

Year 8 – Half term 1 Maths Knowledge Organiser

Indices:

$$3^a \times 3^b = 3^{a+b}$$

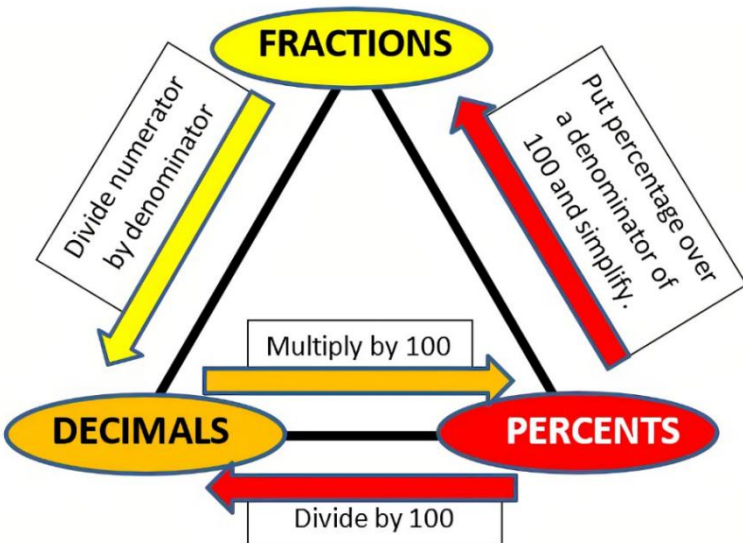
$$3^a \div 3^b = 3^{a-b}$$

$$(3^a)^b = 3^{a \times b}$$

$$3^{-a} = \frac{1}{3^a}$$

$$x^1 = x$$

$$x^0 = 1$$



Important vocabulary	
Factor	Numbers we can multiply together to get another number
Multiple	The result of multiplying a number by an integer (not by a fraction).
Prime	A number which is divisible by 1 and itself. A Prime number has 2 factors, itself and 1.
Highest Common Factor (HCF)	The highest number that divides exactly into two or more numbers.
Lowest Common Multiple (LCM)	The smallest positive number that is a multiple of two or more numbers.

BIDMAS	
B	Brackets
I	Indices
D	Division
M	Multiplication
A	Addition
S	Subtraction

Addition

$\frac{1}{4} + \frac{3}{8} =$

If the **denominators** are different, first find a **common denominator**.

$[\frac{1}{4} \times \frac{2}{2}] + \frac{3}{8} =$

Then add or subtract the **numerators**.

$\frac{2}{8} + \frac{3}{8} = \frac{5}{8}$

The **denominators** stay the same.

Subtraction

$\frac{5}{6} - \frac{3}{4} =$

$[\frac{5}{6} \times \frac{2}{2}] - [\frac{3}{4} \times \frac{3}{3}] =$

$\frac{10}{12} - \frac{9}{12} = \frac{1}{12}$

Multiplication

Multiply the **numerators**.

$\frac{3}{4} \times \frac{4}{5} = \frac{12}{20} = \frac{3}{5}$

Multiply the **denominators**.

Reduce.

Division

First, invert the **divisor**.

$\frac{4}{5} \div \frac{5}{6} =$

Multiply the **numerators**.

$\frac{4}{5} \times \frac{6}{5} = \frac{24}{25}$

Multiply the **denominators**.

