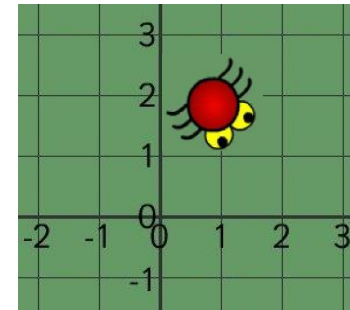
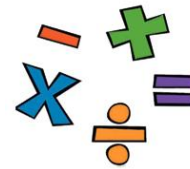




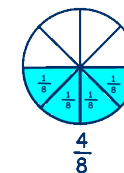
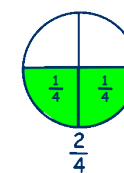
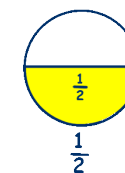
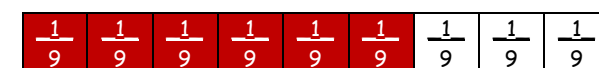
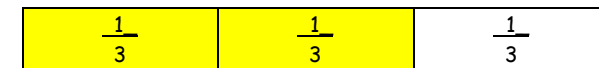
Helpful hints

Top tips



How do I do this?

Maths



Maths Vocab

<p style="text-align: center;">+</p> <p style="text-align: center;">add addition more plus sum together</p>	<p style="text-align: center;">-</p> <p style="text-align: center;">subtract subtraction take away minus leave</p>
<p style="text-align: center;">×</p> <p style="text-align: center;">multiply multiplication times groups of lots of product</p>	<p style="text-align: center;">÷</p> <p style="text-align: center;">divide division share share equally equal groups of</p>
<p><i>Length</i></p> <p>10mm = 1cm 100cm = 1m 1000m = 1km</p> <p><i>Weight</i></p> <p>1000mg = 1g 1000g = 1kg 1000kg = 1 tonne</p>	<p><i>Capacity</i></p> <p>10ml = 1cl 100cl = 1l 1000ml = 1l</p> <p><i>Time</i></p> <p>60 seconds = 1 minute 60 minutes = 1 hour 24 hours = 1 day 7 days = 1 week</p>



Average

The *mean* is what we call the average of a set of numbers.

There are 5 values here: 3, 4, 6, 8, 9

First you add the numbers together
 $3 + 4 + 6 + 8 + 9 = 30$

and then divide the total by the number of values.
 $30 \div 5 = 6$

So, the mean (or average) here is 6.

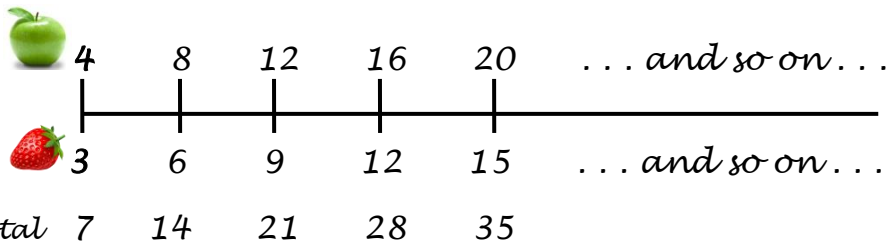
Ratio and Proportion



I have 7 pieces of fruit; 4 apples and 3 strawberries.

The ratio here is 4 apples to 3 strawberries.

The ratio of apples to strawberries is 4:3



The proportion of apples here is 4 in 7 ($4/7$) and the proportion of strawberries is 3 in 7 ($3/7$).

Think of proportion as a fraction of the full amount.

Prime Numbers

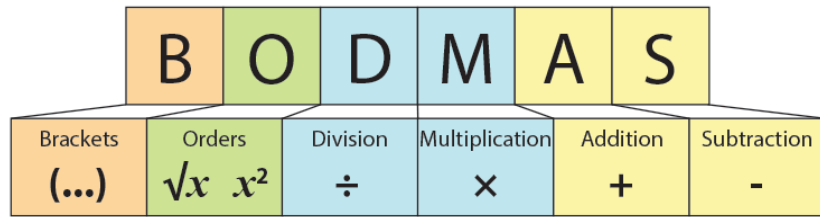
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

A prime number is any number larger than 1, that can only be divided by 1 and itself.

The number 2 is the only even prime number.

No prime number greater than 5 can end in a 5 (as they are all divisible by 5).

0 and 1 are not prime numbers.



Division

$$6 \overline{) 3054}$$

Remember to carry over the remainders.

