotient. Support your answer with an example.



NGSSS Practice

MA.5.A.1.2, MA.6.A.5.3

37. The table shows the average breakdown of body weight for a 130-pound person.

Body Part	Weight (ounces)
Water	896
Muscle	720
Skeleton	240
Head	128
Skin	96

About how many times as great is the weight of water than the weight of skin?

- A. about 9 times
 - B. about 10 times
 - C. about 11 times
 - D. about 12 times
38. **SHORT RESPONSE** For a craft activity at a day care, each child will need 1.75 yards of ribbon. If there are 25 yards of ribbon available, estimate the number of children that can participate.

39. The following advertisement was in the local newspaper.

Bike Country

26" Bike	\$135.99
Folding Bike Rack	\$43.95
Seat Covers	\$6.59
Bike Lock	\$12.89
Helmet	\$29.49

The cost of a 26" bike is equal to about how many bike locks?

- F. about 7
 - G. about 8
 - H. about 9
 - I. about 10
40. **SHORT RESPONSE** Rewrite the following division problem using compatible numbers, so the quotient is a whole number.

$$485.87 \div 71.54$$

Spiral Review

41. **METALS** The table gives the weight of one cubic foot of various metals. (Lesson 1-1E)
- a. How many pounds does 1.5 cubic feet of water weigh?
 - b. What is the weight of 2.6 cubic feet of aluminum foil?
 - c. How many pounds does 0.2 cubic foot of gold weigh?

**Weight of Elements
(pounds per cubic foot)**

water	62.4
aluminum foil	168.53
copper	557.43
gold	1,205.99

42. **HAIR** Human hair grows an average of 12.7 centimeters per year. How many centimeters does hair grow in 5 years? (Lesson 1-1C)

Estimate the product. (Lesson 1-1A)

43. 37.6×7.5

44. 11.08×4.3

45. 243.9×9.6

1-2
Divide Decimals

PART
A
B
C
D
E

Explore

Main Idea

Divide decimals by whole numbers.

NGSSS

☀

MA.6.A.1.1 Explain and justify procedures for multiplying and dividing fractions and decimals.

MA.6.A.1.2 Multiply and divide fractions and decimals efficiently.

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Divide Decimals by Whole Numbers

Dividing decimals is similar to dividing whole numbers. You can also use base-ten blocks to divide decimals by whole numbers.

- Use base-ten blocks to model the dividend.
- Separate the blocks into groups represented by the divisor.
- Begin separating with the ones, tenths, and hundredths.
- Replace any ones with tenths or tenths with hundredths, if needed.
- The quotient is the number in each group.

ACTIVITY

1 MONEY Jeff and two of his friends spend \$3.63 on three bottles of water. How much does one bottle of water cost?

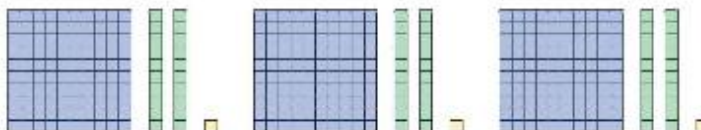
What do you need to find? the cost of one bottle of water

Find $\$3.63 \div 3$ using base-ten blocks.

STEP 1 Model \$3.63 as 3 ones, 6 tenths, and 3 hundredths.



STEP 2 Separate into three equal groups. Start with the ones, tenths, and then the hundredths.



There is 1 one, 2 tenths, and 1 hundredth in each group.

So, $\$3.63 \div 3 = \1.21 .

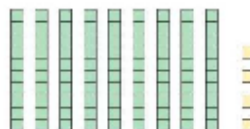
The cost of one bottle of water is \$1.21.



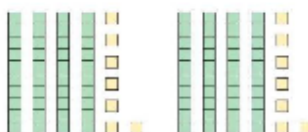
ACTIVITY

2 Find $0.94 \div 2$ using base-ten blocks.

STEP 1 Model 0.94. 0.94 can be shown using 9 tenths and 4 hundredths.



STEP 2 Separate the tenths into two groups. Since there is one tenth extra, rename as ten hundredths. Then separate the hundredths into two groups.



There are 4 tenths and 7 hundredths in each group.
So, $0.94 \div 2 = 0.47$.

Practice and Apply

Use base-ten blocks to show each quotient.

1. $3.4 \div 2$ 2. $4.2 \div 3$ 3. $5.6 \div 4$ 4. $0.9 \div 2$

Find each quotient.

5. $34 \div 2$ 6. $42 \div 3$ 7. $56 \div 4$ 8. $9 \div 2$

Analyze the Results

9. Compare and contrast the quotients in Exercises 1–4 with the quotients in Exercises 5–8.
10. **FOOD** Four friends are splitting the cost of a birthday cake for another friend. If the cost of the birthday cake is \$23.48, how much will each of the four people need to pay?
11. Determine the missing divisor in the sentence $0.39 \div \square = 0.13$. Explain your answer.
12. **Write MATH** How is the quotient affected if the dividend is the same but the divisor is doubled? If the divisor were halved? Explain your reasoning.
13. Suppose you need to find the quotient of 0.85 and 3. Is it possible to do with decimal models? Explain.
14. **MAKE A CONJECTURE** Write a rule you can use to divide a decimal by a whole number.

Multi-Part Lesson
1-2 Divide Decimals

PART A B C D E

Main Idea

Divide decimals by whole numbers.

NGSSS

MA.6.A.1.1 Explain and justify procedures for multiplying and dividing fractions and decimals.
MA.6.A.1.2 Multiply and divide fractions and decimals efficiently.
 Also addresses MA.6.A.1.3, MA.6.A.5.3.



Divide Decimals by Whole Numbers

MOVIES Charlotte, Aaron, Maddie, and Catie went to the movies and ordered snacks from the menu shown.

Cinema 15		
Popcorn	small	\$2.45
	large	\$5.60
Candy	small	\$2.25
	large	\$3.20
Drink	small	\$2.75
	medium	\$3.35
	large	\$3.95

1. What did they pay for four small popcorns?
2. What is the total cost for two small packages and one large package of candy?
3. How much do four medium drinks cost?
4. What is the total cost for Exercises 1–3?
5. Estimate how much each person should pay if they split the total cost among each person.
6. How can an estimate help you find the actual answer?

When dividing a decimal by a whole number, divide as with whole numbers. Then place the decimal point in the quotient directly above its place in the dividend.

EXAMPLE Divide a Decimal by a 1-Digit Number

1 Find $6.8 \div 2$.

Estimate $6 \div 2 = 3$

$$\begin{array}{r} 3.4 \\ 2 \overline{)6.8} \\ \underline{-6} \\ 08 \\ \underline{-8} \\ 0 \end{array}$$

6 ones divided by 2 is 3 ones.
 8 tenths divided by 2 is 4 tenths.



$6.8 \div 2 = 3.4$ Compared to the estimate, the quotient is reasonable.

CHECK Your Progress

- a. $7.5 \div 3$ b. $3.5 \div 7$ c. $9.8 \div 2$



Study Tip

Checking Your Answer
To check that the answer is correct, multiply the quotient by the divisor. In Example 2, $0.55 \times 14 = 7.7$.

EXAMPLE Divide a Decimal by a 2-Digit Number

2 Find $7.7 \div 14$.

Estimate $10 \div 10 = 1$

$$\begin{array}{r} 0.55 \leftarrow \text{Place the decimal point.} \\ 14 \overline{)7.70} \\ \underline{-70} \\ 70 \leftarrow \text{Annex a zero and continue dividing.} \\ \underline{-70} \\ 0 \end{array}$$

$7.7 \div 14 = 0.55$ Compared to the estimate, the quotient is reasonable.

CHECK Your Progress

- d. $9.48 \div 15$ e. $3.49 \div 4$ f. $55.08 \div 17$

In some real-world situations, the division is continuous, meaning it does not result in a remainder of zero. In those situations, round the quotient to a specified place-value position.

Study Tip

Dividing Money When dividing money, it is sometimes necessary to divide to the thousandths place and then round to the hundredths.

Real-World EXAMPLE

3 **MAIL** Lin is mailing a care package to his brother. The table gives the cost for mailing packages. If Lin's care package weighs 3 pounds, how much is the cost per pound?

Weight (pounds)	Cost (\$)
1	4.80
2	5.63
3	6.74
4	7.87

To find the cost per pound, divide \$6.74 by 3.

$$\begin{array}{r} 2.246 \leftarrow \text{Place the decimal point after dividing to thousandths.} \\ 3 \overline{)6.74} \\ \underline{-6} \\ 07 \\ \underline{-06} \\ 14 \\ \underline{-12} \\ 20 \\ \underline{-18} \\ 2 \end{array}$$

The remainder will never be zero.

It costs \$2.25 per pound to mail the package.

