

NKS Maths Curriculum Map 2021



The purpose of studying Maths at NKS is...

Maths is a valued academic discipline at NKS. We aim to equip our students over the course of their time at NKS with excellent numeracy skills that will be of value to them in their chosen route after school, whether this is further education or employment.

We work with students to develop mathematical problem solving skills because problem solving requires students to approach problems in a structured, logical manner. We also encourage students to be resilient and flexible in their approach – if they can't solve a problem with one method, how else could they solve the problem? What other methods could they use?

We are a selective school and our academic expectations of our students are high. We allow our most able KS4 students to undertake an additional Further Maths FSMQ (Level 3) as this develops their algebra skills and prepares them for A level.

We follow a three-year GCSE curriculum because we believe this allows our students to develop their mathematical understanding of the curriculum to a greater depth.

The maths department are also involved in developing mastery approaches to maths learning in KS3. KS3 teachers are working collaboratively to develop a mastery approach based on White Rose that will enable students at KS3 more time to develop fundamental maths skills.

We aim to support our students to enable them to achieve by conducting a stimulating learning environment for maths. We provide regular feedback to our students on their progress. We expect our students to achieve more than students with similar starting points nationally.

For further information please contact:

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Year 7

Prior to joining NKS students will have studied the national KS2 Maths Curriculum. We have approximately 50 feeder primary schools that range from large four-form entry schools to small village schools.

NKS is introducing a mastery-based curriculum in Year 7. A mastery curriculum develops understanding in small steps, using representations where possible to ensure understanding of new concepts or concepts being further developed since primary school.

	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Content – Knowledge and Understanding	Number <ul style="list-style-type: none"> Use the four operations with positive integers and decimals Use a calculator 	Number <ul style="list-style-type: none"> Find fractions of an amount Solve problems with fractions greater than one 	Number <ul style="list-style-type: none"> Use known facts 	Number <ul style="list-style-type: none"> Prime factorisation HCF and LCM Use known facts 	Number <ul style="list-style-type: none"> Multiply and divide fractions Multiply and divide mixed numbers 	Algebra <ul style="list-style-type: none"> Using coordinates Plotting graphs: $y = k$, $x = k$, $y = kx$, $y = x + a$, $y = mx + c$ Exploring gradient Exploring non-linear graphs
Skills and concepts	<ul style="list-style-type: none"> Use factors and multiples Multiply and divide by positive powers of 10 Order of operations Multiply by 0.1 and 0.01 Ratio, Proportion and rates of change <ul style="list-style-type: none"> Convert metric units 	<ul style="list-style-type: none"> Find percentage of an amount using mental and calculator methods Explore over 100% Order directed number <ul style="list-style-type: none"> Use the four operations with directed number 	Algebra <ul style="list-style-type: none"> Explore related algebraic expressions Ratio, Proportion and rates of change <ul style="list-style-type: none"> Use multiplicative relationships between known facts 	Probability <ul style="list-style-type: none"> Use the language of probability Calculate simple probabilities Use the probability scale Sample spaces Understand and use set notation including Venn diagrams 	Algebra <ul style="list-style-type: none"> Conversion graphs Direct proportion graphs Ratio, Proportion and rates of change	Probability <ul style="list-style-type: none"> Recognise different types of data Construct and interpret frequency tables, grouped and

	<ul style="list-style-type: none"> Solve perimeter problems Areas of rectangles, parallelograms and triangles Area of a trapezium <p>Probability</p> <ul style="list-style-type: none"> Solve problems with line charts and bar charts Find the mean 	<ul style="list-style-type: none"> Prime factorisation HCF and LCM Add and subtract fractions incl mixed numbers <p>Algebra</p> <ul style="list-style-type: none"> Revisit notation and substitution Collecting like terms Form and solve 2-step equations Simple algebraic fractions 	<p>Geometry and measures</p> <ul style="list-style-type: none"> Geometric notation Draw lines, angles and simple shapes Parallel and perpendicular lines Name and construct polygons Properties of triangles and quadrilaterals Angles at a point Adjacent angles on a straight line Vertically opposite angles Angles in triangles and quadrilaterals Angles in parallel lines Simple angle proofs <p>Probability</p> <ul style="list-style-type: none"> Construct and interpret pie charts 	<ul style="list-style-type: none"> Know the sum of probabilities is 1 Complement of a set 	<ul style="list-style-type: none"> Understand and use ratio notation Divide in a ratio Work out parts of wholes Pi as a ratio Use the form 1:n Link gradient and ratio Understand and use scale factors Scale diagrams and maps Currency conversions Conversion graphs Similar shapes Direct proportion graphs <p>Geometry and measures</p> <ul style="list-style-type: none"> Circumference of a circle Work with scale factors 	<p>ungrouped, and two-way tables</p> <ul style="list-style-type: none"> Review and extend Y7 coverage Construct Sample Spaces for more than one event Use sample spaces to find probabilities Use tables and Venn diagrams to find probabilities Use the product rule for finding total number of outcomes <p>Statistics</p> <ul style="list-style-type: none"> Scatter graphs Correlation Lines of best fit
Assessment	End of Unit assessments	End of Unit assessments	End of Unit assessments	End of Unit assessments	End of Unit assessments	End of Unit assessments EOY assessment
Enrichment and extension	UKMT					

NKS Maths Curriculum Map 2021

Year 8

Our Y8 curriculum builds on and extends the work done in Y7.

