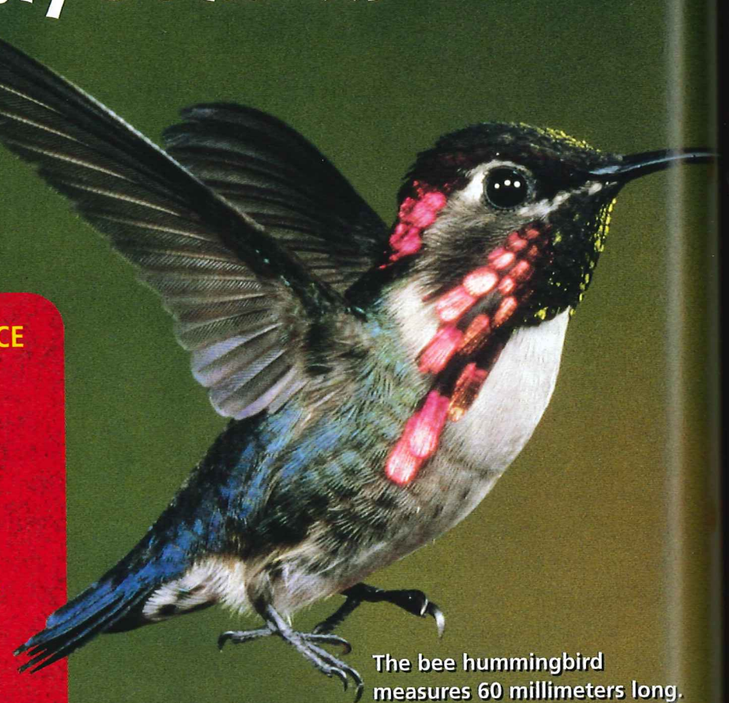
CHAPTER 8

Multiply Decimals



The bee hummingbird measures 60 millimeters long.

FAST FACT • SCIENCE

There are about 10 million different kinds of animals in the world. Some are very light. A bee hummingbird and a golf ball are about the same size, but the weight of a golf ball is about 28 times as great as that of a bee hummingbird.

PROBLEM SOLVING

The table lists some of the lightest and heaviest animals. About how much does a golf ball weigh?

ANIMAL WEIGHTS

Record	Animal	Weight (kilograms)
Lightest bird	Bee hummingbird	0.0016
Lightest land mammal	Bumblebee bat	0.002
Heaviest insect	Goliath beetle	0.099
Heaviest bird	Ostrich	148.5
Heaviest bony fish	Ocean sunfish	1,980
Heaviest land mammal	African elephant	7,000

CHECK WHAT YOU KNOW

Use this page to help you review and remember important skills needed for Chapter 8.

MULTIPLY 2-DIGIT NUMBERS

Find the product.

1. 13×8
2. 24×5
3. 52×7
4. 76×49
5. 39×3
6. 67×4
7. 53×83
8. 84×8
9. 48×27
10. 17×26
11. 92×56
12. 63×15

MULTIPLY MONEY

Multiply.

13. $\$0.10 \times 2$
14. $\$0.05 \times 20$
15. $\$0.25 \times 4$
16. $\$0.25 \times 3$
17. $\$0.10 \times 10$
18. $\$0.50 \times 5$
19. $\$0.01 \times 9$
20. $\$0.05 \times 5$
21. $\$0.25 \times 8$
22. $\$0.25 \times 2$
23. $\$0.10 \times 8$
24. $\$0.05 \times 9$
25. $\$0.01 \times 12$
26. $\$0.25 \times 6$
27. $\$0.50 \times 6$

VOCABULARY POWER

REVIEW

decimal [de′sə•məl] *noun*

Decimal is derived from the Latin *decimus*, meaning "tenth." Explain why this meaning helps you understand decimals.

GO ON-LINE www.harcourtschool.com/mathglossary

LESSON 8

HANDS ON

Multiply Decimals and Whole Numbers

Quick Review

1. 50¢ × 9
2. $60 × 8
3. $12 × 5
4. 75¢ × 4
5. $50 × 8

MATERIALS
decimal models
markers or colored pencils

Explore

The red kangaroo, the world's largest marsupial, uses its tail for balance when jumping. Its tail is about 0.53 times as long as its body. Its body is about 2 meters long. How long is its tail to the nearest meter?

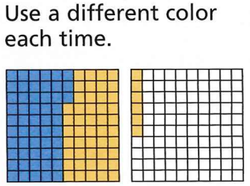
Activity 1

Make a model to show how to multiply 2 by 0.53.

What is 2 × 0.53?

STEP 1

Use hundredths models. Shade 0.53, or 53 hundredths, two times. Use a different color each time.



STEP 2

Count the number of shaded hundredths. There are 106 shaded hundredths. This is 1 whole and 6 hundredths.

So, 2 × 0.53 = 1.06.