CHECK Your Progress

- g. **MAIL** Find the cost per pound of a two-pound and four-pound package.



Real-World Link
 In 1972, a video game console cost \$100. This is comparable to \$495.44 in 2008.

Real-World EXAMPLE

4 VIDEO GAMES Ryan and his brother are sharing the cost of a video game. The video game costs \$28.60. If Ryan saved \$20 to buy the game, how much does he have left after paying his share?



Estimate $\$30 \div 2 = \15 , $\$20 - \$15 = \$5$

Step 1 Determine how much Ryan will pay for the video game.

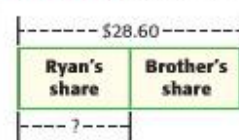
Method 1 Paper and Pencil

$$\begin{array}{r} 14.30 \\ 2 \overline{)28.60} \\ \underline{-2} \\ 08 \\ \underline{-8} \\ 06 \\ \underline{-6} \\ 0 \end{array}$$

Place the decimal point.

Ryan's share of the video game is \$14.30.

Method 2 Bar Diagram



$$\$28.60 \div 2 = \$14.30$$

Step 2 Determine how much Ryan will have left after paying his share.

Method 1 Paper and Pencil

$$\begin{array}{r} \$20.00 \\ - \$14.30 \\ \hline \$5.70 \end{array}$$

Ryan has \$5.70 left.

Method 2 Bar Diagram



$$\$20.00 - \$14.30 = \$5.70$$

CHOOSE Your Method

- h. BAGELS** Four dozen bagels costs \$30.00. Find the cost of each dozen. How much change will you receive if you pay for a dozen bagels with a ten dollar bill?
- i. CARNIVAL** Kristen and her two friends are sharing the cost of a funnel cake at a carnival. The funnel cake costs \$5.49. If Kristen has \$2.00, how much will she have left after she pays her share?



CHECK Your Understanding

Examples 1 and 2
(pp. 51–52)

Divide. Round to the nearest tenth if necessary.

1. $3.6 \div 4$ 2. $9.6 \div 2$ 3. $8.53 \div 6$
 4. $1087.9 \div 46$ 5. $12.32 \div 22$ 6. $69.904 \div 34$

Example 3
(p. 52)

7. **SCIENCE** A light-year, the distance that light travels in one year, is 5.88 trillion miles. How many trillion miles will light travel in one month?

Example 4
(p. 53)

8. **RUNNING** Percy ran 3 miles in 38.7 minutes. How many minutes did it take him to run 1 mile at this speed? How long would it take him to run 5 miles at this speed?

Practice and Problem Solving

= Step-by-Step Solutions begin on page R1.
 Extra Practice is on page EP3.

Examples 1 and 2
(pp. 51–52)

Divide. Round to the nearest tenth if necessary.

9. $39.39 \div 3$ 10. $36.8 \div 2$ 11. $118.5 \div 5$
 12. $124.2 \div 9$ 13. $7.24 \div 7$ 14. $6.27 \div 4$
 15. $11.4 \div 19$ 16. $10.22 \div 14$ 17. $55.2 \div 46$
 18. $59.84 \div 32$ 19. $336.75 \div 31$ 20. $751.2 \div 25$

Examples 3 and 4
(pp. 52–53)

21. **VACATION** The Gonzalez family is taking a cruise that costs \$3,082.24 for a family of four. How much does it cost per person?

22. **BUILDINGS** Find the average height of the buildings shown in the table. (*Hint:* To find the average, add the values and divide by the number of values.)

World's Tallest Buildings (thousands of feet)				
1.667	1.483	1.483	1.451	1.381

23. **MEASUREMENT** Mr. Jamison will stain the deck in his backyard. The deck has an area of 752.4 square feet. If the deck is 33 feet long, how wide is it? Justify your procedure.

24. **FOOD** The Student Council is raising money by selling bottled water at a band competition. The table shows the prices for different brands. Which brand costs the least per bottle? Explain your reasoning.

Cost of Bottled Water (20-oz bottles)		
Brand A	6-pack	\$3.45
Brand B	12-pack	\$5.25
Brand C	24-pack	\$10.99

25. **MEASUREMENT** The Verrazano-Narrows Bridge in New York City is 4.26 thousand feet long and is the seventh longest suspension bridge in the world. There are 3 feet in a yard. How long is the bridge in yards? Justify your procedure.

26. **CAR WASH** The Franklin Middle School jazz band plans to have a car wash to raise \$468.75 for a new sound system. In the past, they washed an average of 125 cars at each car wash. What should they charge per car so they reach their goal?



H.O.T. Problems

27. **CHALLENGE** Find each of the following quotients. Then find a pattern and explain how you can use this pattern to mentally divide 0.0096 by 3.
 $844 \div 2$ $0.844 \div 2$ $84.4 \div 2$ $0.0844 \div 2$ $8.44 \div 2$ $0.00844 \div 2$
28. **FIND THE ERROR** Amanda is finding $11.2 \div 14$. Find her mistake and correct it.

$$\begin{array}{r} 8. \\ 14 \overline{) 11.2} \\ \underline{- 112} \\ 0 \end{array}$$



29. **REASONING** Is the quotient $2.7 \div 3$ greater than or less than 1? Explain.
30. **Write MATH** Explain how you can use estimation to place the decimal point in the quotient $42.56 \div 22$.



Practice

MA.6.A.1.2

31. **GRIDDED RESPONSE** Tanner and three neighborhood friends are buying a basketball hoop that costs \$249.84. If the cost is divided equally, how much will each person pay in dollars?
32. **GRIDDED RESPONSE** Marvin completed 8 rounds of a trivia game and earned 94.4 points. If he earned the same amount of points each round, how many points did he earn each round?

33. The table shows the number of subscribers to several Internet providers.

Internet Provider	Subscribers (millions)
Company A	2.45
Company B	3.12
Company C	2.83

- If Company B earned \$119 million last month, about how much did each subscriber pay?
- A. \$30 C. \$50
 B. \$40 D. \$60

Spiral Review

Estimate each quotient. (Lesson 1-2A)

34. $53.4 \div 6.15$ 35. $312.4 \div 2.98$ 36. $92.4 \div 8.85$

Multiply. (Lesson 1-1E)

37. 2.4×5.7 38. 1.6×2.3 39. $0.32(8.1)$ 40. $2.68(0.84)$



Multi-Part Lesson

1-2 Divide Decimals

PART

A

B

C

D

E

Explore Divide by Decimals

Main Idea

Use models to divide a decimal by a decimal.

NGSSS



MA.6.A.1.1

Explain and justify procedures for multiplying and dividing fractions and decimals.

MA.6.A.1.2 Multiply and divide fractions and decimals efficiently.



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You can also use models to divide a decimal by a decimal.

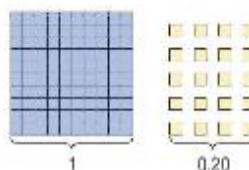
ACTIVITY

- 1 SNACKS** Yolanda bought bags of pretzels that cost a total of \$1.20. If each bag costs \$0.40, how many bags of pretzels did she buy?

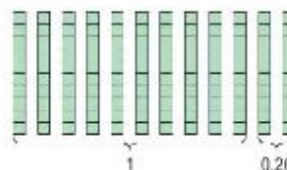
What do you need to find? how many bags she bought

Find $\$1.20 \div \0.40 .

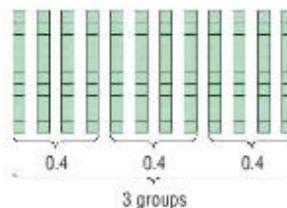
- STEP 1** Model one and 20 hundredths.



- STEP 2** Each bag costs \$0.40, which is 4 dimes or 4 tenths of one dollar. So, replace the ones block with tenths and 20 hundredths with 2 tenths. You should have a total of 12 tenths.



- STEP 3** Separate the tenths into groups of four tenths to show dividing by \$0.40 or 0.4.



So, $\$1.20 \div \$0.40 = 3$.

Yolanda bought three bags of pretzels.

Practice and Apply

Use base-ten blocks to find each quotient.

1. $2.4 \div 0.6$

2. $1.2 \div 0.4$

3. $1.8 \div 0.6$

Course 1 – Chapter 1



Multiplication and division families are related operations.

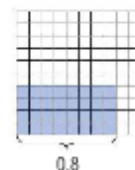
$$\begin{array}{l} 0.3 \times 0.5 = 0.15 \quad 0.15 \div 0.5 = 0.3 \\ 0.5 \times 0.3 = 0.15 \quad 0.15 \div 0.3 = 0.5 \end{array}$$

You can use fact families and missing factors to model division.

