

LO: I can multiply and divide decimals

How to Multiply Decimals

Just follow these steps:

- Multiply normally, ignoring the decimal points.
- **Then** put the decimal point in the answer - it will have as many decimal places as the two original numbers combined.

In other words, just count up how many numbers are after the decimal point in *both* numbers you are multiplying, then the answer should have that many numbers after *its* decimal point.

Example: Multiply 0.03 by 1.1

start with:	0.03×1.1
multiply without decimal points:	$3 \times 11 = 33$
0.03 has 2 decimal places ,	
and 1.1 has 1 decimal place ,	
so the answer has 3 decimal places :	0.033

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How Does It Work?

Because when you multiply without the decimal point, you are really shifting the decimal point to the right to **get it out of the way**:

$$\begin{array}{ccccccc} \text{Original:} & & \text{1 Move:} & & \text{2 Moves:} & & \text{3 Moves:} \\ 0.03 \times 1.1 & \rightarrow & 0.3 \times 1.1 & \rightarrow & 3. \times 1.1 & \rightarrow & 3. \times 11. \end{array}$$

Then we do the (now easy) multiplication:

$$3. \times 11. = 33.$$

But remember, we did 3 Moves of the decimal point, so we need to undo that:

$$\begin{array}{ccccccc} \text{3 Moves:} & & \text{2 Moves:} & & \text{1 Move:} & & \text{Correct} \\ 33. & \rightarrow & 3.3 & \rightarrow & 0.33 & \rightarrow & 0.033 \end{array}$$

Here are some more examples:

Example: Multiply 0.25 by 0.2

start with: 0.25×0.2
 multiply without decimal points: $25 \times 2 = 50$
 0.25 has **2** decimal places,
 and 0.2 has **1** decimal place,
 so the answer has **3** decimal places: **0.050**

LO: I can multiply and divide decimals

Multiplying Decimals

Solve these calculations using a written method.

a) 156.4	b) 345.9	c) 268.6	d) 62.13	e) 34.65	f) 29.13	g) 42.15	h) 89.95	i) 76.84
$\times 6$	$\times 4$	$\times 3$	$\times 5$	$\times 4$	$\times 8$	$\times 7$	$\times 5$	$\times 3$
_____	_____	_____	_____	_____	_____	_____	_____	_____

Solve the following calculations:

j) $423.4 \times 6 =$	o) $75.65 \times 3 =$
_____	_____
k) $362.5 \times 4 =$	p) $64.08 \times 4 =$
_____	_____
l) $32.68 \times 5 =$	q) $95.42 \times 8 =$
_____	_____
m) $63.05 \times 7 =$	

n) $86.25 \times 6 =$	

Solve these word problems:

- | |
|---|
| r) It takes 16.24 metres to make a pair of curtains. How many metres of fabric is needed to make 8 pairs of curtains? |
| _____ |
| s) Sam earns £25.65 working in the local newsagents each Saturday. How much does he earn after working for 5 weekends in a row? |
| _____ |
| t) A house is 32.45 metres wide. 6 terraced houses are built in a row. What is the total width of all 6 houses? |
| _____ |

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Multiplying Decimals **Answers**

Solve these calculations using a written method.

a) 156.4	b) 345.9	c) 268.6	d) 62.13	e) 34.65	f) 29.13	g) 42.15	h) 89.95	i) 76.84
$\times 6$	$\times 4$	$\times 3$	$\times 5$	$\times 4$	$\times 8$	$\times 7$	$\times 5$	$\times 3$
<u>938.4</u>	<u>1383.6</u>	<u>805.8</u>	<u>310.65</u>	<u>138.6</u>	<u>233.04</u>	<u>295.05</u>	<u>449.75</u>	<u>230.52</u>

Solve the following calculations:

- j) $423.4 \times 6 =$ **2540.4**
 k) $362.5 \times 4 =$ **1450**
 l) $32.68 \times 5 =$ **163.4**
 m) $63.05 \times 7 =$ **441.35**
 n) $86.25 \times 6 =$ **517.5**

Solve these word problems:

- r) It takes 16.24 metres to make a pair of curtains. How many metres of fabric is needed to make 8 pairs of curtains?
129.92 metres
- s) Sam earns £25.65 working in the local newsagents each Saturday. How much does he earn after working for 5 weekends in a row?
£128.25
- t) A house is 32.45 metres wide. 6 terraced houses are built in a row. What is the total width of all 6 houses?
194.7 metres

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The trick is to get rid of the decimal point from the number we are dividing by.