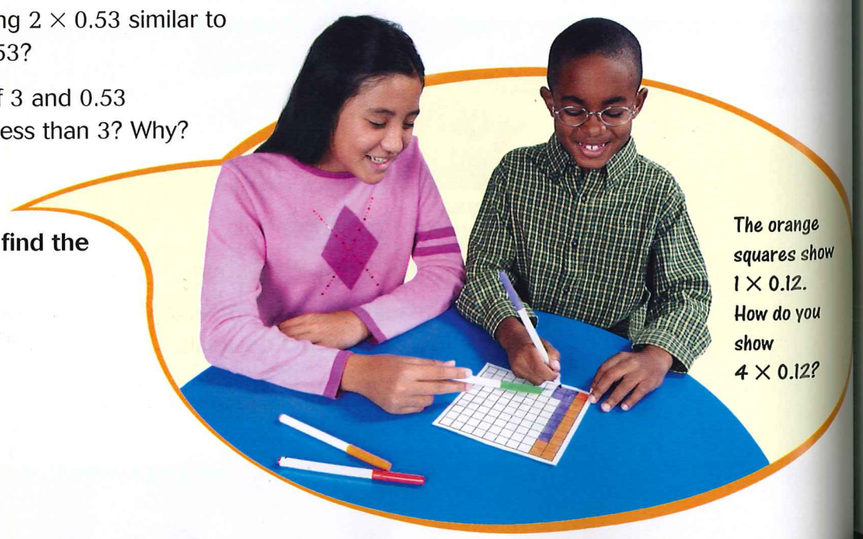
So, the red kangaroo's tail is about 1 meter long.

- How is multiplying 2 × 0.53 similar to multiplying 2 × 53?
- Is the product of 3 and 0.53 greater than or less than 3? Why?

Try It

Make a model to find the product.

a. 4 × 0.12
b. 3 × 0.03
c. 5 × 0.5
d. 3 × 0.3



Connect

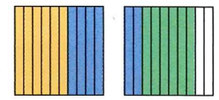
You can write a multiplication sentence for your model.

Activity 2

What is 3 × 0.6?

Model

Use tenths models. Shade 0.6, or 6 tenths, three times. Use a different color each time. Count the number of shaded tenths. There are 18 shaded tenths, or 1 whole and 8 tenths.



Record

Record.

$$\begin{array}{r} 0.6 \\ \times\ \ 3 \\ \hline 1.8 \end{array}$$

Use the model to place the decimal point.
3 × 0.6 is 3 × 6 tenths, or 18 tenths, which is 1.8.
So, 3 × 0.6 = 1.8.

Practice and Problem Solving

Make a model to find each product.

1. 3 × 0.8 **2.** 6 × 0.4 **3.** 5 × 0.6 **4.** 2 × 0.82
5. 7 × 0.03 **6.** 2 × 0.12 **7.** 4 × 0.19 **8.** 9 × 0.18

Joy is shopping at the pet store. For 9–12, use the table to find the total cost.

TROPICAL FISH	
Item	**Price**
Neon tetra	$0.74
Zebra danio	$0.89
Albino danio	$0.99
Leopard danio	$0.95

9. 3 neon tetras, 2 zebra danios
10. 2 albino danios, 3 leopard danios
11. 4 neon tetras, 2 zebra danios, 1 leopard danio
12. 5 albino danios, 3 zebra danios
13. Write about it Explain how to draw a picture to find 3 × 0.9.

Mixed Review and Test Prep

14. Aponi recorded temperatures of 78°, 82°, 65°, 66°, and 83°. What is the range of the data? (p. 96)
15. What is the value of the expression $10 + ($4 − *n*) if *n* is $2? (p. 64)
16. Round 82,394,021 to the nearest million. (p. 38)
17. Write an equivalent decimal for 8.02. (p. 26)
18. TEST PREP Which number is 900 less than the product of 217 and 508? (p. 154)

A 101,236 **C** 110,146
B 109,336 **D** 111,136

LESSON 2

Algebra: Patterns in Decimal Factors and Products

Quick Review

1. 10×12
2. 100×12
3. $1{,}000 \times 12$
4. $10{,}000 \times 12$
5. $100{,}000 \times 12$

Learn

MEASURE UP The smallest frog in the Northern Hemisphere is found in Cuba and grows to about 0.98 centimeters in body length. The photos show the frog at its actual size and enlarged 5 times. What would be the length of the frog in a photo enlarged 1,000 times?

Example

What is $0.98 \times 1{,}000$?

Look for a pattern.

$0.98 \times 1 = 0.98$

$0.98 \times 10 = 9.8$ ← The decimal point moves 1 place to the right.

$0.98 \times 100 = 98.$ ← The decimal point moves 2 places to the right.

$0.98 \times 1{,}000 = 980.$ ← The decimal point moves 3 places to the right.

So, in the photo enlarged 1,000 times, the frog would be 980 centimeters long.

▲ Frog enlarged 5 times

▲ Actual size of frog

- **What if** you enlarge the frog photo 100 times? What will be the length of the frog in the photo?

MATH IDEA The decimal point moves one place to the right when you multiply by 10, two places to the right when you multiply by 100, and three places to the right when you multiply by 1,000.

More Examples

A

$\$3.25 \times 1 = \$3.25$
$\$3.25 \times 10 = \$32.50$
$\$3.25 \times 100 = \$325.00$
$\$3.25 \times 1{,}000 = \$3{,}250.00$

B

$0.478 \times 1 = 0.478$
$0.478 \times 10 = 4.78$
$0.478 \times 100 = 47.8$
$0.478 \times 1{,}000 = 478$

C

$0.0009 \times 1 = 0.0009$
$0.0009 \times 10 = 0.009$
$0.0009 \times 100 = 0.09$
$0.0009 \times 1{,}000 = 0.9$

- **REASONING** How can you use the pattern to place the decimal point in $\$32.50 \times 100$?

Check

1. **Explain** why the product 4.56×100 is the same as the product $4.56 \times 10 \times 10$? What is 4.56×100?

Use mental math to complete.

