CCYD NUMERACY BOOKLET

Table of Contents

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Read and write numbers of any size

There's some information missing from this **place value table**. See if you can fill in the blanks. The first two rows have been done for you.

Number written with **digits**	Th (Thousands)	H (Hundreds)	T (Tens)	U (Units)	Number written in **words**
709		7	0	9	Seven hundred and nine
1,624	1	6	2	4	One thousand six hundred and twenty four
					One hundred and twenty three
					Five hundred and seven
569		5	6	9	
					Seven thousand
	4	5	0	0	
		1	1	9	
					Six hundred and forty
4,004					
884					
					Nine thousand eight hundred and fifteen

Use the four operations and the connections between them
e.g. apply division as the inverse of multiplication

Addition

Example 1
- Add the units first.
- Add the tens.

```
  T U
  6 5
+ 2 4
-----
  8 9   ✓
```

Example 2

```
  H  T  U
  3  8  7
+    2  8
---------
  4  1  5
---------
  1  1
```

N.B: Writing place value headings (e.g. H T U) can help for children that are struggling.

Place value is especially important in decimals.

Example 3

4500 + 83.51 → 4 5 0 0.00   4 5 0 0

                83.51 + instead of   83.51 +   ✗

Practise questions:
https://corbettmaths.com/wp-content/uploads/2013/02/addition-pdf4.pdf

Subtraction

Example 1

```
  T  U
  9  6
-  2  4
———————
  7  2
```

Example 2

```
      6   1
  7   7̸   4
-     3   6
——————————
  7   3   8
```

Example 3 and 4

This method is easier for subtractions where the numbers are close.

Mental Approach

Subtracting by counting up

What is 564 – 437?

100 + 3 + 20 + 4 = 127

```
     + 100    + 3   + 20   + 4
  437       537  540     560   564
```
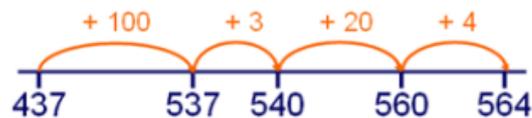
What is 22.5 – 6.4?

10 + 6 + 0.1 = 16.1

```
       + 10      + 6    + 0.1
  6.4        16.4    22.4  22.5
```
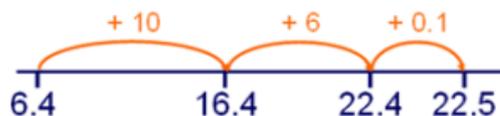
Example 5

5000 – 2899

Here we count +1 (to 2900) + 100 (to 3000) + 2000 (to 5000)
So the final answer is 1 + 100 + 2000 = 2101

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Practise questions:
https://corbettmaths.com/wp-content/uploads/2018/09/Subtraction-pdf.pdf

Multiplication

Times tables need to be learnt!

X	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	46
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	27	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	46	60	72	84	96	108	120	132	144

Practise questions:
https://corbettmaths.com/wp-content/uploads/2018/01/times-tables-pdf.pdf

There are three methods commonly used for multiplication.

