

Multiply a Decimal by a Whole Number

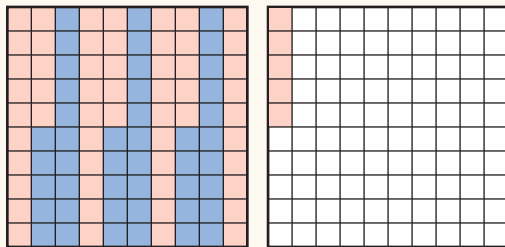


Dear Family,

This week your child is learning to multiply a decimal by a whole number.

One way your child is learning to show multiplying a decimal by a whole number is with a decimal model called a hundredths grid.

The hundredths grids below show 7×0.15 .



Each grid represents one whole (1.0), and each square represents one hundredth (0.01). Each group of fifteen shaded squares shows 15 hundredths (0.15). The decimal model above shows 7 groups of 15 hundredths, or 7×0.15 . The total of 105 shaded squares represents 105 hundredths, or $\frac{105}{100}$.

$$\frac{105}{100} = 1.05$$

So, $7 \times 0.15 = 1.05$.

Your child is also learning how to record the steps of multiplying a decimal by a whole number in a vertical format.

$$\begin{array}{r} 0.15 \\ \times 7 \\ \hline 35 \leftarrow 7 \text{ ones} \times 5 \text{ hundredths} = 35 \text{ hundredths} \\ + 70 \leftarrow 7 \text{ ones} \times 1 \text{ tenth} = 7 \text{ tenths} = 70 \text{ hundredths} \\ \hline 105 \text{ hundredths} = 1.05 \end{array}$$

Invite your child to share what he or she knows about multiplying decimals by whole numbers by doing the following activity together.

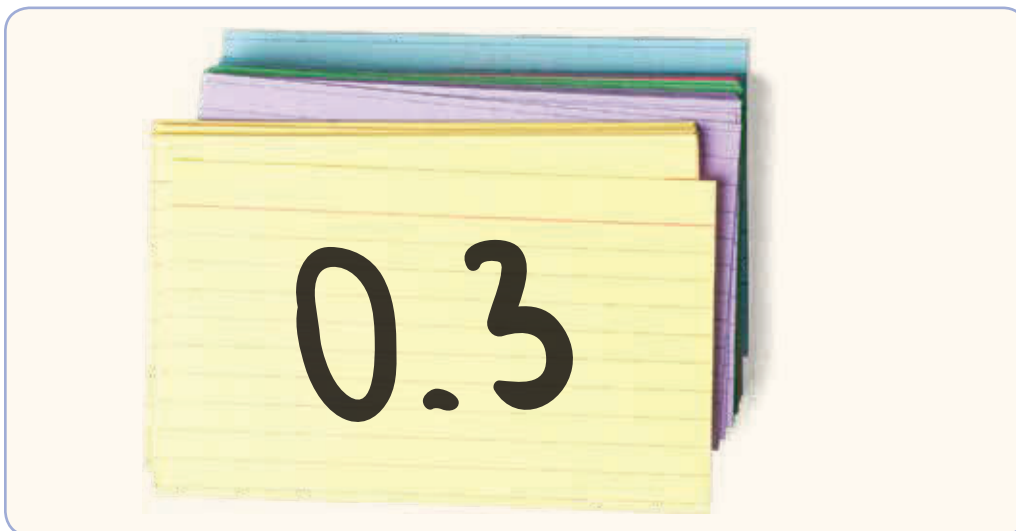
ACTIVITY MULTIPLY WHOLE NUMBERS AND DECIMALS

Do this activity with your child to multiply a decimal by a whole number.

Materials calculator, eight index cards, paper, pencil

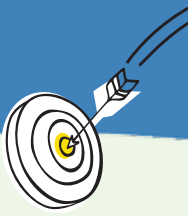
Work with your child to solve problems that involve multiplying a decimal by a whole number.

