# MATHEMATICS
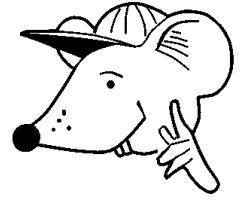
## N.S. Yr. 5   P.7

**Multiply and divide by 10, 100 and 1 000.**

# Equipment

Paper, pencil, calculator

# MathSphere

# <u>Concepts</u>

*The Year 4 module in this topic gives more basic work involving the processes below, knowledge of which is assumed in this module.*
*In this module work also involves decimals.*

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.

**<u>Never</u> 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 x 10 is definitely <u>not</u> 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 <u>one place to the left.</u>*
*When multiplying by 100 the number moves <u>two places to the left.</u>   Etc.*

**Dividing.**
*When dividing by 10 the number moves <u>one place to the right.</u>*
*When dividing by 100 the number <u>moves two places to the right.</u>  Etc.*

These rules work for both whole numbers and decimals:

**Eg.     Th   H   T   U              Th   H   T   U**
**              4     5     8  x 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  x 10   =      4     5     8     2 . 5     0**
                                                                   **This zero is optional,**
                                                                   **<u>but by no means</u>**
                                                                   **<u>necessary.</u>**
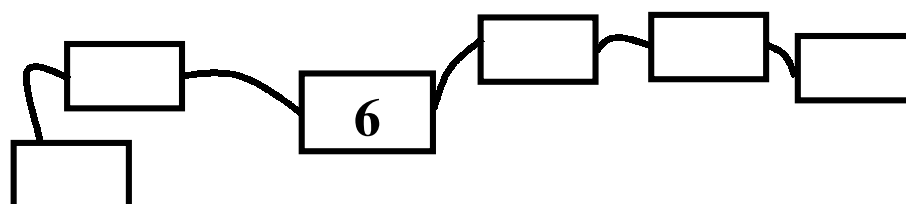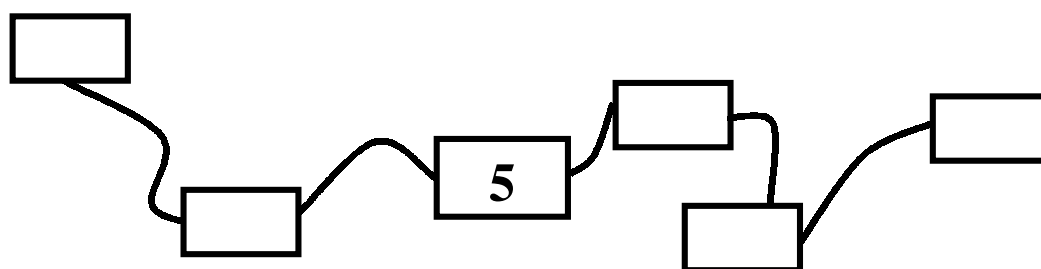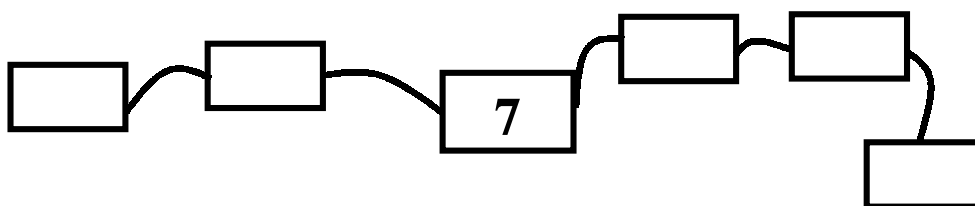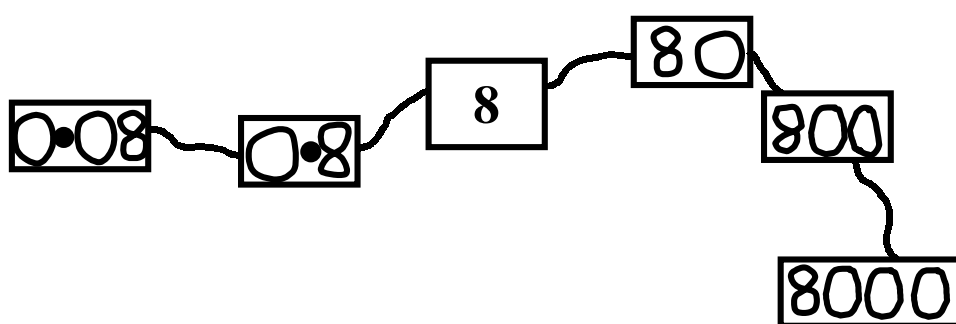
Use a calculator to work out these sums:

