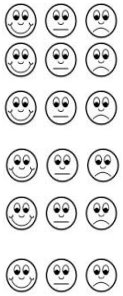
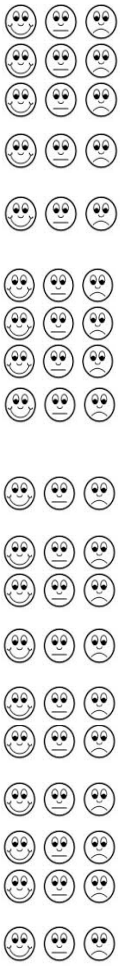
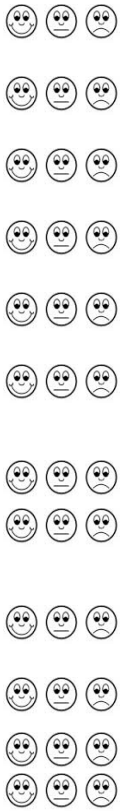
Barrhead High School Mathematics Department

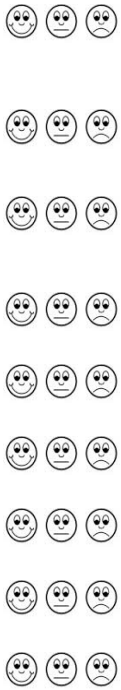
National 5 Mathematics

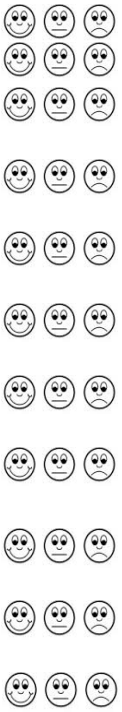
Learning Intentions & Success Criteria: Assessing My Progress

Expressions & Formulae			
Topic	**Learning Intention**	**Success Criteria**	**I understand this…**
Approximation & Estimation	• Pupils should be able to accurately round numbers to a suitable degree of accuracy. • Pupils should be able to estimate the answer to a calculation by rounding.	• I can round to the nearest 10, 100, 1000 etc • I can round to n decimal places. • I understand what is meant by the term “significant figure”. • I can round to a given number of significant figures. • I can choose a suitable degree of accuracy depending on the context of the problem • I can estimate an answer by rounding.	

Surds & Indices	• Pupils will be able to recognise rational and irrational numbers. • Pupils will be able to simplify expressions involving surds and indices. • Pupils will be able to rationalise a surd. • Pupils will be able to express a number in scientific notation (standard form). • Pupils will be able to find the reciprocal of a^m. • Pupils will be able to evaluate expressions involving fractional indices and nth roots.	• I can state the definition of a rational number. • I can state the definition of an irrational number. • I can identify rational and irrational numbers. • I can simplify an expression involving surds by breaking it into a product of factors. • I can identify square numbers and find their square roots. • I can multiply, divide, add and subtract surds. • I can evaluate a number to a given power. • I can find the nth root of a number. • I can multiply like terms involving indices by adding their powers. • I can divide like terms involving indices by subtracting their powers. • I can raise a power to a power by multiplying the indices. • I know that any term raised to the power of 0 equals 1. • I know that any term raised to the power of 1 equals the same term. • I can state the definition of a reciprocal. • I can work with negative indices. • I can write a very large or very small number using scientific notation (standard form). • I can change between fractional indices and roots. • I can evaluate terms with a fractional index or nth root. • I will know where exact values are necessary to use in real life situations.	
Algebraic Expressions & Algebraic Fractions	• Pupils will be able to simplify algebraic expressions by	• I can simplify an algebraic expression by collecting like terms.	

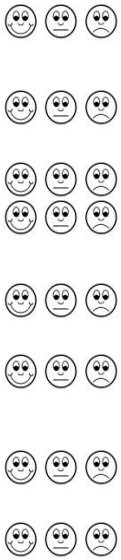
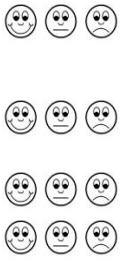
	expanding brackets. • Pupils will be able to factorise an algebraic expression. • Pupils will be able to express a quadratic in the form $(x \pm a)^2 \pm b$. • Pupils will be able to simplify an algebraic fraction. • Pupils will be able to add, subtract, multiply and divide algebraic fractions.	• I can expand a multiply a single numerical or algebraic term through a bracket. • I can expand an algebraic expression in the form $(x \pm a)(x \pm b)$. • I can factorise an algebraic expression by finding a common factor. • I can factorise a quadratic expression using a difference of two squares. • I can factorise a quadratic expression into the form $(x \pm a)(x \pm b)$. • I can factorise a quadratic expression with the x^2 coefficient > 1 into the form $(ax \pm b)(cx \pm d)$. • I can complete the square to express a quadratic in the form $(x \pm a)^2 \pm b$. • I can simplify an algebraic fraction by finding the highest common factor of the numerator and the denominator. • I can add and subtract algebraic fraction by finding a common denominator. • I can multiply algebraic fractions. • I can divide algebraic fractions by multiplying by the reciprocal.	