Integer- whole number

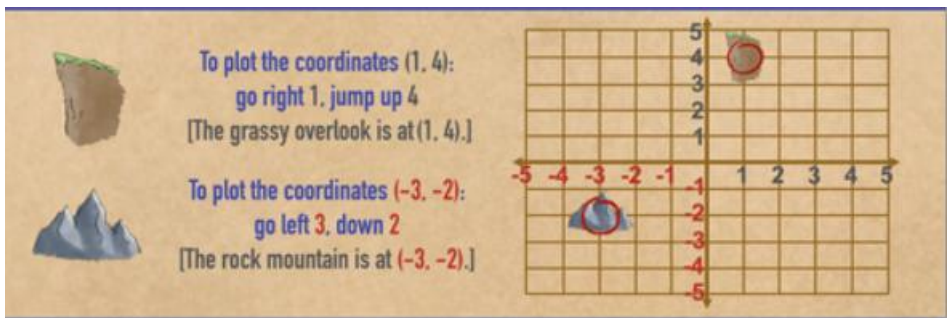
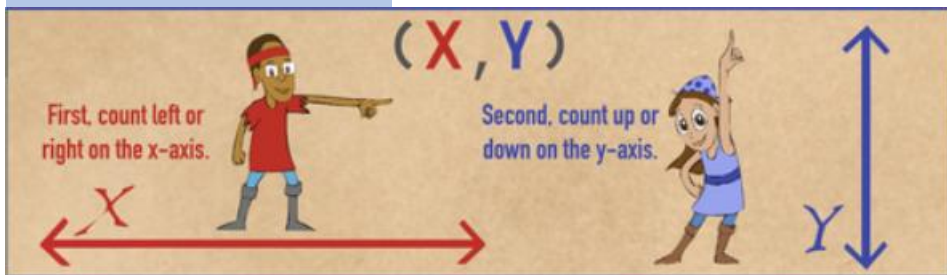
Square number- multiply an integer by itself.

Cube number- multiply an integer by itself 3 times.

2. HCF and LCM using Venn Diagram	Instruction	Venn Diagram
Find the Highest Common Factor (HCF)	Multiply numbers in the overlap section of the Venn diagram	
Find Lowest Common Multiple (LCM)	Multiply all the numbers in the Venn diagram	

Year 8 – Half term 2 Maths Knowledge Organiser

Coordinates:



The Midpoint Formula

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

y=a graphs are horizontal

x=a graphs are vertical

Solving equations:

Balancing method

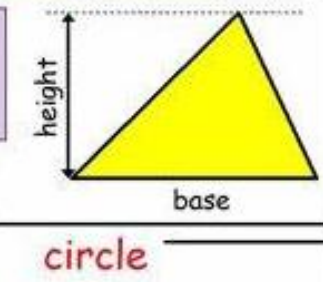
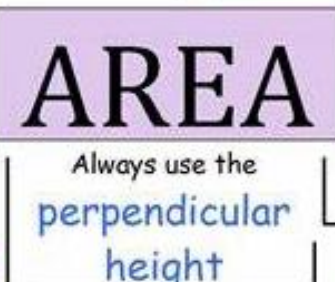
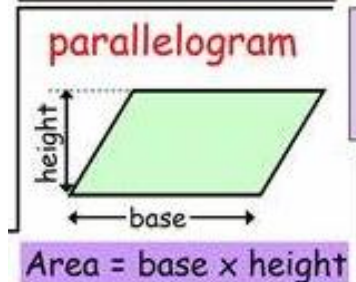
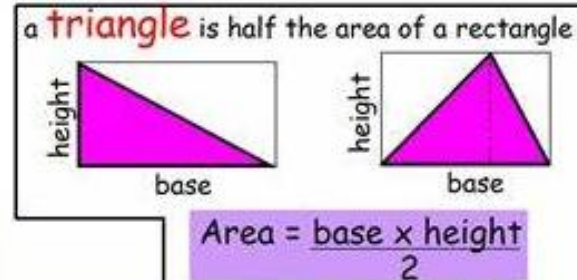
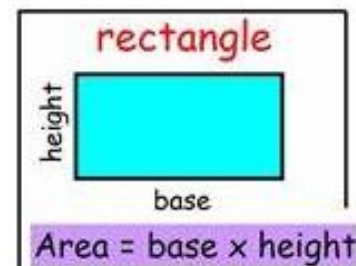
$$\begin{array}{r} 8a - 5 = 11 \\ +5 \quad +5 \\ 8a = 16 \\ \div 8 \quad \div 8 \\ a = 2 \end{array}$$

Balancing method

$$\begin{array}{r} 10 + 6y = 34 \\ -10 \quad -10 \\ 6y = 24 \\ \div 6 \quad \div 6 \\ y = 4 \end{array}$$

Balancing method

$$\begin{array}{r} \frac{x}{12} - 5 = 4 \\ +5 \quad +5 \\ \frac{x}{12} = 9 \\ \times 12 \quad \times 12 \\ x = 108 \end{array}$$



Where x is on both sides:

