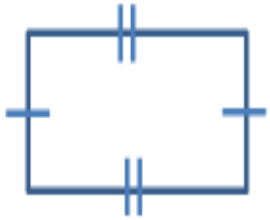
Maths Subject/Topic: Angles 2

- **Key ideas: Use standard convention for labelling sides and angles**

Using Geometric Conventions

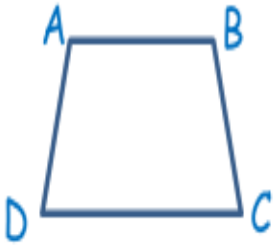
Parallel Lines

Perpendicular Lines / Right Angle



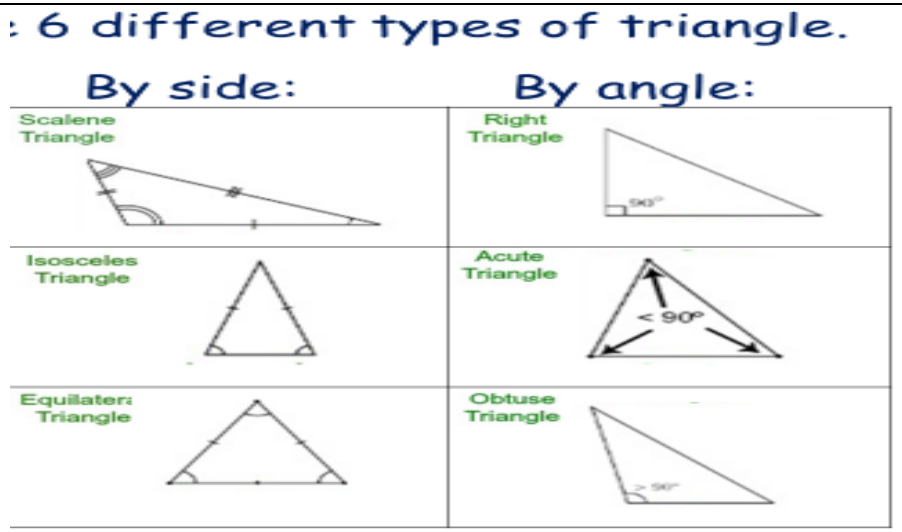
Equal Length Lines

Equal Angles



Labelling Vertices

- Understand the different types of triangles



Key ideas: • Use properties of alternate and corresponding angles within parallel lines to solve problems, and give reasons for angle calculations

A formal geometric proof:

Things we need to know first:

1: There are 180° in a straight line:

2: Take two parallel lines and join them with a sloping straight line – a transversal. This will form a Z. The opposite angles in the Z are always equal – Z angles or alternate angles

We will use these facts to prove that the three internal angles of any triangle always adds up to 180°.

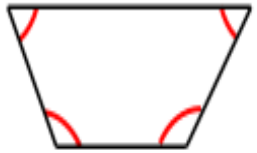
Maths Subject/Topic: Angles 2	
Key ideas: Use angle facts to find missing angles in quadrilaterals	**Key Ideas: • Derive and use the sum of angles in a triangle (e.g. to deduce and use the angle sum in any polygon, and to derive properties of regular polygons)**

Pairs of interior and Exterior angles add up to 180°

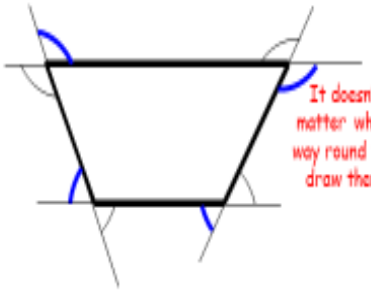
Angles in Polygons

- To begin with, we need to define two key terms; Interior and Exterior angles

Interior angles are the angles inside a polygon

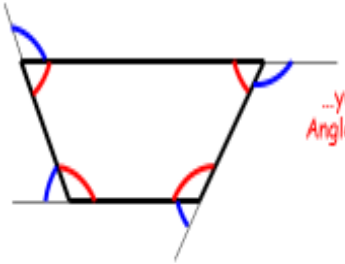


Exterior angles are the angles outside a polygon, **that make a straight line** with the interior angles



It doesn't matter which way round you draw them!

If we combine the two diagrams...



...you can see that pairs of Interior Angles and Exterior Angles will always add up to 180°

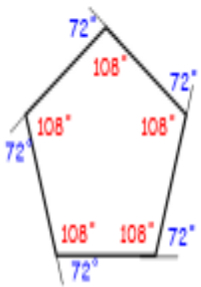
Pairs of interior and exterior angles add up to 180°

Angles in Polygons

Sum of Interior angles, where n is the number of sides
→ $180(n-2)$

If regular, then divide by the number of angles to find what they all are!