- Write one whole number on four of the index cards. (Each number should be between 2 and 9.) Place in one stack.
- Write one decimal (in tenths or hundredths) on the other four index cards. Place in a second stack.
- Give your child the paper and pencil.
- Select one card from the stack of whole numbers and one card from the stack of decimal numbers. Ask your child to multiply the whole number by the decimal.
- Have your child use any method to find the product.
- Use the calculator to check his or her answer.
- Repeat until all four whole numbers have been used.



Look for real-world examples of multiplying decimals by whole numbers with your child. For instance, you may buy 3 pounds of potatoes at a cost of \$0.73 per pound. Work together with your child to multiply to find the total cost of the potatoes. Repeat with other items that you may purchase.

Explore Multiplying a Decimal by a Whole Number



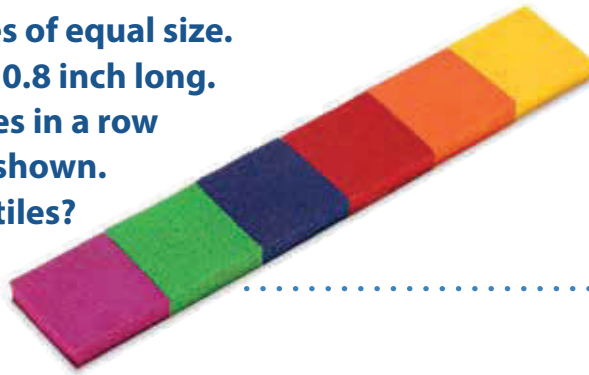
Learning Target

- Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

SMP 1, 2, 3, 4, 5, 6, 7

You know how to multiply two whole numbers. Now you will learn how to multiply a decimal by a whole number. Use what you know to try to solve the problem below.


Margo has 6 square tiles of equal size.
Each side of each tile is 0.8 inch long.
Margo places all the tiles in a row with sides touching as shown.
How long is the row of tiles?



TRY IT



Math Toolkit

- base-ten blocks
- tenths grids
- number lines
- grid paper
- sticky notes
- multiplication models 



DISCUSS IT

Ask your partner: How did you get started?

Tell your partner: I started by ...

CONNECT IT

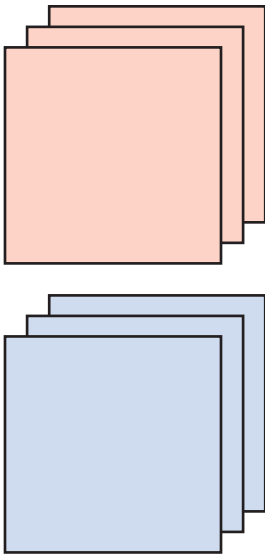
1 LOOK BACK

Explain how you found the length of the row of tiles.

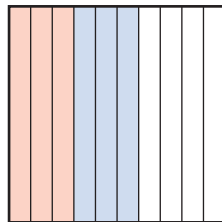
2 LOOK AHEAD

You can find the length of the row of tiles through repeated addition or multiplication of a decimal by a whole number. Look for patterns in the factors and products when multiplying with the whole numbers and decimals shown below. Use the models to write the products.

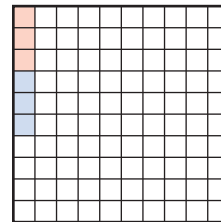
a. $2 \times 3 = \dots\dots\dots$



b. $2 \times 0.3 = \dots\dots\dots$



c. $2 \times 0.03 = \dots\dots\dots$



3 REFLECT

What patterns do you see in the factors and products in the equations? How are these patterns reflected in the models?

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Prepare for Multiplying a Decimal by a Whole Number

- 1 Think about what you know about multiplication. Fill in each box. Use words, numbers, and pictures. Show as many ideas as you can.

Word	In My Own Words	Example
partial product		
product		
factor		

- 2 Look at the multiplication below. What are the factors, partial products, and product?

$$\begin{array}{r}
 215 \\
 \times 3 \\
 \hline
 15 \text{ (} 3 \times 5 \text{ ones)} \\
 30 \text{ (} 3 \times 1 \text{ ten)} \\
 + 600 \text{ (} 3 \times 2 \text{ hundreds)} \\
 \hline
 645
 \end{array}$$

factors:

partial products:

product:

- 3 Solve the problem. Show your work.