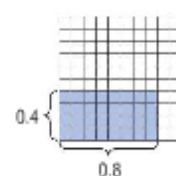
ACTIVITY

2 Find $0.32 \div 0.8$.

STEP 1 Using a 10-by-10 area model, show 0.32 by shading in 32 hundredths. Because the divisor is 8 tenths, there should be 8 columns.



STEP 2 Determine the number of rows that make up the shaded area.



There are 4 rows, and each row represents one tenth.
So, $0.32 \div 0.8 = 0.4$.

Practice and Apply

Use an area model to find each quotient.

4. $0.24 \div 0.6$

5. $0.28 \div 0.4$

6. $0.25 \div 0.5$

Analyze the Results

- Refer to Activity 1. When using base-ten blocks to find a quotient, explain why you should always replace the dividend with the smallest place value of the divisor.
- Explain why the quotient $0.2 \div 0.04$ is a whole number. What does the quotient represent?
- Determine the missing divisor in the sentence $0.8 \div \square = 20$. Explain your answer.
- MAKE A CONJECTURE** Tell whether $1.2 \div 0.03$ is *less than*, *equal to*, or *greater than* 1.2. Justify your procedure.



Multi-Part Lesson

1-2 Divide Decimals

PART

A B C D **E**

Main Idea

Divide decimals by decimals.

NGSSS

MA.6.A.1.1
 Explain and justify procedures for multiplying and dividing fractions and decimals.

MA.6.A.1.2 Multiply and divide fractions and decimals efficiently.

Also addresses MA.6.A.1.3, MA.6.A.5.3.



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Divide Decimals by Decimals

Explore Use a calculator to copy and complete the table.

- Describe a pattern among the division problems and their quotients for each set.
- Use the pattern in Set A to find $36 \div 0.0009$ without a calculator.
- Use the pattern in Set B to find $0.0036 \div 9$ without a calculator.
- Use the pattern in Set C to find $0.0036 \div 0.0009$ without a calculator.

Division Problem	Quotient
$36 \div 9$	4
Set A	
$36 \div 0.9$	
$36 \div 0.09$	
$36 \div 0.009$	
Set B	
$3.6 \div 9$	
$0.36 \div 9$	
$0.036 \div 9$	
Set C	
$3.6 \div 0.9$	
$0.36 \div 0.09$	
$0.036 \div 0.009$	

- Find $0.042 \div 0.07$ without a calculator. Explain your answer.

When dividing by decimals, change the divisor into a whole number. To do this, multiply both the divisor and the dividend by the same power of 10. Then divide as with whole numbers.

EXAMPLE Divide by Decimals

- 1 Find $1.71 \div 0.9$. **Estimate** $2 \div 1 = 2$

Multiply by 10 to make a whole number.

$$\begin{array}{r}
 0.9 \overline{)1.71} \rightarrow 9 \overline{)17.1} \\
 \underline{-9} \\
 81 \\
 \underline{-81} \\
 0
 \end{array}$$

Place the decimal point.
 Divide as with whole numbers.

Multiply by the same number, 10.

1.71 divided by 0.9 is 1.9 . Compared to the estimate, the estimate is reasonable.

Check $1.9 \times 0.9 = 1.71$ ✓

CHECK Your Progress

- a. $54.4 \div 1.7$ b. $8.424 \div 0.36$ c. $0.0063 \div 0.007$



EXAMPLES Zeros in the Quotient and Dividend

2 Find $52 \div 0.4$.

$$0.4 \overline{)52.0}$$

Multiply each by 10.

So, $52 \div 0.4 = 130$.

130. Place the decimal point.

$$\begin{array}{r} 4 \overline{)520.} \\ - 4 \\ \hline 12 \\ - 12 \\ \hline 00 \end{array}$$

Write a zero in the ones place of the quotient because $0 \div 4 = 0$.

Study Tip

Checking Your Answer
You can always check your answer to a division problem by multiplying the quotient by the divisor.

3 Find $0.009 \div 0.18$.

$$0.18 \overline{)0.009}$$

Multiply each by 100.

So, $0.009 \div 0.18$ is 0.05.

0.05 Place the decimal point.

$$\begin{array}{r} 18 \overline{)0.90} \\ - 0 \\ \hline 09 \\ - 00 \\ \hline 90 \\ - 90 \\ \hline 0 \end{array}$$

9 tenths divided by 18 is 0, so write a 0 in the tenths place.

Annex a 0 in the dividend and continue to divide.

CHECK Your Progress

- d. $5.6 \div 0.014$ e. $6.24 \div 200$ f. $0.4 \div 25$

Real-World EXAMPLE

4 **INTERNET** How many times as many Internet users are there in Japan than in Spain? Round to the nearest tenth.

Find $127.4 \div 40.4$.

$$40.4 \overline{)127.4} \quad \rightarrow \quad 404 \overline{)1274.00}$$

$$\begin{array}{r} 3.15 \\ - 1212 \\ \hline 620 \\ - 404 \\ \hline 2160 \\ - 2020 \\ \hline 140 \end{array}$$

To the nearest tenth, $127.4 \div 40.4 = 3.2$. So, there are about 3.2 times as many Internet users in Japan than in Spain.

Internet Users in 2008 (millions)	
China	1,321.9
U.S.	301.1
Japan	127.4
France	63.7
Spain	40.4
Canada	33.4

Study Tip

Rounding When rounding to the nearest tenth, you can stop dividing when there is a digit in the hundredths place.

CHECK Your Progress

g. **INTERNET** How many times as many Internet users are there in the U.S. than in France? Round to the nearest tenth.



CHECK Your Understanding

Divide.

- Example 1** (p. 58)
 - 1. $3.69 \div 0.3$
 - 2. $9.92 \div 0.8$
- Examples 2 and 3** (p. 59)
 - 3. $0.45 \div 0.3$
 - 4. $13.95 \div 3.1$
 - 5. $0.6 \div 0.0024$
 - 6. $0.462 \div 6$
 - 7. $0.321 \div 0.4$
 - 8. $2.943 \div 2.7$
- Example 4** (p. 59)
 - 9. **MEASUREMENT** Alicia bought 5.75 yards of fleece fabric to make blankets for a charity. She needs 1.85 yards of fabric for each blanket. How many blankets can Alicia make with the fabric she bought?

Practice and Problem Solving

= Step-by-Step Solutions begin on page R2. Extra Practice is on page EP3.

Examples 1–3 (pp. 58–59) Divide.

- 10. $1.44 \div 0.4$
- 11. $0.68 \div 3.4$
- 12. $16.24 \div 0.14$
- 13. $2.07 \div 0.9$
- 14. $0.0338 \div 1.3$
- 15. $0.16728 \div 3.4$
- 16. $96.6 \div 0.42$
- 17. $1.08 \div 2.7$
- 18. $13.5 \div 0.03$
- 19. $8.4 \div 0.02$
- 20. $0.12 \div 0.15$
- 21. $0.242 \div 0.4$

Example 4 (p. 59) **22. MEASUREMENT** A submarine sandwich 1.5 feet long is cut into 0.25-foot pieces. How many pieces will there be?



Real-World Link

The population of China is about 20% of the world's total population. So, one in every five people on Earth is a resident of China.

23. MEASUREMENT The average person's *stride length*, the distance covered by one step, is approximately 2.5 feet long. How many steps would the average person take to travel 50 feet?

24. POPULATION The table shows the five most populated countries in the world. How many times as many people live in China than in the United States? Round to the nearest tenth if necessary.

Most Populated Countries	
Country	Approximate Population (billions)
China	1.325
India	1.13
United States	0.304
Indonesia	0.235
Brazil	0.19

25. GEOGRAPHY Alaska has a coastline of about 6.64 thousand miles. Florida has about 1.35 thousand miles of coastline. How many times as much coastline does Alaska have than Florida? Round to the nearest tenth if necessary. Justify your procedure.

26. MEASUREMENT Lake Superior, along the U.S.-Canadian border, has a maximum depth of 1.333 thousand feet. There are 5,280 feet in one mile. How deep is Lake Superior in miles? Round to the nearest hundredth if necessary. Explain your answer.



ALGEBRA Use the order of operations to evaluate each expression if $m = 88.2$, $n = 3$, and $p = 17.5$. Round to the nearest tenth if necessary.

27. $\frac{m}{n}$ 28. $\frac{mp}{n}$ 29. $\frac{mn}{p}$ 30. $\frac{m}{p}$
 31. $\frac{p}{n}$ 32. $\frac{m-p}{n}$ 33. $\frac{p+n}{n}$ 34. $\frac{m+n+p}{p}$

35 CARS Use the table that shows the most popular sports car colors in North America.

Most Popular Sports Car Colors	
Color	Portion of Responses
Silver	0.2
Gray	0.17
Blue	0.16
Black	0.14
White	0.1
Red	0.09
Green	0.06
Other	0.08

- How many times more respondents chose silver than red? Round to the nearest tenth if necessary.
- How many times more respondents chose either silver or black than red? Round to the nearest tenth if necessary.

