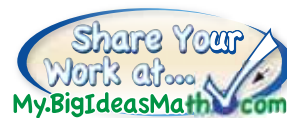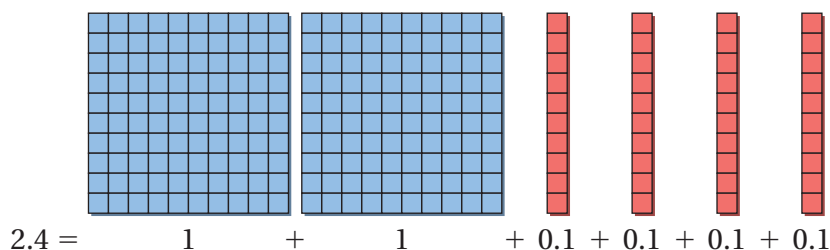# 3.5 Dividing Decimals

Essential Question How can you use base ten blocks to model decimal division?

1 ACTIVITY: Dividing Decimals
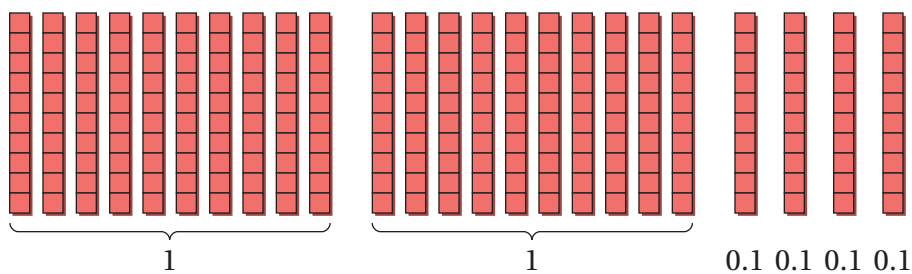
Work with a partner. Use base ten blocks to model the division.

a. **Sample:** $2.4 \div 0.6$

Begin by modeling 2.4.

$$2.4 = \quad 1 \quad + \quad 1 \quad + 0.1 + 0.1 + 0.1 + 0.1$$
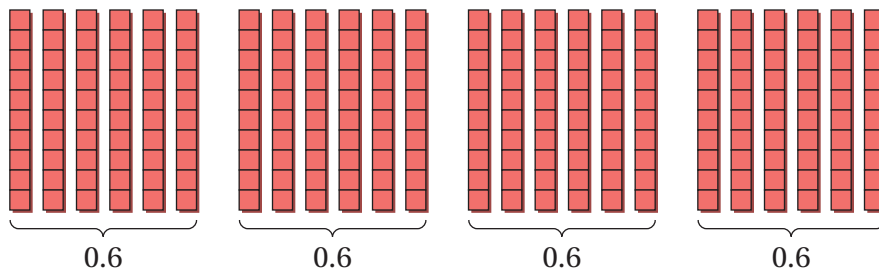
Next, think of the division $2.4 \div 0.6$ as the question "How many 0.6's are in 2.4?" To answer this, divide 2.4 into groups of 0.6 each.

Replace the ones blocks with tenths blocks. You have a total of 24 tenths blocks.

$$\underbrace{\qquad\qquad}_{1} \quad \underbrace{\qquad\qquad}_{1} \quad 0.1 \ 0.1 \ 0.1 \ 0.1$$

Group the blocks into groups of 0.6 each.

$$\underbrace{\qquad}_{0.6} \quad \underbrace{\qquad}_{0.6} \quad \underbrace{\qquad}_{0.6} \quad \underbrace{\qquad}_{0.6}$$
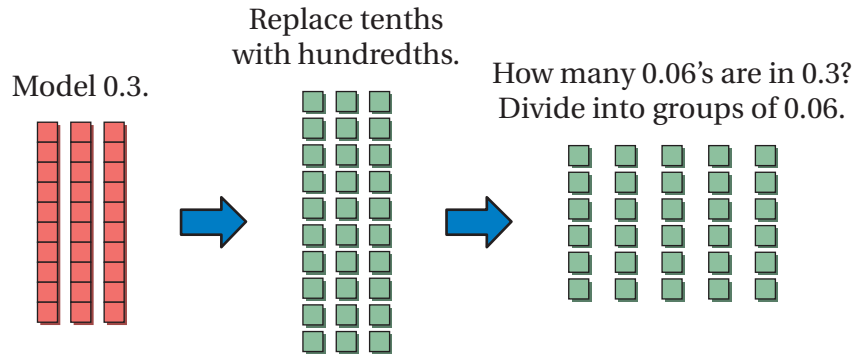
∴ There are four groups of 0.6. So, $2.4 \div 0.6 = 4$.

b. $1.6 \div 0.8$ c. $2.8 \div 0.7$ d. $3.2 \div 0.4$ e. $3.6 \div 0.9$

2 **ACTIVITY: Dividing Decimals**

Work with a partner. Use base ten blocks to model the division.

a. **Sample:** $0.3 ÷ 0.06$

Model 0.3.

Replace tenths with hundredths.

How many 0.06's are in 0.3? Divide into groups of 0.06.

