Decimals, Percentages and Fractions

Understanding place value in 3-place decimals

Objectives

Day 1

Revise 2-place decimals.

Day 2

Introduce 3-place decimals.

Day 3

Multiply and divide by 10, 100 and 1000.

Decimals, Percentages and Fractions

Understanding place value in 3-place decimals

Starters

Day 1

Count in steps of 0.01 (pre-requisite skills)

Day 2

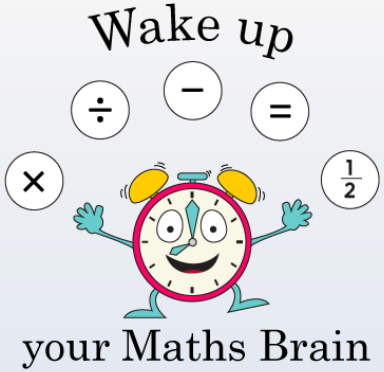
Count in steps of 0.001 (pre-requisite skills)

Day 3

Convert between m and cm (pre-requisite skills)

Decimals, Percentages and Fractions

Understanding place value in 3-place decimals

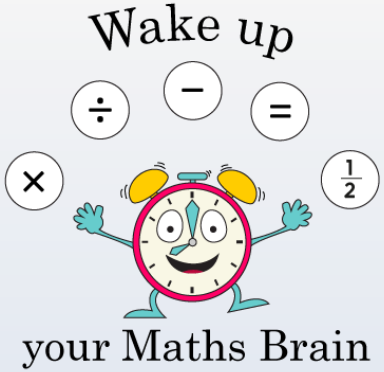


Starter

Count in steps of 0.01

Decimals, Percentages and Fractions

Understanding place value in 3-place decimals



Starter

Count in steps of 0.001

Decimals, Percentages and Fractions

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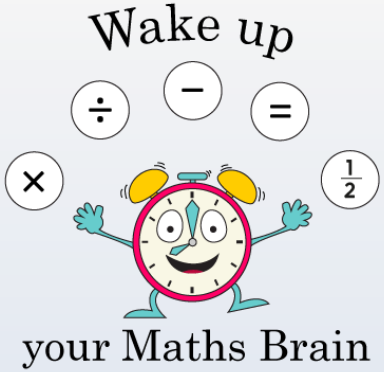

Starter

Convert between m and cm

Decimals, Percentages and Fractions

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Objectives

Day 1

Revise 2-place decimals.

Day 1: Revise 2-place decimals.

What does the first digit represent?

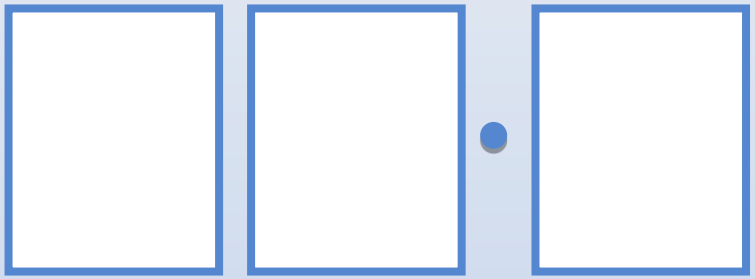
3.33

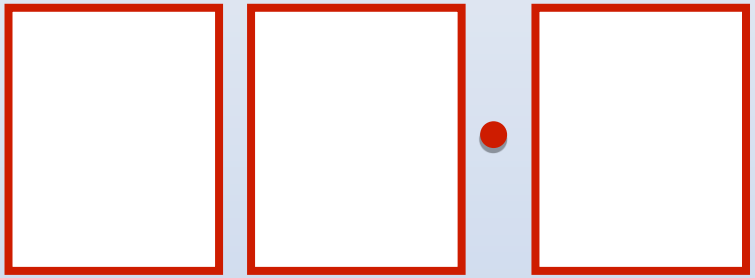
And the second digit?

And the third digit?