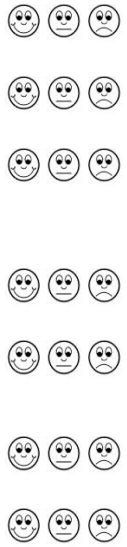
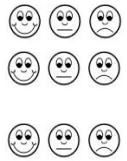
Gradient of a Straight Line	• Pupils will be able to calculate the gradient of a straight line. • Pupils will be able to apply their knowledge of gradient to distance, speed & time graphs.	• I can identify a positive, negative, zero and undefined gradient. • I can calculate the gradient of a straight line by examining the change in the x direction and the change in the y direction. • I can calculate the gradient of a straight line using the formula $m = \frac{y_2 - y_2}{x_2 - x_1}$. • I can calculate the gradient of a straight line given a diagram. • I can calculate the gradient of a straight line given two co-ordinates. • I can use my knowledge of the gradient of a straight line to calculate speed on a distance-time graph. • I can use my knowledge of the gradient of a straight line to calculate acceleration on a speed – time graph. • I will understand what is meant by the term “rate of change”. • I will be able to find the gradient of a line parallel to the given line.	

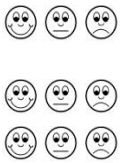
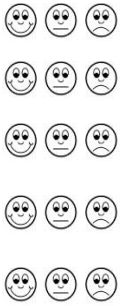
Arcs and Sectors	• Pupils will be able to calculate the length of a major or minor arc of a sector, given the radius and the angle at the centre. • Pupils will be able to calculate the angle at the centre of a major or minor sector, given the radius and the length of the arc. • Pupils will be able to calculate the radius of a major or minor sector, given the angle at the centre and the length of the arc. • Pupils will be able to calculate the area of a major or minor sector, given the radius and the angle at the centre. • Pupils will be able to calculate the angle at the centre of a major or minor sector, given the radius and area of the sector.	• I can identify parts of a circle. • I can identify a minor and major sector/arc. • I can calculate the length of an arc, given the radius and angle at the centre. • I can calculate the angle at the centre of a sector, given the radius and length of the arc. • I can calculate the length of a radius, given the length of the arc and angle at the centre. • I calculate the area of a sector, given the radius and angle at the centre. • I can calculate the angle at the centre of a sector, given the radius and area of the sector. • I can calculate the radius, given the area of the sector and the angle at the centre. • I understand what is meant by the term “compound shape”. • I can find the area of a compound shape involving sectors of circles. • I understand how arcs and sectors play a very important role in design and manufacture process.	

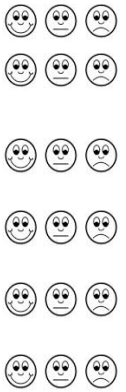
	• Pupils will be able to calculate the radius of a major or minor sector, given the area and the angle at the centre. • Pupils will be able to apply their knowledge of finding the area of a sector to find the area of a compound shape.		

Volume of Solids	• Pupils will be able to identify a range of 3D solids.
	
	• Pupils will be able to find the volume of a simple 3D solid.
	
	• Pupils will be able to find the volume of a compound 3D solid.
		• I can identify a range of 3D solids and state some of their properties.
		• I understand what is meant by the term “compound shape”.
		• I can calculate the volume of a:
		  ○ Cube
		  ○ Cuboid
		  ○ Cylinder
		  ○ Sphere
		  ○ Cone
		  ○ Prism
		• I can apply my knowledge of calculating the volume of simple shapes to problems involving compound shapes.
			
