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4-1 Multiplying Decimals by Whole Numbers (pages 135–138)

When you multiply a decimal by a whole number, you can estimate to find where to put the decimal point in the product. You can also place the decimal point by counting the decimal places in the decimal factor.

Estimation	• Estimate the product of a decimal and a whole number by rounding the decimal to its greatest place value position and then multiplying. • Multiply as you do with whole numbers. • Use your estimate as a guide for placing the decimal in the product.
Counting Decimal Places	• Multiply the decimal and whole number as if they were both whole numbers. • Count the number of decimal places in the decimal factor. Place the decimal point in the answer so that there are the same number of decimal places as in the decimal factor. Annex (or write) zeros to the left of your answer if more decimal places are needed.

EXAMPLES

Find the value of each expression.

A Find 22.3×5.

20×5 Round the decimal. Estimate the product; 100.

$$\begin{array}{r} 22.3 \\ \times\ \ 5 \\ \hline 111.5 \end{array}$$

Multiply as with whole numbers.

Use the estimate, 100, as a guide to placing the decimal. Place the decimal point after 111.

B Find 0.015×3.

$$\begin{array}{r} 0.015 \\ \times\ \ 3 \\ \hline 0.045 \end{array}$$

There are 3 decimal places in this factor.

Annex a zero on the left to make three decimal places.

Try These Together

Multiply.

1. $\begin{array}{r} 4.02 \\ \times\ \ 5 \\ \hline \end{array}$

HINT: Estimate the product; then, multiply as with whole numbers.

2. $\begin{array}{r} 0.017 \\ \times\ \ 2 \\ \hline \end{array}$

HINT: Count the decimal places in the decimal factor.

PRACTICE

Multiply.

3. $\begin{array}{r} 0.4 \\ \times 9 \\ \hline \end{array}$

4. $\begin{array}{r} 0.62 \\ \times\ 7 \\ \hline \end{array}$

5. $\begin{array}{r} 1.71 \\ \times\ 3 \\ \hline \end{array}$

6. $\begin{array}{r} 3.65 \\ \times\ 5 \\ \hline \end{array}$

7. 61×0.004

8. 9.7×561

9. $5{,}618 \times 6.83$

10. **Standardized Test Practice** Evaluate $104h$ if $h = 7.1$.

A 0.7384 **B** 738.4 **C** 7,384 **D** 73,840

Answers: **1.** 20.1 **2.** 0.034 **3.** 3.6 **4.** 4.34 **5.** 5.13 **6.** 18.25 **7.** 0.244 **8.** 5,441.7 **9.** 38,370.94 **10.** B

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4-2 Multiplying Decimals (pages 141–143)

When you multiply two decimals, 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

Find the value of each expression.

A Find 2.9×4.1.

3×4 Round the decimals. Estimate the product; 12.

$$\begin{array}{r} 2.9 \\ \times\ 4.1 \\ \hline 29 \\ 11\,6 \\ \hline 11.89 \end{array}$$

one decimal place
one decimal place
two decimal places

The product is 11.89. Compared to the estimate, the product is reasonable.

B Find 3.2×5.7.

3×6 Round the decimals. Estimate the product; 18.

$$\begin{array}{r} 3.2 \\ \times\ 5.7 \\ \hline 224 \\ 160 \\ \hline 18.24 \end{array}$$

one decimal place
one decimal place
two decimal places

The product is 18.24. Compared to the estimate, the product is reasonable.

Try These Together

Multiply.

1. $\begin{array}{r} 7.6 \\ \times\ 2.3 \\ \hline \end{array}$

HINT: Estimate the product. Then multiply as with whole numbers.

2. $\begin{array}{r} 0.52 \\ \times\ 2.6 \\ \hline \end{array}$

HINT: Count the decimal places in the factors.

PRACTICE

Multiply.

3. 0.52×1.7

4. 6.6×0.054

5. 2.73×5.86

6. 1.5×6.4

7. 0.9×0.036

8. 3.25×7.3

9. 0.85×0.04

10. 4.6×8.2

11. 12.6×2.7

12. Find $2.5a + b$ if $a = 4.65$ and $b = 5.8$

13. **Standardized Test Practice** Multiply 1.6×0.023.

A 0.0368 **B** 0.368 **C** 3.68 **D** 36.8

Answers: **1.** 17.48 **2.** 1.352 **3.** 0.884 **4.** 0.3564 **5.** 15.9978 **6.** 9.6 **7.** 0.0324 **8.** 23.725 **9.** 0.034 **10.** 37.72 **11.** 34.02 **12.** 17.425 **13.** A

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4-3 Dividing Decimals by Whole Numbers (pages 144–147)

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

EXAMPLES

Find each quotient.

A $14.8 \div 2$

First estimate: $14 \div 2 = 7$.

$$\begin{array}{r} 7.4 \\ 2\overline{)14.8} \\ -14 \\ \hline 8 \\ -8 \\ \hline 0 \end{array}$$

Place the decimal point.

Divide as with whole numbers.

