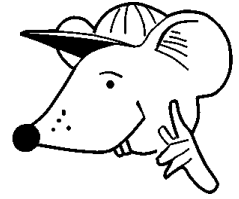


MATHEMATICS



N.S. Yr. 6 P.7

Multiply and divide by 10, 100 and 1 000.

Equipment

Paper, pencil, calculator

MathSphere

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Concepts

The Year 4 and Year 5 modules give more basic work involving the processes below, the Year 4 module going into most detail. Knowledge of these earlier modules is assumed in this module.

Multiplying by 10, 100 and 1000 are fundamental ideas in arithmetic. These ideas will eventually be used in work involving negative numbers, positive numbers, decimals and percentages, so it is very important to master them early on.

Never say 'to multiply by ten we *add a nought*'. This idea certainly works for whole numbers, but is totally false for decimals.

Eg. 3.98×10 is definitely not 3.980!

If children are taught to *add a nought* there will be a great deal of un-learning needed later on. Bad habits are very difficult to break.

The ideas to get across are as follows:

Multiplying.

When multiplying by 10 the number moves one place to the left.

When multiplying by 100 the number moves two places to the left. Etc.

Dividing.

When dividing by 10 the number moves one place to the right.

When dividing by 100 the number moves two places to the right. Etc.

These rules work for both whole numbers and decimals:

Eg.

Th	H	T	U		Th	H	T	U
	4	5	8	$\times 10 =$	4	5	8	0

← This zero is inserted to fill the space created when the number is moved to the left one place.

Eg.

Th	H	T	U	t	h		Th	H	T	U	t	h
	4	5	8	.	2 5	$\times 10 =$	4	5	8	2 . 5	0	

↪ This zero is optional, but by no means necessary.

In both examples, the numbers have moved one place to the left.

1. Look at a metre stick or a tape measure with centimetres on. Remind yourself how long a metre is. Can you pace a metre? How long is a room in metres? How long is a piece of the garden or playground in centimetres?

In this question you are going to look at things which are **approximately** 1m or 10m long etc. Do not worry if they are not exactly these lengths as long as you think they are roughly right.

Complete this table with the names of items around you.

	10 000 metres	
	1 000 metres	
	100 metres	
	10 metres	
Width of room door.	1 metre	
Length of an adult's finger.	0.1 metre	(10 cm)
Thickness of a pen.	0.01 metre	(1 cm)
	0.001 metre	(1 mm)

Now do the same with this table, but choose all your own items.

	10 000 metres
	1 000 metres
	100 metres
	10 metres
	1 metre
	0.1 metre
	0.01 metre
	0.001 metre

Write down some relationships between the items you have chosen.

Eg. *The width of the door is about ten times longer than the length of an adult's finger.*

Eg. *The width of the door is about one hundred times longer than the width of a pen.*

1. What happens to a number when it is:

- a) multiplied by 10
- b) multiplied by 100

- c) divided by 10
- d) divided by 100?

2. Multiply these numbers by 1 000 on your calculator:

- | | | |
|------------------------|-------------------------|------------------------|
| a) 23 x 1000 | b) 45.7 x 1000 | c) 0.936 x 1000 |
| d) 68.34 x 1000 | e) 0.0723 x 1000 | f) 23.9 x 1000 |

What can you say happens when you **multiply a number by 1000**?

3. Divide these numbers by 1 000 on your calculator:

- | | | |
|-------------------------|------------------------|------------------------|
| a) 24 000 ÷ 1000 | b) 9 825 ÷ 1000 | c) 831.1 ÷ 1000 |
| d) 29.4 ÷ 1000 | e) 17.8 ÷ 1000 | f) 555 ÷ 1000 |

What can you say happens when you **divide a number by 1000**?

4. How many £100 notes would you need to make £2 700?

How many £10 notes would you need?

How many £1 coins would you need?

How many 10p coins would you need?

How many 1p coins would you need?

5. How many £100 notes would you need to make £17 000?

How many £10 notes would you need?

How many £1 coins would you need?

How many 10p coins would you need?

How many 1p coins would you need?