Kasim has 7 square platters of equal size. Each side of each platter is 0.4 meters long. Kasim places all the platters in a row with no gaps between the sides. How long is the row of platters?



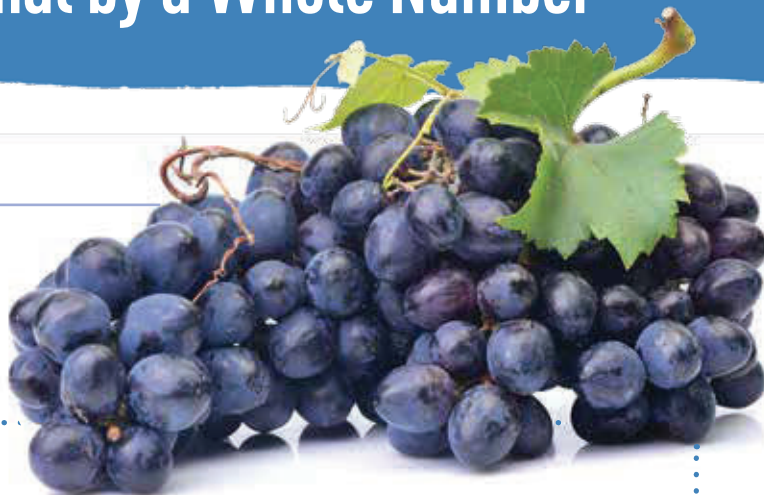
Solution

- 4 Check your answer. Show your work.

Develop Multiplying a Decimal by a Whole Number

Read and try to solve the problem below.


Padma bought 3 pounds of grapes. Each pound of grapes costs \$2.75. How much money did Padma spend on grapes?



TRY IT



Math Toolkit

- base-ten blocks
- play money
- base-ten grid paper
- decimal grids
- thousandths decimal place-value charts
- multiplication models 



DISCUSS IT

Ask your partner: Why did you choose that strategy?

Tell your partner: The strategy I used to find the answer was . . .

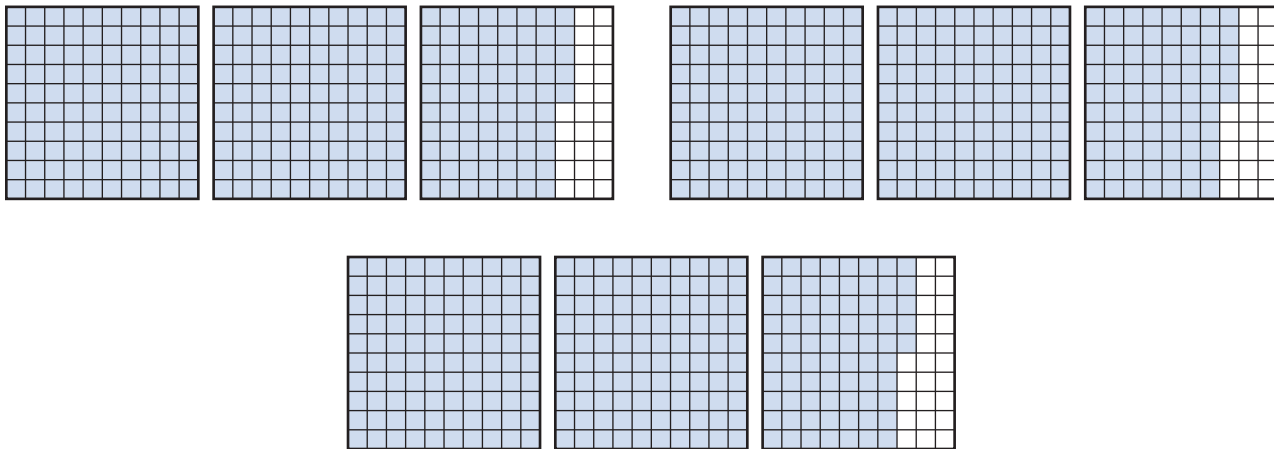
Explore different ways to understand multiplying a decimal by a whole number.

