

Name _____

Algebra • Multiplication Patterns with Decimals

You can use patterns and place value to help you place the decimal point.

To multiply a number by a power of 10, you can use the exponent to determine how the position of the decimal point changes in the product.

	Exponent	Move decimal point:
$10^0 \times 5.18 = \underline{5.18}$	0	0 places to the right
$10^1 \times 5.18 = \underline{51.8}$	1	1 place to the right
$10^2 \times 5.18 = \underline{518}$	2	2 places to the right
$10^3 \times 5.18 = \underline{5,180}$	3	3 places to the right

You can use place-value patterns to find the product of a number and the decimals 0.1 and 0.01.

	Multiply by:	Move decimal point:
$1 \times 2,457 = \underline{2,457}$	1	0 places to the left
$0.1 \times 2,457 = \underline{245.7}$	0.1	1 place to the left
$0.01 \times 2,457 = \underline{24.57}$	0.01	2 places to the left

Complete the pattern.

1. $10^0 \times 25.89 = \underline{\hspace{2cm}}$

2. $1 \times 182 = \underline{\hspace{2cm}}$

$10^1 \times 25.89 = \underline{\hspace{2cm}}$

$0.1 \times 182 = \underline{\hspace{2cm}}$

$10^2 \times 25.89 = \underline{\hspace{2cm}}$

$0.01 \times 182 = \underline{\hspace{2cm}}$

$10^3 \times 25.89 = \underline{\hspace{2cm}}$

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Multiply Decimals and Whole Numbers

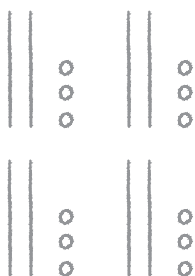
You can draw a quick picture to help multiply a decimal and a whole number.

Find the product. 4×0.23

Draw a quick picture. Each bar represents one tenth, or 0.1.
Each circle represents one hundredth, or 0.01.

Step 1

Draw 4 groups of 2 tenths and 3 hundredths.



Step 2

Combine the tenths. Then combine the hundredths.



Step 3

There are 12 hundredths. Rename 10 hundredths as 1 tenth. Then you will have 9 tenths and 2 hundredths.



So, $4 \times 0.23 = \underline{0.92}$.

Find the product. Draw a quick picture.

1. $2 \times 0.19 = \underline{\hspace{2cm}}$

2. $3 \times 0.54 = \underline{\hspace{2cm}}$

3. $4 \times 0.07 = \underline{\hspace{2cm}}$

4. $3 \times 1.22 = \underline{\hspace{2cm}}$

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Multiplication with Decimals and Whole Numbers

To find the product of a one-digit whole number and a decimal, multiply as you would multiply whole numbers. To find the number of decimal places in the product, add the number of decimal places in the factors.

To multiply 6×4.25 , multiply as you would multiply 6×425 .

Step 1
Multiply the ones.

$$\begin{array}{r} ^3 \\ 425 \\ \times 6 \\ \hline 0 \end{array}$$

Step 2
Multiply the tens.

$$\begin{array}{r} ^{13} \\ 425 \\ \times 6 \\ \hline 50 \end{array}$$

Step 3
Multiply the hundreds. Then place the decimal point in the product.

$$\begin{array}{r} ^{13} \\ 4.25 \leftarrow 2 \text{ decimal places} \\ \times 6 \leftarrow + 0 \text{ decimal places} \\ \hline 25.50 \leftarrow 2 \text{ decimal places} \end{array}$$

So, $6 \times 4.25 = \underline{25.50}$.

Place the decimal point in the product.

1. 8.23 **Think:** The place value of the decimal factor is hundredths.

$$\begin{array}{r} ^3 \\ 8.23 \\ \times 6 \\ \hline 49.38 \end{array}$$

2. 6.3

$$\begin{array}{r} ^1 \\ 6.3 \\ \times 4 \\ \hline 25.2 \end{array}$$

3. 16.82

$$\begin{array}{r} ^{13} \\ 16.82 \\ \times 5 \\ \hline 84.10 \end{array}$$

Find the product.

4. 5.19

$$\begin{array}{r} ^2 \\ 5.19 \\ \times 3 \\ \hline \end{array}$$

5. 7.2

$$\begin{array}{r} ^1 \\ 7.2 \\ \times 8 \\ \hline \end{array}$$

6. 37.46

$$\begin{array}{r} ^{13} \\ 37.46 \\ \times 7 \\ \hline \end{array}$$

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Multiply Using Expanded Form

You can use a model and partial products to help you find the product of a two-digit whole number and a decimal.

Find the product. 13×6.8

Step 1 Draw a large rectangle. Label its longer side 13 and its shorter side 6.8. The area of the large rectangle represents the product, 13 \times 6.8.