- 36 MEASUREMENT** The longest vehicle tunnel in the world is the Laerdal Tunnel in Norway with a length of 15.2 miles. How many vehicles could fit in the tunnel bumper to bumper, in one lane, if the average vehicle length is 0.004 mile? Justify your procedure.
- 37 FIND THE DATA** Refer to the Data File on pages 2–5. Choose some data and write a real-world problem in which you would divide decimals.
- 38 COINS** A U.S. quarter has a mass of 5.67 grams. Find the weight in pounds of \$500 in quarters. Explain your procedure. (*Hint:* 1 pound = 2,200 grams.)
- 39 BEADS** A necklace is being made with beads that are 1.25 centimeters in diameter. The necklace is 30 centimeters long. How many beads are needed?
- 40 GRAPHIC NOVEL** Refer to the graphic novel frame below for Exercises a–b.



- How many hours does Raj need to work to earn the remainder of the money he needs to buy the video game system?
- Suppose Raj receives a raise for his hard work and now earns \$6.25 per hour. How many hours would he need to work to earn \$132?



H.O.T. Problems

41. **CHALLENGE** Find two positive decimals a and b that make the following statement true. Then find two positive decimals a and b that make the statement false.

$$\text{If } a < 1 \text{ and } b < 1, \text{ then } a \div b < 1.$$

42. **Which One Doesn't Belong?** Identify the problem that does not have the same quotient as the other three. Explain your reasoning.

$49 \div 7$

$4.9 \div 7$

$0.49 \div 0.7$

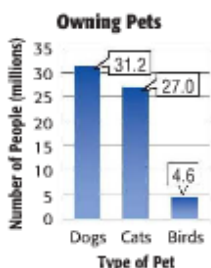
$0.049 \div 0.07$

43. **Write MATH** Refer to the table in Exercise 24 on the world's most populated countries. Write and solve a problem in which you would divide decimals. Include instructions for rounding in your problem.

NGSSS Practice

MA.6.A.1.2

44. To the nearest tenth, how many times as many people in the U.S. own dogs as own birds?



- A. 6.8
B. 12.2
C. 26.6
D. 35.8

45. The table shows the approximate number of people in the world who speak either Spanish or French.

Language	Speakers (billions)
Spanish	0.425
French	0.129

To the nearest tenth, how many times as many people speak Spanish as French?

- F. 0.2
G. 1.1
H. 0.3
I. 3.3

Spiral Review

46. Find the quotient when 68.52 is divided by 12. (Lesson 1-2C)
47. **STICKERS** Anna bought 5 packs of stickers for a total of \$11.18. Estimate the cost per pack of stickers. Explain your reasoning. (Lesson 1-2A)

Multiply. (Lesson 1-1E)

48. 19.2×2.45
49. 8.25×12.42
50. 9.016×51.9
51. 6.32×14.5

Creative Crafts			
Quantity	Item	Unit Price	Price
5	Sticker Packs		11.18

62 **Chapter 1** Multiply and Divide Decimals

CHAPTER 1 Mid-Chapter Check

Estimate each product. (Lesson 1-1A)

1. 4.7×3 2. 7.1×5
3. **MEMORY** An 8-gigabyte memory card costs \$34.99. If Francis bought 3 memory cards, what is the estimated total cost? (Lesson 1-1A)
4. **GAS MILEAGE** Ashton used 12.6 gallons of gasoline to drive his car on a weekend trip. He averaged 21.5 miles per gallon. About how many miles did he travel? (Lesson 1-1E)

Multiply. (Lessons 1-1C and 1-1E)

5. 2.3×5 6. 0.6×8
7. 3.4×5.2 8. 1.2×0.015
9. **TRAILS** The table shows a list of walking trails in the United States.

Location	Length of Trail (mi)
Florida Trail (FL)	4.8
Long Path (NJ)	3.3
Ohio & Erie Canal Trail (OH)	4.3
KATY Trail (MO)	5.7
Point Reyes National Seashore (CA)	5.0

If Latisha walked the Florida Trail 6 days each week, how many miles did she walk in a week? (Lesson 1-1C)

10. **POOL TABLE** The length of a pool table is 7.1 feet and the width is 3.6 feet. Find the area of the surface of the pool table by multiplying length times width. (Lesson 1-1E)

Estimate each quotient. (Lesson 1-2A)

11. $17.7 \div 3.2$ 12. $25.9 \div 7.8$

Divide. (Lessons 1-2C and 1-2E)

13. $19 \div 4.75$ 14. $62 \div 7.75$
15. $76.219 \div 8.45$ 16. $101.84 \div 7.6$
17. **NGSS PRACTICE** Scientists often use soil samples to monitor environmental changes. A soil sample is 126.5 centimeters deep. Every 1.15 centimeters of the sample represents soil from 1 year. How many years are represented by the sample? (Lesson 1-2E)
- A. 145 years C. 110 years
B. 120 years D. 90 years
18. **TICKETS** The total cost of 5 Miami Dolphins tickets was \$212.50. What was the cost of one ticket? (Lesson 1-2C)

19. **NGSS PRACTICE** In a recent year, Florida's population was about 18.2 million people. That same year, Alabama's population was about 4.55 million people. How many times greater was Florida's population than Alabama's? (Lesson 1-2E)
- F. 1 H. 3
G. 2 I. 4

20. **EXTENDED RESPONSE**

Coleen is making 30 necklaces out of leather string. Each necklace requires 30 centimeters of string.



Part A How many centimeters of string does she need?

Part B If the total cost of the string was \$4.41, how much did she spend per meter? Explain your reasoning. (Lesson 1-2E)



Multi-Part Lesson

1-3 Powers of 10

PART

A

B

C

Main Idea

Multiply decimals mentally by powers of 10.

NGSSS

MA.6.A.1.1 Explain and justify procedures for multiplying and dividing fractions and decimals.

MA.6.A.1.2 Multiply and divide fractions and decimals efficiently. Also addresses MA.6.A.1.3.



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Multiply by Powers of 10

Explore Numbers like 10, 100, and 1,000 are called *powers of 10* because they can be obtained by raising 10 to a whole number power.

1. Copy and complete the table shown.

Decimal		Power of 10		Product
1.24	×	1	=	1.24
1.24	×	10	=	12.4
1.24	×	100	=	■
1.24	×	1,000	=	■
1.24	×	10,000	=	■

2. Look for a pattern in the products. Write one or two sentences that describe this pattern.
3. How can you find the product of a number and a power of 10 without using paper and pencil or a calculator?

Multiplying a decimal by a power of 10 greater than 1 moves the decimal point to the right the same number of places as the number of zeros in the power 10.

EXAMPLES

Multiply by a Power of 10 Greater than 1

Find each product.

1

$$0.35 \times 100$$

$$0.35 \times 100 = 0.35$$

$$= 35$$

100 has 2 zeros, so move the decimal point 2 places to the right. Since 35 is a whole number, remove the leading zero and decimal point.

2

$$8.5 \times 1,000$$

$$8.5 \times 1,000 = 8.500$$

$$= 8,500$$

1,000 has 3 zeros, so move the decimal point 3 places to the right. Annex zeros as needed. Remove the decimal and add a comma.



CHECK Your Progress

a. $2.72 \times 1,000$

b. $5.98 \times 10,000$



Real-World Link
 In the 1970s, home video game systems became popular.

Real-World EXAMPLE

3 VIDEO GAMES In a recent year, a football video game sold 3.2 million copies. Write this number in standard form.

$$3.2 \text{ million} = 3.2 \times 1,000,000$$

The word million means 1,000,000.

$$= \underline{3,200,000}$$

1,000,000 has 6 zeros. So, move the decimal point 6 places to the right. Annex zeros as needed.

$$= 3,200,000$$

Remove the decimal point and add commas.

So, 3,200,000 copies of the video game were sold.

CHECK Your Progress

- c. **ROADS** There are about 3.9 million miles of roads in the United States. Write the amount of roads in standard form.
- d. **SUN** The diameter of the Sun is about 1.39 million kilometers. Write this diameter in standard form.

On page 64, you investigated a pattern when multiplying a decimal by powers of 10 greater than 1. A similar pattern is found when multiplying a decimal by powers of 10 like 0.1 and 0.01 that are less than one. In these numbers, $0.1 = \frac{1}{10}$ and $0.01 = \frac{1}{100}$.

Decimal	Power of 10	Product
12.4	$\times 0.1$	$= 1.24$
12.4	$\times 0.01$	$= 0.124$
12.4	$\times 0.001$	$= 0.0124$

The table above suggests that multiplying a decimal by a power of 10 less than one moves the decimal point to the *left* the same number of places as there are after the decimal point.