			 
			 
			 

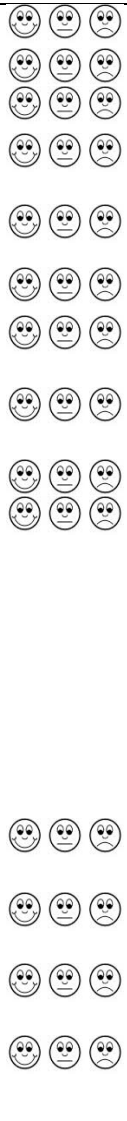
Relationships			
Topic	**Learning Intention**	**Success Criteria**	**I understand this…**
Straight Line Graphs	• Pupils will be able to sketch a straight line graph using a table of values. • Pupils will be able to find the gradient and y intercept of a straight line graph and hence find the equation. • Pupils will be able to find the equation of vertical and horizontal lines. • Pupils will be able to re-arrange an equation into the form y = mx + c. • Pupils will be able to express a straight line graph using function notation.	• I can find the gradient of a straight line graph using the formula $m = \frac{y_2 - y_2}{x_2 - x_1}$. • I can use a table of values to find co-ordinates that lie on a straight line. • I can sketch a straight line graph using a table of values. • I can recognise horizontal and vertical lines and can state their equations. • I can determine the equation of a straight line graph given its gradient and y intercept. • I can determine the equation of a straight line graph given its gradient and one point on the line. • I can recognise the general form of a straight line equation ax + by + c = 0 and can re-arrange it into the form y = mx + c. • I understand what is meant by “function notation” and can write straight line equations in this way.	
Equations & Inequalities	• Pupils will be able to solve a linear equation or inequality using algebraic manipulation.	• I can use mathematical notation to say that one quantity is equal to, less than, less than or equal to, greater than and greater than or equal to another. • I can solve a simple two step equation or inequality or inequality by balancing both sides. • I can solve an equation or inequality involving brackets. • I can solve an equation or inequality where unknowns appear on either side.	

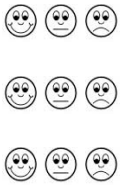
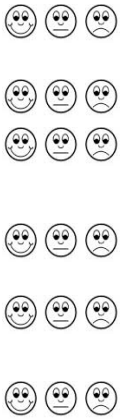
Simultaneous Equations	• Pupils will be able to use graphs to solve simultaneous equations. • Pupils will be able to use an algebraic method to solve simultaneous equations.	• I understand that simultaneous equations only have one unique solution. • I can solve simultaneous equations by drawing the straight line graphs and finding the point of intersection. • I understand that a set of simultaneous equations may have no solution and can demonstrate this by sketching the graphs. • I can use the process of elimination to solve simultaneous equations with one term having a unitary coefficient. • I can use the process of elimination to solve simultaneous equations with both terms having a co-efficient not equal to 1. • I can use the process of substitution to solve simultaneous equations. • I can use simultaneous equations to model a situation.	
Formulae	• Pupils will be able to evaluate a formula using substitution. • Pupils will be able to rearrange a formula.	• I can distinguish between an algebraic expression and a formula. • I can use formulae to model a real life situation. • I can evaluate a formulae using substitution. • I can change the subject of a formula by using inverse operations. • I can solve problems involving rearranging a formula.	
Graphs of Quadratic Functions	• Pupils will be able to identify and sketch graphs of quadratic functions.	• I can sketch a quadratic graph using a table of values. • I can transform a quadratic graph by stretching it and translating it both vertically and horizontally. • I can identify the turning point of a quadratic graph and determine its nature.	

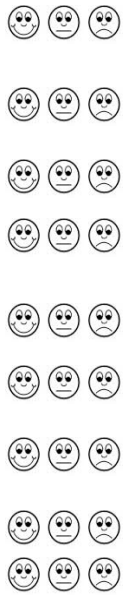
	• Pupils will be able to determine the equation of a quadratic graph. • Pupils will be able to recognise and apply transformations to quadratic graphs. • Pupils will be able to find the turning point of a quadratic graph. • Pupils will be able to complete the square.	• I can complete the square on a quadratic graph and identify the co-ordinates of the turning point. • I can find the axis of symmetry of a quadratic graph. • I can find the equation of a quadratic graph in the forms $y = (x – a)(x – b)$.	
Quadratic Equations	• Pupils will be able to solve quadratic equations graphically. • Pupils will be able to solve quadratic equations by factorising. • Pupils will be able to solve quadratic equations using the quadratic formula. • Pupils will be able to use the discriminant to find the nature of the roots or a quadratic. • Pupils will be able to apply their knowledge of quadratic equations to a variety of real life contexts.	• I can sketch a quadratic graph and using a table of values and use this to solve the quadratic equation. • I can solve a quadratic equation by factorising. • I can use the quadratic formula to solve a quadratic equation. • I can determine the nature of the roots of a quadratic by using the discriminant. • I can use quadratic equations to model real life situations and hence find maximum and minimum values.	