Method 1 – Box Method

e.g. 16 x 85

X	10	6		
80	800	480	=	1280 +
5	50	30	=	80
				1360

6 x 5
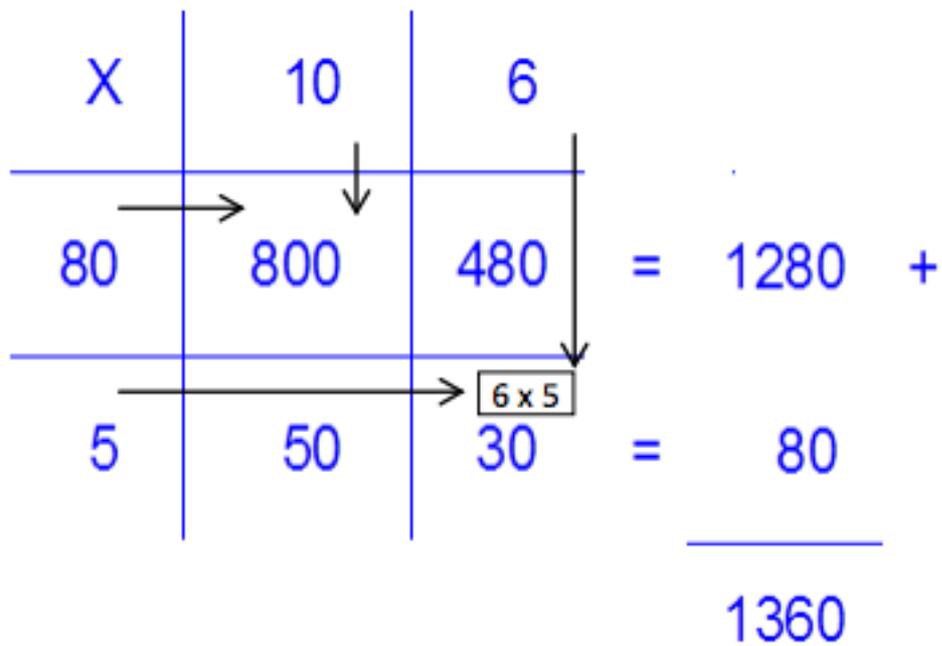
Method 2 – Grid Method

e.g. 376 x 24
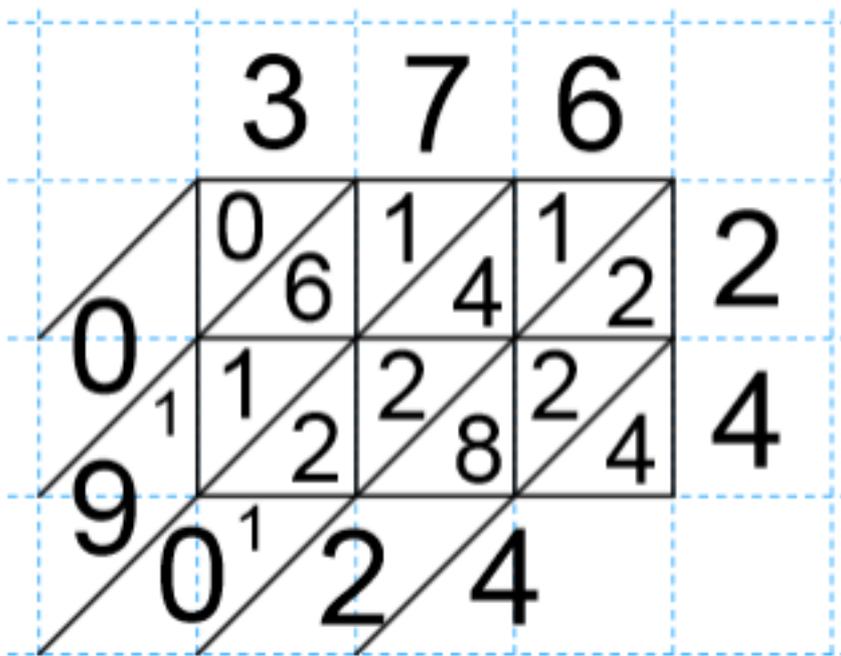
Start at the top right hand corner. You can see that 6 x 2 = 12, the digits 1 and 2 have been put either side of the diagonal line. Next to this, 7 x 2 is 14, the 1 has gone on top of the diagonal line and the 4 below. After doing this for each pair, you add together numbers along the diagonal then read from left to right. This number is 9 024.

Method 3

e.g. 327 x 53

```
        3 2 7
    x     5 3
        9 8₂ 1   ←————————  327 x  3
    1 6₁3₂ 5 0   ←————————  327 x 50
    1 7 3 3 1
```

Broken down:
First step is to multiply 327 by 3 and write it down under the line.
```
        327
    x    53
        981
```

Now we multiply by the next number to the left of the 3. This is the 5 in 53. Because the 5 is in the tens column we need to hold the tens place value by placing a zero before we start multiplying.
```
        327
    x    53
```

```
981
  0 <- place a zero here.
```

Multiply the 5 by the top number and write this number next to the zero.

```
    327
x    53
    981
 16350
```

Add the numbers together.

```
    327
x    53
    981
+ 16350
  17331
```

Practise questions: https://corbettmaths.com/wp-content/uploads/2018/01/multiplication-1-grid.pdf

Division

- Pupils use the 'Bus Stop' method.
- We encourage pupils to write the times tables of the number they are dividing by.