**1.** 12  x  10        **2.** 45.7  x  10        **3.** 84.98  x  10        **4.** 34  x  100
**5.** 15 ÷ 10        **6.** 68.9 ÷ 10        **7.** 49.3 ÷ 100        **8.** 75 ÷ 100

Make chains of numbers on these cards by **multiplying by 10** going in one direction and **dividing by 10** going in the other direction. The first one has been done for you.

Multiply each number in the
tables by 10 going down
and divide by 10 going up.

Some of the first one has been
done for you.

| | |
|---|---|
| 0.3 | Nought point three |
| 3 | Three |
| 30 | Thirty |
| 300 | Three hundred |
| | Three thousand |
| | |
| | |

Describe this pattern.

| | |
|---|---|
| | |
| | |
| 2 | Two |
| | |
| | |
| | |
| | |
| | |

Describe this pattern.

**1.** Use a calculator to complete this table by multiplying and dividing by 10 and 100.

| N ÷ 100 | N ÷ 10 | N | N x 10 | N x 100 |
|---|---|---|---|---|
| | | 12 | | |
| | | 4.6 | | |
| | | 150 | | |
| | | 34.8 | | |
| | | 17 | | |
| | | 0.7 | | |
| | | 0.23 | | |
| | | 9.34 | | |
| | | 27.4 | | |

**2.** Describe what happens when:

a)  a number is multiplied by 10
b)  a number is multiplied by 100
c)  a number is divided by 10
d)  a number is divided by 100

**3.** In this table fill in the missing numbers.

| N ÷ 100 | N ÷ 10 | N | N x 10 | N x 100 |
|---|---|---|---|---|
| | | | 150 | |
| | | | | 2300 |
| | 8 | | | |
| 0.09 | | | | |
| | | | 47.6 | |
| | | | | 3600 |
| | 0.78 | | | |
| 2.34 | | | | |
| | | | 9 | |

Divvy wants to multiply 2.4 by 10 **twice**. He does it like this:

$$2.4 \ x \ 10 \ = \ 24$$

$$24 \ x \ 10 \ = \ 240$$

Multy thinks he knows a short cut.

$$2.4 \ x \ 100 \ = \ 240$$

**What rule did Multy know that Divvy did not use?**

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

**1.** 5.7  x  10  x  10     **2.** 3.2  x  10  x  10     **3.** 25  x  10  x  10
**4.** 0.8  x  10  x  10     **5.** 6.78  x  10  x  10     **6.** 45.9  x  10  x  10
**7.** 0.1  x  10  x  10     **8.** 23.7  x  10  x  10     **9.** 89.6  x  10  x  10
**10.** 4.8  x  10  x  10

Multy has a similar rule for **dividing** by 10 and by 10 again.