B $27.3 \div 3$

First estimate: $27 \div 3 = 9$.

$$\begin{array}{r} 9.1 \\ 3\overline{)27.3} \\ -27 \\ \hline 3 \\ -3 \\ \hline 0 \end{array}$$

Place the decimal point.

Divide as with whole numbers.

Try These Together

Find each quotient.

1. $25.4 \div 2$

HINT: Use the dividend as a guide to placing the decimal in the quotient.

2. $6.16 \div 4$

HINT: Use the dividend as a guide to placing the decimal in the quotient.

PRACTICE

Divide. Round to the nearest tenth if necessary.

3. $7\overline{)29.4}$

4. $12\overline{)915.96}$

5. $31\overline{)570.4}$

6. $155.1 \div 66$

7. $17\overline{)152.83}$

8. $42\overline{)68.46}$

9. $81.81 \div 27$

10. $41.79 \div 86$

11. $21\overline{)698.44}$

12. $69\overline{)73.67}$

13. $58.42 \div 16$

14. $247.73 \div 44$

15. $104.745 \div 34$

16. $65\overline{)623.86}$

17. $91\overline{)5.237}$

18. $24.15 \div 7$

19. $1.507 \div 11$

20. $144.96 \div 48$

21. Money Matters Mika borrowed $18.30 from his parents to buy a book. How much should Mika give his parents each week if he plans to make equal payments for six weeks?

22. **Standardized Test Practice** Round $126.33 \div 16$ to the nearest hundredth.

A 7.8 **B** 7.89 **C** 7.90 **D** 7.93

Answers: **1.** 12.7 **2.** 1.54 **3.** 4.2 **4.** 76.3 **5.** 18.4 **6.** 2.4 **7.** 9.0 **8.** 1.6 **9.** 3.0 **10.** 0.5 **11.** 33.3 **12.** 1.1 **13.** 3.7 **14.** 5.6 **15.** 3.1 **16.** 9.6 **17.** 0.1 **18.** 3.5 **19.** 0.1 **20.** 3.0 **21.** $3.05 **22.** C

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4-4 Dividing by Decimals (pages 152–155)

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

EXAMPLES

Find each quotient.

A 4.4 ÷ 2.5

First estimate: 4 ÷ 2 = 2

$2.5\overline{)4.4}$ → $25\overline{)44.00}$

1.76
−25
190
−175
150
−150
0

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

B Find 33.08 ÷ 16.2 to the nearest hundredth.

$16.2\overline{)33.08}$ → $162\overline{)330.800}$

2.041
−324
68
−0
680
−648
320
−162
158

Divide to the thousandths place to round to the nearest hundredth. Since 68 is less than the divisor, write a zero in the quotient. To the nearest hundredth, the quotient is 2.04.

Try These Together

Divide.

1. 5.4 ÷ 1.2

HINT: Multiply the dividend and divisor by the same power of 10.

2. 16.646 ÷ 4.1

HINT: Do not forget to fill in spaces in the quotient with zeros.

PRACTICE

Divide.

3. $3.9\overline{)849.03}$

4. $5.97\overline{)3{,}826.77}$

5. $11.5\overline{)634.11}$

6. 0.15 ÷ 0.008

7. 6.8034 ÷ 6.67

8. 8.814 ÷ 0.0678

Find each quotient to the nearest hundredth.

9. $0.31\overline{)9.4}$

10. $17.6\overline{)21.191}$

11. $8.39\overline{)486.7}$

12. 63.66 ÷ 7.23

13. 1.76 ÷ 28

14. 59.681 ÷ 0.98

15. Hobbies Paquita wants to make a necklace 55.9 cm long using beads with a diameter of 1.3 cm. How many beads does she need?

16. **Standardized Test Practice** Find 4.998 ÷ 3.4.

A 1.47 **B** 1.52 **C** 6.82 **D** 16.99

Answers: **1.** 4.5 **2.** 4.06 **3.** 217.7 **4.** 641 **5.** 55.14 **6.** 18.75 **7.** 1.02 **8.** 130 **9.** 30.32 **10.** 1.20 **11.** 58.01 **12.** 8.80 **13.** 0.06 **14.** 60.90 **15.** 43 beads **16.** A

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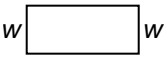
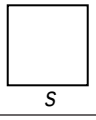
4-5 Perimeter (pages 158–160)

The **perimeter** (P) of a closed figure is the distance around the figure. You can find the perimeter by adding the measures of all the sides of the figure.

Perimeter of a Rectangle	The perimeter of a rectangle is two times the length ℓ plus two times the width w, or $P = 2\ell + 2w$.	
Perimeter of a Square	The perimeter of a square is four times the measure of any of its sides s, or $P = 4s$.	

EXAMPLES

A Find the perimeter of a rectangle with a length of 12.3 ft and a width of 6 ft.

$P = 2\ell + 2w$
$P = 2(12.3) + 2(6)$ $\ell = 12.3$ and $w = 6$
$P = 24.6 + 12$
$P = 36.6$ The perimeter is 36.6 ft.