Study Tip

Check for Reasonableness
 The product of a number and a power of 10 less than 1 is always less than the original number. The product of a number and a power of ten that is greater than 1 will always be greater than the original number.

EXAMPLE Multiply by a Power of 10 Less than 1

4 Find 5.4×0.01 .

$$5.4 \times 0.01 = \underline{05.4}$$

0.01 has 2 places after the decimal point. So, move the decimal point 2 places to the left.

$$= 0.054$$

Annex zeros as needed.

CHECK Your Progress

- e. 93.6×0.1
- f. 7.84×0.001



CHECK Your Understanding

Examples 1 and 2
(p. 64)

Find each product.

1. 0.67×10

2. 1.6×100

3. $8.95 \times 1,000$

Example 3
(p. 65)

4. **SPORTS** The seasonal attendance at a baseball stadium was 3.45 million people. Write the number of people in standard form.

Example 4
(p. 65)

5. 0.45×0.1

6. 0.8×0.01

7. 3.2×0.001

Practice and Problem Solving

= Step-by-Step Solutions begin on page R2.
Extra Practice is on page EP3.

Examples 1 and 2
(p. 64)

Find each product.

8. 0.25×100

9. 6.55×100

10. 0.9×10

11. 3.48×10

12. $7.62 \times 1,000$

13. $0.5 \times 1,000$

14. 0.78×10

15. $9.53 \times 10,000$

16. 18.50×100

Example 3
(p. 65)

Write each number in standard form.

17. **SCIENCE** The planet Mercury is 28.6 million miles from the Sun.

18. **ART** The most expensive painting by a female artist sold for 5.6 million dollars.



Example 4
(p. 65)

Find each product.

19. 0.3×0.01

20. 4.63×0.01

21. 8.7×0.1

22. 16.89×0.1

23. 346×0.01

24. 587.2×0.01

25. 0.02×0.1

26. 0.007×0.001

27. 0.45×0.001

28. **MONEY** The soccer ball shown is on sale for 0.1 off the original price. What is the sale price? Justify your procedure.



29. **MOVIES** One week, a movie theater sold 6,500 tickets. The next week, the number of tickets sold decreased by 0.01. How many tickets were sold in the second week? Justify your procedure.

ALGEBRA Evaluate each expression if $a = 0.1$, $b = 0.01$, and $c = 10$.

30. $3.2a$

31. $1.47 \times c^3$

32. $12 \times b$

33. $c^4 \times 8.4$

34. **EARTHQUAKES** The Richter scale is used to compare the size of earthquakes. The scale uses counting numbers. Each number represents a magnitude 10 times greater than the previous number. An earthquake has a magnitude of 5 on the Richter scale. How much stronger is it than an earthquake with a magnitude of 2?



H.O.T. Problems

35. **FIND THE ERROR** Dwayne is finding $0.60 \times 1,000$ mentally. Find his mistake and correct it.

$$0.60 \times 1,000 = 000.6$$

$$= 0.0006$$



36. **REASONING** By what power of ten would you multiply each number to get a product of 65? Explain your answer.
 a. 6.5 b. 6,500 c. 0.0065
37. **CHALLENGE** Explain how you could find the product of 0.3 and a number mentally. Then use your procedure to find 0.3×25 .
38. **Write MATH** Suppose you plan to purchase 10 items that each cost \$4.95. Explain how you can use mental math to find the cost of the 10 items.



NGSSS Practice

MA.4.A.2.2, MA.6.A.1.2

39. Which item listed costs about one hundred times more than a snack bar?

Item	Price (\$)
Television	498.95
Lunch Combo	5.25
6-Pack Soft Drink	3.25
Snack Bar	0.50
Pair of Shoes	49.98

- A. 6-pack soft drink
 B. pair of shoes
 C. lunch combo
 D. television

40. The length of a blue whale is approximately 10 times the length of a polar bear. What is the approximate length of a blue whale?



- E. 0.75 ft H. 75 ft
 G. 7.5 ft I. 750 ft

Spiral Review

41. **CYCLING** Isla biked 13.5 miles in 1.2 hours. How many miles did she bike in one hour? (Lesson 1-2E)
42. **SHOPPING** The table shows the cost of packages of water bottles. What is the cost of one water bottle from a 12-pack? (Lesson 1-2C)

Water Bottles	
6-pack	\$1.85
12-pack	\$3.72
24-pack	\$7.40



CHECK Your Understanding

Examples 1, 2, 4, and 5
(pp. 68–69)

Find each quotient.

- | | | |
|-------------------|----------------------|----------------------|
| 1. $26.8 \div 10$ | 2. $19.75 \div 100$ | 3. $0.52 \div 1,000$ |
| 4. $592 \div 0.1$ | 5. $62.54 \div 0.01$ | 6. $0.18 \div 0.001$ |

Example 3
(p. 69)

- 7 **PETS** The number of registered Aby cats is 0.01 the number of registered Labrador retriever dogs in the U.S. If there are about 1,400 Aby cats registered in the U.S., about how many Labs are registered?

Practice and Problem Solving

= Step-by-Step Solutions begin on page R2.
Extra Practice is on page EP3.

Examples 1, 2, 4, and 5
(pp. 68–69)

Find each quotient.

- | | | |
|----------------------|------------------------|-----------------------|
| 8. $64.52 \div 100$ | 9. $728 \div 100$ | 10. $0.37 \div 10$ |
| 11. $2.95 \div 10$ | 12. $92.3 \div 1,000$ | 13. $0.82 \div 1,000$ |
| 14. $4.5 \div 0.1$ | 15. $64.65 \div 0.001$ | 16. $28 \div 0.001$ |
| 17. $81.6 \div 0.01$ | 18. $981.6 \div 0.01$ | 19. $4.91 \div 0.1$ |

Example 3
(p. 69)

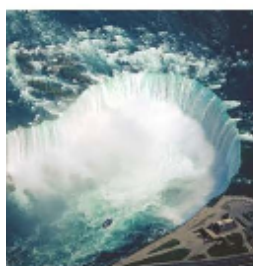
20. **CHARITY** Mrs. McCullough’s homeroom has collected \$578.92 in pennies to donate to charity. A penny is equal to \$0.01. How many pennies did the students collect?

21. **SAVING** Mateo is saving \$10 a week until he has enough to buy a bike that costs \$185. How many weeks will he need to save?



22. **GEOLOGY** A landmass has moved a total of 4.3 meters. How many years did it take for it to move if it moved at a speed of 0.001 meter per year? Explain your answer.

23. **PARTY FAVORS** Keisha purchased 2.5 pounds of chocolate candies to make party favor bags. How many party favor bags can she make if each bag will hold 0.1 pound of candies? Justify your procedure.



Real-World Link

The Falls are 188 feet high, with the deepest section of the Niagara River just at their base—going down 170 feet.

24. **WATERFALLS** Niagara Falls, located between the United States and Canada, drains water from Lake Erie into Lake Ontario.
- At its current rate, the Falls will recede 30 meters in 100 years. How far will it recede in one year?
 - It drains 12 million gallons of water every ten minutes. How many gallons, in standard form, does it drain every minute?

ALGEBRA Evaluate each expression if $a = 10$, $b = 0.1$, and $c = 0.01$.

- | | | | |
|-----------------|---------------------|-----------------|------------------|
| 25. $42 \div b$ | 26. $34.8 \div a^3$ | 27. $15 \div b$ | 28. $7.6 \div c$ |
|-----------------|---------------------|-----------------|------------------|



H.O.T. Problems


29. **NUMBER SENSE** Explain how you could find $0.01 \div 0.0001$ mentally.
30. **REASONING** Compare and contrast multiplying by a power of ten greater than 1 and dividing by a power of ten less than 1.
31. **CHALLENGE** Determine what number you must divide the given number by to get a quotient of 1.8. Explain your answer.
 a. 18 b. 180 c. 0.0018
32. **Write MATH** Explain the relationship between the number of places a decimal is moved to the left and the change in the value of the number.

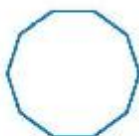


NGSS Practice

MA.4.A.2.2, MA.6.A.1.2

33. Which of the following will change 3.56 to 0.00356?
 A. multiplying by 100
 B. multiplying by 0.1
 C. dividing by 1,000
 D. dividing by 0.0001

34.  **GRIDDED RESPONSE** The distance around the figure shown is 36.7 feet. If each side is the same, what is the length, in feet, of each side?



35. How many dimes are in \$82.80?
 F. 828 H. 8,280
 G. 82,800 I. 828,000
36. The rates for Lorenzo’s cell phone service are shown in the table.

Rates (per 100 minutes)	
Weekday	\$13
Weeknight	\$9
Weekend	\$6

How much does it cost for one minute during the weekday?