2. $1 \times 0.3 = 0.3$
   $10 \times 0.3 = 3$
   $100 \times 0.3 = \blacksquare$
   $1{,}000 \times 0.3 = \blacksquare$

3. $1 \times 2.845 = 2.845$
   $10 \times 2.845 = 28.45$
   $100 \times 2.845 = \blacksquare$
   $1{,}000 \times 2.845 = 2{,}845$

4. $1 \times 0.3459 = 0.3459$
   $10 \times 0.3459 = \blacksquare$
   $100 \times 0.3459 = 34.59$
   $1{,}000 \times 0.3459 = 345.9$

Practice and Problem Solving

Extra Practice, page 178, Set A

Use mental math to complete.

5. $1 \times 0.005 = 0.005$
   $10 \times 0.005 = \blacksquare$
   $100 \times 0.005 = 0.5$
   $1{,}000 \times 0.005 = 5$

6. $1 \times 4.761 = 4.761$
   $10 \times 4.761 = 47.61$
   $100 \times 4.761 = \blacksquare$
   $1{,}000 \times 4.761 = \blacksquare$

7. $1 \times 0.45 = 0.45$
   $10 \times 0.45 = \blacksquare$
   $100 \times 0.45 = \blacksquare$
   $1{,}000 \times 0.45 = \blacksquare$

Multiply each number by 10, by 100, and by 1,000.

8. 0.9
9. 0.51
10. 0.007
11. 0.015
12. 0.2178
13. $0.25
14. 45.69
15. 1.0608

ALGEBRA **Find the value of *n*.**

16. $10 \times 0.009 = n$
17. $n \times 0.08 = 0.8$
18. $100 \times n = 4.5$
19. $1.5 \times n = 15$
20. $n \times 100 = 1.9$
21. $n \times 1{,}000 = 3.1$

22. A half dollar is 0.50 of a dollar. What is the value of 100 half dollars? of 1,000 half dollars?

23. If a snail moves 8 inches a minute, how many minutes would it take it to move 12 feet?

24. **Write About It** Explain why multiplying a decimal by 10, by 100, and by 1,000 is easy to compute mentally.

25. **REASONING** How does the position of the decimal point change when you multiply 6.7 by 10,000?

Mixed Review and Test Prep

26. $1{,}456 \times 8$ (p. 150)
27. 345×23 (p. 152)

Write <, >, or = for each ●. (p. 28)

28. $0.89 \bullet 0.98$
29. $3.9 \bullet 3.09$

30. **TEST PREP** Find the value of *n*. $90 = n + 32 + 28$ (p. 70)

A $n = 20$
B $n = 28$
C $n = 30$
D $n = 32$

LESSON 3

Model Decimal Multiplication

Quick Review

1. $0.4 + 0.4$
2. $0.6 + 0.6$
3. $0.7 + 0.7$
4. $0.4 + 0.4 + 0.4$
5. $0.1 + 0.1 + 0.1$

Learn

FAST FOOD The bee hummingbird weighs about 0.2 dekagram. It needs to eat half its body weight in food every day to stay alive. About how much food does a bee hummingbird need to eat every day?

Example

Find 0.2×0.5. ← **Think:** One half can be written as 0.5.

STEP 1

Divide a square into 10 equal columns. Shade 5 of the columns to show 0.5.

STEP 2

Divide the square into 10 equal rows to make 100 equal parts. Shade 2 of the rows to show 0.2.

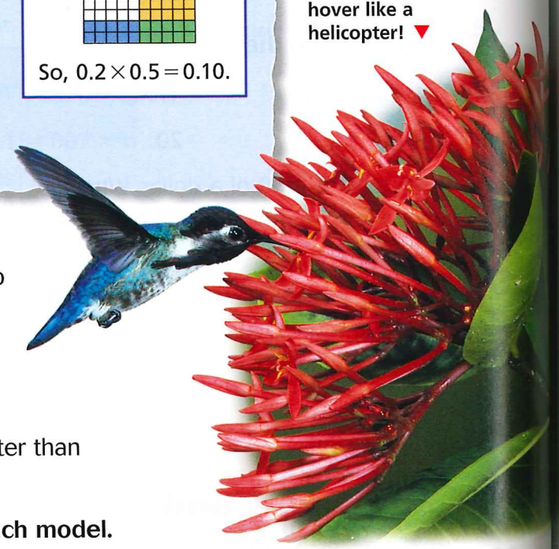
STEP 3

The area in which the shading overlaps shows the product, or 0.2×0.5.

So, $0.2 \times 0.5 = 0.10$.

So, a bee hummingbird eats about 0.10, or 0.1 dekagram, of food every day.

Since hummingbirds can rotate their wings in a figure-eight pattern, they can fly backward, and even hover like a helicopter! ▼

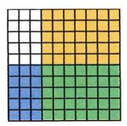


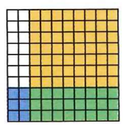
- **REASONING** What relationship do you see between the product and the size of the two decimal factors less than 1?

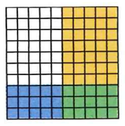
Check

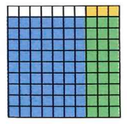
1. **Tell** whether the product 0.2×0.4 is greater than or less than 1. Explain your reasoning.

Complete the multiplication sentence for each model.

2. 
$0.5 \times 0.7 = n$

3. 
$y \times 0.8 = 0.24$

4. 
$0.3 \times 0.5 = p$

5. 
$0.9 \times n = 0.27$

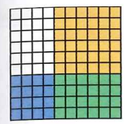
Make a model to find the product.

