

LESSON
4.1

Multiplying Decimals and Whole Numbers

Goal: Multiply decimals and whole numbers.



Vocabulary

Commutative property of multiplication:

#s can be multiplied in any order & the product will be the same

ex: $10 \cdot 5 = 50$

$5 \cdot 10 = 50$

Associative property of multiplication:

you can regroup #'s inside of parentheses

ex: $(5 \cdot 9) \cdot 10 = 450$

$(5 \cdot 10) \cdot 9 = 450$

EXAMPLE 1 Multiplying Decimals by Whole Numbers

Find the product 8×0.009 .

Because 0.009 has 3 decimal places, the answer will have 3 decimal places.

$$\begin{array}{r} 0.009 \\ \times 8 \\ \hline 0.072 \end{array}$$

Write a zero as a placeholder so that the answer has 3 decimal places.

0.072

You may want to think of Example 1 in words. 8 times 9 thousandths is 72 thousandths. Then you can see why a zero is needed as a placeholder in the product.

Your turn now Find the product. Then write the product in words.

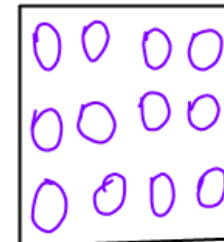
<p>1. 2×0.007</p> $\begin{array}{r} 0.007 \\ \times 2 \\ \hline 0.014 \end{array}$ <p>0.014</p>	<p>2. 6×0.018</p>	<p>3. 3.4×9</p> $\begin{array}{r} 3.4 \\ \times 9 \\ \hline 30.6 \end{array}$	<p>4. 7.14×5</p> $\begin{array}{r} 7.14 \\ \times 5 \\ \hline 35.70 \end{array}$ <p>35.70</p>
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fourteen thousandths

thirty-five and seventy hundredths

EXAMPLE 2 Solving a Problem

Spaghetti Sauce A food company packages its spaghetti sauce in jars that weigh 1.625 pounds. The jars are then shipped in cases that contain 12 jars of sauce each. How much does one case of spaghetti sauce weigh?



Solution

Multiply the weight of one jar by the number of jars in one case.

$$\begin{array}{r}
 1.625 \\
 \times 12 \\
 \hline
 3250 \\
 + 16250 \\
 \hline
 19500
 \end{array}$$

$\frac{3}{10}$

Place the decimal point before dropping any zeros.

Answer: One case weighs 19.5 pounds.

EXAMPLE 3 Checking for Reasonableness

When estimating the product of a decimal and a whole number, you only need to round the decimal and not the whole number.

Use estimation to check that the answer to Example 2 is reasonable.

Weight of one case = 1.625×12

$\approx 2 \times 12$ Round to .

$= 24$

Answer: Because 19.5 is close to 24, the weight is reasonable.

Your turn now Find the product.

5. 0.6×70	6. 3.602×9 $ \begin{array}{r} 3.602 \\ \times 9 \\ \hline 32418 \end{array} $ <u>32.418</u>	7. 4.23×85	8. 7.75×33 $ \begin{array}{r} 7.75 \\ \times 33 \\ \hline 2325 \\ + 23250 \\ \hline 255.75 \end{array} $ <u>255.75</u>
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Your turn now Use estimation to check that the answer is reasonable.

9. 4.135×17 ; 70.295
 4×17
 68 **yes**

10. 19.309×6 ; 1158.54
 19×6
NO

5
 $\begin{array}{r} 19 \\ \times 6 \\ \hline 114 \end{array}$
 7
 $\begin{array}{r} 3.9 \\ \times 8 \\ \hline 31 \frac{2}{8} \end{array}$

11. Explain why the answer 312 is *not* reasonable for the product 8×3.9 .
 Because, there is no decimal.

12. Explain why the answer 2.34 is reasonable for the product 3×0.78 .
 Because there are two decimal places in 0.78 and in 2.34

Properties of Multiplication

Commutative Property In a product, you can multiply numbers

Numbers $7 \times 5.4 =$ Algebra $= b \cdot a$

Associative Property The value of a product does not depend on

Numbers $(7 \times 5.4) \times 3 =$

Algebra $= a \cdot (b \cdot c)$

EXAMPLE 4 Using Properties of Multiplication

Tell whether the *commutative* or *associative* property of multiplication allows you to rewrite the problem as shown. Explain your choice.

a. $8 \times 6.34 \times 5 = 6.34 \times 8 \times 5$
 The order has changed, so this is an example of the **Commutative** property of multiplication.

b. $(6.34 \times 8) \times 5 = 6.34 \times (8 \times 5)$
 The groupings in () have changed, so this is an example of the **associative** property of multiplication.