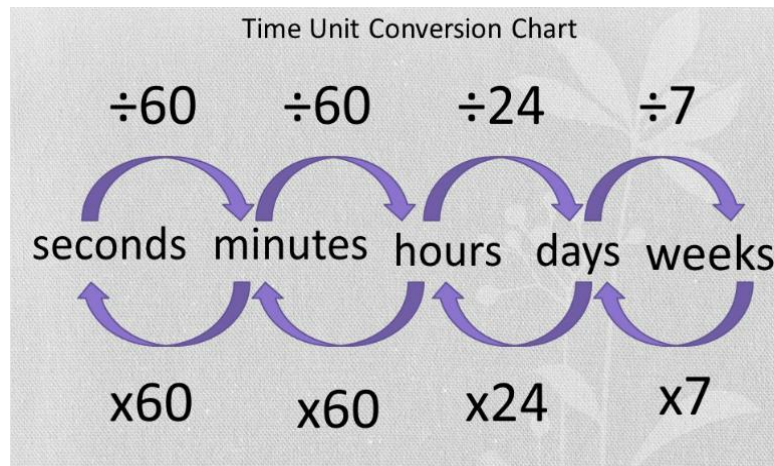
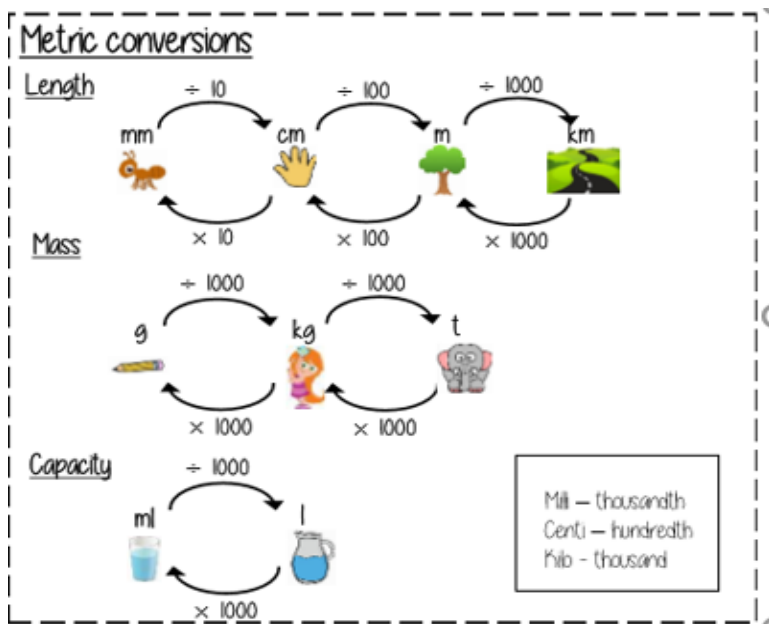
$$\begin{array}{r} 2g - 1 = 7g - 11 \\ -2g \quad -2g \\ -1 = 5g - 11 \\ +11 \quad +11 \\ 10 = 5g \\ /5 \quad /5 \\ 2 = g \end{array}$$

Variable- a quantity represented by a letter

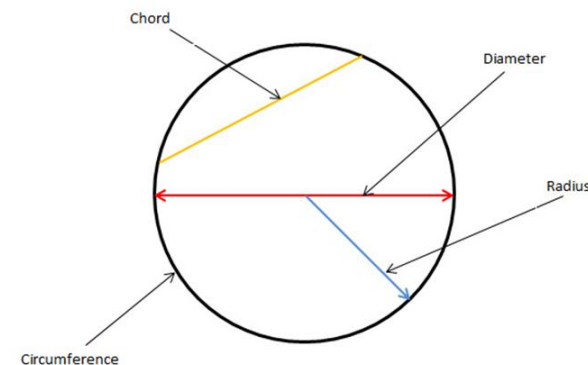
Expression- a mathematical statement with an equals sign

Equation-says that two things are equal. It will have an equals sign "="

