

Multiplying & Dividing Decimals by 10, 100, 1000

Overview

The ability to multiply numbers which include decimals by powers of 10 (10, 100, 1000 etc.) is important for estimating calculations and for converting metric measurements.

This activity takes a 'sensible number' approach, focusing on the leading digit (front number) to do these calculations. This extends the logic and methods for multiplying and dividing whole numbers by powers of 10, rather than introducing new rules about shifting the decimal point backwards and forwards.

Skills and Knowledge

- Multiplying decimal numbers by 10, 100, 1000
- Dividing decimal numbers by 10, 100, 1000

Preparation and Materials

- Photocopy Practice Sheets 1, 2 & 3 (1 per student)
- Calculators (1 per pair or small group of students)

Suggested Procedure

Multiplying by 10, 100, 1000

Start with a simple, whole number, for example 3, and revise with students what happen when it is multiplied by numbers like 10, 100, 1,000 etc.

$$3 \times 10 = 30$$

$$3 \times 100 = 300$$

$$3 \times 1000 = 3000$$

Now look at another number which has a decimal part e.g. 3.25. Write it on the board and ensure that students remember that it is just a bit more than 3.

For example, ask:

- *What the nearest whole number to this?*

Or

- *How you would approximate or estimate this as a whole number. Is it closest to 2, 3, 4 or...?*



You may like to explain that we call this the 'leading digit' or just refer to it as the number in the front. This depends on your students.

If the 3 is multiplied by 10 then we expect it to become 30.

This number 3.25 is a bit more than 3 so if we multiply it by 10, then we would expect it to be just a bit more than 30.

If it is multiplied by 100 we would expect to get a bit more than 300 and so on.

So	3.25×10	=	32.5	–	the 3 will become 30
	3.25×100	=	325	–	the 3 will become 300
	3.25×1000	=	3,250	–	the 3 will become 3,000

If these numbers are lined up you can see the leading digit (number in front) moving one step at a time to become bigger and bigger. The number of steps it moves depends on the number of zeros in the number it is multiplied by.

3.25	
32.5	3.25×10
325.	3.25×100
3250.	3.25×1000

← **Leading digit moving to get bigger**

This approach focuses on the number getting bigger rather than the decimal point 'moving'.

Students can experiment with calculators by multiplying any decimal number successively by 10 and writing the numbers underneath each other to see the leading digit getting bigger by a multiple of 10 each time. They can also be encouraged to predict the result before using the calculator.

Dividing by 10, 100, 1000

The opposite is true of division by 10, 100, 1000.

This time we expect the leading digit to move to smaller place value positions. For example, use students' knowledge of dividing whole numbers to look at the following pattern.

A single digit example will make it simpler for students as the first illustration. For the last two numbers, which are no longer familiar whole numbers, they should be encouraged to predict and then check with a calculator.

It is also important to stress that the digits stay in the same relative position in all of the results. The 2 remains directly after the 3, and the 5 is still straight after the 2. In other words, 3.2 multiplied by 10 becomes 32, not 30.2 as some learners are tempted to write.



$$\begin{aligned}
7000 \div 10 &= 700 \\
7000 \div 100 &= 70 \\
7000 \div 1,000 &= 7. \\
7000 \div 10,000 &= .7 \\
7000 \div 100,000 &= .07
\end{aligned}$$

Leading digit moving → to get smaller

Students could then use calculators to see what happens when a number with more digits is divided by successive powers of 10.

Again, encouraging students to predict the result before checking on the calculator is valuable.

This time the leading digit moves into smaller place value positions depending on the number of zeros in the number it is divided by (one step for each zero).

$$\begin{aligned}
7200 \div 10 &= 720 \\
7200 \div 100 &= 72 \\
7200 \div 1,000 &= 7.2 \\
7200 \div 10,000 &= .72 \\
7200 \div 100,000 &= .072
\end{aligned}$$

Leading digit moving → to get smaller
2nd digit moves with leading digit

Using the place value chart.

This series of calculations can also be demonstrated using the Place Value Chart (See '*Exploring Decimals and Tenths 2*' and '*Exploring Decimals and Hundredths*') For example:

1,000	100	10	1	.	$\frac{1}{10}$	$\frac{1}{100}$
			3	.	2	5
		3	2	.	5	
	3	2	5	.		
3	2	5	0	.		