⋮⋮ There are 5 groups of 0.06. So, $0.3 ÷ 0.06 = 5$.

b. $0.2 ÷ 0.04$

c. $0.6 ÷ 0.01$

d. $0.16 ÷ 0.08$

e. $0.28 ÷ 0.07$

What Is Your Answer?

3. **IN YOUR OWN WORDS** How can you use base ten blocks to model decimal division? Use examples from Activity 1 and Activity 2 as part of your answer.

4. **YOU BE THE TEACHER** Newton's poem is about dividing fractions. Write a poem about dividing decimals.

"When you must divide a fraction, do this very simple action: Flip what you're dividing BY, and then it's easy—multiply!"

5. Think of your own cartoon about dividing decimals. Draw your cartoon.

Practice

Use what you learned about dividing decimals to complete Exercises 9–12 on page 136.

3.5 Lesson

🔑 Key Idea

Dividing Decimals by Decimals

Words Multiply the divisor *and* dividend by 10, 100, or 1000 to make the divisor a whole number. Then place the decimal point in the quotient and divide as you would with whole numbers.

Numbers $1.2\overline{)4.56}$ ⟶ $12\overline{)45.6}$ with quotient 3.8

> Place the decimal point above the decimal point in the dividend 45.6.

> Multiply each number by 10.

EXAMPLE ① **Dividing Decimals**

a. Find $18.2 \div 1.4$.

$1.4\overline{)18.2}$ ⟶

$$
\begin{array}{r}
13. \\
14\overline{)182.} \\
-14 \\
\hline
42 \\
-42 \\
\hline
0
\end{array}
$$

> Place the decimal point above the decimal point in the dividend 182.

> Multiply each number by 10.

Study Tip

Multiplying the divisor and dividend by 10, 100, or 1000 does not change the quotient.

For example:
$18.2 \div 1.4 = 13$
$182 \div 14 = 13$
$1820 \div 140 = 13$

∴ So, $18.2 \div 1.4 = 13$. **Check** $13 \times 1.4 = 18.2$ ✓

b. Find $0.273 \div 0.39$.

$0.39\overline{)0.273}$ ⟶

$$
\begin{array}{r}
0.7 \\
39\overline{)27.3} \\
-27.3 \\
\hline
0
\end{array}
$$

> Multiply each number by 100.

∴ So, $0.273 \div 0.39 = 0.7$. **Check** $0.7 \times 0.39 = 0.273$ ✓

🔴 On Your Own

Divide. Check your answer.

1. $1.2\overline{)9.6}$

2. $3.4\overline{)57.8}$

3. $21.643 \div 2.3$

4. $0.459 \div 0.51$

EXAMPLE 2

Inserting Zeros in the Dividend and Quotient

Find 2.45 ÷ 0.007.

$$0.007\overline{)2.450}$$ ⟶ $$7\overline{)2450}$$
$$\underline{-21}$$
$$35$$
$$\underline{-35}$$
$$00$$

Multiply each number by 1000. Insert a zero in the dividend.

0 ÷ 7 = 0. So, insert a zero in the quotient.

So, 2.45 ÷ 0.007 = 350.

On Your Own

Now You're Ready
Exercises 13–24

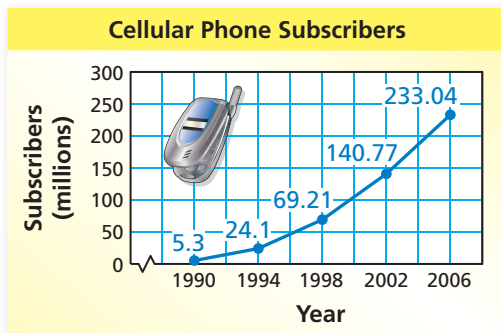**Divide. Check your answer.**

5. 3.8 ÷ 0.16

6. 15.6 ÷ 0.78

7. 7.2 ÷ 0.048

8. 0.18 ÷ 0.003

EXAMPLE 3

Real-Life Application

How many times more cellular phone subscribers were there in 2006 than in 1990? Round to the nearest whole number.

Cellular Phone Subscribers

From the graph, there were 233.04 million subscribers in 2006 and 5.3 million in 1990. So, divide 233.04 by 5.3.

Estimate 230 ÷ 5 = 46

$$5.3\overline{)233.04}$$ ⟶ $$53\overline{)2330.4}$$

$$\begin{array}{r} 43.9 \\ 53\overline{)2330.4} \\ \underline{-212} \\ 210 \\ \underline{-159} \\ 51\ 4 \\ \underline{-47\ 7} \\ 3\ 7 \end{array}$$

Rounds to 44.

So, there were about 44 times more subscribers in 2006 than in 1990.

Reasonable? 44 ≈ 46 ✓

On Your Own

9. How many times more subscribers were there in 2002 than in 1994? Round your answer to the nearest whole number.

✓ Vocabulary and Concept Check

1. NUMBER SENSE Estimate $62.4 \div 6.5$.

Rewrite the problem so that the divisor is a whole number.