Step 2 Rewrite the factors in expanded form. Divide the large rectangle into four smaller rectangles. Use the expanded forms to label the smaller rectangles.

$$13 = \underline{10} + \underline{3} \quad 6.8 = \underline{6} + \underline{0.8}$$

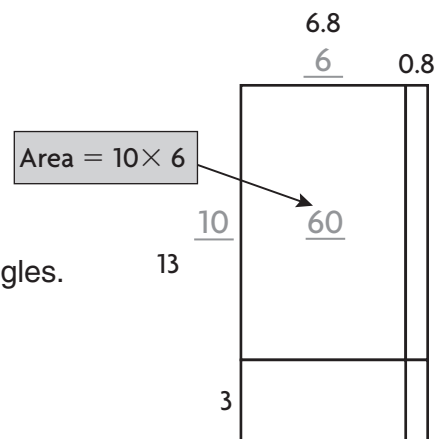
Step 3 Multiply to find the area of each small rectangle.

$$10 \times 6 = \underline{60} \quad 10 \times 0.8 = \underline{8} \quad 3 \times 6 = \underline{18} \quad 3 \times 0.8 = \underline{2.4}$$

Step 4 Add to find the total area.

$$\underline{60} + \underline{8} + \underline{18} + \underline{2.4} = \underline{88.4}$$

So, $13 \times 6.8 = \underline{88.4}$.



Draw a model to find the product.

1. $18 \times 0.25 =$ _____

2. $26 \times 7.2 =$ _____

Find the product.

3. $17 \times 9.3 =$ _____

4. $21 \times 43.5 =$ _____

5. $48 \times 4.74 =$ _____

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Problem Solving • Multiply Money

Three students in the garden club enter a pumpkin-growing contest. Jessie's pumpkin is worth \$12.75. Mara's pumpkin is worth 4 times as much as Jessie's. Hayden's pumpkin is worth \$22.25 more than Mara's. How much is Hayden's pumpkin worth?

Read the Problem	Solve the Problem										
<p>What do I need to find?</p> <p>I need to find <u>how much</u> <u>Hayden's pumpkin is worth</u>.</p>	<p>The amount that Hayden's and Mara's pumpkins are worth depends on how much Jessie's pumpkin is worth. Draw a diagram to compare the amounts without calculating. Then use the diagram to find how much each person's pumpkin is worth.</p>										
<p>What information do I need to use?</p> <p>I need to use the worth of <u>Jessie's</u> pumpkin to find how much <u>Mara's</u> and <u>Hayden's</u> pumpkins are worth.</p>	<p>Jessie <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>\$12.75</td></tr></table></p> <p>Mara <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>\$12.75</td><td>\$12.75</td><td>\$12.75</td><td>\$12.75</td></tr></table></p> <p>Hayden <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>\$12.75</td><td>\$12.75</td><td>\$12.75</td><td>\$12.75</td><td>\$22.25</td></tr></table></p>	\$12.75	\$12.75	\$12.75	\$12.75	\$12.75	\$12.75	\$12.75	\$12.75	\$12.75	\$22.25
\$12.75											
\$12.75	\$12.75	\$12.75	\$12.75								
\$12.75	\$12.75	\$12.75	\$12.75	\$22.25							
<p>How will I use the information:</p> <p>I can draw a diagram to show <u>how</u> <u>much Jessie's and Mara's</u> <u>pumpkins are worth to</u> <u>find how much Hayden's</u> <u>pumpkin is worth.</u></p>	<p>Jessie: \$12.75</p> <p>Mara: $4 \times \underline{\\$12.75} = \underline{\\$51.00}$</p> <p>Hayden: $\underline{\\$51.00} + \\$22.25 = \underline{\\$73.25}$</p>										
<p>So Hayden's pumpkin is worth <u>\$73.25</u>.</p>											

- Three friends go to the local farmers' market. Latasha spends \$3.35. Helen spends 4 times as much as Latasha. Dee spends \$7.50 more than Helen. How much does Dee spend?

- Alexia raises \$75.23 for a charity. Sue raises 3 times as much as Alexia. Manuel raises \$85.89. How much money do the three friends raise for the charity in all?

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Decimal Multiplication

You can use decimal squares to multiply decimals.

Multiply. 0.2×0.9

Step 1 Draw a square with 10 equal rows and 10 equal columns.

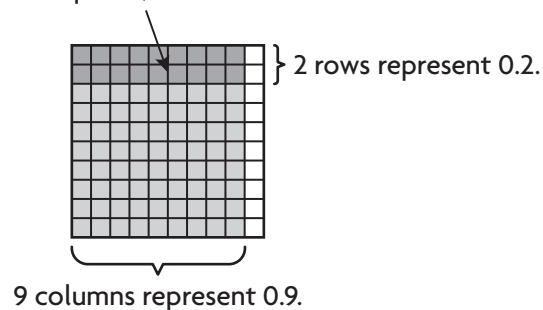
Step 2 Shade 9 columns to represent 0.9.

Step 3 Shade 2 rows to represent 0.2.

Step 4 Count the number of small squares where the shadings overlap: 18 squares, or 0.18.