	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
<p>Content – Knowledge and Understanding</p>	<p>Unit 1: Factors and powers</p> <ol style="list-style-type: none"> Find the prime factor decomposition of a number Use prime factor decomposition to find the HCF or LCM of 2 numbers Apply the index laws for multiplication and division of small positive integer powers Understand the order in which to calculate expressions that contain powers and brackets in fractions Be able to simplify expressions containing powers to complete the calculation Know and use the general forms of the index laws for multiplication and division of positive integer powers Round numbers to a given number of significant figures Use numbers of any size rounded to 1 significant figure <p>Unit 2: Working with powers</p> <ol style="list-style-type: none"> Simplify simple expressions involving powers but not brackets, by collecting like terms 	<p>Unit 3: 2-D shapes and 3-D solids</p> <ol style="list-style-type: none"> Begin to use plans and elevations Use the formula for the circumference of a circle Use the formulae for area of a circle, given the radius or diameter Recognise solids from their nets, complete the nets and sketch 3D shape Calculate the volume of right prisms Know the formula for Pythagoras' theorem and how to substitute in values from a diagram Given the circumference or area of a circle, be able to calculate the radius or diameter Calculate the surface area of right prisms Given the coordinates of points A and B, calculate the length of AB. <p>Unit 4: Real-life graphs</p> <ol style="list-style-type: none"> Draw and use graphs to solve distance–time problems 	<p>Unit 5: Transformations</p> <ol style="list-style-type: none"> Describe a reflection, giving the equation of the line of reflection Rotation on a coordinate grid Identify reflection symmetry in 3D shapes Know that translations, rotations and reflections preserve length and angle Recognise that enlargements preserve angle but not length Reflection on a coordinate grid in $y = x$, $y = -x$ Transform 2D shapes by more complex combinations of rotations, reflections and translations Use fractional scale factors with a centre of enlargement Enlarge 2D shapes, given a centre of enlargement outside the shape and a negative whole number scale factor Recognise that enlargements preserve angle but not length Calculate the new area of a shape after enlargement <p>Unit 6: Fractions, decimals and percentages</p>	<p>Unit 7: Construction and loci</p> <ol style="list-style-type: none"> Draw an accurate triangle given two angles and the included side Use straight edge and compass to construct the perpendicular from a point on a line segment Use straight edge and compass to construct the perpendicular from a point to a line segment Use ruler and compasses to construct simple nets of 3D shapes Use straight edge and compass to construct the midpoint and perpendicular bisector of a line segment Use straight edge and compass to construct the bisector of an angle Draw the locus equidistant from a point Produce shapes and paths by using descriptions of loci 	<p>Unit 8: Probability</p> <ol style="list-style-type: none"> Find and justify probabilities based on equally likely outcomes in simple contexts Understand and use the probability scale from 0 to 1 Know that probability of event is p probability of not occurring is $1 - p$ Identify all mutually exclusive outcomes for two successive events with two outcomes in each event Know that probability of event is p probability of not occurring is $1 - p$ Use the language of probability to compare the choice of x/a with y/b Calculate the probability of the final event of a set of mutually exclusive events Draw and use tree diagrams to represent outcomes of two independent events and calculate probabilities 	<p>Unit 10: Graphs</p> <ol style="list-style-type: none"> Plot straight line graphs Find the y-intercept of a straight line graph Find the gradient of a straight line graph Plot graphs using the gradient and the y-intercept Use $y = mx + c$ Find the equation of a straight line graph Identify parallel and perpendicular lines Find the inverse of a linear function Plot and use non-linear graphs
<p>Skills and concepts</p>						

