# Algebra 5

## Inequalities, Expressions and Quadratics

| | Pi | Theta | Delta | Sigma |
|---|---|---|---|---|
| Mastery | 1) Use the correct notation to show inclusive and exclusive inequalities<br>2) Show inequalities on number lines<br>3) Write down whole number values that satisfy an inequality<br>4) Construct inequalities to represent a set shown on a number line<br>5) Factorise into a single bracket<br>6) Expand the product of two linear expressions of the form x ± n<br>7) Factorise quadratic expressions<br>8) Simplify expressions by collecting like terms (including quadratics) | 9) Solve simple linear inequalities in one variable, and represent the solution set on a number line<br>10) Solve two inequalities in *x*, find the solution sets and compare them to see which value of *x* satisfies both<br>11) Factorise more complex expressions (single brackets)<br>12) Factorise quadratic expressions including difference of 2 squares<br>13) Solve quadratics equations where the coefficient of $x^2$ is 1.<br>14) Expand the product of two linear expressions of the form ax ± n | 1) Solve more complex inequalities involving negative multipliers<br>2) Factorise quadratic expressions of the form $ax^2+bx+c$, including the difference of two squares<br>3) Cancel common factors in rational expressions<br>4) Solve quadratic equations by factorisation (including when the coefficient of $x^2$ is not 1)<br>5) Solve quadratic equations using the quadratic formula<br>6) Plot and Identify roots from a quadratic graph | ○ Sketch the graph of a quadratic function<br>○ Solve quadratic inequalities<br>○ Completing the square<br>○ Sketch the graph of a quadratic (not factorised) including finding the turning point<br>○ Expand triple brackets<br>○ Sketch the graph of a cubic function<br>○ Simplify expressions involving quadratics<br>○ Algebraic proof |

# Shape 4

## Pythagoras Theorem and Trigonometry

| | Pi | Theta | Delta | Sigma |
|---|---|---|---|---|
| Mastery | 1) Given three sides of a triangle, use Pythagoras' Theorem to justify if it is right-angled or not<br>2) Use Pythagoras' Theorem to calculate the length of the hypotenuse in a right-angled triangle<br>3) Use Pythagoras' Theorem to find the length of a shorter side in a right-angled triangle | 4) Solve problems in 2D using Pythagoras' Theorem, including the distance between 2 points on a coordinate grid<br>5) Use the trigonometric ratios sine, cosine and tangent to find angles in 2D triangles<br>6) Use the trigonometric ratios to find lengths in 2D triangles<br>7) Use the trigonometric ratios to solve 2D problems | 1) Solve problems involving compound shapes made from triangles<br>2) Find angles of elevation and depression<br>3) Use Pythagoras' Theorem to solve problems in 3D configurations<br>4) Use trigonometric ratios to solve problems in 3D configurations | ○ Use the sine and cosine rule<br>○ derive exact values of sine, cos and tan 30,45,60<br>○ Solve algebraic right-angled triangle problems |

# Number 5

## Fractions, Decimals, Percentages, Ratio and Proportion

| | Pi | Theta | Delta | Sigma |
|---|---|---|---|---|
| Mastery | 1) Add, subtract, multiply and divide fractions and mixed numbers.<br>2) Multiply decimals<br>3) Calculate percentages (Non – calc)<br>4) Understand the equivalence of more difficult fractions, decimals and percentages, including those greater than 1.<br>5) Use ratio notation<br>6) Simplify ratio<br>7) Divide a quantity into two parts in a given ratio<br>8) Given one part of a ratio, find the other<br>9) Know how to convert between a fraction and a ratio<br>10) Use the unitary method to solve simple problems involving ratio and direct proportion | 11) Simplify ratios, including those expressed in different units, recognising links with fraction notation<br>12) Calculate which is the 'best buy' from two or three options<br>13) Convert between different currencies<br>14) use map scales | 1) Compare two ratios; interpret and use ratio in a range of contexts (combining ratio and one part changing)<br>2) Use the unitary method to solve simple problems involving direct and **inverse** proportion<br>3) Calculate an unknown quantity from quantities that vary in direct proportion using algebraic methods<br>4) Use calculators to explore exponential growth and decay, using a multiplier and the power key | ○ Solve problems involving inverse proportion using algebraic methods<br>○ Comparing pie charts that are proportional pie charts<br>○ UKMT problems |

# Shape 5

## Area, Perimeter and Volume

| | Pi | Theta | Delta | Sigma |
|---|---|---|---|---|
| Mastery | 1) Convert one metric unit to another<br>2) Read and interpret scales<br>3) Know and use the formula for the area of a rectangle, triangle, parallelogram and trapezium.<br>4) Label all parts of a circle<br>5) Know and use the formula for the area and circumference of a circle.<br>6) Calculate the perimeter and area of compound shapes, including circles (semi-circles).<br>7) Find the area, perimeter and volume of shapes with algebraic terms for lengths.<br>8) Know and use the formula for the volume of a cuboid<br>9) Know the number of vertices, faces and edges of a 3-D shape | 10) Convert between units of area<br>11) Calculate the surface area of cubes and cuboids<br>12) Calculate the surface area and volume of prisms (not cylinders)<br>13) Calculate the volume of a cylinder (including in context and working backwards) | 1) Find the surface areas and volumes of cylinders, pyramids, cones and spheres<br>2) Find the surface areas and volumes of composite shapes made from cylinders, pyramids, cones and spheres<br>3) Calculate the area of sectors and arc lengths. | ○ Solve problems involving surface areas and volumes of pyramids, cones and spheres.<br>○ Solve problems involving frustums of cones. |