Maths Autumn Term 1

LEES BROOK COMMUNITY SCHOOL

Section A: Vocabulary

Vocabulary	Definition
Adjacent side	Next to the angle in question
Centre of enlargement	The point at which the shape is enlarged from
Congruent	When two or more objects have the same shape and size. The can be a reflection, rotation or translation of each other, NOT and enlargement. All corresponding angles and lengths are the same
Constant	A value that remains the same
Cosine ratio	The ratio of the length of the adjacent side to that of the hypotenuse
Enlarge	to make a shape bigger (or smaller) by given multiplier
Correspondi ng	Items that appear in the same place in two similar situations
Hypotenuse	Longest side of a right ange triangle, opposite the right ange
Inverse	Function that has the opposite effect
Opposite side	Side opposite to the angle in question
Scale factor of Enlargement	The ratio of the enlarged shape to the original shape
SFE	Scale Factor of Enlargement
Similar	When one shape can become another with a reflection, rotation, enlargement or translation. All corresponding angles are the same.
Sine ratio	The ratio of the length of the opposite side to that of the hypotenuse
Tangent Ratio	The ratio of the length of the opposite side to that of the adjacent
Scale factor	Multiplier of enlargement

Section B:

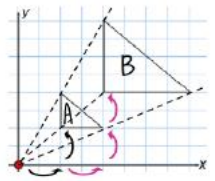
Positive scale factors (R)

Enlargement from a point

Enlarge shape A by SF 2 from (0,0)

The shape is enlarged by 2

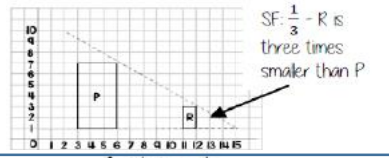
The distance from the point enlarges by 2



Fractional scale factors (R)

Fractions less than 1 make a shape SMALLER

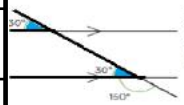
R is an enlargement of P by a scale factor $\frac{1}{3}$ from centre of enlargement (15, 1)



SF: $\frac{1}{3}$ - R is three times smaller than P

Angles in parallel lines (R)

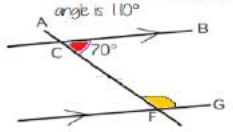
Alternate angles



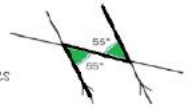
Because alternate angles are equal the highlighted angles are the same size

Co-interior angles

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



Corresponding angles



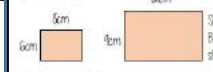
Because corresponding angles are equal the highlighted angles are the same size

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

Identify similar shapes

Angles in similar shapes do not change.
e.g if a triangle gets bigger the angles can not go above 180°

Similar shapes



Scale Factor: Both sides on the bigger shape are 1.5 times bigger

Compare sides: 6 : 9 = 2 : 3 ; 8 : 12 = 2 : 3

Both sets of sides are in the same ratio

Conditions for congruent triangles

Triangles are congruent if they satisfy any of the following conditions

Side-side-side

All three sides on the triangle are the same size

Angle-side-angle

Two angles and the side connecting them are equal in two triangles

Side-angle-side

Two sides and the angle in-between them are equal in two triangles (it will also mean the third side is the same size on both shapes)

Right angle-hypotenuse-side

The triangles both have a right angle, the hypotenuse and one side are the same.

ASS does not prove congruency.

Similar triangles

Shares a vertex

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

Parallel lines — all angles will be the same in both triangle

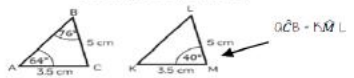
As all angles are the same this is similar — if only one pair of sides are needed to show equality

All the angles in both triangles are the same and so similar

Vertically opposite angles

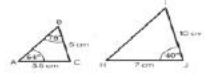
Congruence and Similarity

Congruent shapes are identical — all corresponding sides and angles are the same size



QĈB = hM̂ L

Because all the angles are the same and QC=KM BC=LM triangles QBC and KLM are congruent

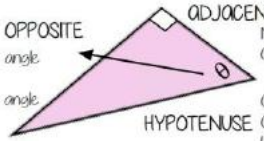


Because all angles are the same, but all sides are enlarged by 2. QBC and HJJ are similar

Section C:

Hypotenuse, adjacent and opposite

ONLY right-angled triangles are labelled in this way

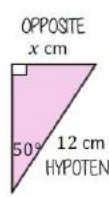


Always opposite an acute angle
Useful to label second
Position depend upon the angle in use for the question