Padma bought 3 pounds of grapes. Each pound of grapes costs \$2.75.
How much money did Padma spend on grapes?

PICTURE IT

You can use decimal grids to picture multiplying a decimal by a whole number.

Think of $3 \times \$2.75$ as 3 groups of 2.75.



MODEL IT

You can use partial products to multiply a decimal by a whole number.

$$\begin{array}{r}
 2.75 \\
 \times 3 \\
 \hline
 15 \leftarrow 3 \text{ ones} \times 5 \text{ hundredths} = 15 \text{ hundredths} \\
 210 \leftarrow 3 \text{ ones} \times 7 \text{ tenths} = 21 \text{ tenths} = 210 \text{ hundredths} \\
 + 600 \leftarrow 3 \text{ ones} \times 2 \text{ ones} = 6 \text{ ones} = 600 \text{ hundredths} \\
 \hline
 825 \text{ hundredths}
 \end{array}$$



CONNECT IT

Now you will use the problem from the previous page to help you understand how to multiply a decimal by a whole number.

1 To solve the problem, you need to find $3 \times \$2.75$. Estimate the total cost of the grapes. Explain your thinking.

2 Look at **Picture It**. How many full grids can you make?

How many squares would be shaded in the partially filled grid?

3 Look at **Model It**. How is multiplying with a decimal like multiplying with a whole number?

4 825 hundredths = ones

5 Both **Picture It** and **Model It** show that $3 \times \$2.75 = \dots\dots\dots$.

Is the product reasonable? Explain.

6 Explain how to multiply a decimal in the hundredths by a whole number.

7 REFLECT

Look back at your **Try It**, strategies by classmates, and **Picture It** and **Model It**. Which models or strategies do you like best for multiplying a decimal by a whole number? Explain.

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APPLY IT

Use what you just learned to solve these problems.

- 8 Onions cost \$0.65 per pound. Sasha bought 4 pounds of onions. How much did she pay for the onions? Show your work.



Solution

- 9 Brian makes a row of 11 paper clips lined up end to end. Each paper clip is 2.48 centimeters long. How long is the row of paper clips? Show your work.

Solution

- 10 What is the product of 14 and 5.3?
- (A) 7.42
 - (B) 0.742
 - (C) 74.2
 - (D) 742

Practice Multiplying a Decimal by a Whole Number

Study the Example showing multiplying a decimal by a whole number using partial products. Then solve problems 1–7.

EXAMPLE

Find 3.17×4 .

Start by estimating: $3 \times 4 = 12$

$$\begin{array}{r}
 3.17 \\
 \times \quad 4 \\
 \hline
 28 \leftarrow 4 \text{ ones} \times 7 \text{ hundredths} = 28 \text{ hundredths} \\
 40 \leftarrow 4 \text{ ones} \times 1 \text{ tenth} = 4 \text{ tenths} = 40 \text{ hundredths} \\
 + \underline{1,200} \leftarrow 4 \text{ ones} \times 3 \text{ ones} = 12 \text{ ones} = \underline{1,200} \text{ hundredths} \\
 \hline
 1,268 \text{ hundredths} = 12.68
 \end{array}$$

- 1 Look at the Example. Compare the product with the estimate. Is it reasonable that the product is greater than the estimate? Explain.

- 2 Complete the steps to find the product. Use decimal grids to help, if needed.

$$\begin{array}{r}
 0.35 \\
 \times \quad 3 \\
 \hline
 \dots\dots \leftarrow 3 \text{ ones} \times \dots\dots \text{ hundredths} = \dots\dots \text{ hundredths} \\
 + \underline{\dots\dots} \leftarrow 3 \text{ ones} \times \dots\dots \text{ tenths} = \dots\dots \text{ tenths} = \dots\dots \text{ hundredths} \\
 \hline
 \dots\dots \text{ hundredths} = \dots\dots
 \end{array}$$

- 3 Look at problem 2. Why is no partial product shown for the zero in the ones place?