- A. \$0.13 C. \$0.08
 B. \$0.10 D. \$0.06

Spiral Review

37. **GEOGRAPHY** The state of Florida covers $6.5758 \times 10,000$ square miles. Express this number in standard form.

(Lesson 1-3A)

Find each product. (Lesson 1-1E)

38. 82.9×1.6 39. 0.07×1.2
 40. 4.04×2.5 41. 7.43×5.6

42. **SHOPPING** What is the cost of one month of the magazine shown? (Lesson 1-2C)



Lesson 1-3 Powers of 10 71



Multi-Part Lesson

1-3 Powers of 10

PART

A

B

C

Problem-Solving Investigation

Main Idea Determine reasonable answers to solve problems.



P.S.I. TEAM +



Determine Reasonable Answers

STEPHANIE: I am burning a CD. I have picked out the first 5 songs. The CD's capacity is 72 minutes. I estimated the number of minutes left on the CD to be 50 minutes. Is my estimation reasonable?

Song	1	2	3	4	5
Length (min)	5.20	4.60	5.75	4.40	4.50

YOUR MISSION: Determine a reasonable estimate.

Understand You know the lengths of the first 5 songs and the capacity of the CD. You need to determine a reasonable estimate for the remaining minutes on the CD.

Plan Estimate the length of each song. Then add the estimated lengths. Finally, subtract that amount from 72, the capacity of the CD.

Solve

Song 1	→	5.20	→	5
Song 2	→	4.60	→	5
Song 3	→	5.75	→	6
Song 4	→	4.40	→	4
Song 5	→	4.50	→	+ 5
				25

Since $72 - 25 = 47$, a reasonable estimate for the number of minutes left is 50.

Check Since $5.20 + 4.60 + 5.75 + 4.40 + 4.50 = 24.25$ and $72 - 24.25 = 47.75$, 50 minutes is a reasonable estimate.

Analyze the Strategy

- Describe a situation where determining a reasonable answer would help you solve a problem. Justify your answer.
- Write MATH** Write a problem that can be solved by determining a reasonable answer. Then tell the steps you would take to solve the problem.



NGSSS

MA.6.A.5.3 Estimate the results of computations with fractions, decimals, and percents and judge the reasonableness of the results. Also addresses MA.6.A.1.3.

72 Chapter 1 Multiply and Divide Decimals



Mixed Problem Solving

Extra Practice is on page EP4.

- Determine reasonable answers.
- Draw a diagram.
- Guess, check, and revise.
- Choose an operation.

Use the *determine reasonable answers* strategy for Exercises 3–5.

3. **CLOTHES** Annie wants to buy 2 pairs of capris for \$34.99 each and 3 pairs of flip flops for \$7.99 each. Does she need to save \$150, or is \$100 enough?

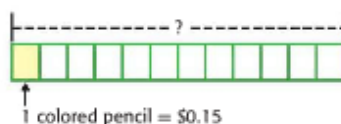
CAPRIS \$34.99
FLIP FLOPS \$7.99



4. **DONATIONS** Leon collected donations for the American Red Cross. Which is a more reasonable estimate for the amount of money Leon will collect next week if he doubles this week's donations: \$700 or \$900?
- | Donations | |
|-----------|----------|
| Monday | \$92.33 |
| Tuesday | \$107.08 |
| Wednesday | \$75.98 |
| Thursday | \$63.01 |
| Friday | \$111.64 |
5. **PLAYGROUND** The length of a playground is 88.5 yards. Which is a more reasonable estimate for the length of the playground in feet: 240 or 270?

Use any strategy to solve Exercises 6–11.

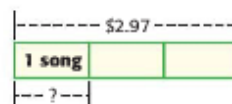
6. **SHOPPING** Nicholas bought 12 colored pencils for \$0.15 each. How much change should he receive after giving the cashier \$5.00?



7. **MAGAZINES** The table below shows the number of magazines a company sold from 2005 to 2009.

Year	Magazines Sold (millions)
2005	17.3
2006	4.5
2007	8.3
2008	3.1
2009	2.8

- a. Which year had about 3 times as many magazines sold as in 2009?
- b. Which year had about 5 million fewer magazines sold than 2007?
8. **MUSIC** Vaughn downloaded 3 songs on his MP3 player for \$2.97. How much does one song cost?



9. **NUMBERS** John wrote down two numbers. The product of the numbers is 48 and the difference between the two numbers is 8. What are the two numbers John wrote down?

10. **WHALES** The table below shows the weight of whales. Is the weight of a blue whale about 3 times, 4 times, or 5 times the weight of a gray whale?

Whale	Weight (tons)
Blue	151.0
Bowhead	95.0
Fin	69.9
Gray	38.5
Humpback	38.1

11. **SHOPPING** An online store sells magnets for \$3.25 each and keychains for \$5.79 each. If Mrs. Anderson spent \$56.78 on magnets and keychains, how many of each did she buy?

Problem Solving in Design

GAINING A COMPETITIVE EDGE


Do you have a passion for sports and a strong interest in science? Are you a creative thinker who always has new ideas or better ways of doing things? If so, then you should consider a career designing sports equipment. **Sports equipment designers** combine creativity and engineering principles to create equipment that is cutting edge and helps improve athletic performance. They design everything from baseball bats and footballs to lacrosse protective gear and racing wheelchairs.



Choose a Major

Are you interested in a career as a sports equipment designer? Take some of the following courses in high school.

- Algebra
- Biology
- Calculus
- Computer Science
- Physics

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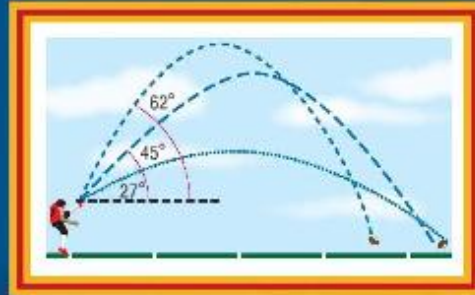
NGSSS

MA.6.A.1.2 Multiply and divide fractions and decimals efficiently. **MA.6.A.1.3** Solve real-world problems involving multiplication and division of fractions and decimals.

When a punter kicks a football, the ball has both horizontal motion and vertical motion. The table shows these values when a football is kicked at 25 meters per second.

PUNTING A FOOTBALL

Angle of Kick	Horizontal Motion (m/s)	Vertical Motion (m/s)
	<i>x</i>	<i>y</i>
27°	22.3	11.3
45°	17.7	17.7
62°	11.7	22.1



Real-World Math

Use the information in the table to solve each problem. Assume that each football is kicked at 25 meters per second. Round to the nearest tenth if necessary.

- The hang time, or time that a football is in the air, of a football that is kicked at a 27° angle is given by 0.204×11.3 . What is the approximate hang time?
- How much greater is the hang time of a football that is kicked at a 62° angle than one that is kicked at a 45° angle? Use the expression 0.204×22.1 and 0.204×17.7 .
- The final distance from the punter to a football kicked at a 27° angle is approximately $22.3 \times 11.3 \times 0.2$. What is the distance from the punter to the football?
- Find the distance of a football that is kicked at an angle of 62° if the distance is found by using the expression $11.7 \times 22.1 \times 0.2$.
- The hang time of a football is about 3 seconds. Find $3 \div 0.204$ to determine the vertical motion of the football.
- A football reaches its maximum height in $y \div 9.8$ seconds. A football is kicked at a 62° angle. At the same time, another football is kicked at a 27° angle. Which reaches its maximum height first? Explain.

CHAPTER
1

Study Guide and Review

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- **STUDY TO GO**
- Vocabulary Review
- Multilingual eGlossary

FOLDABLES
Study Organizer

Be sure the following Key Concepts are noted in your Foldable.



Multiply and Divide Decimals
Lesson 1-1
Lesson 1-2
Lesson 1-3

Key Concepts

Multiply Decimals (Lesson 1-1)

- When multiplying decimals, multiply as with whole numbers. The product has the same number of decimal places as the sum of the number of decimal places in each factor.

Divide Decimals (Lesson 1-2)

- To divide decimals, change the divisor into a whole number. Place the decimal point directly above the decimal point in the dividend, then divide as with whole numbers.

Powers of 10 (Lesson 1-3)

To...	move the decimal point to the...
multiply by a power of 10 less than 1	left
multiply by a power of 10 greater than 1	right
divide by a power of 10 less than 1	right
divide by a power of 10 greater than 1	left

Key Vocabulary

compatible numbers (p. 44)

Vocabulary Check

Choose the correct term or number to complete each sentence.

