

Multiplying Decimals by Whole Numbers

(pages 133–136)



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 find where to put the decimal point in the product by counting the decimal places in the decimal factor.

Estimation	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 .

0.015 There are 3 decimal places in this factor.

$\begin{array}{r} 0.015 \\ \times 3 \\ \hline 0.045 \end{array}$ 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. $\begin{array}{r} 3.65 \\ \times 5 \\ \hline \end{array}$

Solve each equation.

7. $b = 61 \times 0.004$

8. $9.7 \times 561 = a$

9. $v = 5,618 \times 6.83$

 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

Using the Distributive Property

(pages 137–139)



You can use grouping symbols such as parentheses to show multiplication. For example, you can write 2×4 as $2(4)$ or $(2)4$. Grouping symbols affect the order of operations.

Order of Operations with Grouping Symbols	<ol style="list-style-type: none"> 1. Do all operations within grouping symbols first. 2. Do all powers before other operations. 3. Multiply and divide in order from left to right. 4. Add and subtract in order from left to right.
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With grouping symbols, you can use the **distributive property** to solve multiplication problems in parts. You can even do the multiplication mentally.

Distributive Property	<p>Arithmetic: $4(2 + 7) = 4 \cdot 2 + 4 \cdot 7$</p> <p>Algebra: For any numbers a, b, and c, $a(b + c) = ab + ac$.</p>
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EXAMPLES

A Rewrite $4(10 + 5)$ using the distributive property.

$$4(10 + 5) = 4 \times 10 + 4 \times 5$$

B Find 5×12 using the distributive property.

$$\begin{aligned} 5 \times 12 &= 5(10 + 2) \text{ Use } 10 + 2 \text{ for } 12. \\ &= 5 \times 10 + 5 \times 2 \\ &= 50 + 10 \\ &= 60 \end{aligned}$$

Try These Together

Find each product mentally. Use the distributive property.

1. 9×17

HINT: Change 17 into an addition expression.

2. 16×4

HINT: Change 16 into an addition expression.

PRACTICE

Rewrite each expression using the distributive property.

3. $7(60 + 8)$

4. $8(50 + 1)$

5. $52 \times 50 + 52 \times 0.6$

6. $6(70 + 9)$

7. $2(20 + 7)$

8. $19 \times 60 + 19 \times 0.7$

Find each product mentally. Use the distributive property.

9. 9×16

10. 106×5

11. 8×65

12. 9.7×8

13. 1.1×3

14. 204×5



15. Standardized Test Practice Find 1.8×5 mentally using the distributive property.

A 0.9

B 5.4

C 9

D 54

Answers: 1. 153 2. 64 3. $7 \times 60 + 7 \times 8$ 4. $8 \times 50 + 8 \times 1$ 5. $52(50 + 0.6)$ 6. $6 \times 70 + 6 \times 9$ 7. $2 \times 20 + 2 \times 7$ 8. $19(60 + 0.7)$ 9. 144 10. 530 11. 520 12. 77.6 13. 3.3 14. 1,020 15. C
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Multiplying Decimals

(pages 141–143)



When you multiply two decimals, there are two ways to place the decimal point in the product.

Estimation	<ul style="list-style-type: none"> Estimate the product of two decimals by rounding the factors and then multiplying. Multiply the factors as with whole numbers. Use the estimate as a guide to placing the decimal in the product.
Counting Decimal Places	<ul style="list-style-type: none"> Multiply the decimal factors as if they were both whole numbers. The sum of the decimal places in the factors should equal the number of decimal places in the product. Annex zeros on the left if more decimal places are needed.

EXAMPLES

Find the value of each expression.

A Find 2.9×4.1 .

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

$$\begin{array}{r} 2.9 \\ \times 4.1 \\ \hline 29 \\ 116 \\ \hline 11.89 \end{array}$$

Use the estimate, 12, as a guide to placing the decimal. Place the decimal point after the 11.

B Find 3.2×5.7 .

$$\begin{array}{r} 3.2 \text{ one decimal place} \\ \times 5.7 \text{ one decimal place} \\ \hline 224 \\ 160 \\ \hline 18.24 \end{array}$$

There must be two decimal places in the product.

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. $0.52 \cdot 1.7$

4. 6.6×0.054

5. $2.73 \cdot 5.86$

Solve each equation.

6. $k = 1.5 \cdot 6.4$

7. $\ell = 0.9 \cdot 0.036$

8. 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. A

Perimeter and Area (pages 145–148)



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. The **area** (A) of a closed figure is the number of square units needed to cover its surface. You can use algebra to help you find the perimeter and area of a rectangle.