Times Table Square

X	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

$$26 \overline{) 130}$$

Fact box
$1 \times 26 = 26$
$2 \times 26 = 52$
$5 \times 26 = 130$ Half of $10 \times$
$10 \times 26 = 260$

- It's a good idea to estimate a rough answer first.
- Division and multiplication are opposites.
For example, $54 \div 6 = 9$ and $9 \times 6 = 54$.
So you can use multiplication to check your answer to a division problem.
- A division sum can be shown in different ways.
You might see 54 divided by 6 shown in any of the ways below:

$$6 \overline{) 54} \quad 54 \div 6 \quad \frac{54}{6}$$

Multiplication

$$\begin{array}{r}
 89 \times \\
 \underline{15} \\
 445 \\
 4 \\
 \hline
 890 \\
 \hline
 1335 \\
 \hline
 \pm
 \end{array}$$

Multiply each top digit in turn by the 5 (the units).

Don't forget to put in the zero, then multiply by the 1 (the tens).

Then add together.

$$\begin{array}{r}
 759 \times \\
 \underline{25} \\
 3795 \\
 24 \\
 \hline
 15180 \\
 \hline
 18975 \\
 \hline
 \pm
 \end{array}$$

Multiply each top digit in turn by the 5 (the units).

Don't forget to put in the zero, then multiply by the 2 (the tens).

Then add together.

- Lay out your work clearly.
- Remember to carry your numbers over.
- Remember to add them on...
- ... and cross them out when you've done it.
- Always remember to put in the zero (you are multiplying by a number in the tens column - so you'll have nothing in the units).

Factors

Factors are numbers that are in a family tree.

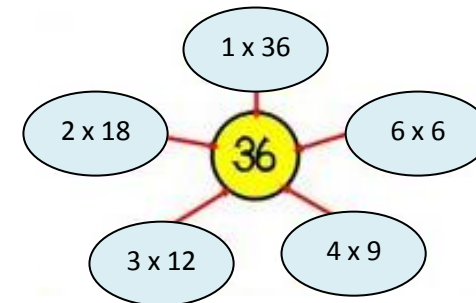
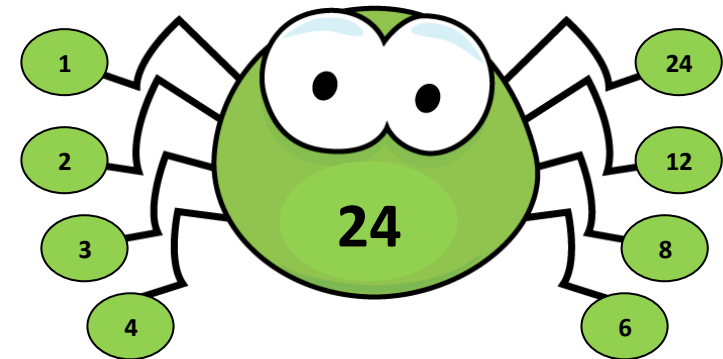
For example, the factors of 12 are;

1, 2, 3, 4, 6 and 12.

This is because

$$\begin{array}{l}
 1 \times 12 = 12 \\
 2 \times 6 = 12 \\
 3 \times 4 = 12
 \end{array}$$

A great way to work out factors is to draw factor bugs.



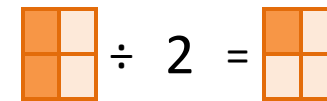
Roman Numerals

I	1	XXV	25
II	2	XXX	30
III	3	XL	40
IV	4	L	50
V	5	LX	60
VI	6	LXX	70
VII	7	LXXX	80
VIII	8	XC	90
IX	9	XCIV	94
X	10	XCIX	99
XI	11	C	100
XII	12	CC	200
XIII	13	CCC	300
XIV	14	CD	400
XV	15	D	500
XVI	16	DC	600
XVII	17	DCC	700
XVIII	18	DCCC	800
XIX	19	CM	900
XX	20	M	1000

To *divide a fraction by a whole number*, multiply the denominator by the whole number (and the numerator stays the same).

$$\frac{1}{2} \div 2 = \frac{1}{4}$$

X



If it helps, try to picture it.

To *divide a fraction by another fraction*, it is slightly more complicated.

$$\frac{6}{10} \div \frac{1}{2} = \frac{12}{10} = 1 \frac{2}{10} = 1 \frac{1}{5}$$

$$\frac{6}{10} \times \frac{2}{1} = \frac{12}{10} = 1 \frac{2}{10} = 1 \frac{1}{5}$$

Turn the fraction you are dividing by upside down.