1. (Dividends, Compatible numbers) can be used to estimate the quotient of $32.1 \div 7.93$ by rounding 32.1 to 32 and 7.93 to 8, and then dividing.
2. The product of $0.423 \times (0.01, 100)$ is 42.3.
3. To mentally divide 385.7 by 1,000, move the decimal point three places to the (left, right).
4. When multiplying decimals and placing the decimal point, find the (sum, product) of the number of decimal places in each factor.
5. The quotient of $95.21 \div 0.001$ is (952.1, 95,210).
6. When dividing decimals, place the decimal point in the quotient directly above the decimal point in the (dividend, divisor).
7. (Powers, Factors) of ten are used in dividing decimals.
8. The quotient of $45 \div 0.9$ is the same as the quotient of $4.5 \div (0.09, 9)$.

Multi-Part Lesson Review

1-1 Multiply Decimals

Estimate Products (pp. 27–31)



MA.6.A.5.3

Estimate each product.

9. 62.7×6.1 10. 8.06×0.7
 11. 483×9.2 12. 3.3×54.2
 13. 2.09×6.76 14. 41.9×7.16
15. **SPEED** A car travels 57.9 miles per hour for 3.2 hours. Estimate the number of miles driven.

EXAMPLE 1 Estimate the product of 32.8×5.1 .

Use rounding.

$$\begin{array}{r} 32.8 \rightarrow 30 \text{ Round } 32.8 \text{ to } 30. \\ \times 5.1 \rightarrow \times 5 \text{ Round } 5.1 \text{ to } 5. \\ \hline 150 \end{array}$$

So, 32.8×5.1 is about 150.

Multiply Decimals by Whole Numbers (pp. 34–37)



MA.6.A.1.1,
MA.6.A.1.2,
MA.6.A.1.3,
MA.6.A.5.3

Multiply.

16. 1.4×6 17. 3×9.95
 18. 2.6×38 19. 12.09×19
 20. 16×6.65 21. 24.7×31
 22. 5×0.048 23. 0.082×17
24. **GROCERIES** A loaf of bread costs \$1.79. How much would five loaves cost?

EXAMPLE 2 Find 6.45×7 .

Estimate $6.45 \times 7 \rightarrow 6 \times 7$ or 42

$$\begin{array}{r} 3 \quad 3 \\ 6.45 \leftarrow \text{two decimal places} \\ \times 7 \\ \hline 45.15 \leftarrow \text{two decimal places} \end{array}$$

$$\begin{array}{r} 45.15 \\ \times 7 \\ \hline 316.05 \end{array}$$

So, $6.45 \times 7 = 45.15$.

Multiply Decimals by Decimals (pp. 40–43)



MA.6.A.1.1,
MA.6.A.1.2,
MA.6.A.1.3,
MA.6.A.5.3

Multiply.

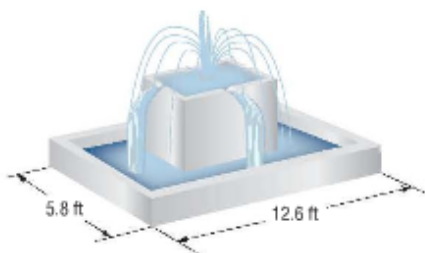
25. 0.6×1.3 26. 8.74×2.23
 27. 0.04×5.1 28. 2.6×3.9
 29. 0.002×50 30. 0.04×0.0063
31. **MEASUREMENT** What is the area of the base of the fountain below?

EXAMPLE 3 Find 38.76×4.2 .

$$\begin{array}{r} 38.76 \leftarrow \text{two decimal places} \\ \times 4.2 \leftarrow \text{one decimal place} \\ \hline 7752 \end{array}$$

$$\begin{array}{r} + 15504 \\ \hline 162.792 \leftarrow \text{three decimal places} \end{array}$$

So, $38.76 \times 4.2 = 162.792$.



1-2 Divide Decimals

Estimate Quotients (pp. 44–48)



MA.6.A.5.3

Estimate each quotient.

32. $478.1 \div 11.9$ 33. $4.77 \div 2.45$
 34. $9.46 \div 3.14$ 35. $63.4 \div 14.87$
 36. $417.25 \div 87.01$ 37. $89.7 \div 9.04$
 38. $478.2 \div 81.3$ 39. $725.6 \div 88.9$

40. **RAINFALL** The rainfall for one year was 35.8 inches. What was the approximate rainfall per month?

EXAMPLE 4 Estimate the quotient of $71.06 \div 34.1$.

Round 71.06 to 70 and 34.1 to 35 by using compatible numbers.

$$34.1 \overline{)71.06} \rightarrow 35 \overline{)70}^2$$

So, $71.06 \div 34.1$ is about 2.

Divide Decimals by Whole Numbers (pp. 51–55)



MA.6.A.1.1,
MA.6.A.1.2,
MA.6.A.1.3,
MA.6.A.5.3

Divide.

41. $4.41 \div 5$ 42. $26.96 \div 8$
 43. $136.5 \div 35$ 44. $37.1 \div 14$
 45. $12.24 \div 36$ 46. $203.84 \div 32$
 47. $624.8 \div 16$ 48. $948.45 \div 15$

49. **MONEY** In one year, Marcy made \$214.68 in interest from her savings account. If she made the same amount of interest each month, how much did she make each month?

EXAMPLE 5 Find the quotient of $16.1 \div 7$.

$$\begin{array}{r} 2.3 \\ 7 \overline{)16.1} \\ -14 \\ \hline 21 \\ -21 \\ \hline 0 \end{array}$$

Place the decimal point.
Divide as with whole numbers.

Divide Decimals by Decimals (pp. 58–62)



MA.6.A.1.1,
MA.6.A.1.2,
MA.6.A.1.3,
MA.6.A.5.3

Divide.

50. $0.96 \div 0.6$ 51. $11.16 \div 6.2$
 52. $0.276 \div 0.6$ 53. $5.88 \div 0.4$
 54. $18.45 \div 0.5$ 55. $0.155 \div 0.25$
 56. $51.667 \div 6.1$ 57. $2.214 \div 0.41$

58. **MARATHONS** A marathon race is 26.2 miles long. Lacey ran the marathon in 3.6 hours. On average, how many miles did she run per hour? Round to the nearest tenth.

EXAMPLE 6 Find $11.48 \div 8.2$.

$$\begin{array}{r} 1.4 \\ 8.2 \overline{)11.48} \\ -82 \\ \hline 328 \\ -328 \\ \hline 0 \end{array}$$

Multiply the divisor and the dividend by 10.
Place the decimal point.
Divide as with whole numbers.

1-3 Powers of 10

Multiply by Powers of 10 (pp. 64–67)

Find each product.

- 59. 0.81×100
- 60. $0.94 \times 1,000$
- 61. 62.3×0.1
- 62. 17.5×0.01
- 63. **PHYSICS** The speed of light is $1.86 \times 100,000$ miles per second. Write this number in standard form.



MA.6.A.1.1,
MA.6.A.1.2

EXAMPLE 7 Find $0.98 \times 1,000$.

$$0.98 \times 1,000 = \underline{0980}$$

1,000 has 3 zeros. So, move the decimal point 3 places to the right.

$$= 980$$

EXAMPLE 8 Find 623.45×0.01 .

$$623.45 \times 0.01 = \underline{62345}$$

0.01 has 2 places after the decimal point. So, move the decimal point 2 places to the left.

$$= 6.2345$$

Divide by Powers of 10 (pp. 68–71)

Find each quotient.

- 64. $50.14 \div 10$
- 65. $2.35 \div 1,000$
- 66. $0.106 \div 0.01$
- 67. $451 \div 0.1$
- 68. **MONEY** How many dimes are in \$8,590?



MA.6.A.1.1,
MA.6.A.1.2

EXAMPLE 9 Find $34.6 \div 100$.

$$34.6 \div 100 = \underline{0346}$$

100 has 2 zeros. So, move the decimal point 2 places to the left.

$$= 0.346$$

EXAMPLE 10 Find $0.418 \div 0.001$.

$$0.418 \div 0.001 = \underline{0418}$$

0.001 has 3 places after the decimal point. So, move the decimal point 3 places to the right.

$$= 418$$

PSI: Determine Reasonable Answers (pp. 72–73)

- 69. **HEIGHT** Evan is 5.75 feet tall. His sister, Cindy, is 0.8 times his height. Which is a reasonable height for Cindy: about 4 feet, 4.5 feet, or 6 feet? Explain your reasoning.
- 70. **MONEY** Derek has \$23.80 in his pocket. He spent about 0.51 of this amount on a CD. Would \$8, \$12, or \$20 be a reasonable price for the CD?



MA.6.A.5.3,
MA.6.A.1.3

EXAMPLE 11

There are 24 students in the Spanish club. If the number of students in the school is 19.5 times this amount, would about 400, 500, or 600 be a reasonable number of students in the school?