Let's write the number in a place value grid to check.

1s	$^1/_{10}$s (0.1s)	$^1/_{100}$s (0.01s)
3	3	3





Round each number to the nearest whole, then tenth.

Whole class investigation

- Work in pairs to find out how many numbers between 1 and 10, with one or two decimal places, contain a digit '9'.
- How can you be sure you have found them all?

Challenge! Do you think the answer will be the same for numbers that contain a zero?

Numbers with two decimal places

Sheet 1

Section A

Write > or < between each pair of numbers.

1. 3.64 3.46
2. 7.32 2.37
3. 43.21 7.89
4. 0.39 0.93

Section B

Write a number which belongs between each pair of numbers.

5. 7 and 8
6. 2.1 and 2.2
7. 4.9 and 5
8. 3.45 and 4.45
9. 6.35 and 6.45
10. 8 and 8.1

Section C

Round each number to the nearest whole number.

11. 6.78
12. 9.23
13. 8.49
14. 7.05
15. 4.58

Section D

Round each number to the nearest tenth.

16. 0.59
17. 0.32
18. 4.78
19. 3.26
20. 6.84
21. 2.96

Decimals, Percentages and Fractions

Understanding place value in 3-place decimals

Objectives

Day 2

Introduce 3-place decimals.

Day 2: Introduce 3-place decimals.

Which labels belong with each row in this place value chart?

0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009
0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
1	2	3	4	5	6	7	8	9
10	20	30	40	50	60	70	80	90
100	200	300	400	500	600	700	800	900
1000	2000	3000	4000	5000	6000	7000	8000	9000

thousands

hundredths

ones

tens

thousandths

tenths

hundreds

Day 2: Introduce 3-place decimals.

Which labels belong with each row in this place value chart?

We may not have come across this one before – why might we need to divide something into such a small amount?

0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	thousandths
0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	hundredths
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	tenths
1	2	3	4	5	6	7	8	9	ones
10	20	30	40	50	60	70	80	90	tens
100	200	300	400	500	600	700	800	900	hundreds
1000	2000	3000	4000	5000	6000	7000	8000	9000	thousands

What happens to the digit 5 on the place value chart, as each number is multiplied by 10?

What happens as each number is divided by 10?

1 millimetre is one thousandth of a metre!

Day 2: Introduce 3-place decimals.

25.895

I can make this number by pointing to five numbers on the place value chart. What is the biggest number I would point to?

And the next biggest? And then?

0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009
0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
1	2	3	4	5	6	7	8	9
10	20	30	40	50	60	70	80	90
100	200	300	400	500	600	700	800	900
1000	2000	3000	4000	5000	6000	7000	8000	9000

20 + 5 + 0.8 + 0.09 + 0.005

Day 2: Introduce 3-place decimals.

Record the total of the ringed numbers on your whiteboards.

0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009
0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
1	2	3	4	5	6	7	8	9
10	20	30	40	50	60	70	80	90
100	200	300	400	500	600	700	800	900
1000	2000	3000	4000	5000	6000	7000	8000	9000

351.637

Day 2: Introduce 3-place decimals.

Record the total of the ringed numbers on your whiteboards.

0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009
0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
1	2	3	4	5	6	7	8	9
10	20	30	40	50	60	70	80	90
100	200	300	400	500	600	700	800	900
1000	2000	3000	4000	5000	6000	7000	8000	9000

7351.637

Day 2: Introduce 3-place decimals.

Record the total of the ringed numbers on your whiteboards.

0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009
0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
1	2	3	4	5	6	7	8	9
10	20	30	40	50	60	70	80	90
100	200	300	400	500	600	700	800	900
1000	2000	3000	4000	5000	6000	7000	8000	9000

6350.249

Day 2: Introduce 3-place decimals.

Record the total of the ringed numbers on your whiteboards.

0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009
0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
1	2	3	4	5	6	7	8	
10	20	30	40	50	60	70	80	
100	200	300	400	500	600	700	800	900
1000	2000	3000	4000	5000	6000	7000	8000	9000

How do we show that there are no tenths?