- If the shapes are **regular**, all the exterior angles will also be the same
  → Remember that the interior and exterior angles make a straight line together, so must add up to 180°

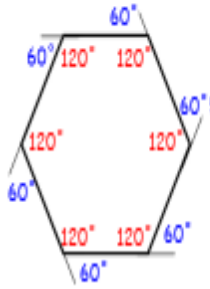


Regular Pentagon

Each interior angle = 108°

Each exterior angle = 180 - 108

= 72°

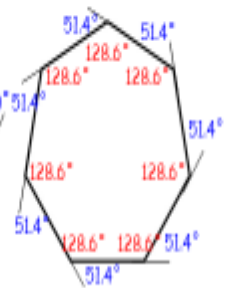


Regular Hexagon

Each interior angle = 120°

Each exterior angle = 180 - 120

= 60°



Regular Heptagon

Each interior angle = 128.6°

Each exterior angle = 180 - 128.6

= 51.4°

?

Regular 'n'-gon

Each interior angle $= \frac{180(n-2)}{n}$

Each exterior angle $= 180 - \frac{180(n-2)}{n}$

Maths Subject/Topic: Fractions

Key ideas: • Identify fractions from words or diagrams

Match the word with its meaning. Use the words below to fill in the gaps.

Improper , Equivalent , Numerator , Fraction , Simplify , Mixed number , Denominator

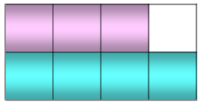
1. Fraction = one whole number written over another (means top number divided by bottom number).
2. Simplify = change a fraction to the simplest equivalent fraction.
3. Equivalent = a fraction with the same value as another.
4. Numerator = the number at the top of a fraction.
5. Denominator = the number at the bottom of a fraction.
6. Improper = a fraction where the top number is bigger than the bottom number.
7. Mixed number = a number made up of a whole number and a fraction.

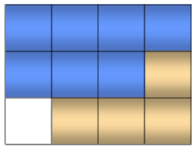
Key Ideas: • Change fractions to decimals and vice versa

Solutions

Fraction	Decimal	Percentage
13/100	0.13	13%
$\frac{1}{2}$	0.5	50%
$\frac{1}{4}$	0.25	25%
4/5	0.8	80%
11/100	0.11	11%
13/20	0.65	65%
$\frac{3}{4}$	0.75	75%
2/5	0.4	40%
3/50	0.06	6%

Key ideas: Fractions as part of shape and different forms.

$\frac{3}{8} + \frac{4}{8} =$  $= \frac{7}{8}$

$\frac{7}{12} + \frac{4}{12} =$  $= \frac{11}{12}$

Key Ideas: Multiply and divide Fractions.

Multiplying Fractions

To multiply simply times the numbers at the top, then times the numbers at the bottom, you may have to simplify

$\frac{3}{4} \times \frac{5}{8} = \frac{15}{32}$

$\frac{2}{7} \times \frac{5}{6} = \frac{10}{42} = \frac{5}{21}$

$\frac{3}{5} \times \frac{7}{9} = \frac{21}{45} = \frac{7}{15}$

How do I divide fractions?

$\frac{3}{1} \div \frac{3}{4}$

$\frac{3}{1} \div \frac{3}{4}$

1. KEEP the first fraction
2. FLIP the second fraction
3. CHANGE the sign to multiply

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

Or "multiply by the reciprocal"

Year 9 Maths Foundation Term 2.

Maths Subject/Topic: Algebra 2

Key ideas: • Using and applying BIDMAS
- **Work out the value of numbers raised to a power**

Bidmas

To help us remember the order we use the word BIDMAS

B	Brackets
I	Indices (powers)
D	Divide
M	Multiply
AS	Add and subtract, going left to right

Key Ideas: • Expand and simplify expressions with brackets

Expand and simplify.