24×19.5 is about 25×20 or 500.

So, 500 is a reasonable number of students in the school.


CHAPTER 1 Practice Test

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• Chapter Test

Multiply.

1. 7.8×6 2. 0.92×4
 3. 12×0.034 4. 4.56×9.7

5.  **NGSS PRACTICE** Armando and his 3 friends ordered a 4-foot sub for \$25.99, 4 large drinks for \$1.79 each, and a salad for \$5.89. Which of the following represents the total cost, not including tax?
 A. \$134.68 C. \$37.25
 B. \$39.04 D. \$33.67

Divide.

6. $7.2 \div 3$ 7. $0.45 \div 15$
 8. $36.08 \div 8.2$ 9. $10.79 \div 4.15$

10. **MINIMUM WAGE** The table shows the minimum wage in the United States during various years.

Year	Wage (\$)
1997	5.15
2007	5.85
2008	6.55
2009	7.25

Estimate the number of hours someone would need to work in 2008 to earn \$210.

Estimate each product or quotient.

11. 21.5×4.85 12. $53.46 \div 9.03$
 13. 7.08×11.29 14. $832 \div 39.1$

15. **DOGS** A greyhound can run as fast as 39.35 miles per hour. Without calculating, would about 12, 14, or 16 be a reasonable answer for the number of miles a greyhound could run at this rate in 0.4 hour? Explain your reasoning.


16. **POPULATION** The table shows the population density of several countries.

Country	Population Density (per square kilometer)
Japan	338.96
Austria	97.66
United States	31.27
Australia	2.6

About how many times as great is the population density of Japan than Australia?

Find each product or quotient.

17. 43.89×0.01 18. $5.82 \times 1,000$
 19. 7.63×0.1 20. $14.9 \div 100$
 21. $83.71 \div 0.1$ 22. $0.63 \div 0.001$

23.  **EXTENDED RESPONSE** An exchange rate is the rate at which a dollar can be exchanged in a foreign country. The table below gives the exchange rates for various foreign currency.

1 U.S. Dollar is equal to:
109.886 Japanese yen
0.68 Euros
1.06 Canadian dollars
0.54 United Kingdom pounds

- Part A** Raul cashes \$175 for euros. How many euros will he get?
Part B Sasha buys a sweater in Ontario that costs 75 Canadian dollars. What is the approximate value in American dollars?
Part C Would you rather have 50 United Kingdom pounds, 50 Canadian dollars, or 50 euros? Explain.

CHAPTER
1

Preparing for Standardized Tests



Gridded Response: Whole Numbers

When a test question has the symbol shown at the right, you must fill in a grid on your answer sheet. First, write your answer in the boxes at the top of the answer grid. Then fill in a bubble under each box to match your answer.



NGSS PRACTICE EXAMPLE

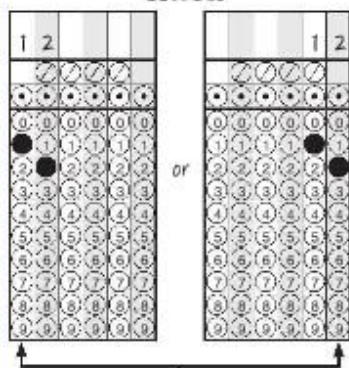
Gia bought 106 red beads and 44 blue beads for \$0.08 per bead. How much did the beads cost altogether?

total number of beads = $106 + 44$ or 150

$150 \times 0.08 = 12$

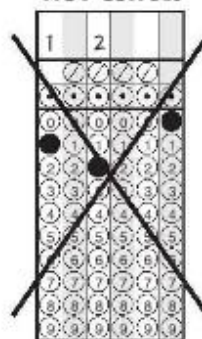
The total cost is \$12. So, grid in 12.

Correct



The answer can have the first digit in the left column or the last digit in the right column.

NOT Correct



- Do NOT leave blank answer boxes in the middle.
- Do NOT fill in bubbles under unused answer boxes.



Work on It

Derek walked 4.75 miles in 66.5 minutes. If he walked the same pace the entire time, how many minutes did it take him to walk one mile? Fill in your answer on an answer grid.

Test Hint

Fill in each bubble by making a solid black mark that completely fills the circle.





Read each question. Then fill in the correct answer on the answer sheet provided by your teacher or on a sheet of paper.

1. Justin was estimating the area of the square sticky note shown below. Which would be a reasonable estimate of the area of the note?



- A. 49 square centimeters
 B. 52 square centimeters
 C. 64 square centimeters
 D. 72 square centimeters
2. Marlene purchased 20 stamps at the post office for \$8.40. What is the cost of one stamp?
 F. \$0.41 H. \$1.68
 G. \$0.42 I. \$2.38

3. **SHORT RESPONSE** Manuel bought supplies for making party favors. The table shows the cost of each supply. If Manuel made 12 party favors, how much did it cost to make each party favor?

Supply	Cost (\$)
Bags	2.00
Candy	5.75
Stickers	6.39
Pencils	4.82

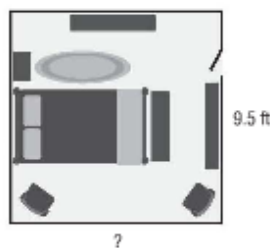
4. **GRIDDED RESPONSE** Shellie spent \$10.56 on oranges that cost \$0.88 per orange. How many oranges did she purchase?

5. **GRIDDED RESPONSE** The average weight of a bass in a neighborhood lake is 5.1 pounds. Norman and his friend caught 4 bass. Assuming the bass were all average weight, what was the total weight in pounds of the fish they caught?

6. Bartholomew went hiking over the weekend. He hiked all 4 trails in 3 hours. Which is the **best** estimate for the number of miles he hiked per hour?

Trail	Length (mi)
Great Fork	1.7
Stoney Creek	0.8
Sippo Lake	2.6
Rock Falls	0.5

- A. 2 miles C. 15 miles
 B. 2.5 miles D. 18 miles
7. The area of Trina’s bedroom is 96.9 square feet. What is the base of her bedroom?



- F. 10.2 feet H. 9.2 feet
 G. 10.0 feet I. 9.0 feet
8. **GRIDDED RESPONSE** Find the area in square meters of a rectangle with a base of 2.1 meters and a height of 0.8 meter.



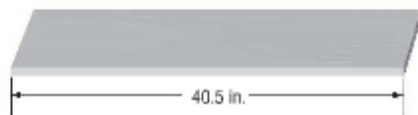
Review

For test-taking strategies and practice, see page FL1.

9. A model plane is 100 times smaller than an actual plane. The length of the model is 4.8 inches. What is the actual length of the plane?
- A. 480 feet C. 20 feet
B. 40 feet D. 8 feet
10. **SHORT RESPONSE** Rita bought 5.7 pounds of bananas and 2.8 pounds of apples. Write a multiplication expression and find the total cost for the fruit. Round to the nearest cent.



11. Malabar Middle School is raising money for a local charity. Their goal is to raise \$500 by their holiday break. If they have 10 days before their break, what is a reasonable amount that they should collect each day to reach their goal?
- F. \$5 H. \$50
G. \$25 I. \$100
12. Ignacio cut the board shown into 4.5-inch pieces. How many pieces can he cut?



- A. 6 C. 8
B. 7 D. 9

NEED EXTRA HELP?

If You Missed Question...	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Go to Lesson...	1-1A	1-2C	1-2C	1-2E	1-1C	1-2A	1-2E	1-1E	1-3A	1-1E	1-3B	1-2E	1-2C	1-2C
For help with NGSSS...	A.5.3	A.1.2	A.1.2	A.1.2	A.1.2	A.5.3	A.1.2	A.1.2	A.1.2	A.1.1	A.1.2	A.1.2	A.1.3	A.1.2

13. The table below shows times from the Men's 4 × 100 meter Medley. The four swimmers each swam 100 meters.

2008 Olympic Results	
Team	Time (min:sec)
United States	3:29.34
Australia	3:30.04
Japan	3:31.18
Russian Federation	3:31.92

Suppose each swimmer swam the same amount of time. How long did each United States swimmer swim in the race?

- F. 67.335 s H. 52.335 s
G. 67 s I. 52 s

14. **EXTENDED RESPONSE** Wesley lives in an apartment and would like to have his own vegetable garden. His city offers garden plots, but he has to pay for the fencing.

Plot A	Plot B	Plot C
Area: 204 ft ²	Area: ■	Area: 204.49 ft ²
Base: ■	Base: 12.78 ft	Base: ■
Height: 10.2 ft	Height: ■	Height: 14.3 ft
Perimeter: ■	Perimeter: 57.56 ft	Perimeter: ■

Part A Find the missing measurement for each plot.

Part B Which plot requires the least amount of fencing?

Part C Which plot has the greatest area?