Example 1
84 ÷ 3

```
    2  8
3) 8 ²4 ✓
```

Example 2
92 ÷ 4

```
    2  3
4) 9 ¹2 ✓
```

Example 3
260 ÷ 15

```
   0 1 6
15) 2²6⁹0        15, 30, 45, 60, 75, 90 ...
```

Example 4
938 ÷ 7

```
    1  3  4
7) 9 ²3 ²8                .EG CYMUNEDOL Y DDERWEN
```

Practise questions:
https://corbettmaths.com/wp-content/uploads/2018/01/division-pdf.pdf

If 16 + 4 = 20 then   20 − 16 = 4
                             20 − 4 = 16

If 6 x 5 = 30 then   30 ÷ 6 = 5
                             30 ÷ 5 = 6

Square and Square root

A square number is the name we give to the answer we get when we multiply a number by itself.

We represent squaring a number with a ^{2}.

<u>Examples</u>
  1) 5^2 = 5 x 5 = 25

  2) 9^2 = 9 x 9 = 81

The opposite of squaring a number is square rooting.

The symbol for square rooting is √.

<u>Example</u>
What is the square root of 81?

In other words…what number do we square to get 81?

$$\sqrt{81} = 9$$

$9^2 = 81$

Practise questions:
https://corbettmaths.com/wp-content/uploads/2018/09/Squaring-Numbers-pdf.pdf

https://corbettmaths.com/wp-content/uploads/2018/09/Square-Root-pdf.pdf

Use equivalence of fractions, decimals and percentages

A percentage is the same as a fraction out of 100.

1) 60 out of 100 = $\frac{60}{100}$ = 60% = 0.60 (or 0.6)

2) 40 out of 50 = $\frac{40}{50}$ = $\frac{80}{100}$ = 80% = 0.80 (or 0.8)

3) 3 out of 10 = $\frac{3}{10}$ = $\frac{30}{100}$ = 30% = 0.30 (or 0.3)

Practise questions:
https://corbettmaths.com/wp-content/uploads/2013/02/fractions-to-percentages-pdf1.pdf

Recognise that some fractions are recurring decimals
e.g. 1/3 is 0.33333…

To change a fraction to a decimal, just divide the top of the fraction by the bottom.

<u>Example</u>
What is <u>3</u> as a decimal?
    8

$$0.\ 3\ 7\ 5$$

$$8\ \overline{)\ 3.\ 0^{3}\ 0^{6}\ 0^{4}}$$

0.375 is not a recurring decimal.

Dot notation is used with recurring decimals. The dot above the number shows which numbers recur, for example $0.5\dot{7}$ is equal to 0.5777777... and $0.\dot{2}\dot{7}$ is equal to 0.27272727...

<u>Example</u>

Change $\underline{5}$ to a recurring decimal.
     6

$$0.\ 8\ 3\ 3\ 3\ ...$$
$$6\ |\ 5.\ \overset{5}{0}\ \overset{2}{0}\ \overset{2}{0}\ \overset{2}{0}\ ...$$

$$= 0.8\dot{3}$$

Practise questions:
https://corbettmaths.com/wp-content/uploads/2013/02/fractions-to-decimals-pdf.pdf

Calculate percentages of amounts using non-calculator methods

- Always start by finding 10%.
- You can halve this answer to find 5%.
- You can multiply this answer by 2 for 20%, 3 for 30%, etc.
- To find 1%, divide by 100.

HINTS

To find:

10% = DIVIDE BY 10

5% = FIND HALF OF 10%

50% = DIVIDE BY 2 (halve the amount)

25% = DIVIDE BY 4 (halve the amount and then halve again)

Example 1

Find 10% of 120

    120 ÷ 10 = 12

Example 2
Find 17.5% of 120

    10% = 120 ÷ 10 = 12
    5%   = 12 ÷ 2   = 6
    2.5% = 6 ÷ 2   =   3
    17.5%   = 21

Practise questions:
https://corbettmaths.com/wp-content/uploads/2018/11/Percentages-of-amounts-234-pdf.pdf

Ratio
Sharing a ratio

1) **Share 35 in the ratio 5 : 2**

   Number of parts = 5 + 2 = 7
   1 part = 35 ÷ 7 = **5**
   5 parts = 5 x **5** = 25
   2 parts = 2 x **5** = 10

   CHECK: 25 + 10 = 35

2) **Arthur and Tommy are left some money in the ratio 2 : 7. If Tommy receives £210, how much does Arthur get?**

   A : T
   2 : 7

   7 parts = £210
   1 part = 210 ÷ 7 = 30
   2 parts = 30 x 2 = 60

Arthur gets £60.