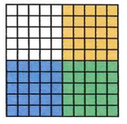
6. 0.1×0.5
7. 0.4×0.7
8. 0.3×0.3
9. 0.8×0.4

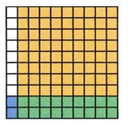
Practice and Problem Solving

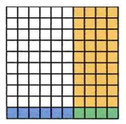
Extra Practice, page 178, Set B

Complete the multiplication sentence for each model.

10. 
$0.4 \times 0.6 = n$

11. 
$0.5 \times y = 0.25$

12. 
$p \times 0.9 = 0.18$

13. 
$0.1 \times 0.4 = n$

Make a model to find the product.

14. 0.8×0.8
15. 0.1×0.9
16. 0.6×0.2
17. 0.8×0.3

Find the product.

18. 0.7×0.8
19. 0.2×0.8
20. 0.9×0.6
21. 0.6×0.7
22. 0.5×0.6
23. 0.8×0.9
24. 0.5×0.4
25. 0.3×0.6

ALGEBRA **For 26–29, find the value of *n*.**

26. $n \times 0.2 = 0.14$
27. $0.6 \times n = 0.48$
28. $0.9 \times n = 0.63$
29. $n \times 0.7 = 0.35$

30. **Vocabulary Power** *Deca-* and *deka-* are variations of the same prefix. A *decagon* is a polygon with 10 sides. Use the meaning of *decagon* to explain the meaning of *dekagram*.

31. At the pet store, Jason bought 2 birdcages at \$12.98 each and 5 boxes of birdseed at \$3.49 each. If he gave the clerk five \$10-bills, what would be his change?

32. **What's the Error?** Marco said $0.1 \times 0.6 = 0.6$. Describe his error. Draw a model.

33. **FAST FACT • SCIENCE** A grasshopper can leap about 0.7 meter. A flea can jump 0.5 times as far. About how far can a flea jump?

Mixed Review and Test Prep

Round to the nearest million. (p. 38)

34. 4,099,999
35. 16,399,999

Order from least to greatest. (p. 10)

36. 87,314; 87,413; 81,341
37. 109,721; 190,271; 109,271

38. **TEST PREP** Which shows three and two tenths written as a decimal and a fraction? (p. 22)

A $3.2; 3\frac{2}{10}$
B $2.3; 2\frac{3}{10}$
C $3.12; 3\frac{12}{100}$
D $3.02; 3\frac{2}{100}$

LESSON 4

Place the Decimal Point

Quick Review

Round to the nearest whole number.

1. 3.4 **2.** 99.2 **3.** 0.38
4. 0.68 **5.** 5.3

Learn

TIP TO TIP From the tip of its nose to the end of its tail, a pygmy shrew measures 6.1 centimeters long. A house mouse is 2.7 times as long. How long is the house mouse?

You can use estimation to help you place the decimal point in a decimal product and to determine if your answer is reasonable.

Example 1 Find 2.7×6.1.

STEP 1

Estimate the product. Round each factor.

2.7×6.1
$\downarrow \quad \downarrow$
$3 \times 6 = 18$

STEP 2

Multiply as with whole numbers.

$$\begin{array}{r} 6.1 \\ \times 2.7 \\ \hline 427 \\ +1220 \\ \hline 1647 \end{array}$$

STEP 3

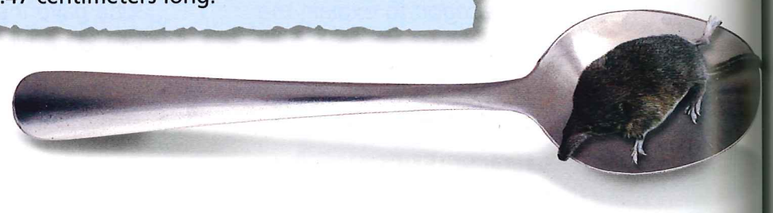
Use the estimate to place the decimal point in the product.

$$\begin{array}{r} 6.1 \\ \times 2.7 \\ \hline 427 \\ +1220 \\ \hline 16.47 \end{array}$$

Since the estimate is 18, place the decimal point so there is a two-digit whole number in the product.

So, the house mouse is 16.47 centimeters long.

The pygmy shrew, one of the world's smallest mammals, could sleep in a spoon! And it weighs about as much as a table-tennis ball! ▼



More Examples

A Find 12×0.48.

$10 \times 0.5 = 5 \leftarrow$ Estimate.

$$\begin{array}{r} 0.48 \\ \times \quad 12 \\ \hline 96 \\ +480 \\ \hline 5.76 \end{array}$$

Since the estimate is 5, place the decimal point so there is a one-digit whole number in the product.

B Find $0.75 \times \$1.25$.

$0.8 \times \$1 = \$0.8$, or $\$0.80 \leftarrow$ Estimate.

$$\begin{array}{r} \$1.25 \\ \times \ 0.75 \\ \hline 625 \\ +8750 \\ \hline \$0.9375 \end{array}$$

Since the estimate is \$0.80, place the decimal point so there is less than 1 dollar in the product.

Count Decimal Places

You can also place the decimal point by finding the total number of decimal places in the factors. Then count that many places from the right in the product.

Technology Link

More Practice: Harcourt Mega Math The Number Games, *Buggy Bargains*, Levels K, L

Example 2 Find 0.7×0.2.

STEP 1

Multiply as with whole numbers.

$$\begin{array}{r} 0.7 \\ \times 0.2 \\ \hline 14 \end{array}$$

STEP 2

Find the total number of decimal places in the factors. Place the decimal point that number of places from the right in the product.