8165.042

Day 2: Introduce 3-place decimals.

Record the total of the ringed numbers on your whiteboards.

0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009
0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
1	2	3	4	5	6	7	8	9
10	20	30	40	50	60	70	80	90
100	200	300	400	500	600	700	800	900
1000	2000	3000	4000	5000	6000	7000	8000	9000

307.003

Place Value

Sheet 1

Complete the following number sentences.

2.304 + 0.05 = ☐

2.37 + 0.002 = ☐

2.074 + 0.5 = ☐

23.78 + 0.009 = ☐

1.58 + 0.005 = ☐

2.305 + 0.02 = ☐

78.409 + ☐ = 78.429

3.075 + ☐ = 3.175

45.015 + ☐ = 45.215

☐ + 0.555 = 2.555

Make up your own number sentence to include the number 3.795.

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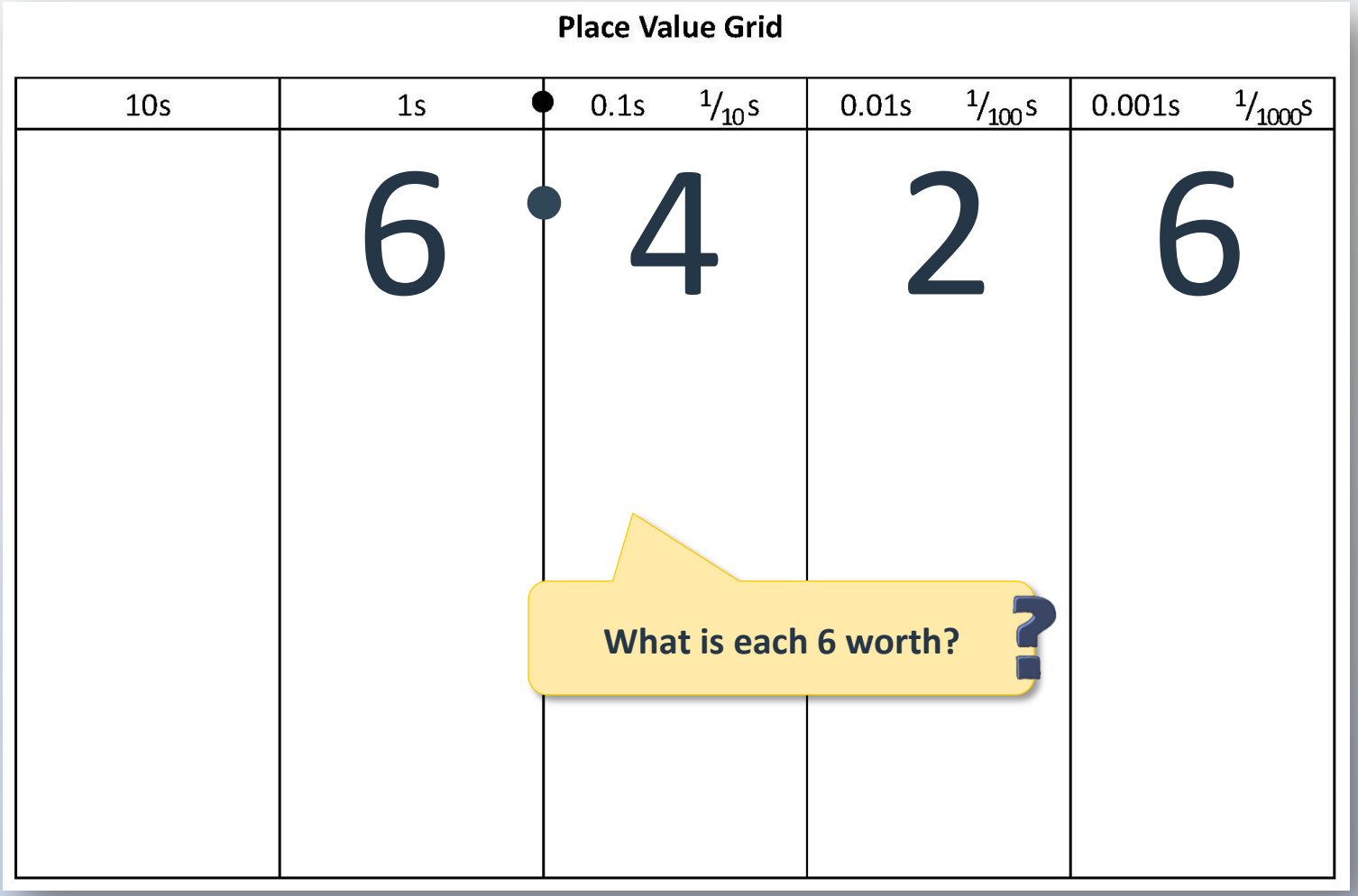
Objectives