Practise questions:
https://corbettmaths.com/wp-content/uploads/2013/02/ratio-sharing-the-total-pdf.pdf

Multiplying and dividing decimals by single-digit whole numbers

Example 1 - Multiplying
   2 x 0.9

*   First multiply the numbers, ignoring the decimal
    2 x 9 = 18

*   Count how many numbers there are after the decimal point in the question
    2 x 0.**9**

*   There is one, so there needs to be one number after the decimal point in the answer.

$$2 \times 0.9 = 1.8$$

Example 2 - Multiplying
3 x 0.05

3 x 5 = 15
3 x 0.<u>05</u> = 0.15

Practise questions:
https://corbettmaths.com/wp-content/uploads/2018/01/multiplying-decimals-textbook-pdf.pdf

Dividing a decimal by a whole number – the bus stop method can be used here.

<u>Example 3 - Dividing</u>
2.4 ÷ 5

```
        0.4 8
      _____
   5 | 2.4²⁴0
```

<u>Example 4 - Dividing</u>
4.05 ÷ 9

```
        0.4 5
      _____
   9 | 4.0⁴⁴5
```

Practise questions:
https://corbettmaths.com/wp-content/uploads/2018/11/Dividing-Decimals-by-whole-numbers-pdf.pdf

Multiply and divide whole numbers by 0.5, 0.2, 0.1

Multiplying
- Multiplying by 0.5 is the same as dividing by 2.

- Multiplying by 0.2 is the same as dividing by 5.

- Multiplying by 0.1 is the same as dividing by 10.

This can be proven using the method in the '**Multiplying and dividing decimals by single-digit whole numbers'** section.

Examples
1) 24 x 0.5 = 24 ÷ 2 = 12

Proof: 24 x 5 = 120. Put the decimal point in, = 12.0.

2) 36 x 0.1 = 36 ÷ 10 = 3.6

Proof: 36 x 1 = 36. Put the decimal point in, = 3.6.

Dividing
- Dividing by 0.5 is the same as multiplying by 2.
  Think about: how many 0.5's are in 1? There are 2. So for every whole number there are 2 0.5's.

- Dividing by 0.2 is the same as multiplying by 5.
  Think about: how many 0.2's are in 1? There are 5. So for every whole number there are 5 0.2's.

- Dividing by 0.1 is the same as multiplying by 10.
  Think about: how many 0.1's are in 1? There are 10. So for every whole number there are 10 0.1's.

Examples
1) $8 \div 0.5 = 8 \times 2 = 16$

2) $12 \div 0.2 = 12 \times 5 = 60$

Dividing decimals

Example 1
Work out $4 \div 0.2$
- We would multiply these so that both numbers are whole numbers
- 0.2 needs to be multiplied by 10 to get a whole number

Multiply both by 10 and we get $40 \div 2 = 20$

$40 \div 2 = 20$, so $4 \div 0.2$ must equal 20 too.

Example 2
Work out $18.9 \div 0.09$
- We would need to multiply 0.09 by 100 to get a whole number
- Both numbers would be multiplied by 100

$1890 \div 9 = 210$, so $18.9 \div 0.09 = 210$

Practise questions:

Order of operations

When you see a question such as 7 + (6 × 5^2 + 3), you think 'which part should I calculate first?'

Mathematicians have agreed rules to follow when doing a calculation with more than one operation.

The rules can be remembered using BIDMAS or BODMAS.