Perimeter of a Rectangle	The perimeter of a rectangle is two times the length (ℓ) plus two times the width (w), or $P = 2\ell + 2w$.	
Area of a Rectangle	The area of a rectangle is the product of its length (ℓ) and width (w), or $A = \ell \cdot w$.	

EXAMPLES

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

$$\begin{aligned}
 P &= 2\ell + 2w \\
 P &= 2(12.3) + 2(6) \quad \ell = 12.3 \text{ and } w = 6 \\
 P &= 24.6 + 12 \\
 P &= 36.6 \quad \text{The perimeter is 36.6 ft.}
 \end{aligned}$$

B Find the area of a rectangle with a length of 12.3 ft and a width of 6 ft.

$$\begin{aligned}
 A &= \ell \cdot w \\
 A &= 12.3 \cdot 6 \quad \ell = 12.3 \text{ and } w = 6 \\
 A &= 73.8 \quad \text{The area is 73.8 square ft.}
 \end{aligned}$$

Try These Together

1. Find the perimeter of a rectangle with a length of 9 m and a width of 4 m.

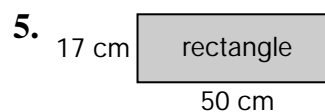
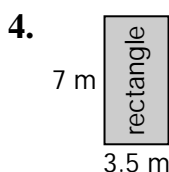
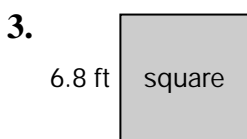
HINT: The perimeter is two times the length plus two times the width.

2. Find the area of a rectangle with a length of 9 m and a width of 4 m.

HINT: Area of a rectangle is length times width.

PRACTICE

Find the perimeter and the area of each figure.



6. square: s , 7.1 in.

7. rectangle: ℓ , 33 ft; w , 70 ft

8. square: s , 6.2 cm



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. 36 m² 3. 27.2 ft; 46.24 ft² 4. 21 m; 24.5 m² 5. 134 cm; 850 cm² 6. 28.4 in.; 50.41 in² 7. 206 ft; 2310 ft² 8. 24.8 cm; 38.44 cm² 9. D

Dividing Decimals by Whole Numbers

(pages 152–155)



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 $14.8 \div 2$

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

First estimate: $14 \div 2 = 7$.
Place the decimal point.

Divide as with whole numbers.

B $27.3 \div 3$

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

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

Find each quotient.

3. $7 \overline{)29.4}$

4. $12 \overline{)915.96}$

5. $31 \overline{)570.4}$

6. $155.1 \div 66$

7. $152.83 \div 17$

8. $68.46 \div 42$

Round each quotient to the nearest tenth.

9. $81.81 \div 27$

10. $41.79 \div 86$

11. $698.44 \div 21$

12. $73.67 \div 69$

13. $58.42 \div 16$

14. $247.73 \div 44$

Round each quotient to the nearest hundredth.

15. $104.745 \div 34$

16. $623.86 \div 65$

17. $5.237 \div 91$

Solve each equation.

18. $a = 24.15 \div 7$

19. $1.507 \div 11 = b$

20. $c = 144.96 \div 48$

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. 76.33 5. 18.4 6. 2.35 7. 8.99 8. 1.63 9. 3.0 10. 0.5 11. 33.3 12. 1.1 13. 3.7 14. 5.6 15. 3.08 16. 9.60 17. 0.06 18. 3.45 19. 0.137 20. 3.02 21. \$3.05 22. C

Dividing by Decimals

(pages 157–159)



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.

EXAMPLE

Find each quotient.

$$4.4 \div 2.5$$

First estimate: $4 \div 2 = 2$

$$\begin{array}{r} 1.76 \\ 2.5 \overline{)44.00} \\ \underline{-25} \\ 190 \\ \underline{-175} \\ 150 \\ \underline{-150} \\ 0 \end{array}$$

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

Try These Together

Find each quotient.

1. $5.4 \div 1.2$

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

2. $6.3 \div 1.8$

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

PRACTICE

Find each quotient.

3. $3.9 \overline{)849.03}$

4. $0.97 \overline{)477.24}$

5. $5.97 \overline{)3,826.77}$

6. $9.2 \overline{)1.748}$

7. $11.5 \overline{)634.11}$

8. $0.003 \overline{)0.0051}$

9. $0.15 \div 0.008$

10. $190.92 \div 0.086$

11. $8.814 \div 0.0678$

12. $0.0874 \div 0.076$

13. $46.99155 \div 52.3$

14. $7,544.5587 \div 309.33$

Solve each equation.