Day 3

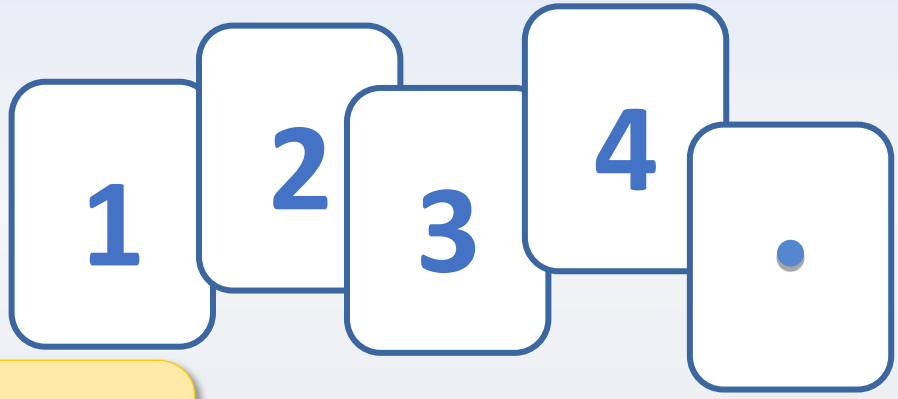
Multiply and divide by 10, 100 and 1000.

Day 3: Multiply and divide by 10, 100 and 1000.



Day 3: Multiply and divide by 10, 100 and 1000.

Stand on either side of the decimal point to show 1.234



Now multiply 1.234 by 10. Move to show the answer. The decimal point must NOT move!

Does everyone else agree with the answer?

What is the 4 worth now?

Now multiply by 10 again.