Year 8 – Half term 3 Maths Knowledge Organiser



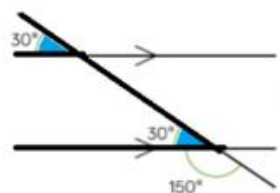
Parts of a circle



Circumference of a circle $= \pi d$
Where d is the diameter of the circle

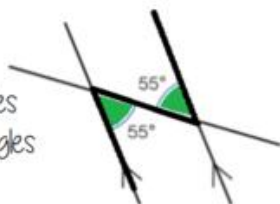
Angles in parallel lines

Alternate/ Corresponding angles

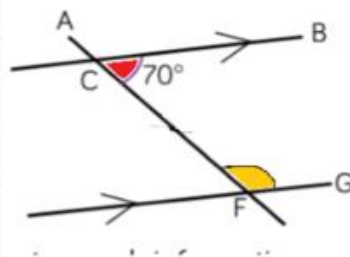


Because alternate angles are equal the highlighted angles are the same size

Because corresponding angles are equal the highlighted angles are the same size



Co-interior angles



Because co-interior angles have a sum of 180° the highlighted angle is 110°

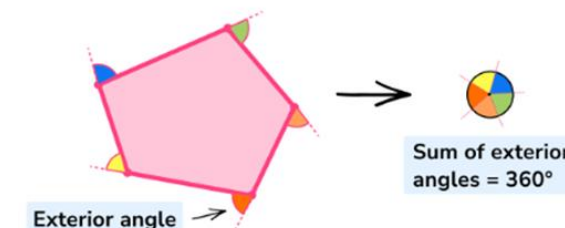
As angles on a line add up to 180° co-interior angles can also be calculated from applying alternate/ corresponding rules first

Angles in a polygon

If the polygon has n sides, there will be $(n - 2)$ triangles inside.

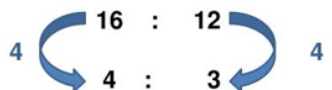
Angle sum = $(n - 2) \times 180$

Sum of Exterior Angles of a Polygon = 360°



Year 8 – Half term 4 Maths Knowledge Organiser

Simplify ratio: Divide by common factors.

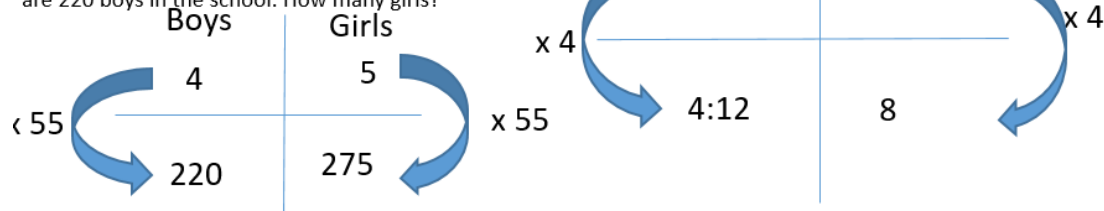


Ratio- difference between:

A bag contains yellow +blue blocks in the ratio 1:3 There are 8 more blue blocks than yellow blocks. How many yellow blocks are there?

Ratio- finding on quantity:

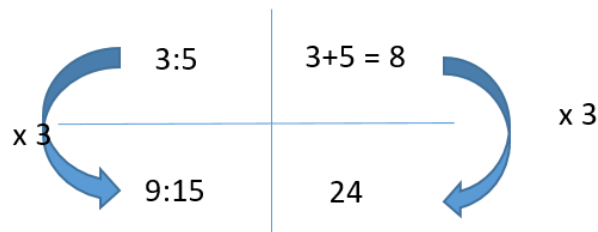
The ratio of boys to girls in a school is 4 : 5 There are 220 boys in the school. How many girls?



Ratio- a way of comparing 2 or more quantities

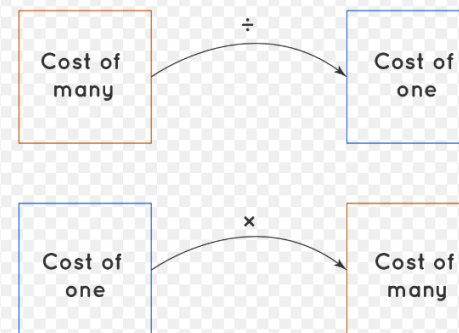
Share in a ratio:

James and Helen get pocket money in the ratio 3 : 5. The total amount of pocket money they are given is £24. How much money do they each get?