**What do you think Multy's rule for dividing by 10 and by 10 again is?**

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

**11.**  3800 ÷ 10 ÷ 10     **12.**  4500 ÷ 10 ÷ 10     **13.** 76.9 ÷ 10 ÷ 10
**14.**  9 ÷ 10 ÷ 10     **15.**  230 ÷ 10 ÷ 10     **16.** 53.8 ÷ 10 ÷ 10
**17.**  100 ÷ 10 ÷ 10     **18.**  200 ÷ 10 ÷ 10     **19.** 450 ÷ 10 ÷ 10
**20.**  4.7 ÷ 10 ÷ 10

Can you get all these correct?
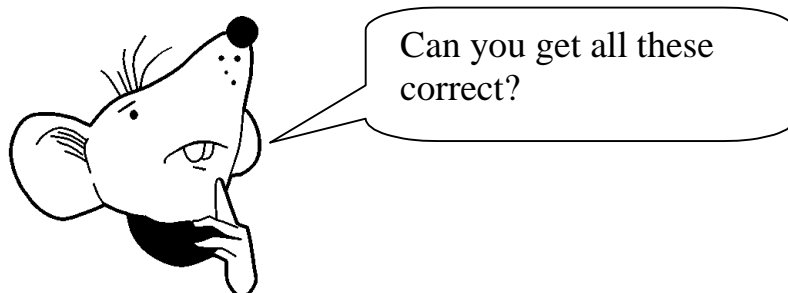
1. How many times **larger** is 230 than 23 ?
2. How many times **larger** is 45 than 4.5 ?
3. How many times **larger** is 3700 than 37 ?
4. How many times **larger** is 23.4 than 2.34 ?
5. How many times **larger** is 900 than 9 ?
6. How many times **larger** is 2340 than 23. 4 ?
7. How many times **larger** is 100 than 1 ?
8. How many times **larger** is 300 than 30 ?
9. How many times **larger** is 693.8 than 6.938 ?
10. How many times **larger** is 0.7 than 0.07 ?

11. How many times **smaller** is 4 than 400 ?
12. How many times **smaller** is 45 than 4500 ?
13. How many times **smaller** is 2.5 than 25 ?
14. How many times **smaller** is 6 than 600 ?
15. How many times **smaller** is 23.4 than 234 ?
16. How many times **smaller** is 9.98 than 998 ?
17. How many times **smaller** is 3 than 300 ?
18. How many times **smaller** is 3.5 than 35 ?
19. How many times **smaller** is 3.5 than 350 ?
20. How many times **smaller** is 22 than 220 ?

21. Thirty people build a house. How much longer would the house take to build if only three people worked on it?

22. Twenty three people pack oranges into boxes. How much quicker would be if two hundred and thirty people packed the oranges?

Can you get all these correct?
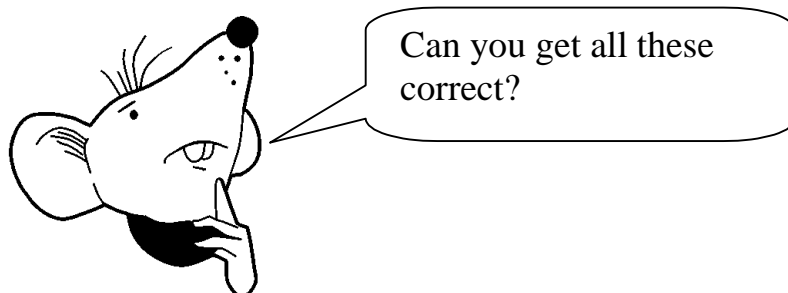
1. How many times **larger** is  450  than  45 ?
2. How many times **larger** is  29  than  2.9 ?
3. How many times **larger** is  5500  than  55 ?
4. How many times **larger** is  65.2  than  6.52 ?
5. How many times **larger** is  300  than  3 ?
6. How many times **larger** is  4920  than  49.2 ?
7. How many times **larger** is  700 than  7 ?
8. How many times **larger** is  200 than  20 ?
9. How many times **larger** is  183.2  than  1.832 ?
10. How many times **larger** is  0.4  than  0.04 ?


11. How many times **smaller** is  9  than  900 ?
12. How many times **smaller** is  26  than  2600 ?
13. How many times **smaller** is  4.6  than  46 ?
14. How many times **smaller** is  3  than  300 ?
15. How many times **smaller** is  31.1  than  311 ?
16. How many times **smaller** is  8.43  than  843 ?
17. How many times **smaller** is  6 than  600 ?
18. How many times **smaller** is  9.4 than  94 ?
19. How many times **smaller** is  2.2  than  220 ?
20. How many times **smaller** is  86  than  860 ?