15. $s = 13.92 \div 0.87$

16. $r = 22.94 \div 0.74$

17. $102.3627 \div 930.57 = p$

18. $0.0018 \div 0.006 = n$

19. $g = 2.414 \div 7.1$

20. $3.7505 \div 0.065 = v$

21. **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?



22. **Standardized Test Practice** Find $4.998 \div 3.4$.

A 1.47

B 1.52

C 6.82

D 16.99

Answers: 1.45 2.35 3.2177 4.492 5.641 6.019 7.5514 8.17 9.1875 10.2220 11.130 12.115 13.08985 14.2439 15.16 16.31 17.0.11 18.0.3 19.0.34 20.57.7 21.43 beads 22.A

Zeros in the Quotient

(pages 161–163)



When you divide by decimals, you may have to write zeros in the quotient.

EXAMPLES

Find each quotient.

A $8.04 \div 0.402$

$$\begin{array}{r} 20.0 \\ 0.402 \overline{)8.04} \\ \underline{804} \\ 00 \end{array}$$

In this case, you must write a zero to fill in the ones place.

B Find $33.08 \div 16.2$ to the nearest hundredth.

$$\begin{array}{r} 2.041 \\ 16.2 \overline{)33.08} \\ \underline{324} \\ 68 \\ \underline{680} \\ 680 \\ \underline{648} \\ 320 \\ \underline{320} \\ 0 \end{array}$$

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

Find each quotient.

1. $3.468 \div 3.4$

HINT: Don't forget to fill in spaces in the quotient with zeros.

2. $16.646 \div 4.1$

HINT: Don't forget to fill in spaces in the quotient with zeros.

PRACTICE

Find each quotient to the nearest hundredth.

3. $6.7 \overline{)943.427}$

4. $26 \overline{)41.79}$

5. $0.98 \overline{)59.681}$

6. $0.44 \overline{)0.472}$

7. $72 \overline{)870}$

8. $5.12 \overline{)5.28}$

9. $1.76 \div 28$

10. $63.66 \div 7.23$

11. $486.7 \div 8.39$

12. $9.4 \div 0.31$

13. $21.191 \div 17.6$

14. $50.41 \div 47.6$

Solve each equation.

15. $m = 305.61 \div 6.1$

16. $j = 77.14 \div 0.38$

17. $6.8034 \div 6.67 = x$

18. $704.34 \div 7.8 = z$

19. $c = 14.5808 \div 2.08$

20. $17.017 \div 13 = f$

21. Money Matters Mr. Kwon's long distance bill was \$9.36 last month. If he pays \$0.09 per minute, how many minutes of long distance calls did he make last month?



22. Standardized Test Practice Find $10.51 \div 9.9$ to the nearest hundredth.

A 1.01

B 1.06

C 1.10

D 1.60

Answers: 1. 1.1.02 2. 4.06 3. 140.81 4. 1.61 5. 60.90 6. 1.07 7. 12.08 8. 1.03 9. 0.06 10. 8.80 11. 58.01 12. 30.32 13. 1.20 14. 1.06 15. 50.1 16. 203 17. 1.02 18. 90.3 19. 7.01 20. 1.309 21. 104 minutes 22. B

Mass and Capacity in the Metric System

(pages 164–166)



In the metric system, all units are defined in terms of a basic unit. The basic unit of mass is the **gram** (g). The basic unit of capacity is the **liter** (L).

Metric Units of Mass	gram (g)	A small paperclip has a mass of about 1 gram.
	kilogram (kg) 1 kg = 1,000 g	A textbook has a mass of about 1 kilogram.
	milligram (mg) 1 mg = 0.001 g	A grain of salt has a mass of about 1 milligram.
Metric Units of Capacity	liter (L)	A small pitcher has a capacity of about 1 liter.
	milliliter (mL) 1 mL = 0.001 L	An eyedropper holds about 1 milliliter of liquid.

EXAMPLES

What unit would you use to measure each of the following?

A the mass of a compact car

Even a compact car has quite a bit of mass. The kilogram is the appropriate unit to measure the mass of a compact car. The average compact car has a mass of about 1,200 kilograms.

B the capacity of a soda can

Since a liter is about the same capacity as a quart, you know that a soda can has less than one liter of capacity. The milliliter is the appropriate unit to measure the capacity of a soda can. The average soda can holds about 355 mL.

Try These Together

What unit would you use to measure each of the following? Estimate the mass or capacity.

1. a coffee cup

HINT: A coffee cup is smaller than a soda can.

2. a candy bar

HINT: A candy bar has less mass than a textbook.

PRACTICE

Write the unit that you would use to measure each of the following. Then estimate the mass or capacity.