$0.7 \leftarrow$ 1 decimal place in the factor
$\times 0.2 \leftarrow$ 1 decimal place in the factor
$0.14 \leftarrow$ 1 + 1, or 2 decimal places in the product

So, 0.7×0.2 is 0.14.

More Examples

C

$23 \leftarrow$ 0 decimal places in the factor
$\times 0.04 \leftarrow$ 2 decimal places in the factor
$0.92 \leftarrow$ 0 + 2, or 2 decimal places in the product

D

$7.52 \leftarrow$ 2 decimal places in the factor
$\times 0.23 \leftarrow$ 2 decimal places in the factor
2256
+15040
$1.7296 \leftarrow$ 2 + 2, or 4 decimal places in the product

MATH IDEA You can use estimation or the total number of decimal places in the factors to determine where to place the decimal point in the product.

▼ House mouse

Check

1. **Explain** how you can check that the answer to Example D is reasonable.

Choose the better estimate. Write *a* or *b*.

2. 34×0.8 **a.** 24 **b.** 2.4 **3.** 4.2×3.9 **a.** 16 **b.** 1.6

Copy each exercise. Place the decimal point in the product.

4. $\begin{array}{r} 29 \\ \times 0.7 \\ \hline 203 \end{array}$ **5.** $\begin{array}{r} 2.98 \\ \times \ 0.7 \\ \hline 2086 \end{array}$ **6.** $\begin{array}{r} 1.8 \\ \times 0.2 \\ \hline 36 \end{array}$ **7.** $\begin{array}{r} 0.37 \\ \times 0.64 \\ \hline 2368 \end{array}$

Find the product. Estimate to check.

8. 9×1.7 **9.** 0.2×12 **10.** 95×0.64 **11.** 1.25×0.5
12. 0.9×0.4 **13.** 0.37×0.6 **14.** 0.211×18

LESSON CONTINUES

Practice and Problem Solving

Extra Practice, page 178, Set C

Choose the better estimate. Write *a* or *b*.

15. 22×0.6 **a.** 12 **b.** 1.2

16. 2.3×4.8 **a.** 10 **b.** 1.0

17. 0.82×6 **a.** 0.48 **b.** 4.8

18. 42×0.5 **a.** 20 **b.** 2.0

Copy each exercise. Place the decimal point in the product.

19.
$$\begin{array}{r} 3.4 \\ \times\ 5 \\ \hline 170 \end{array}$$

20.
$$\begin{array}{r} 0.58 \\ \times\ 2 \\ \hline 116 \end{array}$$

21.
$$\begin{array}{r} 5.48 \\ \times 0.726 \\ \hline 397848 \end{array}$$

22.
$$\begin{array}{r} 2.32 \\ \times 4.68 \\ \hline 108576 \end{array}$$

Find the product. Estimate to check.

23. 0.3×14

24. $0.5 \times 1{,}206$

25. 6.8×4.5

26. 7.25×3.8

27. 5.1×2.7

28. 12.92×7.2

29. 19×0.21

30. 38.8×4.62

31. 0.7×0.8

32. 6.9×3.1

33. 0.12×0.9

34. 0.325×82

35. 0.68×0.4

36. 2.36×0.9

37. 0.3×0.918

38. 9.2×0.07

39. 0.25×0.75

40. 0.8×0.201

41. 2.7×5.6

42. 43.3×6.2

43. 24.37×0.8

44. 0.848×3.2

45. 9.748×0.42

46. 436.3×0.181

47. Which product will have 6 decimal places?

a. 0.12×0.0456 **b.** 1.2×0.0456 **c.** 12×0.0456

48. Which product will have 5 decimal places?

a. 0.283×1.078 **b.** 2.83×1.078 **c.** 28.3×1.078

49. **Write About It** How can you use an estimate to help you place the decimal point? Give an example.

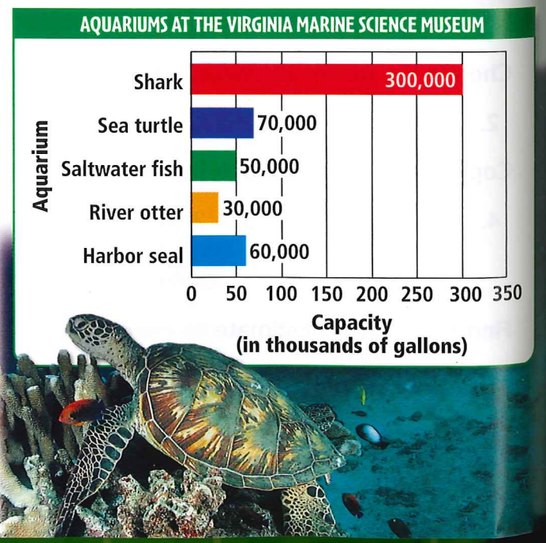
USE DATA For 50–52, use the graph.

50. Which aquarium has a capacity that is 0.20 times as great as that of the shark aquarium?

51. Is the total capacity of the five aquariums greater than or less than 500,000 gallons? Explain.

52. Which aquariums have capacities that are greater than twice that of the river otter aquarium?

53. The largest male killer whale weighed 55 times the weight of a dolphin. If an average dolphin weighs 400 lb, how much did the largest killer whale weigh?



54. Four students shared 6 boxes of markers equally. Each of the boxes had the same number of markers. Each student received 6 markers. How many markers were in each box?

55. The largest frog is the Goliath frog. With its legs stretched out, it is about 0.8 meter long. When its legs are not stretched out, its body is about 0.5 times that length. How long is its body?