Proportion

Unitary Method



Percent of Change

$$\% \text{ Change} = \frac{\text{New} - \text{Original}}{\text{original}} \times 100 \%$$

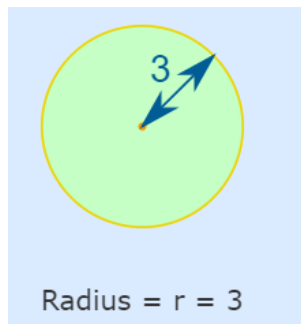
Increase £42 by 3%

$$\begin{array}{l} 100\% \text{ of } 42 \\ + 3\% \text{ of } 42 \\ \hline 103\% \text{ of } 42 \end{array} \quad 42 \times 1.03 = \pounds 43.26$$

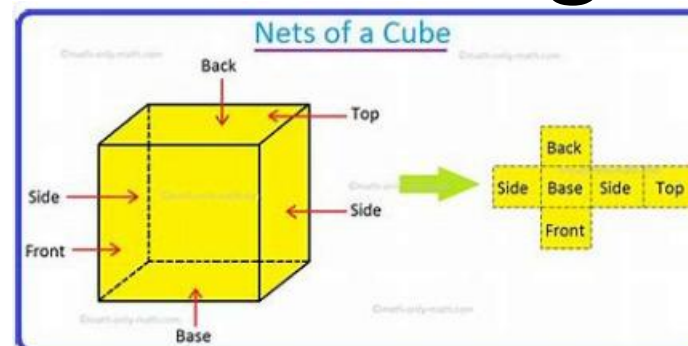
Decrease £42 by 3%

$$\begin{array}{l} 100\% \text{ of } 42 \\ - 3\% \text{ of } 42 \\ \hline 97\% \text{ of } 42 \end{array} \quad 42 \times 0.97 = \pounds 40.74$$

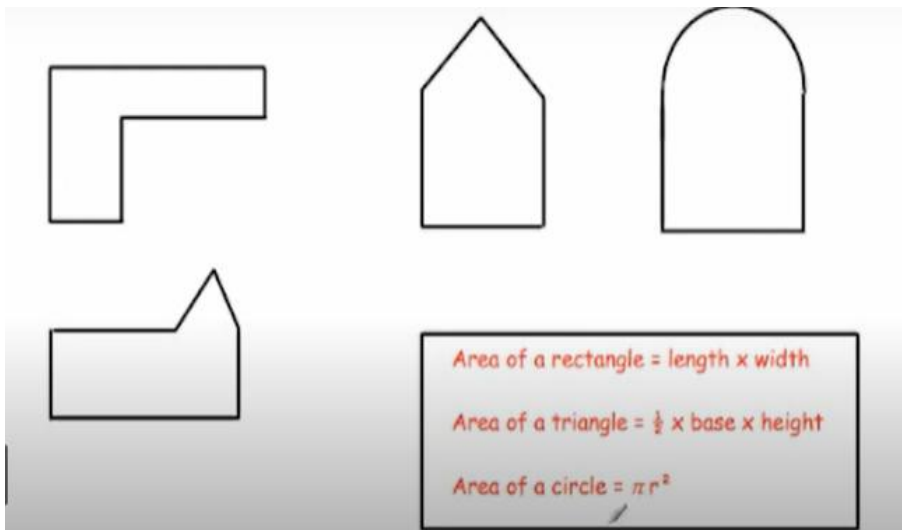
Year 8 – Half term 5 Maths Knowledge Organiser



