Year 1/AS Pure Mathematics PLC **Name:_____**

1) ALGEBRAIC EXPRESSIONS

I am able to…

			
Multiply and divide integer powers			
Expand a single term over brackets and collect like terms			
Expand the product of two or three expressions			
Factorise linear, quadratic and simple cubic expressions			
Know and use the laws of indices			
Simplify and use the rules of surds			
Rationalise denominators			

2) QUADRATICS

I am able to…

			
Solve quadratic equations using factorisation, the quadratic formula and completing the square			
Read and use f(x) notation when working with functions			
Sketch the graph and find the turning point of a quadratic function			
Find and interpret the discriminant of a quadratic expression			
Use and apply models that involve quadratic functions			

3) EQUATIONS AND INEQUALITIES

I am able to…

			
Solve linear simultaneous equations using elimination or substitution			
Solve simultaneous equations, one linear and one quadratic			
Interpret algebraic solutions of equations graphically			
Solve linear inequalities			
Solve quadratic inequalities			
Interpret inequalities graphically			
Represent linear and quadratic inequalities graphically			

4) GRAPHS AND TRANSFORMATIONS

I am able to…

			
Sketch cubic graphs			
Sketch quadratic graphs			
Sketch reciprocal graphs of the form $y = a/x$ and $y = a/x^2$			
Use intersection points of graphs to solve equations			
Translate graphs			
Stretch graphs			
Transform graphs of unfamiliar functions			

5) STRAIGHT LINE GRAPHS

I am able to…

	☺	😐	☹
Calculate the gradient of a line joining a pair of points			
Understand the link between the equation of a line, its gradient and intercept			
Find the equation of a line given (i) the gradient and one point on the line or (ii) two points on the line			
Find the point of intersection for a pair of straight lines			
Know and use the rules for parallel and perpendicular gradients(lines)			
Solve length and area problems on coordinate grids			
Use straight line graphs to construct mathematical models			

6) CIRCLES

I am able to…

	☺	😐	☹
Find the midpoint of a line segment			
Find the equation of the perpendicular bisector to a line segment			
Know how to find the equation of a circle			
Solve geometric problems involving straight lines and circles			
Use circle properties to solve problems on coordinate grids			
Find the angle in a semicircle and solve other problems involving circles and triangles			

7) ALGEBRAIC METHODS

I am able to…

	☺	😐	☹
Cancel factors in algebraic fractions			
Divide a polynomial by a linear expression			
Use the factor theorem to factorise a cubic expression			
Construct mathematical proofs using algebra			
Use proof by exhaustion and disproof by counter-example			

8) THE BINOMIAL EXPANSION

I am able to…

	☺	😐	☹
Use Pascal's Triangle to identify binomial coefficients and use them to expand simple binomial expansions			
Use combinations and factorial notations			
Use the binomial expansion to expand brackets			
Find individual coefficients in a binomial expansion			
Make approximations using the binomial expansion			

9) TRIGONOMETRIC RATIOS

I am able to…

	☺	😐	☹
Use the Cosine rule to find a missing side or angle			
Use the Sine rule to find a missing side or angle			
Find the area of a triangle using an appropriate formula			
Solve problems involving triangles			
Sketch the graphs of the sine, cosine and tangent functions			
Sketch simple transformations of sine, cosine and tangent graphs			

10) TRIGONOMETRIC IDENTITIES AND EQUATIONS

I am able to…

	☺	😐	☹
Calculate the sine, cosine and tangent of any angle			
Know and use the exact trigonometric ratios for 30, 45 and 60			
Know and use the relationships $\tan\Theta = \sin\Theta/\cos\Theta$ and $\cos^2\Theta + \sin^2\Theta = 1$			
Solve simple trigonometric equations of the forms $\sin\Theta=k$, $\cos\Theta=k$ and $\tan\Theta=k$			
Solve more challenging trigonometric equations of the forms $\sin n\Theta=k$ and $\sin(n\Theta\pm\mu)=k$ and equivalent equations involving cos and tan			
Solve trigonometric equations that produce quadratics			

11) VECTORS

I am able to…

	☺	😐	☹
Use vectors in two dimensions			
Use column vectors and carry out arithmetic operations on vectors			
Calculate the magnitude and direction of a vector			
Understand and use position vectors			
Use vectors to solve geometric problems			
Understand vector magnitude and use vectors in speed and distance calculations			
Use vectors to solve problems in context			

12) DIFFERENTIATION

I am able to…

			
Find the derivative, f'(x) or dy/dx, of a simple function			
Use the derivative to solve problems involving gradients, tangents and normals			
Identify increasing and decreasing functions			
Find the second order derivative, f''(x) or d^2y/dx^2 of a simple function			
Find stationary points of functions and determine their nature			
Sketch the gradient function of a given function			
Model real-life situations with differentiation			

13) INTEGRATIATION

I am able to…

			
Find y given dy/dx or x^n			
Integrate polynomials			
Find f(x) given f'(x) and a point on the curve			
Evaluate a definite integral			
Find the area bounded by a curve and the x-axis			
Find areas bounded by curves and straight lines			

14) EXPONENTIALS AND LOGARITHMS

I am able to…

			
Sketch graphs of the form $y=a^x$, $y=e^x$ and transformations of these graphs			
Differentiate e^{kx} and understand why this result is important			
Use and interpret models that use exponential functions			
Recognise the relationship between exponents and logarithms			
Recall and apply the laws of logarithms			
Solve equations of the form $a^x=b$			
Describe and use the natural logarithm function			
Use logarithms to estimate the values of constants in non-linear models			