Mixed Review and Test Prep

56. $7{,}981 + 6{,}909 + 2{,}574$ (p. 46)

57. Solve $87 + n = 147$. (p. 70)

58. TEST PREP In which is eight thousandths written as a decimal? (p. 22)

A 0.80 **C** 0.008

B 0.08 **D** 0.0008

59. Solve $5 + (9 + 3) = (5 + n) + 3$. Name the addition property used. (p. 76)

60. TEST PREP In which number does the digit 4 have the least value? (p. 22)

F 7.0492 **H** 7.4902

G 7.2049 **J** 7.9204

Problem Solving LINKUP . . . to Reading

STRATEGY • SUMMARIZE To *summarize,* you restate information in a shortened form. You include only the most important information.

Gwen runs her computer 8 hours each day, 5 days each week. How much does the electricity cost for 4 weeks?

Summary	Solve
A. Electricity costs \$0.01 per hour.	
B. The computer runs 8 hours a day.	$8 \times \$0.01 = \$0.08$
C. The computer runs 5 days a week.	$5 \times \$0.08 = \$0.40$
D. How much does it cost for 4 weeks?	$4 \times \$0.40 = \$1.60$

So, it costs Gwen \$1.60.

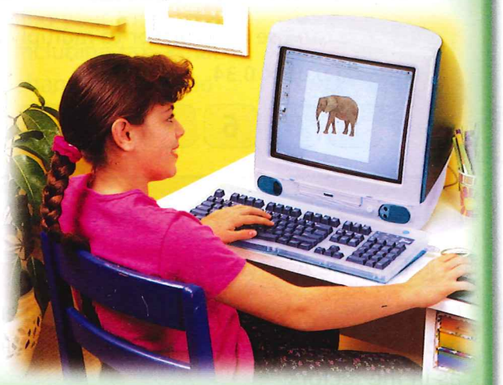
ELECTRICITY COST (based on a 2001 average electric rate)

Appliances	Cost per hour
Computer	\$0.01
Lamp, 100 watt	\$0.01
Refrigerator/freezer	\$0.02
Hair dryer	\$0.12
Television	\$0.02
Water heater	\$0.40

USE DATA For 1–2, use the table.

1. Mr. Ramos' water heater is on a timer. It runs a total of 3 hours each day. How much does it cost to run his water heater each week?

2. A fluorescent lamp costs \$0.003 per hour to run. How much more does it cost to run the 100-watt lamp for 10 hours than the fluorescent lamp for 10 hours?



LESSON 5

Zeros in the Product

Quick Review

1. 1×0.4
2. 2×0.4
3. 10×0.4
4. 20×0.4
5. 125×0.5

Learn

Sometimes when you multiply with decimals, there are zeros in the product.

SUPER ANT A *Formica japonica* worker ant weighs 0.004 gram. It can walk while holding in its mouth an object weighing 5 times as much as its own body. How many grams can a worker ant carry?

Find 5×0.004.

$$\begin{array}{r} 0.004 \\ \times \quad 5 \\ \hline 0.020 \end{array}$$

← Since there are 3 decimal places in the factors, you will need 3 decimal places in the product. Write a zero at the left in the product to place the decimal point.

So, a worker ant can carry 0.020, or 0.02, gram.

Examples

A Find $0.003 \times \$18$.

$$\begin{array}{r} \$18 \\ \times 0.003 \\ \hline \$0.054 \end{array}$$

Since 3 decimal places are needed in the product, write a zero in this place.

B Find 0.09×0.07.

$$\begin{array}{r} 0.07 \\ \times 0.09 \\ \hline 0.0063 \end{array}$$

Since 4 decimal places are needed in the product, write zeros in these places.

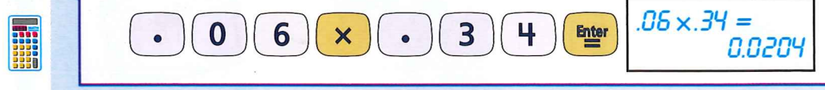
C Find 0.002×9.27.

$$\begin{array}{r} 9.27 \\ \times 0.002 \\ \hline 0.01854 \end{array}$$

Since 5 decimal places are needed in the product, write a zero in this place.

D You can use a calculator to multiply decimals.

Find 0.06×0.34.



- In Example A, what is the product to the nearest cent?

MATH IDEA You may need to insert zeros at the left in the product to keep the same number of decimal places in the product as in the factors.

Check

1. **Explain** how you know when to insert a zero in a product to place a decimal point.

Find the product.

2. 8×0.003
3. 0.04×0.4
4. 0.018×9
5. 6×0.0006

Practice and Problem Solving

Extra Practice, page 178, Set D

Find the product.

6. 9×0.007
7. 0.02×2
8. 0.016×0.5
9. 0.8×0.03

10. $\begin{array}{r} 0.006 \\ \times \quad 9 \\ \hline \end{array}$
11. $\begin{array}{r} 0.08 \\ \times 0.02 \\ \hline \end{array}$
12. $\begin{array}{r} 0.004 \\ \times \quad 24 \\ \hline \end{array}$
13. $\begin{array}{r} 0.12 \\ \times 0.09 \\ \hline \end{array}$

14. $\begin{array}{r} 54.07 \\ \times \ 0.04 \\ \hline \end{array}$
15. $\begin{array}{r} 0.007 \\ \times \quad 8 \\ \hline \end{array}$
16. $\begin{array}{r} 0.032 \\ \times \quad 17 \\ \hline \end{array}$
17. $\begin{array}{r} 0.014 \\ \times \ 0.06 \\ \hline \end{array}$

Find the product. Round to the nearest cent.