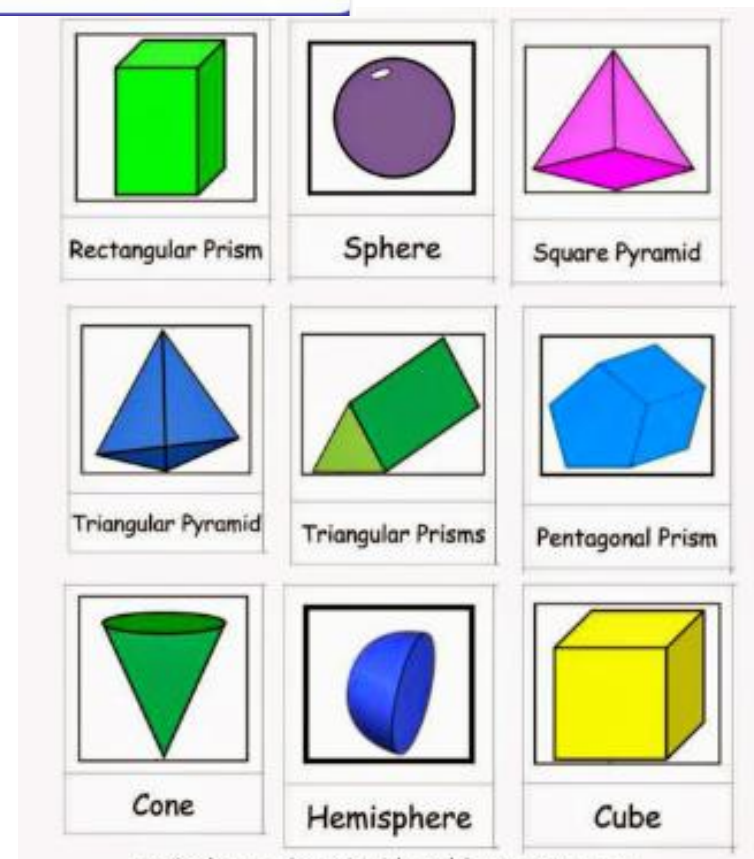
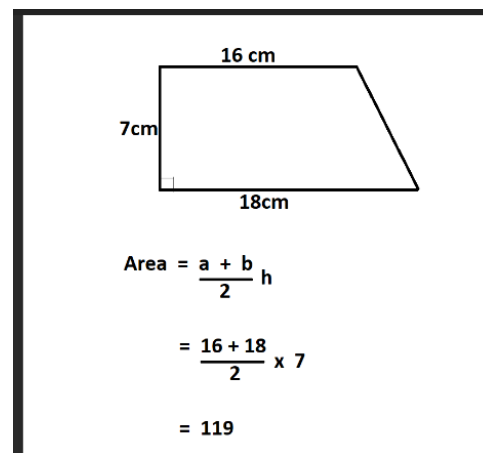
$$\begin{aligned}
 \text{Area} &= \pi r^2 \\
 &= \pi \times 3^2 \\
 &= 3.14159... \times (3 \times 3) \\
 &= \mathbf{28.27 \text{ m}^2} \text{ (to 2 decimal places)}
 \end{aligned}$$



Types of Area of Compound Shapes



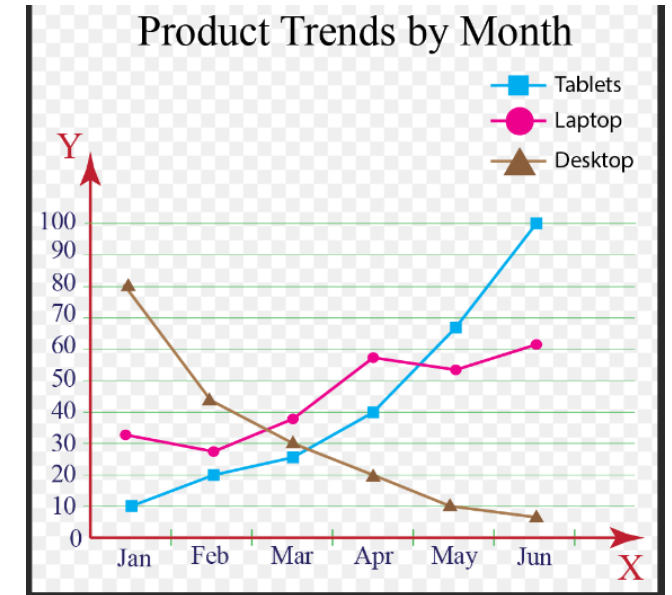
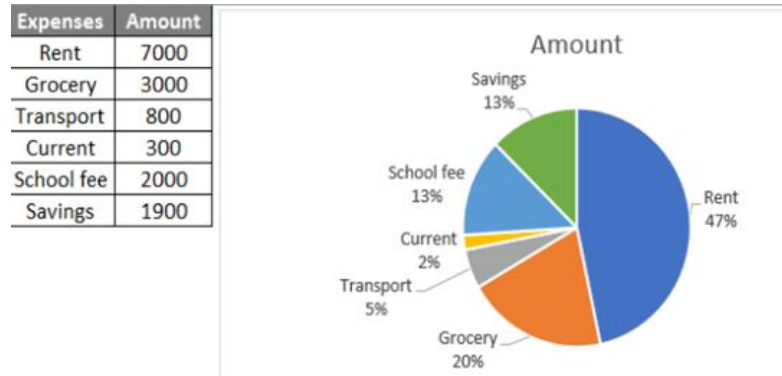
Divide the shapes into separate shapes
then work out the areas and add them together.