How? We can "shift the decimal point" out of the way by multiplying by 10, as many times as we need to.

But we must do the **same thing** to both numbers in the division.

Example: 15 divided by 0.2

Let us multiply the 0.2 by 10, which shifts the decimal point out of the way:

$$\rightarrow 0.2 \times 10 = 2$$

But we must **also** do it to the 15:

$$\rightarrow 15 \times 10 = 150$$

So $15 \div 0.2$ has become $150 \div 2$ (they are **both** 10 times larger):

$$150 \div 2 = 75$$

And so the answer is:

$$15 \div 0.2 = 75$$

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$$15 \div 0.2$$

dividend \rightarrow \leftarrow divisor
 The number we divide by is called the divisor.

To divide decimal numbers:

Multiply the divisor by as many 10's as necessary until we get a whole number. Remember to multiply the dividend by the same number of 10's.

Example: Divide 6.4 by 0.4

Let us just shift the decimal point one space for both:

move 1	
6.4	\rightarrow 64
0.4	\rightarrow 4
move 1	

6.4/0.4 is exactly the same as 64/4,
 as we moved the decimal point of both numbers.

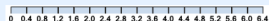
Now we can calculate:

$$64 / 4 = 16$$

So the answer is:

$$6.4 / 0.4 = 16$$

Are there really 16 lots of 0.4 in 6.4? Let's see:



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Dividing

1.

- a. $3.2 \div 4$
- b. $4.8 \div 8$
- c. $7.2 \div 9$
- d. $2.4 \div 6$
- e. $1.8 \div 3$

2.

- a. $5.6 \div 0.7$
- b. $6.3 \div 0.7$
- c. $2.7 \div 0.3$
- d. $4.9 \div 0.7$
- e. $2.8 \div 0.7$

3.

- a. $1.65 \div 0.15$
- b. $\quad \div 0.12$
- c. $27.3 \div 1.3$
- d. $0.03 \div 0.005$
- e. $0.99 \div 0.0009$

Please only continue if you are not coming in to school at all.

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Calculate each product.

$\begin{array}{r} 2.3 \\ \times 4.6 \\ \hline \end{array}$	$\begin{array}{r} 0.67 \\ \times 0.50 \\ \hline \end{array}$	$\begin{array}{r} 0.27 \\ \times 73 \\ \hline \end{array}$	$\begin{array}{r} 2.8 \\ \times 32 \\ \hline \end{array}$	$\begin{array}{r} 3.1 \\ \times 94 \\ \hline \end{array}$
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$\begin{array}{r} 6.5 \\ \times 6.6 \\ \hline \end{array}$	$\begin{array}{r} 3.3 \\ \times 0.89 \\ \hline \end{array}$	$\begin{array}{r} 48 \\ \times 48 \\ \hline \end{array}$	$\begin{array}{r} 5.4 \\ \times 0.19 \\ \hline \end{array}$	$\begin{array}{r} 47 \\ \times 14 \\ \hline \end{array}$
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$\begin{array}{r} 5.8 \\ \times 4.3 \\ \hline \end{array}$	$\begin{array}{r} 0.46 \\ \times 0.50 \\ \hline \end{array}$	$\begin{array}{r} 53 \\ \times 7.8 \\ \hline \end{array}$	$\begin{array}{r} 3.0 \\ \times 0.49 \\ \hline \end{array}$	$\begin{array}{r} 87 \\ \times 0.21 \\ \hline \end{array}$
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$\begin{array}{r} 47 \\ \times 0.12 \\ \hline \end{array}$	$\begin{array}{r} 84 \\ \times 18 \\ \hline \end{array}$	$\begin{array}{r} 6.7 \\ \times 0.95 \\ \hline \end{array}$	$\begin{array}{r} 0.83 \\ \times 8.9 \\ \hline \end{array}$	$\begin{array}{r} 1.2 \\ \times 0.54 \\ \hline \end{array}$
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$\begin{array}{r} 0.13 \\ \times 4.3 \\ \hline \end{array}$	$\begin{array}{r} 0.89 \\ \times 0.34 \\ \hline \end{array}$	$\begin{array}{r} 0.31 \\ \times 0.93 \\ \hline \end{array}$	$\begin{array}{r} 8.1 \\ \times 16 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ \times 0.76 \\ \hline \end{array}$
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Answers