B Find the perimeter of a square whose sides measure 3 yd.

$P = 4s$
$P = 4(3)$ $s = 3$
$P = 12$ The perimeter is 12 yd.

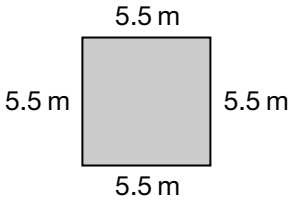
Try These Together

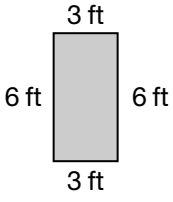
1. Find the perimeter of a rectangle with a length of 9 m and a width of 4 m.
HINT: The perimeter is two times the length plus two times the width.

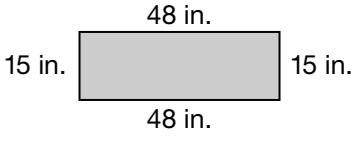
2. Find the perimeter of a square whose sides measure 8 in.
HINT: Perimeter of a square is four times any side.

PRACTICE

Find the perimeter of each figure.

3.


4.


5.


6. square: $s = 18.4$ cm **7.** rectangle: $\ell = 12$ yd; $w = 8$ yd **8.** square: $s = 11.6$ ft

9. **Standardized Test Practice** A rectangle is 8.6 cm long, and its perimeter is 18 cm. What is its width?

A 9.4 cm **B** 2.09 cm **C** 0.8 cm **D** 0.4 cm

Answers: **1.** 26 m **2.** 32 in. **3.** 22 m **4.** 18 ft **5.** 126 in. **6.** 73.6 cm **7.** 40 yd **8.** 46.4 ft **9.** D

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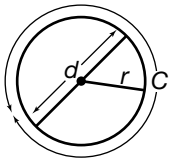
4-6 Circumference (pages 161–164)

A **circle** is a set of points in a plane, all of which are the same distance from a fixed point in the plane called the **center**.

Circle Definitions 	• The distance from the center of a circle to any point on the circle is called the **radius *r***. • The distance across the circle through the center is called the **diameter *d***. The diameter of a circle is twice the length of its radius. • The **circumference *C*** is the distance around the circle. • The circumference of a circle is always a little more than three times its diameter. The exact number of times is represented by the Greek letter π (pi). The decimal 3.14 and the fraction $\frac{22}{7}$ are used as approximations for π.
Finding the Circumference	The circumference of a circle is equal to π times the diameter or π times twice its radius, $C = \pi d$ or $C = 2\pi r$.

EXAMPLE

Find the circumference of a circle with a diameter of 2.5 in.

$C = \pi d$

$\approx 3.14 \cdot 2.5$ *Replace π with 3.14 and d with 2.5.*

≈ 7.85 *Multiply.*

The circumference of the circle is about 7.85 inches.

PRACTICE

Find the circumference of each circle described. Round to the nearest tenth.

1. $d = 8$ in. **2.** $r = 4.25$ ft **3.** $r = 6$ m **4.** $d = 1.4$ m

5. $r = 0.9$ in. **6.** $d = 2.5$ ft **7.** $r = 5.2$ in. **8.** $d = 10$ cm

9. $d = 7.5$ m **10.** $r = 22$ cm **11.** $d = 3.75$ yd **12.** $r = 9$ ft

13. **Standardized Test Practice** The Sacagawea Golden Dollar coin has a radius of 13.25 mm. What is its circumference?

A 41.2 mm **B** 83.3 mm **C** 26.5 mm **D** 79.5 mm

Answers: **1.** 25.12 in. **2.** 26.7 ft **3.** 37.68 m **4.** 4.396 m **5.** 5.7 in. **6.** 7.9 ft **7.** 32.7 in. **8.** 31.4 cm **9.** 23.6 m **10.** 138.2 cm **11.** 11.8 yd **12.** 56.5 ft **13.** B

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4

Chapter 4 Review

Decimal Treasure Hunt

Every week, Mr. Jefferson records extra credit for the first person in his math class who can locate the hidden treasure in his room. The hidden treasure is on a bulletin board on the back of a card with a certain number on it. There are many cards on the bulletin board, so the students first solve a set of problems in order to find the hidden treasure and earn the extra credit.

The following problems will help you find this week's treasure.

1. Start with the number 12.32. Multiply this number by 4.

2. Take your answer from problem 1 and add it to $3(4 + 6)$.

3. Multiply the answer from problem 2 by 2.3.

4. Divide the answer from problem 3 by 8.

5. Divide the answer from problem 4 by 3.1. Round the quotient to the nearest hundredth.

6. Circle the number on Mr. Jefferson's bulletin board under which you would find the treasure.

TREASURE HUNT FOR THIS WEEK

22.8	13.75	49.3	182.3	12.32
7.4	30	2.3	24	
70.28	65.2	3.14	7.35	11.8
14.1	6.28	9.85	6.87	
15.26	31.84	65.98	22.25	14.42

Answers are located on p. 105.