So, $0.2 \times 0.9 = \underline{0.18}$.

The shadings overlap in 18 squares, or 0.18.

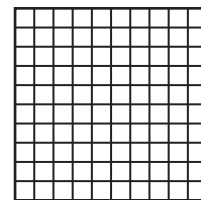
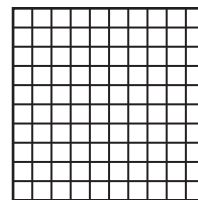
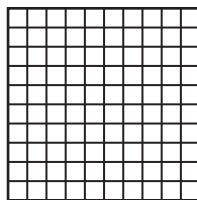
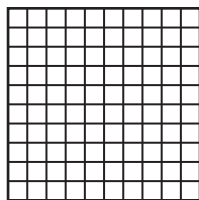


Multiply. Use the decimal model.

1. $0.3 \times 0.2 =$ _____

2. $0.9 \times 0.5 =$ _____

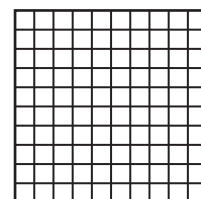
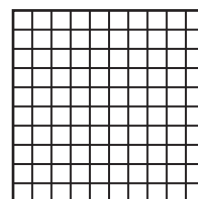
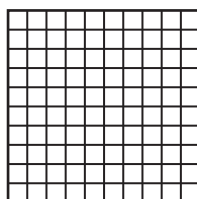
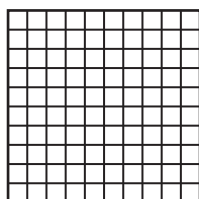
3. $0.1 \times 1.8 =$ _____



4. $0.4 \times 0.4 =$ _____

5. $0.6 \times 0.5 =$ _____

6. $0.4 \times 1.2 =$ _____



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Multiply Decimals

Multiply. 9.3×5.27

Step 1 Multiply as with whole numbers.

$$\begin{array}{r}
 26 \\
 2 \\
 527 \\
 \times 93 \\
 \hline
 1,581 \\
 + 47,430 \\
 \hline
 49,011
 \end{array}$$

Step 2 Add the number of decimal places in the factors to place the decimal point in the product.

$$\begin{array}{r}
 5.27 \leftarrow \underline{2} \text{ decimal places} \\
 \times 9.3 \leftarrow + \underline{1} \text{ decimal place} \\
 \hline
 1,581 \\
 + 47,430 \\
 \hline
 49.011 \leftarrow \underline{3} \text{ decimal places}
 \end{array}$$

So, $9.3 \times 5.27 = \underline{49.011}$.

Place the decimal point in the product.

1.
$$\begin{array}{r}
 1.6 \\
 \times 0.7 \\
 \hline
 112
 \end{array}$$

2.
$$\begin{array}{r}
 14.2 \\
 \times 7.6 \\
 \hline
 10792
 \end{array}$$

3.
$$\begin{array}{r}
 3.59 \\
 \times 4.8 \\
 \hline
 17232
 \end{array}$$

Find the product.

4.
$$\begin{array}{r}
 5.7 \\
 \times 0.8 \\
 \hline
 \end{array}$$

5.
$$\begin{array}{r}
 35.1 \\
 \times 8.4 \\
 \hline
 \end{array}$$

6.
$$\begin{array}{r}
 2.19 \\
 \times 6.3 \\
 \hline
 \end{array}$$

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Zeros in the Product

Sometimes when you multiply two decimals, there are not enough digits in the product to place the decimal point.

Multiply. 0.9×0.03

Step 1 Multiply as with whole numbers.

$$\begin{array}{r} 3 \\ \times 9 \\ \hline 27 \end{array}$$

Step 2 Find the number of decimal places in the product by adding the number of decimal places in the factors.

$$\begin{array}{l} 0.03 \leftarrow \underline{2} \text{ decimal places} \\ \times 0.9 \leftarrow + \underline{1} \text{ decimal place} \\ \hline \leftarrow \underline{3} \text{ decimal places} \end{array}$$

Step 3 Place the decimal point.

0.027

There are not enough digits in the product to place the decimal point. Write zeros as needed to the left of the product to place the decimal point.

So, $0.9 \times 0.03 = \underline{0.027}$.

Write zeros in the product.

1.
$$\begin{array}{r} 0.8 \\ \times 0.1 \\ \hline \square 8 \end{array}$$

2.
$$\begin{array}{r} 0.04 \\ \times 0.7 \\ \hline \square 28 \end{array}$$

3.
$$\begin{array}{r} 0.03 \\ \times 0.3 \\ \hline \square 9 \end{array}$$

Find the product.

4.
$$\begin{array}{r} \$0.06 \\ \times 0.5 \\ \hline \end{array}$$

5.
$$\begin{array}{r} 0.09 \\ \times 0.8 \\ \hline \end{array}$$

6.
$$\begin{array}{r} 0.05 \\ \times 0.7 \\ \hline \end{array}$$