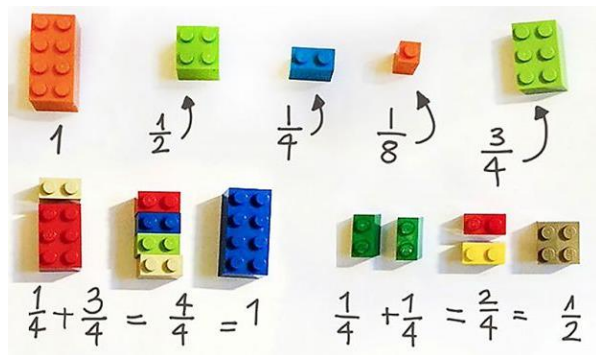
Remember KFC;

Keep the first fraction, *Flip* the second and *Change* the answer (simplify it).

When we say $\frac{6}{10} \div \frac{1}{2}$, we are asking how many $\frac{1}{2}$'s there are in $\frac{6}{10}$.

There is one half and one fifth of a half in six tenths.

To *add or subtract fractions*, the denominators must be the same and you just add or subtract the numerators. You will need to find equivalent fractions.



$$\frac{7}{10} - \frac{3}{9} = \frac{63}{90} - \frac{30}{90} = \frac{33}{90} = \frac{11}{30}$$

To *multiply a fraction by a whole number*, multiply the numerator by the whole number (and the denominator stays the same).

$$\frac{5}{7} \times 6 = \frac{30}{7} = 4 \frac{2}{7}$$

$$\frac{5}{7} \times \frac{6}{1} = \frac{30}{7} = 4 \frac{2}{7}$$

To *multiply a fraction by another fraction*, you multiply the numerator by the numerator and the denominator by the denominator (and simplify the answer).

$$\frac{5}{7} \times \frac{7}{8} = \frac{35}{56} = \frac{5}{8}$$



When smaller numerals are on the *right* of larger ones, you *add them together*.

$$XV = 10 + 5 = 15$$

When smaller numerals are on the *left* of larger ones, you *subtract them*.

$$XC = 100 - 10 = 90$$

MCMXCV	1995	MMV	2005
MCMXCIX	1999	MMVI	2006
MM	2000	MMXVI	2016
MMI	2001	MMXVII	2017

When writing years, you have to work it out bit by bit.
For example:

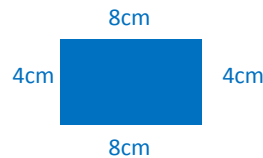
$$1000 + 900 + 90 + 9 = 1999$$

So, it would be...

$$M + CM + XC + IX = MCMXCIX$$

Area

Area is the total amount of space that is covered in a 2D shape.

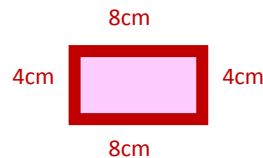


To find the area of a shape, you multiply the length by the width.
 $8\text{cm} \times 4\text{cm} = 32\text{cm}$

So, the area of this rectangle is 32cm^2 .
 (Thirty-two centimetres squared - there are 32 square cm in this rectangle.)

Perimeter

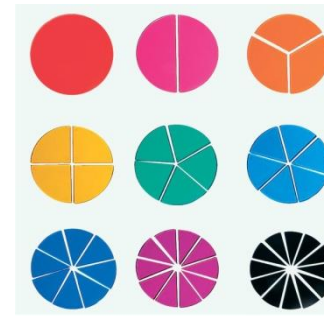
Perimeter is the total distance around the outside of a 2D shape.



To find the perimeter of a shape, you add up all the lengths of the shape.

$$8 + 4 + 8 + 4 = 24\text{cm}$$

So, the perimeter of this rectangle is 24cm.

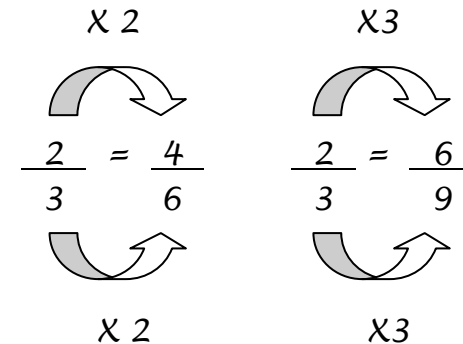


A fraction is a part of a whole.

If you have one half ($\frac{1}{2}$), it means the whole thing has been shared in to two equal parts and you have one of them.

Equivalent Fractions

$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$						
$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$			
$\frac{1}{9}$	$\frac{1}{9}$	$\frac{1}{9}$	$\frac{1}{9}$	$\frac{1}{9}$	$\frac{1}{9}$	$\frac{1}{9}$	$\frac{1}{9}$	$\frac{1}{9}$



Always do the same to the top number (numerator) as you do to the bottom number (denominator).