4 Write the decimal point in each product so that the equation is correct.

a. $6 \times 8.29 = 4974$

b. $0.53 \times 5 = 265$

c. $9.72 \times 7 = 6804$

d. $3.18 \times 16 = 5088$

5 Explain how you decided where to place the decimal points in the products in problem 4.

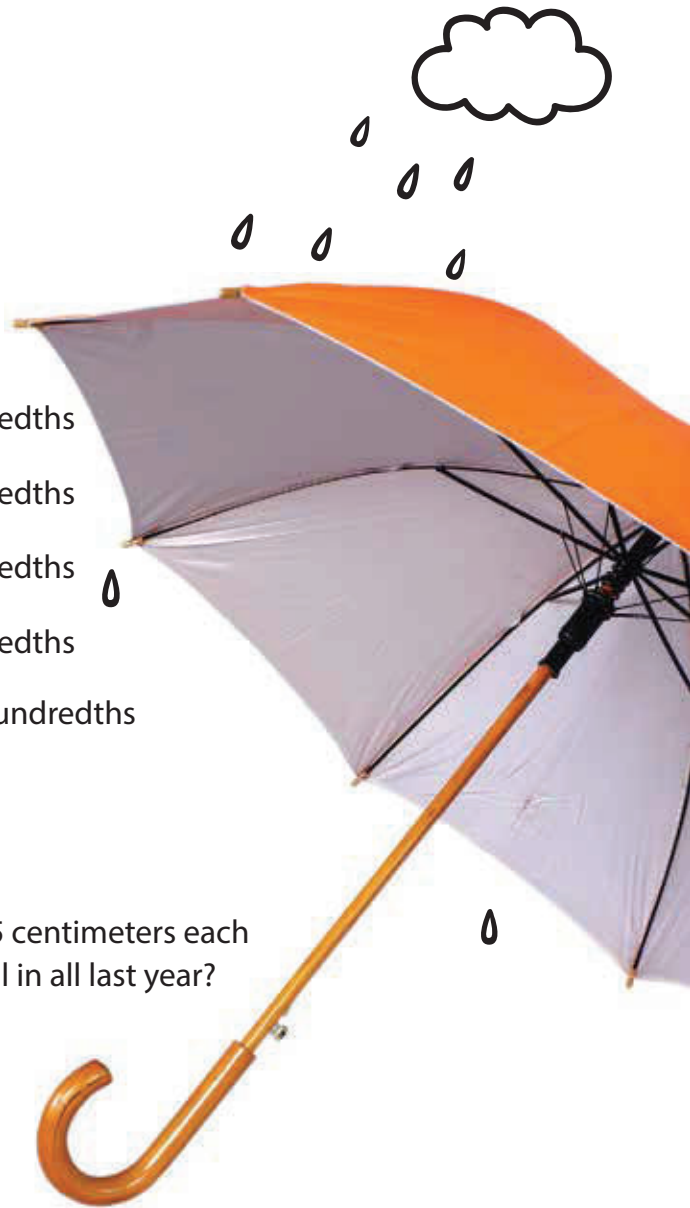
6 Complete the steps to find 3.18×16 .

$$\begin{array}{r} 3.18 \\ \times 10 \\ \hline 80 \text{ hundredths} \\ \dots\dots\dots \text{ hundredths} \\ + \dots\dots\dots \text{ hundredths} \\ \hline \dots\dots\dots \text{ hundredths} \end{array}$$

$$\begin{array}{r} 3.18 \\ \times 6 \\ \hline \dots\dots\dots \text{ hundredths} \\ \dots\dots\dots \text{ hundredths} \\ + \dots\dots\dots \text{ hundredths} \\ \hline \dots\dots\dots \text{ hundredths} \end{array}$$

$$\begin{aligned} 3.18 \times 16 &= \dots\dots\dots \text{ hundredths} + \dots\dots\dots \text{ hundredths} \\ &= \dots\dots\dots \text{ hundredths} \\ &= \dots\dots\dots \end{aligned}$$

7 In the city where Sonya lives, it rained an average of 8.05 centimeters each month last year. About how many centimeters of rain fell in all last year? Show your work.