18. $\$0.89 \times 0.08$
19. $\$0.95 \times 0.05$
20. $\$3.09 \times 0.05$
21. $\$5.05 \times 0.06$

Write <, >, or = for each ●.

22. 0.008×9 ● 0.009×8
23. 3×0.025 ● 3.01×0.02

24. **What's the Question?** Eileen bought 2 gallons of milk at \$3.02 per gallon and one loaf of bread at \$0.99. The answer is \$7.03.

25. **Write a problem** including this information: a dozen eggs costs \$0.78, a loaf of bread costs \$1.03, a pound of bananas costs \$0.63.

26. You can draw a line 35 miles long with a standard pencil. That's 0.9 of the distance from Baltimore to Washington, D.C. How long a line can you draw with 3 pencils?

27. The price of an ant farm is \$28.00. The computer multiplies the price by 1.07 to find your total cost including tax. What change would you get from two \$20-bills?

28. **Write About It** To find 0.05×0.06, would you use a calculator, paper and pencil, or mental math? Explain.

Mixed Review and Test Prep

29. $9{,}126{,}543 - 3{,}972{,}645$ (p. 52)
30. $19{,}282{,}443 + 723{,}451$ (p. 52)
31. $456 - 309$ (p. 46)
32. $13 \times \$1.25$ (p. 170)
33. **TEST PREP** Round 2.2178 to the place of the blue digit. (p. 40)

A 2 **B** 2.2 **C** 2.22 **D** 2.218

LESSON 6

Problem Solving Skill
Make Decisions

UNDERSTAND → PLAN → SOLVE → CHECK

ARTIST'S CHOICE Suppose you are planning to take art lessons. You can sign up for either painting or sculpture. To help you make a decision on which to take, there are several things that you need to think about before you decide.

Quick Review

Write <, >, or = for each ●.

1. \$36.52 ● \$36.25
2. 49¢ ● 51¢
3. \$7.81 ● \$7.84
4. \$0.98 ● \$0.89
5. 4 × \$1.50 ● 6 × \$1.25

THINGS TO CONSIDER	PAINTING	SCULPTURE
Time	Wednesday, 4:00 P.M. to 6:00 P.M.	Saturday, 10 A.M. to 11:30 A.M.
Number of lessons	6	9
Cost per lesson	\$12.75	\$9.50
Cost of general supplies	\$10	\$25
Cost per project	\$2.35 per canvas panel	\$1.45 per 5-lb bag of clay

Use the information in the table to help you answer the following questions.

A. For each choice, how much will it cost for lessons and general supplies? Which costs less?

B. What is the difference in cost for general supplies for each choice?

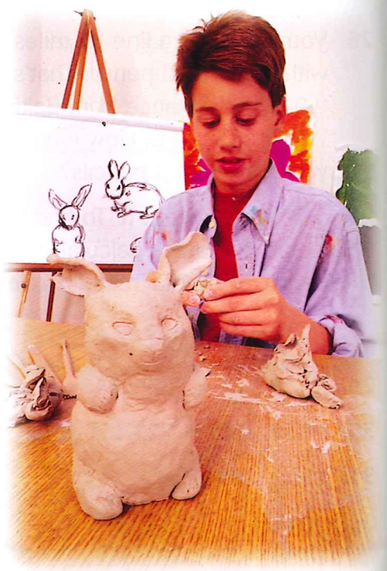
C. How many total hours will each choice last? What is the difference in the amount of time?

D. You will complete a total of 4 painting projects or 6 sculpture projects. How much will you spend on project supplies for painting? for sculpture? In which project would supplies cost less?

Talk About It

- If you had to take the one that costs less, would you take painting or sculpture? Explain the reasons for your decision.
- Make a list of other things you may consider before deciding which to take.

MATH IDEA To help you make a decision, compare facts and data.



Problem Solving Practice

USE DATA **For 1–3, use the information in the table.**

1. You have a coupon from Store A for \$2.00 off if you purchase \$10.00 worth of art supplies. You plan to buy 12 sheets of charcoal paper and 10 pastels. Would you spend more at Store A or Store B? How much more?

You are buying art supplies for a drawing class. You need 4 sticks of charcoal, 3 kneaded erasers, and 2 pastels. You do not have any store coupons.

2. You need to buy all the supplies from the same store. At which store would you spend the least?

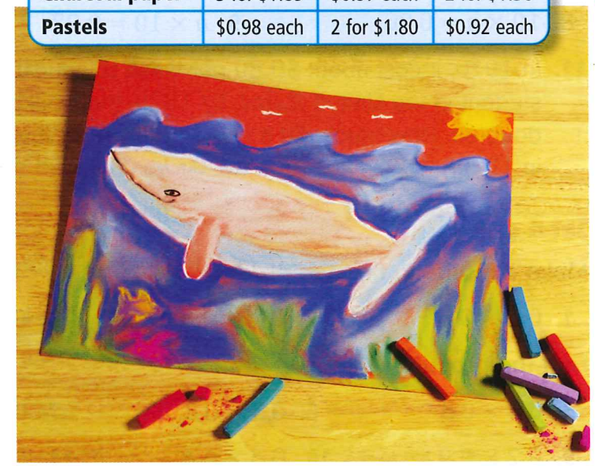
   A Store A
   B Store B
   C Store C
   D The cost is the same at each store.