3. a wading pool

4. a hammer

5. the wings of a housefly

6. the ink in a fountain pen

7. a nickel

8. a bird bath

Name an item that you think has the given measure.

9. about 20 g

10. about 500 mL

11. about 2 L

12. about 5 kg

13. Food A bottle of grape juice has a capacity of 1890 mL. If the bottle has eight servings, how many mL is one serving?



14. Standardized Test Practice What is the mass of a large can of tomatoes?

A 1 mL

B 1 L

C 1 g

D 1 kg

Answers: 1. milliliter, about 200 mL 2. gram, about 50 g 3. liter, about 1,000 L 4. kilogram, about 1 kg 5. milligram, about 2 mg 6. millimeter, about 1 mL 7. gram, about 5 g 8. liter, about 8 L 9–12. Answers will vary. 13. 236.25 mL 14. D

Changing Metric Units

(pages 167-169)



To change from one metric unit to another, you either multiply or divide by powers of 10. The chart below shows the relationship between the metric units and the powers of 10.

	<p>To change from a larger unit to a smaller unit, you need to multiply. To change from a smaller unit to a larger unit, you need to divide.</p> <div style="text-align: center;"> <p><i>MULTIPLY</i> $\times 1,000$ $\times 100$ $\times 10$</p> <p> $\text{km} \xrightarrow{\quad} \text{m} \xrightarrow{\quad} \text{cm} \xrightarrow{\quad} \text{mm}$ </p> <p> $\div 1,000$ $\div 100$ $\div 10$ <i>DIVIDE</i> </p> </div>
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EXAMPLES

A $1.5 \text{ L} = \underline{\quad} \text{ mL}$

To change from liters to milliliters, multiply by 1,000 since $1 \text{ mL} = 0.001 \text{ L}$.

$1.5 \times 1,000 = 1,500$

$1.5 \text{ L} = 1,500 \text{ mL}$

B $12 \text{ cm} = \underline{\quad} \text{ m}$

To change from centimeters to meters, divide by 100 since $1 \text{ m} = 100 \text{ cm}$.

$12 \div 100 = 0.12$

$12 \text{ cm} = 0.12 \text{ m}$

Try These Together

Complete.

1. $3 \text{ kg} = \underline{\quad} \text{ g}$

HINT: Kilograms are larger units than grams; multiply.

2. $9 \text{ mm} = \underline{\quad} \text{ cm}$

HINT: Millimeters are smaller units than centimeters; divide.

PRACTICE

Complete.

- | | | |
|---|--|---|
| 3. $4,860 \text{ mm} = \underline{\quad} \text{ km}$ | 4. $\underline{\quad} \text{ L} = 397 \text{ mL}$ | 5. $669 \text{ mm} = \underline{\quad} \text{ cm}$ |
| 6. $\underline{\quad} \text{ mg} = 0.0079 \text{ g}$ | 7. $8,170 \text{ mm} = \underline{\quad} \text{ m}$ | 8. $\underline{\quad} \text{ mL} = 7.6 \text{ L}$ |
| 9. $0.0034 \text{ kg} = \underline{\quad} \text{ mg}$ | 10. $\underline{\quad} \text{ mg} = 0.4 \text{ g}$ | 11. $460 \text{ mL} = \underline{\quad} \text{ L}$ |
| 12. $\underline{\quad} \text{ g} = 557 \text{ mg}$ | 13. $748 \text{ cm} = \underline{\quad} \text{ m}$ | 14. $\underline{\quad} \text{ mL} = 0.06 \text{ L}$ |
| 15. $1.68 \text{ km} = \underline{\quad} \text{ cm}$ | 16. $\underline{\quad} \text{ g} = 8.05 \text{ kg}$ | 17. $336 \text{ m} = \underline{\quad} \text{ km}$ |
| 18. $\underline{\quad} \text{ L} = 621 \text{ mL}$ | 19. $2,146 \text{ g} = \underline{\quad} \text{ kg}$ | 20. $\underline{\quad} \text{ cm} = 48 \text{ mm}$ |

21. **Food** A baby drinks 85 milliliters of juice a day. How many liters of juice does the baby drink in a week?



22. **Standardized Test Practice** How many centimeters are in 0.082 kilometers?

- A** 8.2 **B** 82 **C** 8,200 **D** 82,000

Answers: 1. 3,000 2. 0.9 3. 0.00486 4. 0.397 5. 66.9 6. 7.9 7. 8.17 8. 7,600 9. 3,400 10. 400 11. 0.46 12. 0.557
 13. 7.48 14. 60 15. 168,000 16. 8,050 17. 0.336 18. 0.621 19. 2,146 20. 4.8 21. 0.955 L 22. C

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. 109.