6. How many £100 notes would you need to make £350 000?

How many £10 notes would you need?

How many £1 coins would you need?

How many 10p coins would you need?

How many 1p coins would you need?



Divvy wants to multiply 3.87 by 10 **three times**. He does it like this:

$$3.87 \times 10 = 38.7$$

$$38.7 \times 10 = 387$$

$$387 \times 10 = 3870$$



Multy thinks he knows a short cut.

$$3.87 \times 1000 = 3870$$

What rule did Multy know that Divvy did not use?

Work these out on your calculator using **Multy's shortcut rule**.

1. $4.98 \times 10 \times 10 \times 10$

3. $2.4 \times 10 \times 10 \times 10$

5. $27.82 \times 10 \times 10 \times 10$

7. $0.009 \times 10 \times 10 \times 10$

9. $4.5 \times 10 \times 10 \times 10$

2. $5.267 \times 10 \times 10 \times 10$

4. $0.679 \times 10 \times 10 \times 10$

6. $0.098 \times 10 \times 10 \times 10$

8. $20.002 \times 10 \times 10 \times 10$

10. $0.42 \times 10 \times 10 \times 10$

What do you think Multy's rule for dividing by 10 three times is?

Work these out on your calculator using Multy's shortcut rule for division.

11. $34\,000 \div 10 \div 10 \div 10$

13. $48.9 \div 10 \div 10 \div 10$

15. $19.35 \div 10 \div 10 \div 10$

17. $8000 \div 10 \div 10 \div 10$

19. $753.9 \div 10 \div 10 \div 10$

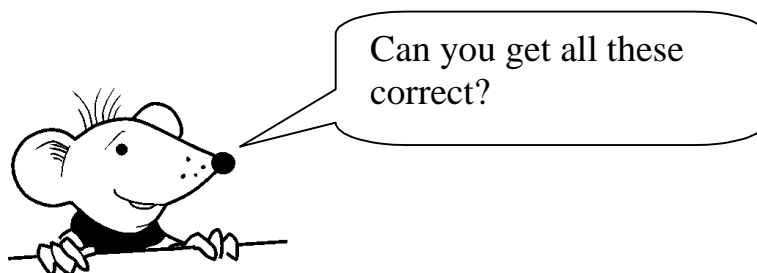
12. $55.9 \div 10 \div 10 \div 10$

14. $8.83 \div 10 \div 10 \div 10$

16. $19\,299 \div 10 \div 10 \div 10$

18. $4532.3 \div 10 \div 10 \div 10$

20. $5 \div 10 \div 10 \div 10$



1. How many times **larger** is 63 000 than 63 ?
2. How many times **larger** is 294 than 2.94 ?
3. How many times **larger** is 38 000 than 38 ?
4. How many times **larger** is 89.6 than 8.96 ?
5. How many times **larger** is 89.6 than 0.0896 ?
6. How many times **larger** is 1212 than 12.12 ?
7. How many times **larger** is 9 000 than 9 ?
8. How many times **larger** is 3 009 than 30.09 ?
9. How many times **larger** is 3.453 than 0.03453 ?
10. How many times **larger** is 9034 than 9.034 ?

11. How many times **smaller** is 8.7 than 870 ?
12. How many times **smaller** is 8.34 than 8340 ?
13. How many times **smaller** is 0.1 than 10 ?
14. How many times **smaller** is 9.6 than 9 600 ?
15. How many times **smaller** is 4.188 than 418.8 ?
16. How many times **smaller** is 8 than 0.008 ?
17. How many times **smaller** is 5.6 than 560 ?
18. How many times **smaller** is 650.3 than 65 030 ?
19. How many times **smaller** is 19 than 190 ?
20. How many times **smaller** is 45 than 45 000 ?

21. A team of six people make 56 televisions in a day. How much longer would it take them to make 56 000 televisions at the same rate?

22. Apple pickers can pick 50Kg of apples in one hour. How many hours would it take them to pick 50 tonnes of apples?
(One tonne = 1000 Kg.)



How are you doing, guys?