← Leading digit moving to get bigger

Practice Sheets 1, 2 & 3 allow students to apply these skills in everyday situations.



Multiplying & dividing decimals by 10, 100, 1000

Practice Sheet 1 (page 1)

SUPER OFFICE SUPPLIES PRICE LIST



\$1.36 each

Calculator
\$21.98 each



Scissors
\$2.19 each

Mini Staplers
\$3.73 each



Paper clips
\$6.14 pkt of 100

Pencil sharpener

\$1.17



Coloured Pencils



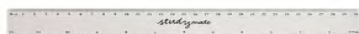
\$7.98 pkt of 10



Ballpoint pens
\$2.17 pkt of 10.

Rulers

\$0.88 each



Stapler \$14.11 each



Multiplying & dividing decimals by 10, 100, 1000

Practice Sheet 1 (page 2)

Maya and Serena go shopping at Super Office Supplies.

Maya shops for her office. She buys 10 of everything.

Serena buys for a school. She buys 100 of each.

Without using a calculator fill in the spaces in their dockets.

Maya	
Exercise book	\$ _____
10 @ \$1.36	_____
[10 x 1.36]	
Calculator	
10 @ _____	_____
Pencil sharpeners	
10 @ _____	_____
Ballpoint pens	
10 pkts @ _____	_____
Staplers	
10 @ _____	_____
Paper clips	
10 pkts @ _____	_____

Serena	
Exercise book	\$ _____
100 @ _____	_____
Scissors	
100 @ _____	_____
Pencil sharpeners	
100 @ _____	_____
Rulers	
100 @ _____	_____
Coloured pencils	
100 pkts @ _____	_____
Calculators	
100 @ _____	_____



Multiplying & dividing decimals by 10, 100, 1000 Practice Sheet 2

1. Lunch for ten people cost \$153.60
How much each? _____
2. 10 people share a \$978.90 prize.
Each person gets: _____
3. Pizzas for 100 people cost \$645.
How much each? _____
4. A school trip for 100 children cost \$1450.



How much each? _____

5. Ball point pens cost \$2.17 a packet of 10.
Each pen costs: _____
6. A packet of 100 sweets costs \$7.30
How much per sweet? _____
7. A box of 10 muffins cost \$20.90
How much each? _____
8. 100 metres of rope costs \$305.00
How much per metre? _____



Multiplying & dividing decimals by 10, 100, 1000 Practice Sheet 3

1. Do these without your calculator.

- | | |
|------------------------|-------------------------|
| a. 3.25×10 | b. $.270 \div 10$ |
| c. 0.2×10 | d. 27.6×1000 |
| e. 0.537×100 | f. $3196 \div 1000$ |
| g. 0.062×1000 | h. 12.01×100 |
| i. $5.09 \div 10$ | j. $0.0384 \div 10$ |
| k. $126 \div 100$ | l. 0.00057×100 |
| m. $22.5 \div 1000$ | n. 0.0032×1000 |

2. Katrina used 100 litres of petrol at 156.95 cents per litre.

- How much did it cost her?
- How much would it cost her if the price went up to 170.3 cents a litre?



3. 1 kilometre = 1000 metres.

How many kilometres in:

- 5280 metres?
- 11,056 metres?

4. 1 metre = 1000 millimetres.

A room measures 3427 mm by 4175 mm.

What is this in metres? _____ x _____

5. Judith supplies stationery to departments at a large company. She receives an order from Sales. How much should she bill them for?

ITEM	Quantity	Cost
Envelopes	1000	\$ 39.80
Manila folders (plain)	100	\$ 15.65
Manila folders (coloured)	10	\$ 9.95
A4 paper	1000 sheets	\$ 11.54
Shipping tags	100	\$ 2.90
Price tags	1000	\$ 19.95

Memo: Date: 26/11

To: Judith
From: Dianne
Subject: Stationery order

100 envelopes.
1000 plain manila folders
100 coloured manila folders
10,000 sheets paper
1000 shipping tags
10,000 price tags.

Thanks,
Di.