Next to the angle in question
Often labelled last

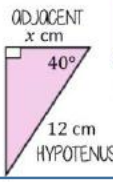
Always the longest side
Always opposite the right angle
Useful to label this first

Sin and Cos ratio: side lengths



$\sin\theta = \frac{\text{opposite side}}{\text{hypotenuse side}}$

NOTE
The Sin(x) ratio is the same as the Cos(90-x) ratio



$\cos\theta = \frac{\text{adjacent side}}{\text{hypotenuse side}}$

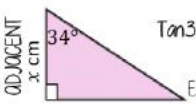
Substitute the values into the ratio formula

Equations might need rearranging to solve

Tangent ratio: side lengths

$\tan\theta = \frac{\text{opposite side}}{\text{adjacent side}}$

Substitute the values into the tangent formula



$\tan 34 = \frac{10}{x}$

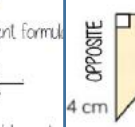
Equations might need rearranging to solve

$x \times \tan 34 = 10$

$x = \frac{10}{\tan 34} = 14.8\text{cm}$

Sin, Cos, Tan: Angles

Inverse trigonometric functions



Label your triangle and choose your trigonometric ratio

Substitute values into the ratio formula

$\tan\theta = \frac{3}{4}$

$\theta = \tan^{-1}\frac{3}{4}$

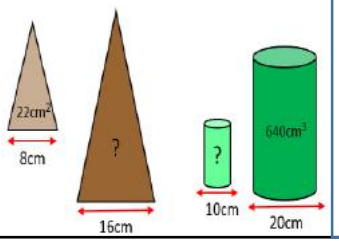
$\theta = 36.9°$

$\theta = \tan^{-1}\frac{\text{opposite side}}{\text{adjacent side}}$

$\theta = \sin^{-1}\frac{\text{opposite side}}{\text{hypotenuse side}}$

$\theta = \cos^{-1}\frac{\text{adjacent side}}{\text{hypotenuse side}}$

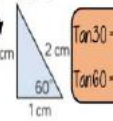
Area (ASF)	Volume (VSF)
Calculate the missing area.	Calculate the missing volume.
1. Find SF: 16/8 = 2	1. Find SF: 20/10 = 2
2. Square SF: $2^2 = 4$	2. Cube SF: $2^3 = 8$
3. Multiply 22 x 4 = 88cm²	3. Divide 640 ÷ 8 = 80cm³



Key angles

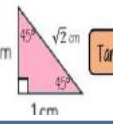
This side could be calculated using Pythagoras

Because trig ratios remain the same for similar shapes you can generate from the following statements



$\tan 30 = \frac{1}{\sqrt{3}}$ $\cos 30 = \frac{\sqrt{3}}{2}$ $\sin 30 = \frac{1}{2}$

$\tan 60 = \sqrt{3}$ $\cos 60 = \frac{1}{2}$ $\sin 60 = \frac{\sqrt{3}}{2}$



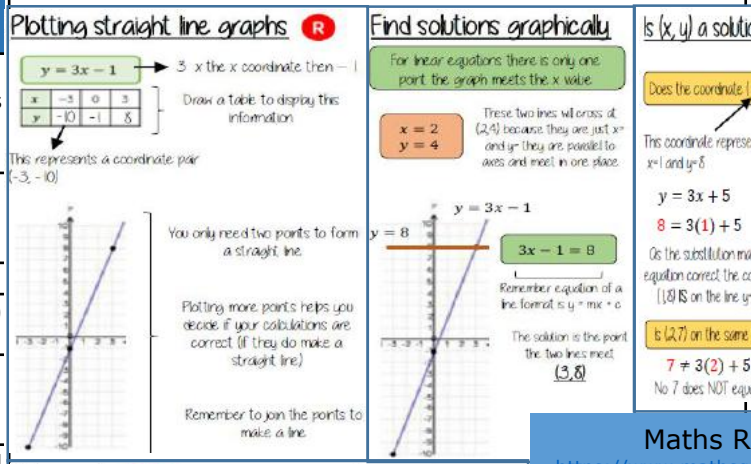
$\tan 45 = 1$ $\cos 45 = \frac{1}{\sqrt{2}}$ $\sin 45 = \frac{1}{\sqrt{2}}$