Year 8 – Half term 5 Maths Knowledge Organiser

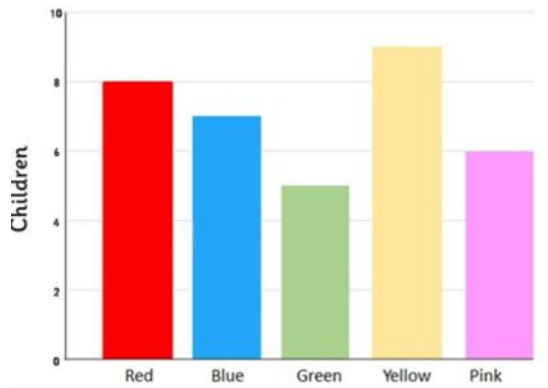
Example of a line graph

Example of a pie chart



Averages

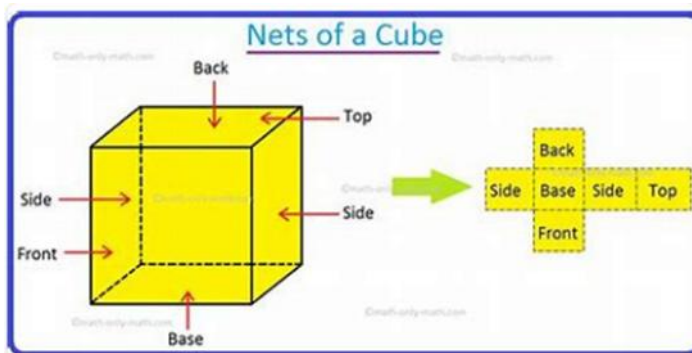
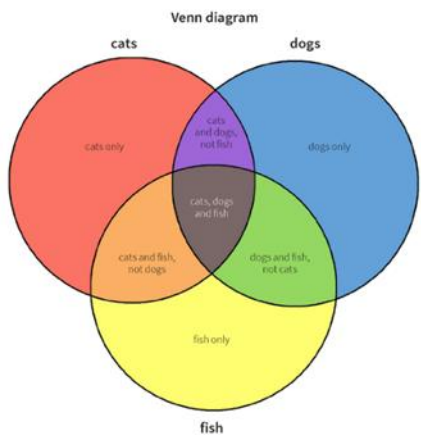
Example of a bar chart



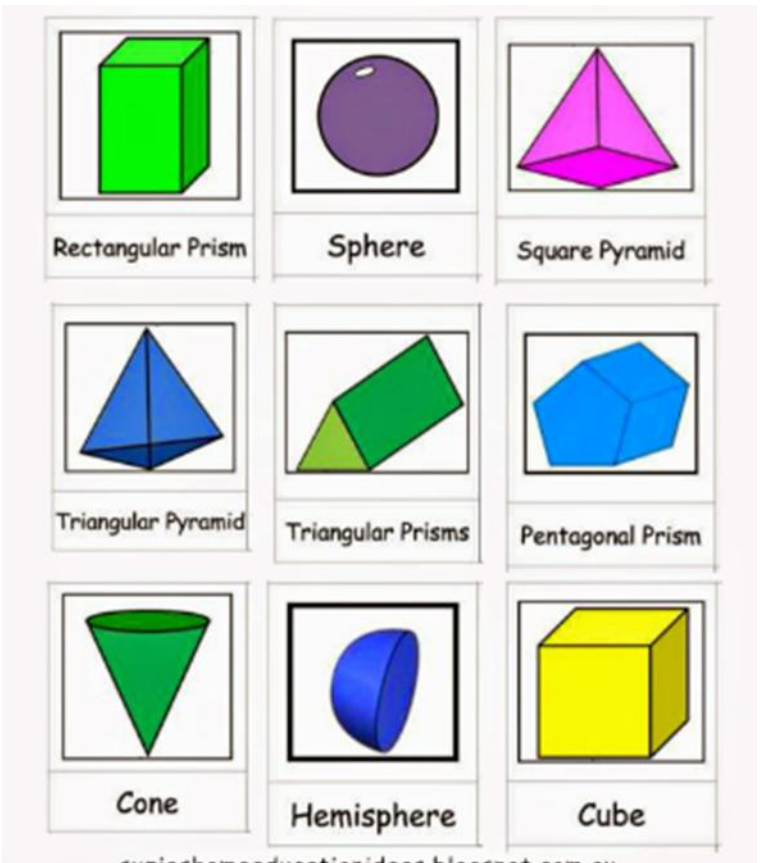
- **Mean:** the average, which is found by adding up all the values in a set of data and dividing it by the total number of values you added together.
- **Median:** the middle number in the set of values. You find it by putting the numbers in order from the smallest to largest and covering up one number on each end until you get to the middle.
- **Mode:** the number or value, which appears most often in the set. To find the mode, you need to count how many times each value appears.
- **Range:** the difference between the lowest and the highest value. To work it out, simply subtract the lowest value from the highest.