B	**B**rackets first
O	**O**rders (i.e. Powers and Square Roots, etc.)
DM	**D**ivision and **M**ultiplication (left-to-right)
AS	**A**ddition and **S**ubtraction (left-to-right)

Divide and multiply rank equally (just go left to right)
Addition and subtraction rank equally (just go left to right)

<u>Examples</u>

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✓ $5 \times 2^2 = 5 \times 4 = \mathbf{20}$

✗ $5 \times 2^2 = 10^2 = 100$ (wrong)

✓ $2 + 5 \times 3 = 2 + 15 = \mathbf{17}$

✗ $2 + 5 \times 3 = 7 \times 3 = 21$ (wrong)

✓ $30 \div 5 \times 3 = 6 \times 3 = \mathbf{18}$

✗ $30 \div 5 \times 3 = 30 \div 15 = 2$ (wrong)

Practise questions: https://corbettmaths.com/wp-content/uploads/2018/11/Order-of-Operations-Exercise-211-pdf.pdf

Present answers to a given number of decimal places

Decimal places are counted from the decimal point.

1st decimal figure

3rd decimal figure

5. 7 4 3

2nd decimal figure
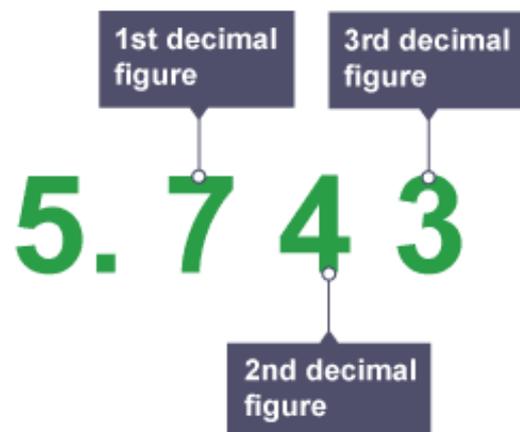
Examples

1) Round 9.6371 to 2 decimal places.

This means we need to 2 digits after the decimal point.

9.6371

Because the next digit 7, is more than 5, we round the 3 up.

9.6371 = 9.64 (2 decimal places)

2) Round 3.65 to 1 decimal place.
= 3.7

Practise questions:
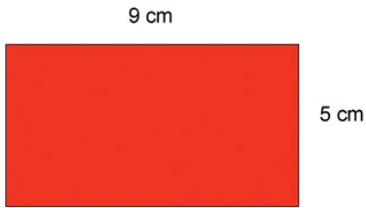https://corbettmaths.com/wp-content/uploads/2013/02/rounding-decimal-places-pdf.pdf

Perimeter

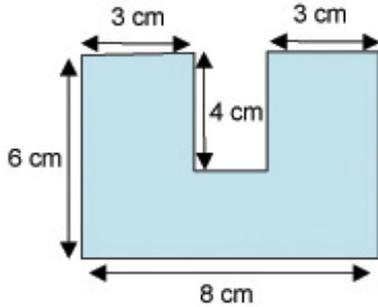To work out the perimeter of a shape, add up all the sides.

Example 1
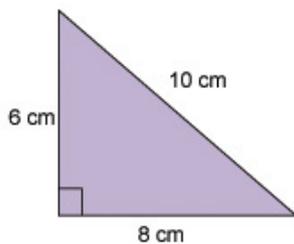
Perimeter = 10 + 6 + 8 = 24cm

Example 2

9 cm

5 cm

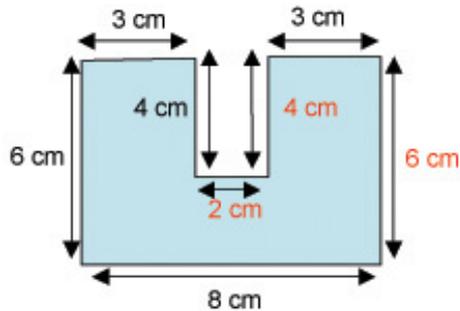Perimeter = 9 + 5 + 9 + 5 = 28cm

Example 3

3 cm   3 cm

4 cm

6 cm

8 cm

First, work out the sides not given.

3 cm   3 cm

4 cm   4 cm

6 cm   6 cm

2 cm

8 cm

Perimeter = 6 + 3 + 4 + 2 + 4 + 3 + 6 + 8 = 36cm

Practise questions:
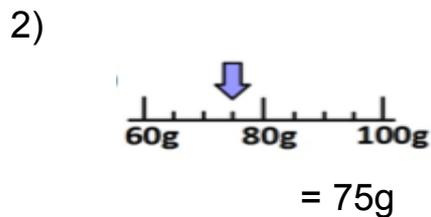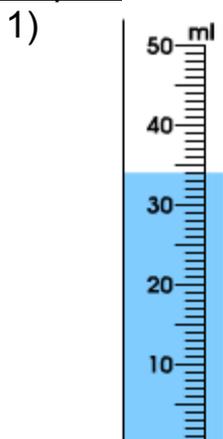https://corbettmaths.com/wp-content/uploads/2013/02/perimeter-pdf2.pdf

Read and interpret scales
Work out what the scale is going up/down in, before attempting any actual measurements.

Examples
1)

ml
50
40
30
20
10

2)

60g   80g   100g

= 75g

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= 34ml

Practise Questions: https://corbettmaths.com/wp-content/uploads/2013/02/reading-scales-pdf.pdf

Converting between units of the metric system

The table shows the most common metric units.

Converting measurements			
Length	1 km = 1,000 m	1 m = 100 cm	1 cm = 10 mm
Weight	1 tonne = 1,000 kg	1 kg = 1,000 g	1 g = 1,000 mg
Capacity	1 l = 100 cl	1 cl = 10 ml	1 l = 1,000 ml

Example 1
Change 4m into cm.

$\times$ 100

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$$1m = 100cm$$

÷ 100

$$4 \times 100 = \underline{400cm}$$

Example 2
Change 3000m into km.

× 1000

1km = 1000m

÷ 1000

$$3000 \div 1000 = \underline{3km}$$

Practise questions:
https://corbettmaths.com/wp-content/uploads/2013/02/metric-units-pdf1.pdf

Area of triangles and rectangles

Area of a rectangle
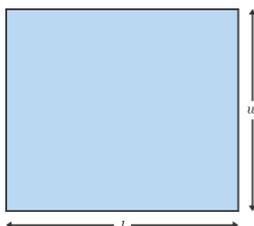
Area = length (l) × width (w)

<u>Example</u>
Calculate the area of this rectangle.

Area = l x w
       = 8 x 3
       = 24cm^2
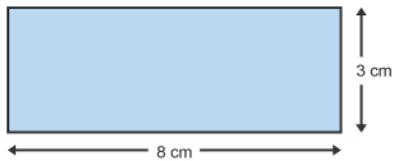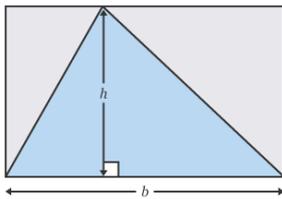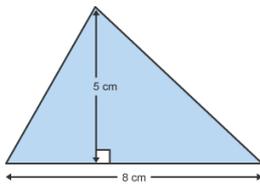

Area of a triangle

$$Area = \frac{(b \times h)}{2}$$

The area of a triangle is **half** the area of a rectangle.

<u>Example</u>

Area = $\frac{b \times h}{2}$

= $\frac{8 \times 5}{2}$

= 20cm^2

Practise questions: https://corbettmaths.com/wp-content/uploads/2013/02/area-of-a-rectangle-pdf1.pdf

https://corbettmaths.com/wp-content/uploads/2018/02/area-of-a-triangle-pdf.pdf

Finding the mean, median, mode and range

Mean
The mean is the total of the numbers divided by how many numbers there are.

- To find the mean, add all the numbers together then divide by the number of numbers.
- Eg 6 + 3 + 100 + 3 + 13 = 125 ÷ 5 = 25
- The mean is 25.

The mean is not always a whole number.

Median
The median is the middle value.

- To find the median, order the numbers and see which one is in the middle of the list.
- Eg 3, 3, 6, 13, 100 = 6
- The median is 6.

Mode

The mode is the number that appears the most.

- To find the mode, order the numbers lowest to highest and see which number appears the most often.
- Eg 3, 3, 6, 13, 100 = 3
- The mode is 3.

Range

The range is the difference between the biggest and the smallest number.

- To find the range, subtract the lowest number from the biggest number.
- Eg 100 - 3 = 97
- The range is 97.

Practise questions: https://corbettmaths.com/wp-content/uploads/2013/02/averages-and-range-pdf2.pdf

Averages video: https://www.youtube.com/watch?v=IHginNwss5c