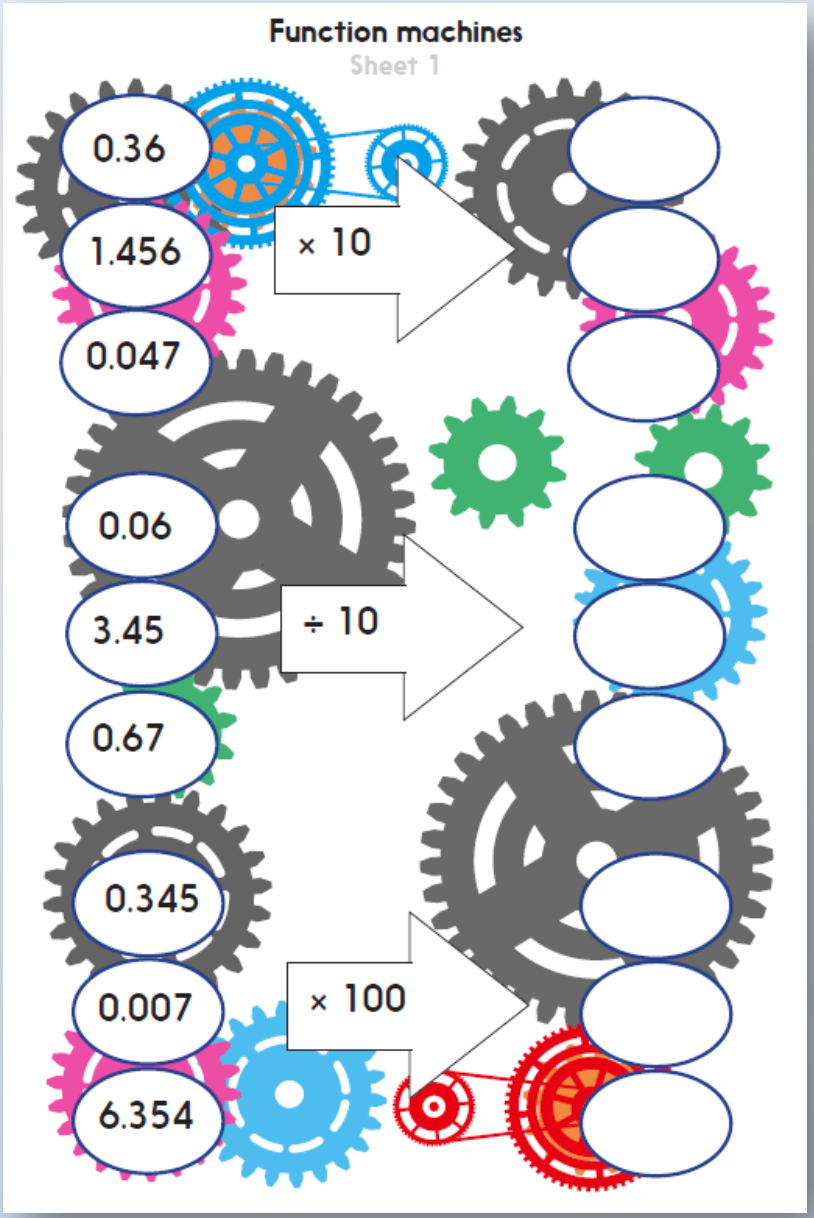
What is the 3 worth now?

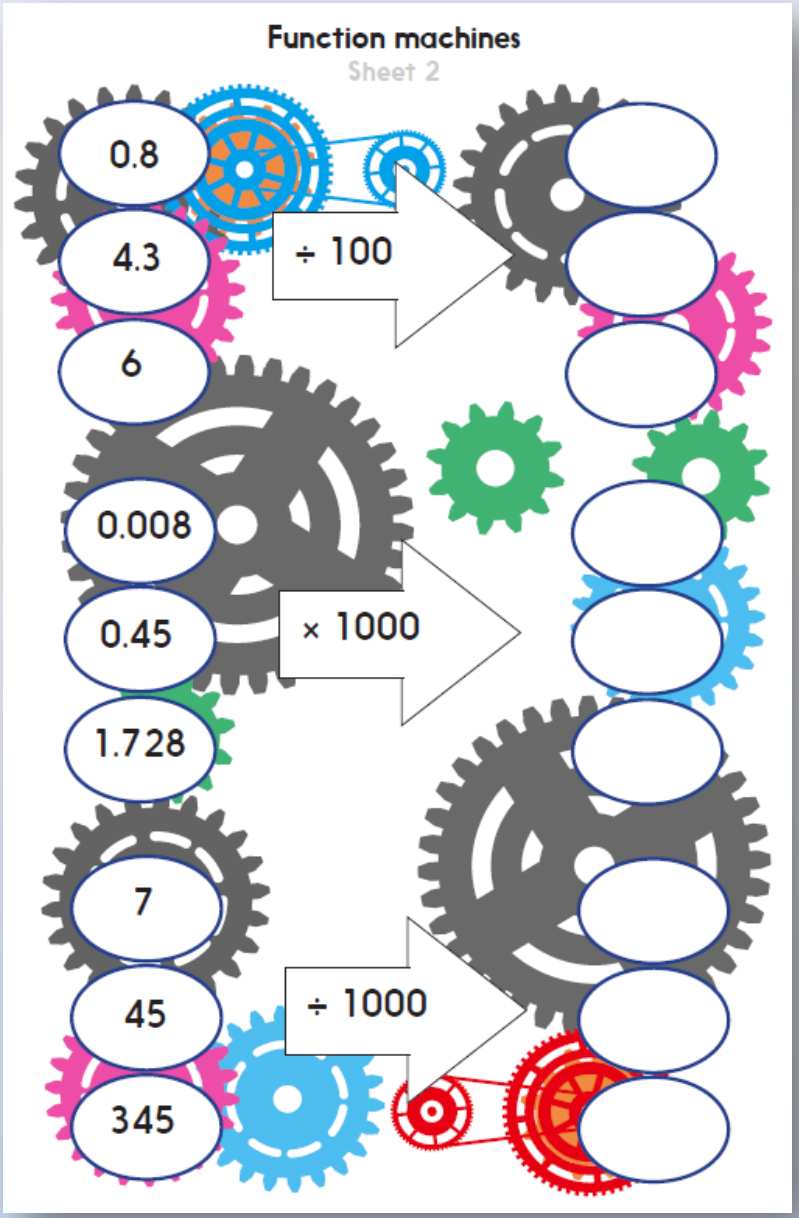
Now divide by 100.