$\begin{array}{r} 2.3 \\ \times 4.6 \\ \hline 138 \\ 920 \\ \hline 10.58 \end{array}$	$\begin{array}{r} 0.67 \\ \times 0.50 \\ \hline 0.3350 \end{array}$	$\begin{array}{r} 0.27 \\ \times 73 \\ \hline 81 \\ 1890 \\ \hline 19.71 \end{array}$	$\begin{array}{r} 2.8 \\ \times 32 \\ \hline 56 \\ 840 \\ \hline 89.6 \end{array}$	$\begin{array}{r} 3.1 \\ \times 94 \\ \hline 124 \\ 2790 \\ \hline 291.4 \end{array}$
$\begin{array}{r} 6.5 \\ \times 6.6 \\ \hline 390 \\ 3900 \\ \hline 42.90 \end{array}$	$\begin{array}{r} 3.3 \\ \times 0.89 \\ \hline 297 \\ 2640 \\ \hline 2.937 \end{array}$	$\begin{array}{r} 48 \\ \times 48 \\ \hline 384 \\ 1920 \\ \hline 2304 \end{array}$	$\begin{array}{r} 5.4 \\ \times 0.19 \\ \hline 486 \\ 540 \\ \hline 1.026 \end{array}$	$\begin{array}{r} 47 \\ \times 14 \\ \hline 188 \\ 470 \\ \hline 658 \end{array}$
$\begin{array}{r} 5.8 \\ \times 4.3 \\ \hline 174 \\ 2320 \\ \hline 24.94 \end{array}$	$\begin{array}{r} 0.46 \\ \times 0.50 \\ \hline 0.2300 \end{array}$	$\begin{array}{r} 53 \\ \times 7.8 \\ \hline 424 \\ 3710 \\ \hline 413.4 \end{array}$	$\begin{array}{r} 3.0 \\ \times 0.49 \\ \hline 270 \\ 1200 \\ \hline 1.470 \end{array}$	$\begin{array}{r} 87 \\ \times 0.21 \\ \hline 87 \\ 1740 \\ \hline 18.27 \end{array}$
$\begin{array}{r} 47 \\ \times 0.12 \\ \hline 94 \\ 470 \\ \hline 5.64 \end{array}$	$\begin{array}{r} 84 \\ \times 18 \\ \hline 672 \\ 840 \\ \hline 1512 \end{array}$	$\begin{array}{r} 6.7 \\ \times 0.95 \\ \hline 335 \\ 6030 \\ \hline 6.365 \end{array}$	$\begin{array}{r} 0.83 \\ \times 8.9 \\ \hline 747 \\ 6640 \\ \hline 7.387 \end{array}$	$\begin{array}{r} 1.2 \\ \times 0.54 \\ \hline 48 \\ 600 \\ \hline 0.648 \end{array}$
$\begin{array}{r} 0.13 \\ \times 4.3 \\ \hline 39 \\ 520 \\ \hline 0.559 \end{array}$	$\begin{array}{r} 0.89 \\ \times 0.34 \\ \hline 356 \\ 2670 \\ \hline 0.3026 \end{array}$	$\begin{array}{r} 0.31 \\ \times 0.93 \\ \hline 93 \\ 2790 \\ \hline 0.2883 \end{array}$	$\begin{array}{r} 8.1 \\ \times 16 \\ \hline 486 \\ 810 \\ \hline 129.6 \end{array}$	$\begin{array}{r} 13 \\ \times 0.76 \\ \hline 78 \\ 910 \\ \hline 9.88 \end{array}$

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2. Calculate the answers to the following divisions without a calculator:

Remember what happens to the decimal point when we divide by 10, 100 and 1000.

a) $0.8 \div 10 =$

b) $0.25 \div 100 =$

c) $1.34 \div 1000 =$

d) $10 \div 0.5 =$

e) $5 \div 0.25 =$

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3. Calculate the answers to the following multiplications and divisions without a calculator:

Remember, when multiplying with decimals, there will be the same number of decimal places in the answer as there was in the question.

Remember, when dividing with decimals, multiply both decimals by 10 or 100 to make them easier whole numbers to work with.

- a) $0.2 \times 0.8 =$
- b) $0.3 \times 0.8 =$
- c) $1.5 \times 0.5 =$
- d) $1.5 \div 0.5 =$
- e) $2.2 \div 0.2 =$
- f) $40 \div 0.4 =$