Fractions, Decimals and Percentages

Fractions	Decimal	Percentage
$\frac{1}{10}$ $\frac{10}{100}$	0.1	10%
$\frac{2}{10}$ $\frac{20}{100}$	0.2	20%
$\frac{1}{4}$ $\frac{25}{100}$	0.25	25%
$\frac{3}{10}$ $\frac{30}{100}$	0.3	30%
$\frac{1}{3}$ $\frac{33}{100}$	0.33	33%
$\frac{4}{10}$ $\frac{40}{100}$	0.4	40%
$\frac{1}{2}$ $\frac{50}{100}$	0.5	50%
$\frac{6}{10}$ $\frac{60}{100}$	0.6	60%
$\frac{7}{10}$ $\frac{70}{100}$	0.7	70%
$\frac{3}{4}$ $\frac{75}{100}$	0.75	75%
$\frac{8}{10}$ $\frac{80}{100}$	0.8	80%
$\frac{9}{10}$ $\frac{90}{100}$	0.9	90%
$\frac{10}{10}$ $\frac{100}{100}$	1.0	100%

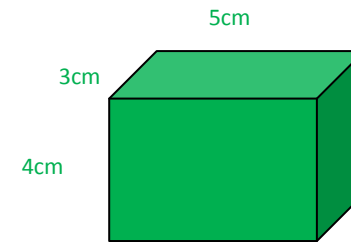
The top number of a fraction is called the *numerator*.
 The bottom number of a fraction is called the *denominator*.

Remember:

$$\frac{1}{10} = 1 \div 10 = 0.1$$

Volume

Volume is the space that is inside a 3D shape.



To find the volume, you multiply the length x width x height.

Length = 5cm
 Width = 3cm
 Height = 4cm

$$5\text{cm} \times 3\text{cm} \times 4\text{cm} =$$

$$5 \times 3 = 15$$

$$15 \times 4 = 60$$

$$\text{Volume} = 60\text{cm}^3$$

So, the volume of this shape is 60cm^3

(Sixty centimetres cubed
 - there are 60 cm cubes in this shape.)

2D shapes

Square

- 4 sides
- 4 vertices
- 2 pairs of parallel sides
- All sides are equal length
- Each internal angle is 90°
- All angles add up to 360°



Rectangle

- 4 sides
- 4 vertices
- 2 pairs of parallel sides
- 2 long sides and 2 short sides
- Each internal angle is 90°
- All angles add up to 360°



Circle

- only one curved side
- no vertices



Equilateral triangle

- 3 equal sides
- 3 vertices
- Each internal angle is 60°
- All angles add up to 180°



Isosceles triangle

- 3 sides and 3 vertices
- 2 of the sides are equal
- 2 of the angles are equal
- All angles add up to 180°



Ordering decimal numbers

	↓	↓	↓		↓	↓
	H	T	U	.	$\frac{1}{10}$	$\frac{1}{100}$
	2	3	.	0	2	
	3	3	.	0	4	
1	2	3	.	1	3	
2	3	.	0	3		

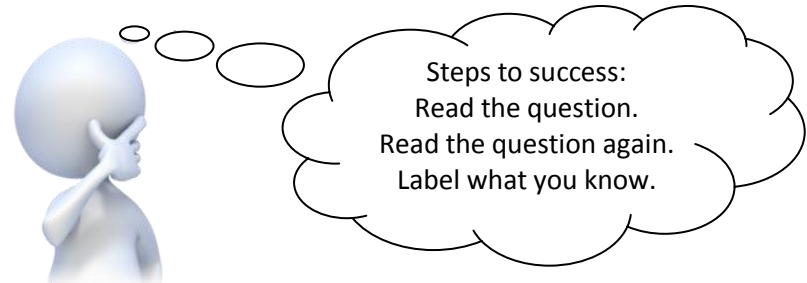
To find the biggest number, start working from the left.

There is only one number in the hundreds column, so that must be the biggest number.

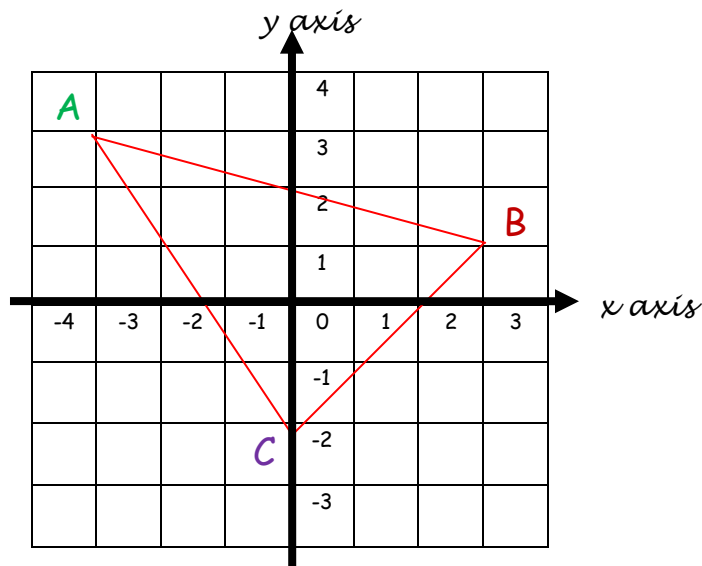
Then, look to the next column, and so on.

So, from largest to smallest, the numbers would be:

1 2 3 . 1 3
 3 3 . 0 4
 2 3 . 0 3
 2 3 . 0 2



Co-ordinates



Point **A** is at $(-3, 3)$
 Point **B** is at $(3, 1)$
 Point **C** is at $(0, -2)$

Point $(0,0)$ is called the point of origin.
 This is where we **always** start from.

The **x axis** is the **horizontal** axis (lying down because it is **exhausted!**) and the **y axis** is the **vertical** axis.

We always write co-ordinates in alphabetical order
 - **x** then **y**. (x, y)

Just remember:
 'Along the corridor and up (or down) the stairs'.

Scalene triangle		<ul style="list-style-type: none"> • 3 sides of different lengths • 3 angles of different sizes
Isosceles triangle		<ul style="list-style-type: none"> • 2 equal sides • 2 equal angles
Equilateral triangle		<ul style="list-style-type: none"> • 3 equal sides • 3 equal angles
Right-angled triangle	 	<ul style="list-style-type: none"> • 3 sides • 3 corners • 1 angle of 90° • Can be an isosceles • Can be scalene

Shape	Sides
Square	4
Rectangle	4
Pentagon	5
Hexagon	6
Heptagon	7

Shape	Sides
Octagon	8
Nonagon	9
Decagon	10
hendecagon	11
Dodecagon	12

Regular shapes have equal sides and equal angles.
Irregular shapes have sides of different lengths and different sized angles.

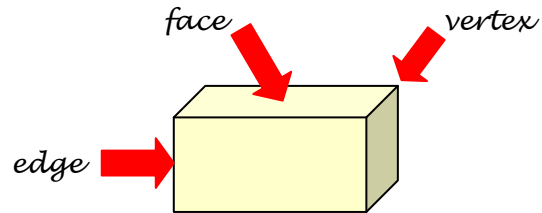
The angles of a triangle always add up to 180°

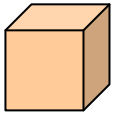

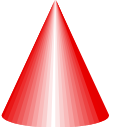
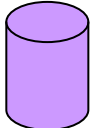
3D shapes are solid.


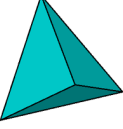
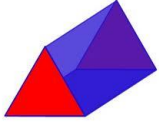

Faces are the flat sides of a 3D shape.

Edges are where the faces of a 3D shape join.

Vertices are the corners of a 3D shape.



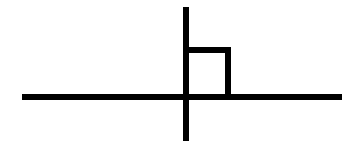
Cube		<ul style="list-style-type: none"> • 6 square faces • 8 vertices • 12 edges
Cuboid		<ul style="list-style-type: none"> • 8 vertices • 12 edges • 6 faces
Cone		<ul style="list-style-type: none"> • 1 face • 1 curved surface • 1 vertex • 1 edge
Cylinder		<ul style="list-style-type: none"> • 2 faces • 1 curved surface • 2 edges

Square based pyramid		<ul style="list-style-type: none"> • 4 triangular faces • 1 square face • 5 vertices • 8 edges
Tetrahedron (Triangular based pyramid)		<ul style="list-style-type: none"> • 4 triangular faces • 4 vertices • 6 edges
Triangular prism		<ul style="list-style-type: none"> • 5 faces • 6 vertices • 9 edges
Sphere		<ul style="list-style-type: none"> • 1 curved surface • The shape of a ball

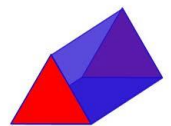
Parallel lines run alongside each other, always the same distance apart (like railway tracks).



Perpendicular is where one line meets another line at a right angle (90°).



Prisms are the same shape and size all the way through (like the slices in a loaf of bread or a Toblerone).



Pyramids go to a point at the top.