21. Fifty people make a car. How much longer would the car take to build if only five people worked on it?

22. Thirty seven people plant apple trees in a large orchard. How much quicker would it be if three hundred and seventy people planted the trees?

What a lot of work!
Good exercise for the brain,
though.

1. Pencils cost 16p each.  They are put in **packs** of  10.
   How much does each **pack** cost in pence?
   How much is this in pounds?

2. Rubbers cost 21p each.  They are put in **packs** of  10.
   These **packs** are put in **boxes** of 10 **packs**.
   How much does each **box** cost in pence?
   How much is this in pounds?

3. Computer discs cost 23p each. They are put in **boxes** of 100.
   How much does a **box** cost in pence?
   What is this in pounds?

4. A container holds 100 oranges.  A container costs £23.
   How many pence is this?
   How much does each orange cost?

5. Cassette tapes are sold in packs of 10.
   Ten packs are put into one box.
   One box costs £135.
   How many pennies is this?
   How much does one cassette tape cost?

6. How many £10 notes would you need to make £240 ?
   How many £1 coins?
   How many 10p coins?
   How many 1p coins?

7. How many £10 notes would you need to make £990 ?
   How many £1 coins?
   How many 10p coins?
   How many 1p coins?

And to finish off.....!

1. Crayons cost 19p each.  They are put in **packs** of  10.
   How much does each **pack** cost in pence?
   How much is this in pounds?

2. Rulers cost 33p each.  They are put in **packs** of  10.
   These **packs** are put in **boxes** of 10 **packs**.
   How much does each **box** cost in pence?
   How much is this in pounds?

3. Toy dolls cost 56p each. They are put in **boxes** of 100.
   How much does a **box** cost in pence?
   What is this in pounds?

4. A container holds 100 castle guides.  A container costs £37.
   How many pence is this?
   How much does each castle guide cost?

5. Door handles are sold in packs of 10.
   Ten packs are put into one box.
   One box costs £274.
   How many pennies is this?
   How much does one door handle cost?

6. How many £10 notes would you need to make £580 ?
   How many £1 coins?
   How many 10p coins?
   How many 1p coins?

7. How many £10 notes would you need to make £470 ?
   How many £1 coins?
   How many 10p coins?
   How many 1p coins?

# Answers

| Page 3 |
| --- |

**1.** 120   **2.** 457   **3.** 849.8   **4.** 3400   **5.** 1.5   **6.** 6.89   **7.** 0.493   **8.** 0.75

0.07 ⟸ 0.7 ⟸ **7** ⟹ 70 ⟹ 700 ⟹ 7000

0.05 ⟸ 0.5 ⟸ **5** ⟹ 50 ⟹ 500 ⟹ 5000

0.06 ⟸ 0.6 ⟸ **6** ⟹ 60 ⟹ 600 ⟹ 6000

| Page 4 |
| --- |

| | | | |
| --- | --- | --- | --- |
| 0.03 | Nought point nought three | 0.02 | Nought point nought two |
| 0.3 | Nought point three | 0.2 | Nought point two |
| 3 | Three | 2 | Two |
| 30 | Thirty | 20 | Twenty |
| 300 | Three hundred | 200 | Two hundred |
| 3 000 | Three thousand | 2 000 | Two thousand |
| 30 000 | Thirty thousand | 20 000 | Twenty thousand |
| 300 000 | Three hundred thousand | 200 000 | Two hundred thousand |