Solution

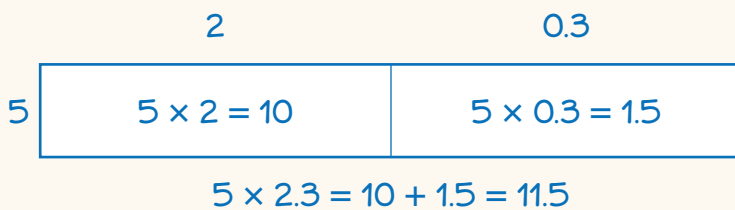
Refine Multiplying a Decimal by a Whole Number

Complete the Example below. Then solve problems 1–9.

EXAMPLE

Ben swims 2.3 hours each day at practice. He practices once per day. How long will Ben swim in 5 days?

Look at how you could show your work using an area model.



Solution

The student wrote 2.3 as $2 + 0.3$ and used an area model to solve the problem.



PAIR/SHARE

How is the distributive property used in this solution?

APPLY IT

- Gale sells 16 bags of cherries at the farmers market. Each bag weighs 1.8 pounds. How many pounds of cherries does Gale sell in all? Show your work.

You can use partial products to solve this problem.



PAIR/SHARE

Explain how to check if your answer is reasonable.

Solution

- 2 A person's hair grows 1.2 centimeters in 1 month. How much would the person's hair grow in 9 months? Show your work.

Will the product be in tenths or hundredths?



Solution

- 3 What is the product of 2 and 0.73?
- (A) 146
 - (B) 14.6
 - (C) 1.46
 - (D) 0.146

Kendall chose (B) as the correct answer. How did she get that answer?

PAIR/SHARE

Explain how you can solve the problem using an area model.

Will 2 groups of 0.73 be greater than or less than 2?

PAIR/SHARE

Is Kendall's answer reasonable? Explain.

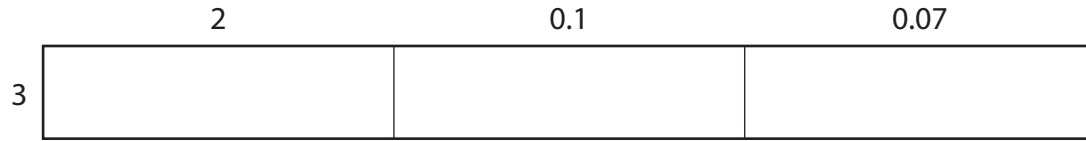
- 4 Which product has a value of 16.68?
- (A) 278×6
- (B) 27.8×60
- (C) 27.8×6
- (D) 2.78×6
- 5 Willa downloads 5 songs. Three of the song files are each 2.75 megabytes. Two song files are each 3.8 megabytes. How many megabytes does Willa download in all?

0	0	0	0	0	0
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9



- 6 Which expressions have the same value as the product of 4.6 and 5?
- (A) 460×0.5
- (B) 460×0.05
- (C) 46×5.0
- (D) 46×0.5
- (E) 0.46×50

- 7 The area model below can be used to find the product of 3 and 2.17. Complete the area model and find the product.



$3 \times 2.17 = \dots\dots\dots$

- 8 Tyrone said that 2.35×5 equals 1.175 because there is only one digit before the decimal point in 2.35, so there must be one digit before the decimal point in the product. Use pictures, numbers, or words to explain whether or not Tyrone is correct.

Solution

9 MATH JOURNAL

Myles said that 5×0.13 is 6.5. Do you agree? Explain.

SELF CHECK Go back to the Unit 3 Opener and see what you can check off.