	<p>2. Multiply a single term over a bracket</p> <p>3. Know and understand the meaning of an identity and use the identity sign</p> <p>4. Simplify simple expressions involving index notation</p> <p>5. Simplify expressions involving brackets and powers</p> <p>6. Use the distributive law to take out single term algebraic factors</p> <p>7. Substitute positive and negative integers into linear expressions and expressions involving powers</p> <p>8. Substitute positive and negative integers into linear expressions and expressions involving powers</p> <p>9. Apply the index laws for multiplication and division of small integer powers</p> <p>10. Solve equations that involve multiplying out brackets by a negative number and collecting like terms</p> <p>11. Construct and solve equations brackets by a negative number and collecting like terms</p>	<p>2. Discuss and interpret real-life graphs, involving trends</p> <p>3. Recognise graphs that show direct proportion</p> <p>4. Plot the graphs of a function derived from a real-life problem</p> <p>5. Discuss and interpret linear and non-linear graphs from a range of sources</p>	<p>1. Know the denominators of simple fractions that produce recurring decimals</p> <p>2. Learn fractional equivalents to key recurring decimals</p> <p>3. Convert a recurring decimal to a fraction</p> <p>4. Convert a fraction to a recurring decimal</p> <p>5. Calculate percentage change, where formula is recalled</p> <p>6. Use the unitary method for an inverse operation to find the original price</p> <p>7. Calculate percentage change, where formula is given</p> <p>8. Use the unitary method for an inverse operation to find the original price</p> <p>9. Calculate repeated percentage change</p>		<p>Unit 9: Scale drawings and measures</p> <ol style="list-style-type: none"> 1. Use the scales in maps and plans 2. Measure and use bearings 3. Draw diagrams to scale using bearings 4. Draw diagrams to scale 5. Use and interpret scale drawings 6. Identify congruent and similar shapes 7. Use congruence to solve problems in triangles and quadrilaterals 8. Use similarity to solve problems in 2D shapes 9. <p>- - - - -</p>	
Assessment	End of Unit assessments	End of Unit assessments	End of Unit assessments	End of Unit assessments	End of Unit assessments	End of Unit assessments
Enrichment and extension	UKMT					

NKS Maths Curriculum Map 2021

Year 9

Our Y9 curriculum is the start of our student's GCSE Maths course. Students have been equipped with foundational mathematical knowledge from KS3 which has been developed through mastery techniques enabling them to commence the course with confidence.

Our GCSE curriculum is based on a Collins scheme of work that has been modified in places to enable a smoother progression of maths skills development.

	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
<p>Content – Knowledge and Understanding</p> <p>Skills and concepts</p>	<p>Basic number</p> <p>Solve problems set in a real-life context.</p> <p>Multiply a decimal number by another decimal number.</p> <p>Divide by a decimal number.</p> <p>Round to a given number of significant figures.</p> <p>Estimate before calculating.</p> <p>Round a calculation to give a reasonable answer.</p> <p>Find multiples and factors.</p> <p>Identify prime numbers.</p> <p>Identify square and triangular numbers.</p> <p>Find square roots.</p> <p>Identify cubes and cube roots.</p> <p>Identify prime factors.</p> <p>Identify the least common multiple of two numbers.</p> <p>Identify the highest common factor of two multiples.</p> <p>Calculate with positive and negative numbers.</p> <p>Powers, roots and standard form</p>	<p>Fractions</p> <p>One quantity as a fraction of another</p> <p>Add and subtract fractions with different denominators.</p> <p>Multiply proper fractions and mixed numbers.</p> <p>Divide by fractions.</p> <p>Use a calculator to accurately solve problems involving fractions.</p> <p>Recognise rational numbers, reciprocals, terminating decimals and recurring decimals</p> <p>Convert terminal decimals to fractions</p> <p>Convert fractions to recurring decimals</p> <p>Find reciprocals of numbers or fractions</p> <p>Percentages</p> <p>Increase and decrease quantities by a percentage</p> <p>Work out percentage change.</p> <p>Express one quantity as a percentage of another.</p> <p>Calculate compound interest.</p>	<p>Angles</p> <p>Know the sum of the angles on a straight line, around a point, in a triangle and in a quadrilateral.</p> <p>Solve missing angle problems in triangles.</p> <p>Work out the sum of the interior angles in a polygon.</p> <p>Calculate the size of the interior and exterior angles of any regular polygon.</p> <p>Solve problems involving alternate, corresponding, allied and opposite angles.</p> <p>Calculate the size of angles in special quadrilaterals using their geometric properties.</p> <p>Number and sequences</p> <p>Recognise patterns in number sequences.</p> <p>Generate sequences, given the nth term.</p> <p>Find the nth term of a linear sequence.</p> <p>Linear graphs</p> <p>Draw linear graphs by finding points.</p> <p>Find the gradient of a straight line.</p>	<p>Transformations</p> <p>Demonstrate that two triangles are congruent</p> <p>Find the order of rotational symmetry for a 2D shape</p> <p>Recognise shapes with rotational symmetry.</p> <p>Translate, reflect, rotate and enlarge a 2D shape.</p> <p>Combine transformations</p> <p>Area in 2-D</p> <p>Calculate the circumference and area of a circle.</p> <p>Calculate the area of a parallelogram.</p> <p>Calculate the area of a trapezium.</p> <p>Calculate the length of an arc.</p> <p>Calculate the area and angle of a sector.</p> <p>Find the error interval or limits of accuracy of numbers that have been rounded to different degrees of accuracy.</p> <p>Combine limits of two or more variables together to solve problems.</p>	<p>Pythagoras' Theorem</p> <p>Calculate the length of the hypotenuse in a right-angled triangle.</p> <p>Calculate the length of a shorter side in a right-angled triangle.</p> <p>Solve practical problems involving Pythagoras' theorem.</p> <p>Use Pythagoras' Theorem and isosceles triangles</p> <p>Statistical diagrams and averages</p> <p>Draw and interpret bar charts and pie charts.</p> <p>Draw and interpret line graphs.</p> <p>Use averages to solve more complex problems.</p> <p>Identify the advantages and disadvantages of each type of average and learn which one to use in different situations.</p> <p>Work out and use the range of a set of data.</p> <p>Calculate the mode, the median and the mean from a frequency table.</p> <p>Identify the modal group.</p> <p>Estimate the mean from a grouped frequency table.</p> <p>Draw, interpret and use scatter diagrams.</p>	<p>Exploring and applying probability</p> <p>Calculate experimental probabilities and relative frequencies.</p> <p>Estimate probabilities from experiments.</p> <p>Use different methods to estimate probabilities.</p> <p>Recognise mutually exclusive, complementary and exhaustive events.</p> <p>Predict the likely number of successful events, given the number of trials and the probability of any one outcome.</p> <p>Read two-way tables and use them to work out probabilities.</p> <p>Use Venn diagrams to solve probability questions.</p> <p>Constructions and loci</p> <p>To be able to make a scale drawing to a given scale.</p> <p>To be able to convert measurements to calculate actual distances.</p> <p>To be able to read, interpret and draw bearings diagrams.</p>