In the pattern descriptions, the point should be made that the **numbers move left one place** every time **a multiplication by 10** occurs and **right one place** for a **division by 10.**

| Page 5 |
| --- |

**1.**

| | | | | |
| --- | --- | --- | --- | --- |
| 0.12 | 1.2 | **12** | 120 | 1200 |
| 0.046 | 0.46 | **4.6** | 46 | 460 |
| 1.5 | 15 | **150** | 1500 | 15000 |
| 0.348 | 3.48 | **34.8** | 348 | 3480 |
| 0.17 | 1.7 | **17** | 170 | 1700 |
| 0.007 | 0.07 | **0.7** | 7 | 70 |
| 0.0023 | 0.023 | **0.23** | 2.3 | 23 |
| 0.0934 | 0.934 | **9.34** | 93.4 | 934 |
| 0.274 | 2.74 | **27.4** | 274 | 2740 |

**2.**   When a number is multiplied by 10 it moves one place to the left.
When a number is multiplied by 100 it moves two places to the left.
When a number is divided by 10 it moves one place to the right.
When a number is divided by 100 it moves two places to the right.

**3.**

| | | | | |
| --- | --- | --- | --- | --- |
| 0.15 | 1.5 | 15 | **150** | 1500 |
| 0.23 | 2.3 | 23 | 230 | **2300** |
| 0.8 | **8** | 80 | 800 | 8000 |
| **0.09** | 0.9 | 9 | 90 | 900 |
| 0.0476 | 0.476 | 4.76 | **47.6** | 476 |
| 0.36 | 3.6 | 36 | 360 | **3600** |
| 0.078 | **0.78** | 7.8 | 78 | 780 |
| **2.34** | 23.4 | 234 | 2340 | 23400 |
| 0.009 | 0.09 | 0.9 | **9** | 90 |

# Answers

**Page 6**

Multy's Rule for multiplying: Instead of multiplying by 10 and by 10 again, simply **multiply by 100.**

| | | | | |
|---|---|---|---|---|
| **1.** 570 | **2.** 320 | **3.** 2500 | **4.** 80 | **5.** 678 |
| **6.** 4590 | **7.** 10 | **8.** 2370 | **9.** 8960 | **10.** 480 |

Multy's Rule for dividing: Instead of dividing by 10 and by 10 again, simply **divide by 100.**

| | | | | |
|---|---|---|---|---|
| **11.** 38 | **12.** 45 | **13.** 0.769 | **14.** 0.09 | **15.** 2.3 |
| **16.** 0.538 | **17.** 1 | **18.** 2 | **19.** 4.5 | **20.** 0.047 |

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| | | | | |
|---|---|---|---|---|
| **1.** 10 | **2.** 10 | **3.** 100 | **4.** 10 | **5.** 100 |
| **6.** 100 | **7.** 100 | **8.** 10 | **9.** 100 | **10.** 10 |
| **11.** 100 | **12.** 100 | **13.** 10 | **14.** 100 | **15.** 10 |
| **16.** 100 | **17.** 100 | **18.** 10 | **19.** 100 | **20.** 10 |

**21.**  Ten times longer.          **22.**  Ten times quicker.

**Page 8**

| | | | | |
|---|---|---|---|---|
| **1.** 10 | **2.** 10 | **3.** 100 | **4.** 10 | **5.** 100 |
| **6.** 100 | **7.** 100 | **8.** 10 | **9.** 100 | **10.** 10 |
| **11.** 100 | **12.** 100 | **13.** 10 | **14.** 100 | **15.** 10 |
| **16.** 100 | **17.** 100 | **18.** 10 | **19.** 100 | **20.** 10 |

**21.**  Ten times longer.          **22.**  Ten times quicker.

**Page 9**

**1.**  160p     £1.60          **2.**  2 100p     £21.00
**3.**  2 300p     £23.00          **4.**  2 300p     23p
**5.**  13 500p     135p or £1.35
**6.**  24   240   2 400   24 000          **7.**  99          990          9 900          99 000

**Page 10**

**1.**  190p     £1.90          **2.**  3 300p     £33.00
**3.**  5 600p     £56.00          **4.**  3 700p     37p
**5.**  27 400p     274p or £2.74
**6.**  58   580   5 800   58 000          **7.**  47          470          4 700          47 000