1. Plants cost 36p each. They are put in **boxes** of 10.
Ten **boxes** are put into a **crate** and ten **crates** are put onto a **lorry**.
How much are the plants on the lorry worth in pence?
How much is this in pounds?
How much would the plants on ten lorries like this be worth?
2. A **box** of drawing pins costs 56p.
The **boxes** are put into **packs** of 10.
Ten **packs** are put into a **container**.
How much does each **container** cost in pence?
How much is this in pounds?
How much would ten containers cost?
How much would a hundred containers cost?
How much would a thousand containers cost?
3. Crash helmets cost £23 each. They are put in **boxes** of 10.
How much does a **box** cost?
How much do ten boxes cost?
A hundred boxes are put into a van.
How much are the crash helmets in a van worth?
4. A train carriage holds a hundred tonnes of coal.
The coal in a carriage is worth £2 500.
How much is this per tonne?
5. One thousand football fans paid altogether £12 000 to watch a match.
How much did each fan pay?
How much did ten fans pay altogether?
How much did a hundred fans pay?



And to finish off.....!

1. Story books cost 75p each. They are put in **boxes** of 10.
Ten **boxes** are put into a **crate** and ten **crates** are put onto a **lorry**.
How much are the books on the lorry worth in pence?
How much is this in pounds?
How much would the books on ten lorries like this be worth?
2. A **box** of paper clips costs 38p.
The **boxes** are put into **packs** of 10.
Ten **packs** are put into a **container**.
How much does each **container** cost in pence?
How much is this in pounds?
How much would ten containers cost?
How much would a hundred containers cost?
How much would a thousand containers cost?
3. Hockey boots cost £27 a pair.
They are put in **boxes** of 10 pairs per box.
How much does a **box** cost?
How much do ten boxes cost?
A hundred boxes are put into a van.
How much are the hockey boots in a van worth?
4. A milk lorry holds a thousand litres of milk.
The milk in a lorry is worth £320.
How much is this per litre?
5. One thousand netball fans paid altogether £7 000 to watch a match.
How much did each fan pay?
How much did ten fans pay altogether?
How much did a hundred fans pay?

Answers

Page 3

1. Any items with approximately the right dimensions are acceptable e.g. length of corridor, distance to town.

With the relationship section, try to encourage a whole variety of combinations eg How many coins would make a pile as high as the block of flats?

Page 4

1. a) The number moves one place to the left.
b) The number moves two places to the left.
c) The number moves one place to the right.
d) The number moves two places to the right.
2. a) 23 000 b) 45 700 c) 936 d) 68 340 e) 72.3 f) 23 900
The number moves three places to the left.
3. a) 24 b) 9.825 c) 0.8311 d) 0.0294 e) 0.0178 f) 0.555
The number moves three places to the right.
4. 27, 270, 2 700, 27 000, 270 000
5. 170, 1 700, 17 000, 170 000, 1 700 000
6. 3 500, 35 000, 350 000, 3 500 000, 35 000 000

Page 5

Multy knows that you can move the figures three places in one go.

1. 4 980 2. 5 267 3. 2 400 4. 679 5. 27 820
 6. 98 7. 9 8. 20 002 9. 4 500 10. 420
- Instead of dividing by ten three times, simply divide by 1 000
11. 34 12. 0.0559 13. 0.0489 14. 0.00883 15. 0.01935
 16. 19.299 17. 8 18. 4.5323 19. 0.7539 20. 0.005

Page 6

1. 1 000 2. 100 3. 1 000 4. 10 5. 1 000
6. 100 7. 1 000 8. 100 9. 100 10. 1 000
11. 100 12. 1 000 13. 100 14. 1 000 15. 100
16. 1 000 17. 100 18. 100 19. 10 20. 1 000
21. 1 000 times longer. 22. 1 000 hours

Page 7

1. 36 000p, £360, £3 600
2. 5 600p, £56, £560, £5 600, £56 000
3. £230, £2 300, £23 000 4. £25 5. £12, £120, £1 200

Page 8

1. 75 000p, £750, £7 500
2. 38 000p, £380, £3 800, £38 000, £380 000
3. £270, £2 700, £27 000 4. 32p or £0.32 5. £7, £70, £700