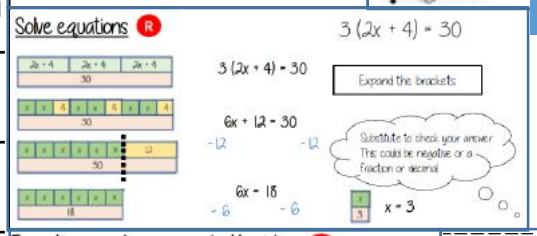
Maths Autumn Term 2

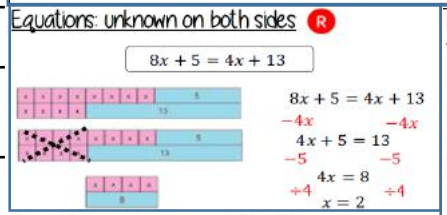
Section A: Vocabulary

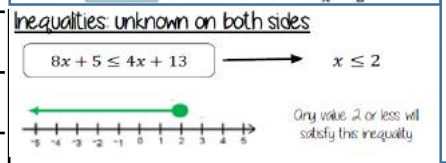
Vocabulary	Definition
Balance the equation	A method for solving equations or inequalities by adding/subtracting/multiply/dividing terms to each side of the equality or inequality in order to solve the equation or inequality
Coordinate	A set of values to show an exact position. The x value is always first and the y is second. e.g. (3,-5) is a point 3 to the right and 5 down.
Eliminate	To remove.
Equation	An equation says that two things (expressions) are equal. It will have an equals sign =.
Expression	Numbers, symbols and operators (e.g. + -) grouped together to show the value of something. It does not have an equals sign.
Gradient	A measure of steepness of a linear line plotted on a coordinate plan
Identity	An equation where both sides have variables that cause the same answer. It will have a ≡ sign.
Inequality	An inequality compares two values showing if one is greater than, less than or equal to another
Intersection	The point where two lines meet
LCM	Lowest common multiple - first number in the times table of two or more numbers that match
Linear	An equation or function that is the equation of a straight line
Solve	The process of working out the solution to an equality or solution set for an inequality
Solution	A value we can put in place of a variable that makes the equation true.
Solution set	A set of values we can put in place of a variable that makes the inequation true.
Substitute	Replace a variable with a numerical value.
Variable	A symbol for a number we don't know
Y intercept	Where the plot of an equation crosses the Y axis

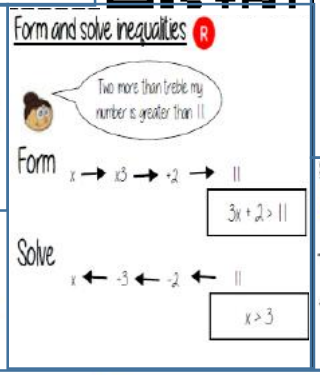
Section B:

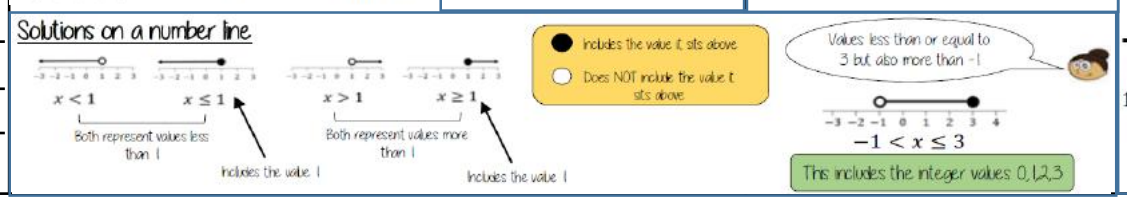




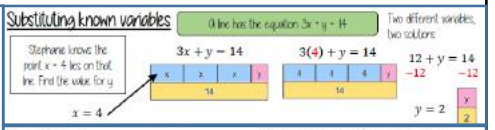


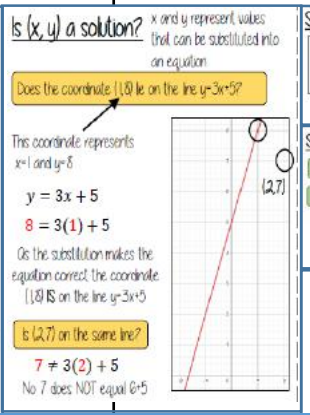


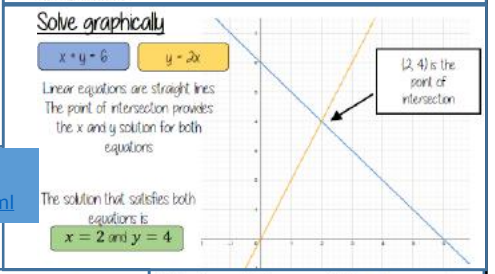




Section C:







Maths Revision:
https://www.mathsgenie.co.uk/gcse.html