Year 8 – Half term 6 Maths Knowledge Organiser

Example of a venn diagram



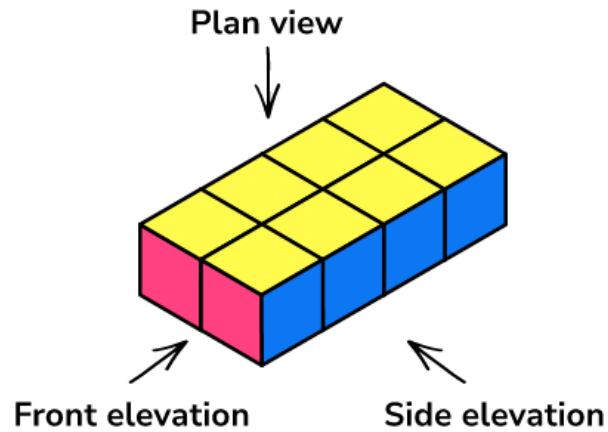
Names of 3D shapes



Example of a 2 way table

	Like Skateboards	Do Not Like Skateboards	Totals
Like Snowmobiles	80	25	105
Do not like Snowmobiles	45	10	55
Totals	125	35	160

Year 8 – Half term 6 Maths Knowledge Organiser



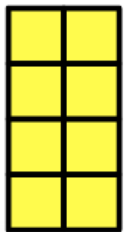
Front elevation



Side elevation



Plan view



Cube 1

$$\text{Volume} = 1 \text{ m} \times 1 \text{ m} \times 1 \text{ m}$$

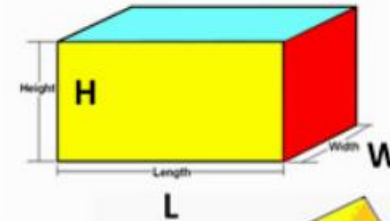
$$\text{Volume} = 1 \text{ m}^3$$

Cube 2

$$\text{Volume} = 100 \text{ cm} \times 100 \text{ cm} \times 100 \text{ cm}$$

$$\text{Volume} = 1,000,000 \text{ cm}^3$$

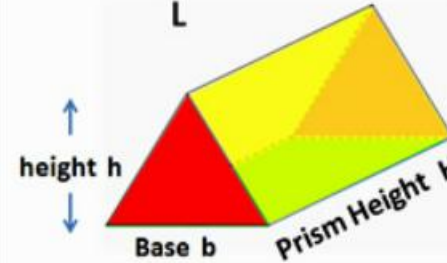
Volume of Prisms - FORMULAS



$$V = L \times W \times H$$

or

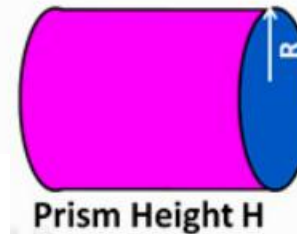
$$V = LWH$$



$$V = \frac{1}{2} \times b \times h \times H$$

or

$$V = \frac{1}{2}bhH$$



$$V = \pi \times R \times R \times H$$

or

$$V = \pi R^2 H$$