3. **What if** you could go to more than one store? What is the least amount you could spend?

   F \$4.53 **H** \$4.77
   G \$4.62 **J** \$4.87

WHICH STORE HAS THE BEST BUY?

Items	Store A	Store B	Store C
Charcoal	2 for \$0.75	\$0.33 each	4 for \$1.40
Kneaded eraser	\$0.47 each	3 for \$1.50	\$0.51 each
Charcoal paper	3 for \$1.89	\$0.57 each	2 for \$1.36
Pastels	\$0.98 each	2 for \$1.80	\$0.92 each



Mixed Applications

4. On an average day, 450 cars pass through the toll plaza. Val says about 164,250 cars pass through the toll plaza in a year. Chuck says about 42,750 pass through the toll plaza in a year. Whose answer is reasonable? Explain.

5. **Write a problem** in which you need to make a decision that can be answered with information in the table above.

6. Use the diagram above. Al's balloon is not next to Maggie's. Clem's balloon is larger than Maggie's. Who has the striped balloon?

Extra Practice

Set A (pp. 166–167)

Multiply each number by 10, by 100, and by 1,000.

1. 0.7
2. 0.32
3. 0.003
4. 0.152

ALGEBRA **Find the value of *n*.**

5. $100 \times 0.1 = n$
6. $10 \times 5.643 = n$
7. $1{,}000 \times 0.9023 = n$
8. $10 \times n = 0.06$
9. $n \times 10 = 0.27$
10. $100 \times n = 0.45$

11. In 1910, it cost about \$0.80 per week to educate a public school student in the United States. By 1920, the weekly cost had doubled. How much did it cost to educate a student for 1 week in 1920?

Set B (pp. 168–169)

Make a model to find the product.

1. 0.6×0.6
2. 0.1×0.8
3. 0.5×0.3
4. 0.7×0.3

Find the product.

5. 0.6×0.8
6. 0.3×0.8
7. 0.9×0.5
8. 0.4×0.9
9. 0.2×0.9
10. 0.5×0.4
11. 0.2×0.3
12. 0.2×0.2

Set C (pp. 170–173)

Find the product. Estimate to check.

1. 0.3×14
2. $0.5 \times 1{,}206$
3. 6.8×4.5
4. 7.25×3.8

5. $\begin{array}{r} 0.67 \\ \times\ \ 8 \\ \hline \end{array}$
6. $\begin{array}{r} 3.94 \\ \times 0.04 \\ \hline \end{array}$
7. $\begin{array}{r} 0.53 \\ \times\ 58 \\ \hline \end{array}$
8. $\begin{array}{r} 5.06 \\ \times\ 28 \\ \hline \end{array}$

9. Gustavo has a pumpkin with a mass of 4.8 kilograms. If 0.9 of its mass is water, how much of its mass is water? How much is not water?
10. Bernadette bought 2 loaves of bread at \$0.97 each and a carton of milk for \$1.18. How much did she spend?

Set D (pp. 174–175)

Find the product.

1. 8×0.006
2. 0.03×2
3. 0.02×4
4. 7×0.004
5. 0.7×0.07
6. 0.025×0.6
7. 0.075×0.9
8. 0.5×0.024

Review/Test

CHECK VOCABULARY AND CONCEPTS

Choose the best term from the box.

greater than
less than
one tenth
one hundredth
one thousandth

1. 0.1 represents _?_. (p. 164)
2. The product of 9 and 0.65 is _?_ 9. (p. 164)
3. 0.01 represents _?_. (p. 164)

Make a model to find the product. (pp. 168–169)

4. 0.6×5
5. 0.51×3
6. 2×0.25
7. 0.82×4

CHECK SKILLS

Multiply each number by 10, by 100, and by 1,000. (pp. 166–167)

8. 0.3
9. 0.64
10. 0.002
11. 0.0225

Copy each exercise. Place the decimal point in each product. (pp. 170–173)

12. $0.5 \times 0.5 = 25$
13. $1.6 \times 3.34 = 5344$
14. $0.152 \times 0.78 = 11856$
15. $0.28 \times 0.7 = 196$
16. $0.9 \times 2.186 = 19674$
17. $25.4 \times 0.92 = 23368$

Find the product. (pp. 174–175)

18. 6.50×0.8
19. 2.85×22
20. 4.15×0.6
21. 4.34×0.3
22. 0.62×0.07
23. 0.7×0.1
24. 0.4×0.5
25. 0.76×65

26. $\begin{array}{r} 0.96 \\ \times\ \ 5 \\ \hline \end{array}$
27. $\begin{array}{r} 7.62 \\ \times 0.08 \\ \hline \end{array}$
28. $\begin{array}{r} 0.9 \\ \times 0.09 \\ \hline \end{array}$
29. $\begin{array}{r} 3.96 \\ \times\ 28 \\ \hline \end{array}$

CHECK PROBLEM SOLVING

For 30–31, use the table. (pp. 176–177)

SERVICE	DELIVERY SCHEDULE	RATE (in 2002)
First-Class Mail	varies	\$0.37 for the first ounce, \$0.23 for each additional ounce
Priority Mail	2 days	\$3.85
Express Mail	next day	\$13.65

30. Janet needs to mail a 1-oz letter. Today is Monday. What is the least amount she could spend and guarantee it will arrive by Wednesday?
31. Which service is the fastest? How much does it cost?
32. Jorge earns \$24.65 a week. How much does he earn in 12 weeks? (pp. 170–173)
33. What is the value of 100 quarters? of 1,000 quarters? (pp. 166–167)