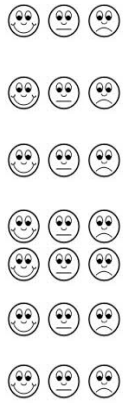
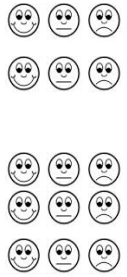
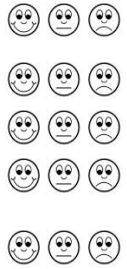
Pythagoras' Theorem	• Pupils will be able to use Pythagoras' Theorem to find the length of a missing side in a right angled triangle. • Pupils will be able to use the converse of Pythagoras' Theorem to decide if a triangle is right angled or not. • Pupils will be able to apply Pythagoras' Theorem to problems in 3 dimensions.	• I can square and square root numbers. • I can state and apply Pythagoras' Theorem to find the length of the hypotenuse. • I can state and apply Pythagoras' Theorem to find the length of a shorter side. • I can use the converse of Pythagoras' Theorem to prove whether a triangle is right angled or not. • I can identify right angled triangles in 3 dimensional shapes. • I can apply Pythagoras' Theorem to a variety of problems in 3 dimensions.	

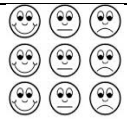
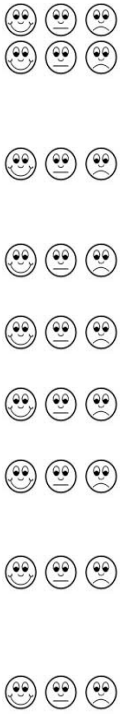
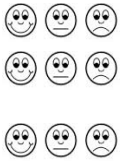
Properties of Shapes	• Pupils will be able to identify types of triangle.
	• Pupils will be able to use triangle properties to calculate missing angles.
	• Pupils will be able to state the properties of a variety of quadrilaterals and use their properties to calculate missing sides and angles.
	• Pupils will know the properties of parallel lines and associated angles.
		• I can name and describe a range of triangles including:
		  ○ Acute angled
		  ○ Obtuse angled
		  ○ Right angled
		  ○ Scalene
		  ○ Isosceles
		  ○ Equilateral
		• I can calculate an exterior angle in a triangle given its supplementary interior angle.
		• I can calculate an interior angle in a triangle given its supplementary exterior angle.
		• I can state the properties of a range of quadrilaterals:
		  ○ Square
		  ○ Rectangle
		  ○ Parallelogram
		  ○ Rhombus
		  ○ Trapezium
		  ○ Kite
			

	• Pupils will be able to find interior and exterior angles for regular and irregular polygons.
	
	• Pupils will be able to describe all parts of a circle and use triangle properties within a circle.
		• I can identify and calculate corresponding angles.
		• I can identify and calculate alternate angles.
		• I can identify and calculate allied angles.
		• I can calculate an exterior angle in a polygon given its supplementary interior angle.
		• I can calculate an interior angle in a polygon given its supplementary exterior angle.
		• I can calculate the sum of the interior angles in a polygon.
		• I can calculate the sum of the exterior angles in a polygon.
		• I can find the number of sides in a regular polygon given its exterior angle.
		• I can cover an area by tessellating shapes.
		• I can name and describe a range of parts of a circle:
		  ○ Circumference
		  ○ Diameter
		  ○ Radius
		  ○ Arc
		  ○ Chord
		  ○ Segment
		  ○ Sector
		  ○ Tangent
		• I can construct a right angled triangle inside a circle or semi-circle.
		• I know that a tangent meets a circle at only one point and is perpendicular to the radius.
		• I can identify the perpendicular bisector of a chord and use this to create a right angled triangle.
		• I can apply my knowledge of circles to a variety of real life contexts.
			