Investigation

Use 'Greater Than or Less Than?' from NRICH: https://nrich.maths.org/10587

Use numbers and symbols to make a number sentence correct. How many different ways can you find?


Function machines
Sheet 1
0.36
1.456
0.047
× 10
0.06
3.45
0.67
÷ 10
0.345
0.007
6.354
× 100


Function machines
Sheet 2
0.8
4.3
6
÷ 100
0.008
0.45
1.728
× 1000
7
45
345
÷ 1000

Decimals, Percentages and Fractions

Understanding place value in 3-place decimals

Well Done! You've completed this unit.

Objectives

Day 1

Revise 2-place decimals.

Day 2

Introduce 3-place decimals.

Day 3

Multiply and divide by 10, 100 and 1000.

Problem solving and reasoning questions

Write the next numbers in each sequence.

41 4.1 ____ ____

0.009 0.09 ____ ____

20 2 ____ ____ ____

Divide 65 by 10 repeatedly until you get a number that is less than 0.1.

Write that number.

True or false?

- 4.3 ÷ 100 = 0.43
- 109 = 1.009 x 100
- 0.005 x 100 = 0.5
- 71 ÷ 1000 = 0.0071
- 164 = 0.164 x 1000
- 804 ÷ 1000 = 0.084

Problem solving and reasoning: Answers

Write the next numbers in each sequence.

41 4.1 0.41 0.041

0.009 0.09 0.9 9

20 2 0.2 0.02

Look for the children who do not appropriately multiply or divide by 10, often evidenced in including unnecessary zeroes, for example, 41, 4.1, 4.10, 4.100.

Divide 65 by 10 repeatedly until you get a number that is less than 0.1.

Write that number. 0.065 An answer of 0.65 suggests child has misread the question and given the first number found less than 1. 65 needs to divided by ten 3 times to get to 0.065

True or false?

- 4.3 ÷ 100 = 0.43 False, should be 0.043.
- 109 = 1.009 x 100 False, should be 109 = 1.09 x 100 **or** 1.009 x 100 = 100.9
- 0.005 x 100 = 0.5 True
- 71 ÷ 1000 = 0.0071 False, should be 71 ÷ 1000 = 0.071 **or** 71 ÷ 10,000 = 0.0071
- 164 = 0.164 x 1000 True
- 804 ÷ 1000 = 0.084 False, should be 804 ÷ 1000 = 0.804 **or** 84 ÷ 1000 = 0.084

Check children have actually carried out the calculation, moving the digits to the right or left the appropriate number of places.