

Lesson 5 – Multiplying by Powers of 10

Starter

Put these decimals in order from smallest to biggest:

- 1) 0.5, 0.42, 0.8, 0.072
- 2) 0.4, 0.042, 0.42, 0.402, 0.422

Starter Answers

- 1) 0.072, 0.42, 0.5, 0.8
- 2) 0.042, 0.4, 0.402, 0.42, 0.422

Multiplying by Powers of 10

Every column is **ten times greater** than the one before it.

$\times 10$	$\times 10$	$\times 10$	$\times 10$	$\times 10$	$\times 10$	$\times 10$	$\times 10$	$\times 10$	$\times 10$	$\times 10$	$\times 10$	$\times 10$
100,000	10,000	1,000	100	10	1	●	0.1	0.01	0.001	0.0001	0.00001	
Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones	●	tenths	hundredths	thousandths	ten-thousandths	hundred-thousandths	

Therefore, when we multiply a number by **10**, all of digits in the number move **one** column to the left.

When we multiply by **100**, the digits move **two** columns to the left.

When we multiply by **1000** all the digits move **three** columns to the left.

Example 1

1) $5.6 \times 10 = 56$

Th	H	T	U	●	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$	$\frac{1}{10000}$
		5	6	●				
				●				

Move the digits once place left

2) $0.45 \times 100 = 45$

Th	H	T	U	●	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$	$\frac{1}{10000}$
		4	5	●				
				●				

Move the digits two places left

3) $3.42 \times 1000 = 3420$

Th	H	T	U	●	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$	$\frac{1}{10000}$
			3	●				
				●				
				●				

Move the digits three places left

Your go

- 1) $0.03 \times 10 =$
- 2) $0.056 \times 100 =$
- 3) $34.2 \times 1000 =$
- 4) $0.00006 \times 10000 =$
- 5) $5.67 \times \underline{\quad} = 56.7$
- 6) $0.054 \times \underline{\quad} = 54$

Answers

- 1) 0.3 2) 5.6 3) 34200 4) 0.6 5) 10 6) 1000

Multiplying by 0.1, 0.01, 0.001

Have a look at the calculations below. Can you spot a pattern?

$$\begin{array}{rcl} 64 \times 1000 & = & 64000 \\ 64 \times 100 & = & 6400 \\ 64 \times 10 & = & 640 \\ 64 \times 1 & = & 64 \\ 64 \times 0.1 & = & ? \\ 64 \times 0.01 & = & ? \end{array}$$

What do you think the answer is to the last two calculations?

The amount we are multiplying by is getting ten times smaller each time, so the answer is also getting ten times smaller each time.

So, $64 \times 0.1 = 6.4$ and $64 \times 0.01 = 0.64$

Example 2

1) $67 \times 0.1 =$

$$67 \times 1 = 67$$

$$67 \times 0.1 = 6.7$$

2) $650 \times 0.1 =$

$$650 \times 1 = 650$$

$$650 \times 0.1 = 65$$

3) $271 \times 0.01 =$

$$271 \times 1 = 271$$

$$271 \times 0.1 = 27.1$$

$$271 \times 0.01 = 2.71$$

4) $23 \times 0.001 =$

$$23 \times 1 = 23$$

$$23 \times 0.1 = 2.3$$

$$23 \times 0.01 = 0.23$$

$$23 \times 0.001 = 0.023$$

NOTE: Notice how multiplying by something less than 1 makes the number **smaller**.