	<p>Multiply and divide by powers of 10.</p> <p>Use rules for multiplying and dividing powers.</p> <p>Change a number into standard form.</p> <p>Calculate using numbers in standard form.</p> <p>How to estimate powers and roots of any given positive number.</p> <p>Apply the rules of powers to negative and fractional powers</p> <p>Find and use the relationship between negative powers and roots</p> <p>Simplify surds (only).</p> <p>Basic algebra</p> <p>Recognise expressions, equations, formulae and identities.</p> <p>Substitute into, manipulate and simplify algebraic expressions.</p> <p>Factorise an algebraic expression.</p> <p>Solve equations in which the variable (the letter) appears as part of the numerator of a fraction.</p> <p>Solve equations where you have to expand brackets first.</p> <p>Solve equations where the variable appears on both sides of the equals sign.</p> <p>Set up equations from given information and then solve them.</p> <p>Change the subject of a formula.</p>	<p>Solve problems involving repeated percentage change.</p> <p>Calculate the original amount after a known percentage change.</p> <p>Ratio and proportion</p> <p>Simplify a ratio.</p> <p>Express a ratio as a fraction.</p> <p>Divide amounts in given ratios.</p> <p>Complete calculations from a given ratio.</p> <p>Recognise and solve problems using direct proportion.</p> <p>Find either the cost per unit weight or the weigh per unit cost and use to identify the cheapest product.</p> <p>Recognise and solve problems involving the compound measures of rates of pay, speed, density and pressure.</p>	<p>Draw a line with a certain gradient.</p> <p>AM Find the gradient, length and midpoint of a line joining two points</p> <p>Draw graphs using the gradient-intercept method.</p> <p>Draw graphs using the cover-up method.</p> <p>Find the equation of a line, using its gradient and intercept.</p> <p>Find the equation of a line given two points on the line.</p> <p>Convert from one unit to another unit by using a conversion graph.</p> <p>Use straight-line graphs to find formulae.</p> <p>Draw linear graphs parallel or perpendicular to other lines and passing through a specific point.</p>	<p>- - - - -</p> <p>-</p>	<p>Draw and use a line of best fit.</p> <p>Revision and EOY exams</p> <p>- - - - -</p>	<p>To use the geometrical properties of a diagram to calculate a bearing.</p> <p>Construct the bisectors of lines and angles</p> <p>Construct angles of 60° and 90°.</p> <p>Draw a locus for a given rule</p> <p>Solve practical problems using loci</p> <p>Construct and interpret plans and elevations of 3D shapes.</p> <p>- - - - -</p>
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Assessment	End of Unit assessments	End of Unit assessments	End of Unit assessments	End of Unit assessments	End of Unit assessments	End of Unit assessments
Enrichment and extension	UKMT					

NKS Maths Curriculum Map 2021

Year 10

Our Y10 curriculum builds on and extends the work done in Y9 by developing mathematical skills whilst following our GCSE curriculum

	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Content – Knowledge and Understanding	Non-linear sequences Recognise and continue some special number sequences such as square numbers. Find the n th term of a sequence from a diagram or practical problem. Generate the terms of a quadratic sequence from the n th term. Work out the n th term of a quadratic sequence.	Further surds Calculate and manipulate surds, including rationalising a denominator. Similarity Show two triangles are similar. Work out the scale factor between similar triangles. Solve problems involving the area and volume of similar shapes. Trigonometry Use the three trigonometric ratios. Use the trigonometric ratios to calculate an angle. Find lengths of sides and angles in right-angled triangles using the sine and cosine functions. Find lengths of sides and angles in right-angled triangles using the tangent function. Decide which trigonometric ratio to use in a right-angled triangle. Solve practical problems using trigonometry.	Simultaneous equations Solve simultaneous linear equations using graphs. Solve simultaneous linear equations in two variables using the elimination method. Solve simultaneous linear equations in two variables using the substitution method. Solve simultaneous linear equations by balancing coefficients. Solve problems using simultaneous linear equations. Sampling and more complex diagrams Understand sampling. Collect unbiased reliable data for a sample. Draw and interpret frequency polygons. Draw and interpret cumulative frequency graphs. Draw and interpret box plots. Draw and interpret histograms where the bars are of equal width.	Quadratic equations and functions Draw and read values from quadratic graphs. Solve a quadratic equation by factorisation. Rearrange a quadratic equation so that it can be factorised. Solve a quadratic equation by using the quadratic formula. Recognise why some quadratic equations cannot be solved. Solve a quadratic equation by completing the square. Identify the significant points of a quadratic function graphically. Identify the roots of a quadratic function by solving a quadratic equation. Identify the turning point of a quadratic function by using symmetry or completing the square. AM Functions and equations Factor theorem NT(2) Applications of linear, quadratic and cubic equations	Graphical solutions and equations Solve a pair of simultaneous equations where one is linear and one is non-linear, using graphs. Solve equations by the method of intersecting graphs. Solve simultaneous equations where one equation is linear and the other is non-linear. Simultaneous equations Solve quadratic inequalities. Revision and EOY exams - - - - -	Variation Solve a pair of simultaneous equations where one is linear and one is non-linear, using graphs. Solve equations by the method of intersecting graphs. Solve simultaneous equations where one equation is linear and the other is non-linear. Solve quadratic inequalities. Combined events Solve problems where two variables have a directly proportional relationship. Work out the constant of proportionality. Solve problems where two variables have an inversely proportional relationship. Work out the constant of proportionality. Work out the number of choices, arrangements or outcomes when choosing from lists or sets.
Skills and concepts						

	<p>Area and volume</p> <p>Calculate the volume of a prism.</p> <p>Calculate the volume and surface area of a cylinder.</p> <p>Calculate the volume of a pyramid.</p> <p>Calculate the volume and surface area of a cone.</p> <p>Calculate the volume and surface area of a sphere.</p> <p>Use Pythagoras' theorem to solve problems involving three dimensions.</p> <p>- - - - -</p>	<p>Solve problems using an angle of elevation or an angle of depression.</p> <p>- - - - -</p>	<p>Draw and interpret histograms where the bars are of unequal width.</p> <p>Calculate the median, quartiles and interquartile range from a histogram.</p> <p>Linear inequalities</p> <p>Solve a simple linear inequality and represent it on a number line.</p> <p>Show a graphical inequality.</p> <p>Find regions that satisfy more than one graphical inequality.</p> <p>AM content here</p> <p>AM Linear programming</p> <p>Express real situations in terms of linear inequalities.</p> <p>Use graphs of linear inequalities to solve 2-dimensional maximisation and minimisation problems.</p> <p>Know the definition of objective function and be able to find it in 2-dimensional cases.</p> <p>- - - - -</p>	<p>Properties of circles</p> <p>Work out the size of angles in circles.</p> <p>Find the size of angles in cyclic quadrilaterals.</p> <p>Use tangents and chords to find the size of angles in circles.</p> <p>Use the alternate segment theorem to find the size of angles in circles.</p> <p>- - - - -</p>		<p>Use the product rule for counting numbers of outcomes of combined events.</p> <p>Enumerate the number of ways of obtaining an ordered linear subset (permutation) of r elements from a set of n distinct objects.</p> <p>Enumerate an unordered subset (combination) of r elements from a set of n distinct objects.</p> <p>Work out the probability of different outcomes of combined events.</p> <p>Work out the probability of two outcomes or events occurring at the same time.</p> <p>Use tree diagrams to work out the probability of combined events</p> <p>Use the connectors 'and' and 'or' to work out the probabilities for combined events.</p> <p>Work out the probability of combined events when the probabilities change after each event.</p> <p>Solve problems about outcomes, including problems in the context of probability.</p> <p>Including $P(A B) = \frac{P(A \cap B)}{P(B)}$ and $P(A \cup B) = P(A) + P(B) - P(A \cap B)$</p> <p>- - - - -</p>
Assessment	End of Unit assessments	End of Unit assessments	End of Unit assessments	End of Unit assessments	End of Unit assessment Year 10 PPEs	End of Unit assessments
Enrichment and extension	UKMT, OCR Additional Maths FSMQ (Level 3) for most able students					

NKS Maths Curriculum Map 2021

Year 11

Our Y11 curriculum builds on and extends the work done in Y10 by developing mathematical skills whilst following our GCSE curriculum

	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Content – Knowledge and Understanding	<p>Further trigonometry</p> <p>Use trigonometric ratios and Pythagoras' theorem to solve more complex two-dimensional problems.</p>	<p>Algebraic fractions and functions cont</p> <p>Use areas of rectangles, triangles and trapeziums to estimate the area under a curve.</p>	<p>Some will study Additional maths (OCR L3)</p> <p>AM The Binomial Distribution</p>	<p>Some will study Additional maths (OCR L3)</p> <p>AM Differentiation</p>	<p>Some will study Additional maths (OCR L3)</p> <p>Remainder will review and revise for their GCSE exams</p>	
Skills and concepts	<p>Use trigonometric ratios and Pythagoras' theorem to solve more complex three-dimensional problems</p> <p>Find the sine, cosine and tangent of any angle from 0° to 360°.</p> <p>Plot the graphs of trigonometric functions</p> <p>Use the properties of the graphs of trigonometric functions to solve trigonometric equations</p> <p>Use the sine rule and the cosine rule to find sides and angles in any triangle.</p> <p>Know the sine and cosine rules and be able to apply them, including the ambiguous case for sine.</p> <p>Apply Pythagoras' Theorem and trigonometry to 2- and 3-dimensional problems.</p> <p>Work out the area of a triangle if you know two sides and the included angle.</p>	<p>Interpret the meaning of the area under a curve.</p> <p>Draw a tangent at a point on a curve and use it to work out the gradient at a point on a curve</p> <p>Interpret the gradient at a point on a curve.</p> <p>Find the equation of a tangent to a circle.</p> <p>Find and use the equation of a circle</p> <p>Recognise and plot cubic, exponential and reciprocal graphs.</p> <p>Sketch & plot a graph of a polynomial of order 3 or higher.</p> <p>Sketch & plot an exponential graph</p> <p>Transform a graph.</p> <p>Algebraic fractions and functions</p> <p>Simplify algebraic fractions</p>	<p>Understand and be able to apply the binomial expansion of $(a + b)^n$ where n is a positive integer.</p> <p>Construct and use the binomial distribution to enumerate outcomes.</p> <p>AM Exponentials and logarithms</p> <p>Know and use the function ka^x and its graph, where a is positive.</p> <p>Know and use the definition of $\log_a x$ as the inverse of a^x.</p> <p>Convert equations of the form $y = ka^x$ and $y = kx^n$ to a linear form using logarithms.</p> <p>Estimate values of k and a or k and n from graphs.</p> <p>Solve equations of the form $a^x = b$ for $a > 0$.</p> <p>Use exponentials and logarithms in problems involving exponential growth and decay.</p> <p>AM Numerical methods</p>	<p>Differentiate kx^n where n is a positive integer or 0, and the sum of</p> <p>such functions.</p> <p>Know that the gradient function gives the gradient of the curve and</p> <p>measures the rate of change of y with x.</p> <p>Know that the gradient of the function is the gradient of the tangent at that point.</p> <p>Find the equation of a tangent and normal at any point on a curve.</p> <p>Use differentiation to find stationary points on a curve.</p> <p>Determine the nature of a stationary point.</p> <p>Sketch a curve with known stationary points.</p> <p>AM Integration</p>	<p>-----</p> <p>-----</p>	

	<p>AM Trigonometric identities</p> <p>Know and use the identity $\tan \theta \equiv \frac{\sin \theta}{\cos \theta}$</p> <p>Know and use the identity $\sin^2 \theta + \cos^2 \theta \equiv 1.$</p> <p>Graphs</p> <p>Interpret distance–time graphs</p> <p>Draw a graph of the depth of liquid as a container is filled.</p> <p>Read information from a velocity–time graph.</p> <p>Work out the distance travelled from a velocity–time graph.</p> <p>Work out the acceleration from a velocity–time graph.</p> <p>Solve equations containing algebraic fractions.</p> <p>Change the subject of a formula where the subject occurs more than once.</p> <p>Find the output of a function.</p> <p>Find the inverse function.</p> <p>Find the composite of two functions.</p> <p>Estimate the answer to an equations that does not have an exact solution using trial and improvement.</p> <p>Find an approximate solution for an equation using the process of iteration.</p> <p>Use a simple iterative method to solve equations approximately</p> <p>- - - - -</p>	<p>Vector Geometry</p> <p>Add and subtract vectors.</p> <p>Use vectors to solve geometric problems.</p> <p>- - - - -</p>	<p>Solve equations approximately by considering the change of sign.</p> <p>Recognise when these numerical methods may fail.</p> <p>Use a chord to estimate gradient of a tangent to a curve at a point.</p> <p>Recognise how to improve an estimate for the gradient of a curve at a point.</p> <p>Use rectangular strips to estimate the area between a curve and the x-axis.</p> <p>Use trapezium rule to estimate the area between a curve and the x-axis. Recognise whether an estimate would be an over or under estimate, and understand how to calculate an improved estimate.</p> <p>Apply numerical methods in context where appropriate.</p> <p>Remainder will review and revise for their GCSE exams</p> <p>- - - - -</p>	<p>Integrate kx^n where n is a positive integer or 0, and the sum of such functions.</p> <p>Be aware that integration is the reverse of differentiation.</p> <p>Know what is meant by an indefinite and a definite integral.</p> <p>Evaluate definite integrals.</p> <p>Find the area between a curve, two ordinates and the x-axis.</p> <p>Find the area between two curves.</p> <p>AM Application of kinematics</p> <p>Recognise the special case where the use of constant acceleration formulae is appropriate.</p> <p>Use differentiation and integration with respect to time to solve simple problems involving variable acceleration.</p> <p>Remainder will review and revise for their GCSE exams</p> <p>- - - - -</p>		
Assessment	End of Unit assessments	End of Unit assessments Year 11 PPE				

Enrichment and extension	UKMT, OCR Additional Maths FSMQ (Level 3) for most able students
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NKS Maths Curriculum Map 2021

Year 12

Prior to commencing A Level students will have studied...

An understanding of students' starting points is achieved by...

Our Y12 curriculum builds on and extends this by... e.g. Units are sequenced to encourage/allow...

	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6	
Content – Knowledge and Understanding	Algebraic expressions <ul style="list-style-type: none"> Index Laws Expanding brackets Factorising Negative and fractional indices Surds Rationalising denominators 	Graphs and transformations <ul style="list-style-type: none"> Cubic graphs Quartic graphs Reciprocal graphs Points of intersection Translating graphs Sketching graphs Transforming functions 	Algebraic methods <ul style="list-style-type: none"> Algebraic fractions Dividing polynomials The factor theorem Mathematical proof Methods of proof 	Trigonometric identities and equations <ul style="list-style-type: none"> Angles in all four quadrants Exact values of trig ratios Trig identities Trig equations Equations and identities 	Integration <ul style="list-style-type: none"> Integrating x^n Indefinite integrals Finding functions Definite integrals Areas under curves Areas under the x-axis Areas between curves and lines 	Algebraic methods <ul style="list-style-type: none"> Use proof by contradiction. Multiply and divide two or more algebraic fractions Add or subtract two or more algebraic fractions Convert an expression with linear factors or repeated linear factors into partial fractions 	
Skills and concepts	Quadratics <ul style="list-style-type: none"> Solving quadratic equations Completing the square Functions Quadratic graphs The discriminant Modelling with particles Equations and inequalities <ul style="list-style-type: none"> Linear simultaneous equations Quadratic simultaneous equations Simultaneous equations on graphs Linear inequalities Quadratic inequalities Inequalities on graphs Data Collection <ul style="list-style-type: none"> Populations and samples Sampling Non-random sampling 	Straight line graphs <ul style="list-style-type: none"> $Y = mx + c$ Equations of straight lines Parallel and perpendicular lines Length and area Modelling with straight lines Circles <ul style="list-style-type: none"> Midpoints and perpendicular bisector Equation of a circle Intersections of straight lines and circles Use tangent and chord properties Circles and triangles Correlation <ul style="list-style-type: none"> Correlation Linear regression Probability	Binomial expansion <ul style="list-style-type: none"> Pascal's triangle Factorial notation The binomial expansion Solving binomial problems Binomial estimation Trigonometric ratios <ul style="list-style-type: none"> The cosine rule The sine rule Areas of triangles Solving triangle problems Graphs of sine, cosine and tangent Transforming trig graphs Hypothesis testing <ul style="list-style-type: none"> Hypothesis testing Finding critical values One-tailed tests Two-tailed tests Mechanics	Binomial expansion <ul style="list-style-type: none"> Pascal's triangle Factorial notation The binomial expansion Solving binomial problems Binomial estimation Trigonometric ratios <ul style="list-style-type: none"> The cosine rule The sine rule Areas of triangles Solving triangle problems Graphs of sine, cosine and tangent Transforming trig graphs Hypothesis testing <ul style="list-style-type: none"> Hypothesis testing Finding critical values One-tailed tests Two-tailed tests Mechanics	Vectors <ul style="list-style-type: none"> Vectors Representing vectors Magnitude and direction Position vectors Solving geometric problems Modelling with vectors Differentiation <ul style="list-style-type: none"> Gradients of curves Finding the derivative Differentiating x^n Differentiating with quadratics Gradients, tangents and normal Increasing and decreasing functions Second order derivatives Stationary points Sketching gradient functions Modelling with differentiation Variable acceleration	Exponentials and logarithms <ul style="list-style-type: none"> Exponential functions $Y = e^x$ Exponential modelling Logarithms Laws of logarithms Solving equations using logarithms Working with natural logarithms Logarithms and non-linear data - - - - -	Functions and graphs <ul style="list-style-type: none"> Understand and use modulus notation Understand mappings and functions, use domain and range Combine two or more functions to make a composite function Know how to find the inverse of a function graphically or algebraically Sketch the graphs of modulus functions

	<ul style="list-style-type: none"> Types of data The large data set <p>Measures of location and spread</p> <ul style="list-style-type: none"> Measures of central tendency Other measures of location Measures of spread Variance and standard deviation Coding <p>Representations of data</p> <ul style="list-style-type: none"> Outliers Box plots Cumulative frequency Histograms Comparing data 	<ul style="list-style-type: none"> Calculating probabilities Venn diagrams Mutually exclusive and independent events Tree diagrams <p>Statistical distribution</p> <ul style="list-style-type: none"> Probability distributions The binomial distribution Cumulative probabilities 	<ul style="list-style-type: none"> Modelling assumptions Quantities and units Working with vectors <p>Constant acceleration</p> <ul style="list-style-type: none"> Displacement-time graphs Velocity-time graphs Constant acceleration formulae Vertical motion under gravity <p>Forces and motion</p> <ul style="list-style-type: none"> Force diagrams Forces as vectors Forces and acceleration Motion in 2 dimensions Connected particles Pulleys 	<ul style="list-style-type: none"> Functions of time Using differentiation Maxima and minima problems Using integration Constant acceleration formulae 		<ul style="list-style-type: none"> Transform the modulus function <p>Statistics</p> <ul style="list-style-type: none"> Regression, correlation and hypothesis testing Exponential models Measuring correlation Hypothesis testing for zero correlation <p>Conditional probability</p> <ul style="list-style-type: none"> Set notation Conditional probability Conditional probabilities in Venn diagrams Probability formulae Tree diagrams
Assessment	End of Unit assessments	End of Unit assessments	End of Unit assessments	End of Unit assessments	End of Unit assessments Y12 PPEs	End of Unit assessments
Enrichment and extension	UKMT					

NKS Maths Curriculum Map 2021

Year 13

Our Y13 curriculum builds on and extends the work done in Y12 by... e.g. Units are sequenced to encourage/allow...

	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Content – Knowledge and Understanding	Sequences and series <ul style="list-style-type: none"> Find the nth term of an arithmetic sequence Prove and use the formula for the sum of the first n terms of an arithmetic series Find the nth term of a geometric sequence Prove and use the formula for the sum of the first n terms of a geometric series Prove and use the formula for the sum to infinity for a convergent series Generate sequences from recurrence relations Model real-life situations 	Trigonometric functions <ul style="list-style-type: none"> Understand the definition of secant, cosecant and cotangent Understand the graphs of secant, cosecant and cotangent Simplify expressions, prove simple identities involving secant, cosecant and cotangent Prove and use $\sec^2 x = 1 + \tan^2 x$ and $\operatorname{cosec}^2 x = 1 + \cot^2 x$ Understand and use inverse trig functions and their domains and ranges 	Parametric equations <ul style="list-style-type: none"> Convert parametric equations into Cartesian form by substitution or using trig identities Understand and use parametric equations of curves and sketch parametric curves Solve coordinate geometry problems involving parametric equations Use parametric equations in modelling a variety of contexts 	Integration <ul style="list-style-type: none"> Integrate standard functions including trig and exponential functions and use the reverse of the Chain rule Use trig identities in integration Integrate using a substitution, by parts or using partial fractions Find the area under a curve Use the trapezium rule Solve simple differential equations 	Revision and past paper practice	
Skills and concepts	Binomial expansion <ul style="list-style-type: none"> Expand $(1 + x)^n$ and determine the range of values of x for which the expansion is valid Expand $(a + bx)^n$ and determine the range of values of x for which the expansion is valid Use partial fractions to expand fractional expressions Radians <ul style="list-style-type: none"> Convert between degrees and radians and apply this to trig graphs and their transformations Know exact values of angles measured in radians Find arc length using radians Find areas of sectors and segments using radians 	Trigonometry and modelling <ul style="list-style-type: none"> Prove and use the Addition formulae Understand and use the double angle formulae Solve trig equations using the double angle and addition formulae Write expressions of the form $a \cos x + b \sin x$ in the forms $R \cos(x + \alpha)$ or $R \sin(x + \alpha)$ Use trigonometric functions to model real-life situations Mechanics <ul style="list-style-type: none"> Moments Resultant moments Equilibrium Centre of mass Tilting 	Differentiation <ul style="list-style-type: none"> Differentiate trigonometric functions Differentiate exponentials and logs Use the Chain, Product and Quotient rules Differentiate parametric equations Use the second derivative Solve problems involving connected rates of change Numerical methods <ul style="list-style-type: none"> Locate roots of $f(x) = 0$ by considering changes of sign Use iteration to find an approximation Use the Newton-Raphson procedure Solve problems in context Applications of forces	Vectors <ul style="list-style-type: none"> Understand 3D Cartesian coordinates Use vectors in three dimensions Use vectors to solve geometric problems Model 3D motion in mechanics with vectors Further kinematics <ul style="list-style-type: none"> Vectors in kinematics Vector methods and projectiles Variable acceleration in one dimension Differentiating vectors Integrating vectors 		

	<ul style="list-style-type: none"> Solve trig equations in radians Use approx. trig values when theta is small <p>The normal distribution</p> <ul style="list-style-type: none"> The normal distribution Finding probabilities from normal distributions The inverse normal distribution The standard normal distribution Finding mu and sigma Approximating a binomial distribution Hypothesis testing with the normal distribution 	<p>Forces and friction</p> <ul style="list-style-type: none"> Resolving forces Inclined planes Frictions 	<ul style="list-style-type: none"> Static particles Modelling with Statics Friction and static particles Static rigid bodies Dynamics and inclined planes Connected particles 			
Assessment	End of Unit assessments	End of Unit assessments	End of Unit assessments Y13 PPEs	End of Unit assessments		
Enrichment and extension	UKMT					