Similarity	• Pupils will be able to use a scale factor to enlarge or reduce a length, area or volume.	• I can identify a linear scale factor and use it to calculate a missing length in an enlargement or reduction. • I can identify an area scale factor and use it to calculate a missing length or area in an enlargement or reduction. • I can identify a volume scale factor and use it to calculate a missing length or volume in an enlargement or reduction.	
Trigonometric Functions	• Pupils will be able to find the sine, cosine or tangent of any angle. • Pupils will be able to sketch trigonometric graphs. • Pupils will be able to apply a variety of transformations to trigonometric graphs. • Pupils will be able to find the equation of a trigonometric graph. • Pupils will be able to solve trigonometric equations. • Pupils will be able to identify and apply trigonometric identities to simplify expressions.	• I can use a calculator to find the sine, cosine or tangent of any angle. • I can accurately sketch the graphs of sin x, cos x and tan x. • I can give the definition of the period and amplitude of a trigonometric function. • I can transform a trigonometric graph by stretching it vertically and horizontally, by moving it left to right and by moving it up and down. • I can solve a trigonometric equation and find all solutions. • I can use trigonometric identities: ○ $\tan x = \frac{\sin x}{\cos x}$ ○ $sin^2x + cos^2x = 1$ to simplify expressions.	

Applications			
Topic	**Learning Intention**	**Success Criteria**	**I understand this…**
Trigonometry	• Pupils should be able to calculate the area of a non-right angled triangle. • Pupils should be able to find the length of a missing length in any triangle. • Pupils should be able to calculate a missing angle in any triangle. • Pupils should be able to apply their knowledge of triangles and trigonometry to solve problems including bearings.	• I understand that trigonometry deals with the ratio of sides in triangles. • I can calculate the area of a triangle given the length of two sides and an angle. • I can use the sine rule to calculate the length of a missing side in a non right angled triangle. • I can use the sine rule to calculate the size of an angle in a no right angled triangle. • I can use the cosine rule to calculate the length of a missing side in a non right angled triangle. • I can use the cosine rule to calculate the size of an angle in a no right angled triangle. • I can use three figure bearings to describe direction. • I can accurately measure and sketch a bearing. • I can use information given to determine whether an angle is acute or obtuse.	
Vectors & 3D Co-ordinates	• Pupils will be able to use vectors to describe force and direction. • • Pupils will be able to use co-ordinates and vectors in three dimensions.	• I understand that a vector has both direction and size magnitude. • I understand that a scalar has no direction. • I can express a vector using column notation. • I can express a vector using a directed line segment. • I can sketch a vector given its components.	

		• I understand that vectors are equal if they have the same magnitude and direction. • I can multiply a vector by a scalar and understand how the vector changes. • I understand that the negative of any vector changes its direction. • I can calculate the magnitude of a vector. • I can find a resultant vector by adding vectors. • I can sketch a diagram to illustrate vector addition. • I can use three dimensional co-ordinated to describe a point in space.	
Percentages	• Pupils will be able to accurately work with percentages in a variety of contexts.	• I can find a percentage of a quantity. • I can find the original value of one quantity given its increased/decreased value. (Reverse Percentages) • I can calculate simple interest. • I can calculate compound interest. • I know the definitions of “appreciation” and “depreciation” and know how to calculate these.	
Fractions	• Pupils will be able to apply the four basic operations to fractions. • Pupils will be able to use fractions in a variety of contexts. • Pupils will be able to express fractions in equivalent forms.	• I can identify the numerator and denominator of a fraction. • I can find an equivalent fraction. • I can simplify a fraction. • I can write a mixed number fraction as an improper fraction. • I can write an improper fraction as a mixed number fraction.	

		• I can find a fraction of a quantity. • I can find the reciprocal of a fraction. • I can add, subtract, multiply and divide fractions	
Distributions	• Pupils will be able to use statistical analysis to compare distributions and data sets. • Pupils will be able to illustrate a data set using a box plot.	• I can calculate the range of a data set. • I can calculate the mean, median and mode of a data set. • I understand that mean, median and mode are all types of averages and know which one is best to use in certain situations. • I can calculate a five figure summary of a data set – lowest, highest and quartiles. • I can calculate the interquartile range and semi-interquartile range of a data set. • I can illustrate a five figure summary on a box plot. • I can compare two or more distributions using box plots and can make valid statements about all. • I understand that the standard deviation of a data set gives an idea of how spread out the data set is. • I can calculate the standard deviation of a data set.	
Scatter Graphs	• Pupils will be able to interpret a scatter graph. • Pupils will be able to identify correlation.	• I can accurately plot a scatter graph. • I can interpret a scatter graph to determine required information. • I can identify the three types of correlation by examining a scatter graph.	

	• Pupils will be able to draw a best fitting line and determine its equation.	• I can draw a line of best fit on a scatter graph. • I understand that a line of best fit identifies the trend of the data. • I can determine the equation of a line of best fit. • I can estimate a value from one data set when the corresponding data is given.