2. $4.7\overline{)13.6}$

3. $0.21\overline{)17.66}$

4. $2.16\overline{)18.5}$

5. $15.6 \div 4.7$
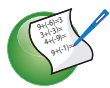
6. $9.28 \div 0.3$

7. $5.59 \div 0.647$

8. DIFFERENT WORDS, SAME QUESTION Which is different? Find "both" answers.

9.6 is how many times larger than 1.6?	What is the quotient of 9.6 and 1.6?
1.6 is how much less than 9.6?	What is 9.6 divided by 1.6?

✏️ Practice and Problem Solving

Divide.

9. $3.6 \div 0.3$

10. $2.6 \div 0.2$

11. $0.72 \div 0.06$

12. $0.36 \div 0.04$

Divide. Check your answer.

① ② **13.** $2.1\overline{)25.2}$

14. $3.8\overline{)34.2}$

15. $0.4\overline{)14.6}$

16. $8.75\overline{)35.35}$

17. $78.54 \div 4.2$

18. $9.52 \div 1.19$

19. $36.47 \div 0.7$

20. $0.984 \div 12.3$

21. $4.23 \div 1.2$

22. $0.52 \div 0.0013$

23. $95.04 \div 13.2$

24. $32.2 \div 0.07$

25. ERROR ANALYSIS Describe and correct the error in rewriting the problem.

✗ $0.32\overline{)146.4} \longrightarrow 32\overline{)1.464}$

26. TICKETS Tickets to the school musical cost $6.25. The amount received from ticket sales is $706.25. How many tickets were sold?

27. HEIGHT A person's running stride is about 1.14 times his or her height. Your friend's stride is 5.472 feet. How tall is your friend?

28. MP3 PLAYER You have 3.4 gigabytes available on your MP3 player. Each song is about 0.004 gigabyte. How many more songs can you download onto your MP3 player?

Divide. Round to the nearest hundredth if necessary.

29. $44.8 \div 1.25$

30. $80.88 \div 8.425$

31. $9.9 \div 3.18$

32. $0.8 \div 0.6$

33. $38.9 \div 6.44$

34. $11.6 \div 0.95$

35. $0.35 \div 0.45$

36. $87.6 \div 9.24$

Without finding the quotient, copy and complete the statement using <, >, or =.

37. $6.66 \div 0.74$ ▢ $66.6 \div 7.4$

**38.** $32.2 \div 0.7$ ▢ $3.22 \div 7$

39. $160.72 \div 16.4$ ▢ $160.72 \div 1.64$

40. $75.6 \div 63$ ▢ $7.56 \div 0.63$

41. BEES The formula $N = \dfrac{3x}{0.014}$ approximates the number N of bees in a hive based on the number x of bees seen leaving the hive in one minute. You see 25 bees leave the hive in one minute. About how many bees are in the hive?

Orange Prices

42. ORANGES How many times more expensive was one pound of oranges in 2006 than in 1990? Round your answer to the nearest tenth.
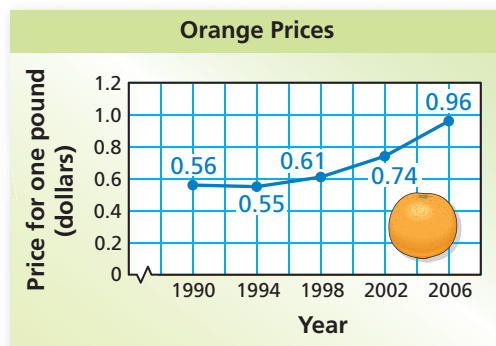
Applesauce

|	
3.9-ounce bowl	$0.52
24-ounce jar	$2.63

43. APPLESAUCE A store sells applesauce in two sizes.

   a. How many *bowls* of applesauce fit in a *jar*? Round your answer to the nearest hundredth.

   b. Explain two ways to find the better buy.

   c. What is the better buy?

44. Geometry The large rectangle's dimensions are three times the dimensions of the small rectangle.

23.1 ft

49.2 ft

   a. How many times greater is the perimeter of the larger rectangle compared to the perimeter of the smaller rectangle?

   b. How many times greater is the area of the larger rectangle compared to the area of the smaller rectangle?

   c. Are the answers to parts (a) and (b) the same? *Explain* why or why not.

   d. What happens in parts (a) and (b) if the dimensions of the small rectangle are doubled?
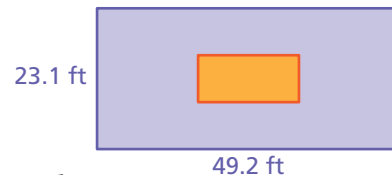
Fair Game Review What you learned in previous grades & lessons

Write the fraction as a percent.

45. $\dfrac{1}{4}$

46. $\dfrac{7}{10}$

47. $\dfrac{21}{100}$

48. $\dfrac{57}{100}$

49. MULTIPLE CHOICE Melissa earns $7.40 an hour working at a grocery store. She works 14.25 hours this week. How much will she earn? *(Section 3.3)*

   A $83.13   **B** $105.45   **C** $156.75   **D** $1054.50