$(x - 9)(x + 6)$

$x^2 + 6x - 9x - 54$

$2x(4x - 3) = 2x \times 4x - 3 \times 2x$

$= 8x^2 - 6x$

$(x - 2)(x^2 + 4x + 3) = x^3 + 4x^2 + 3x - 2x^2 - 8x - 6$

Key Ideas: Collecting like terms

Simplify by collecting like terms

1) a + a + a + a = 4a (not a^4)

2) b + c + b + c + b = 3b + 2c

3) 2m + 4p + 5m + 3p = 7m + 7p

4) 4x + 3y − 3x + 4y = x + 7y

When we have more than one letter, we can only add and subtract the same letter

8x + 7y − 3y + 9x = 17x + 4y

5a + 8b − 9c + 2a − b + 3c

= 7a + 7b − 6c

Keywords/Key Language:

Expressions, Identities, Formulae, Equations

An expression...

Is an algebraic statement consisting of at least one variable and one number. It has no equals sign and so cannot be solved.

An equation...

Is an algebraic statement consisting of an expression and a variable (or another expression) separated by an equal symbol. It can be solved to find the particular values of the variable for which it is true.

A formula...

Relates one variable (letter) to another. It consists of one variable and an expression separated by an equal symbol.

An identity...

Is an equation that is always true for any variables (letter values) you choose.

Year 9 Maths Foundation Term 2.

Maths Subject/Topic: Measures

Key ideas: Speed, Distance, Time.

Speed, Distance, Time

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Calculate the average speed

1) A car travels 60 km in 2 hours
2) A cyclist travels 18 miles in 1 hour 30 minutes
3) A girl cycles 4 km in 20 minutes
4) A train travels 140 km in 1 hour 45 minutes
5) A car travels 6 km in 5 minutes
6) A cyclist travels 3 km in 10 minutes

★★

Calculate the distance

1) A car travels at a speed of 40 km/h for 2 hours
2) A train travels at a speed of 60 mph for 1 hour 20 minutes
3) A cyclist travels at a speed of 20 km/h for 15 minutes
4) A snails travels at a speed of 4 cm per minute for 210 seconds
5) A car travels at a speed of 72 mph for 35 minutes
6) A train travel at a speed of 84 mph for 3 hours 10 minutes

★★★

Calculate the time

1) A car covers a distance of 150 km at a speed of 60 km/h
2) A cyclist covers a distance of 12 km at a speed of 18 km/h
3) A train travels a distance of 60 miles at a speed of 80 mph
4) A taxi travels a distance of 4 miles at a speed of 24 miles per hour.
5) A car travels 100 km at a speed of 80 km/h
6) A train travels 210 km at a speed of 90 km/h

Keywords /Key Language: Conversion of units. Compound measures.

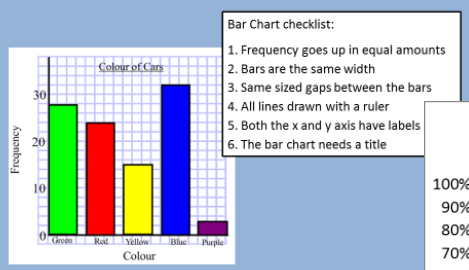
Length	*Weight*	*Volume*
1 km = 1,000 m	1 kg = 1,000 g	1 kL = 1,000 L
1 m = .001 km	1 g = .001 kg	1 L = .001 kL
1 m = 100 cm	1 g = 100 cg	1 L = 100 cL
1 cm = .01 m	1 cg = .01 g	1 cL = .01 L
1 m = 1,000 mm	1 g = 1,000 mg	1 L = 1,000 mL
1 mm = .001 m	1 mg = .001 g	1 mL = .001 L

1 centimetre = 10 millimetres
1 gram = 1000 milligrams
1 kilogram = 1000 grams
1 centilitre = 10 millilitres
1 litre = 100 centilitres
1 mile = 1.61 kilometres

Subject/Topic: Processing Representing and Interpreting Data

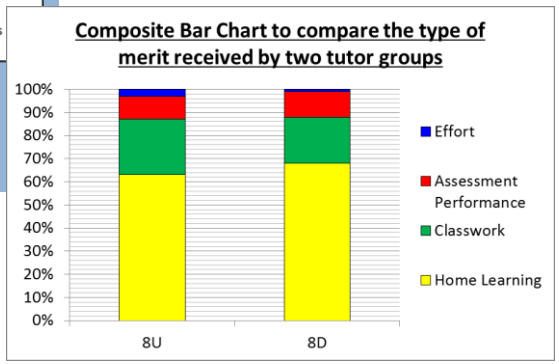
Key ideas: Representing data in graphical form

Bar Charts



Bar Chart checklist:

1. Frequency goes up in equal amounts
2. Bars are the same width
3. Same sized gaps between the bars
4. All lines drawn with a ruler
5. Both the x and y axis have labels
6. The bar chart needs a title



Keywords /Key Language: