

SUBJECT: MATHEMATICS – Advanced+

Year Group	Year 10								
Rationale	Communicate mathematical thinking more clearly within more advanced areas of study. Be fluent in the use of numeric and algebraic manipulation. Use a scientific calculator with ease. Become fluent working with AO1, AO2 and AO3 style questions.								
	Autumn Term 1	Autumn Term 2	Spring Term 1	Spring Term 2	Summer Term 1	Summer Term 2			
Topic/Unit	Sketching & Using Quadratic Graphs & Quadratic Inequalities Scales & Bearings Iteration & Triple Brackets	 Further Trigonometry Pythagoras Solving Advanced Simultaneous Equations Accuracy & Bounds 	 Investigating Linear Graphs Algebraic Fractions & Equations 	 Numerical & Geometric Vectors Similarity in 3D 	Functions Circle Theorems	Real Life Graphs & Measures Complex Solids & Measures Graphs of Trigonometric Functions & Transforming Graphs			
Knowledge	Sketching & Using Quadratic Graphs & Quadratic Inequalities Pupils will know how to sketch a quadratic graph, be able to identify from a graph if a quadratic has any real roots and find approximate solutions to a quadratic equation using a graph. Pupils will learn how to solve quadratic inequalities. Scales & Bearings Pupils will know how to interpret maps and scale drawings and know how to construct scale drawings and estimate real-life measures. Pupils will be able to draw and measure 3- figure bearings, including involving scale drawing and calculate bearings using angle properties and trigonometry skills. Iteration & Triple Brackets Pupils will be able to expand and simplify the product of three brackets, show that the solution to a higher power equation lies between two given values and rearrange a higher power equation in either 'show that' form	Further Trigonometry & Pythagoras Pupils will know how to calculate the area of a triangle using \(\frac{1}{2} ab \) sin c formula and the sine and cosine rules to calculate missing lengths and angles in non-right-angled triangles. Pupils will be able to calculate the length of a diagonal on a cuboid, find the angle between a line and a plane and use Pythagoras' theorem and trigonometry to solve problems in 3D shapes. Solve and geometrical problems on coordinate axes including 3D coordinates. Solving Advanced Simultaneous Equations Pupils will be able to solve a pair of simultaneous equations, either one linear and one quadratic or one linear and one a circle.	Investigating Linear Graphs Pupils will know how to find the equation of a line through two points, work out graphs that are parallel or perpendicular to other graphs using a range of given information, interpret and analyse parallel and perpendicular graphs in various contexts. Algebraic Fractions & Equations Pupils will be able to simplify use the 4 rules of arithmetic and solve equations involving algebraic fractions. Pupils will know how to change the subject of a formula/equation where the variables are in the denominators of the algebraic fractions.	Geometric Vectors Pupils will know how to use vector notation. Pupils will understand the notation used with parallel vectors and the direction of a vector. Pupils will be able to represent vectors, combinations of vectors and scalar multiples in the plane pictorially. Pupils will know how to calculate the sum/difference or scalar multiple of a vector including algebraic terms. Pupils will be able to solve geometric problems in 2D, where vectors are divided in half or in a given ratio and produce geometrical and algebraic proofs to show that vectors are parallel or that points are co- linear. Similarity in 3D Pupils will understand the	Functions Pupils will be able to use function notation and evaluate numerical functions. Pupils will be able to add, subtract and find multiples of functions, numerically and algebraically. Pupils will know how to find the inverse of a function and use correct notation to represent an inverse function. Pupils will be able to find composite functions numerically and algebraically. Circle Theorems Pupils will remember the parts of a circle and be able to use/prove the circle theorems: the angle Pupils will be able to solve a range of missing	Real Life Graphs & Measures Pupils will know how to use straight line graphs for real- life situations. Pupils will be able to interpret the gradient and intercept on a linear or non- linear graph in a range of real-life contexts. Pupils will be able to interpret the rate of change of graphs of containers filling and emptying, draw distance- time graphs and use them to calculate and interpret a range of measures. Pupils will understand the compound measures of speed, distance and time and be able convert between metric speed measurements. Pupils will know how to draw velocity-time graphs and use them to calculate and interpret a range of measures.			



Pupils will know how to use iteration methods to find approximate solutions to complex equations, be able to comment on the accuracy of a solution found. how to solve pairs of linear/quadratic or linear/circular graphically.

Accuracy & Bounds Pupils will know how to calculate the upper and lowers bounds of numbers and measurements given to various degrees of accuracy and be able to calculate upper and lower bounds of calculations with all four operations, powers and roots, using various metric units and in differing contexts. Pupils will know how to use inequality notation to write an error interval and give calculations involving bounds to an appropriate degree of accuracy, justifying the choice.

angles, lengths, area and volume. Pupils will be able to write the lengths, areas or volumes of shapes as ratio in their simplest form and be able to calculate the linear, area or volume scale factor from given 2D or 3D shapes. Pupils will know the relationship between linear. area and volume scale factors, using one to calculate another and find missing lengths, areas or volume from similar 2D and 3D shapes in a range of contexts.

using a combination of circle theorems and the angle and geometrical properties of shapes.

Pupils will know how to solve a range of problems involving complex solids including segments of circles and frustums. Pupils will be able to find the surface area and volume of compound solids constructed from cubes, cuboids, cones. pyramids. sphere, hemispheres and cylinders. Pupils will know how to convert between metric measurements of volume and capacity. Pupils will understand the compound measures of mass, density and volume and be able to convert between metric density measurements. Pupils will understand and use the compound measures of force, pressure and area and be able to convert between metric pressure measures.

Graphs of **Trigonometric** Functions & Transforming Graphs Pupils will recognise, sketch and interpret graphs of trigonometric functions (in degrees) y = $\sin x, y =$ $\cos x$ and y =tan x for angles of any size. Pupils will be able to apply to the graph of y =f(x) the transformations

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Chille	Chatching 2 Heir n	Tourish an		Muse evic et 2	- Compations	of reflection $(y = -f(x))$ and $y = f(-x)$) and translation $(y = f(x) + a)$ and $y = f(x + a)$ including for linear, quadratic, cubic, reciprocal and trigonometrical functions.
Skills	Sketching & Using Quadratic Graphs & Quadratic Inequalities Sketch a quadratic graph, finding key features from factorising and completing the square. Identify from a graph whether a quadratic has any real roots. Find approximate solutions to a quadratic equation using a graph. Solve quadratic inequalities including by factorising and sketch to find critical values. Scales & Bearings Interpret maps and scale drawings using a variety of scales and metric units. Construct scale drawings. Estimate real life measures. Draw and measure 3-figure bearings, including involving scale drawing. Calculate bearings using angle properties and trigonometry where required. Iteration & Triple Brackets Expand and simplify the product of three brackets. Show that the solution to a higher power equation lies between two given values.	Further Trigonometry & Pythagoras Calculate the area of a triangle and solve problems using ½ ab sin c formula. Use the sine and cosine rules to calculate missing lengths and angles in non-right angled triangles. Calculate the length of a diagonal on a cuboid. Find the angle between a line and a plane. Use both Pythagoras' theorem and basic and advanced trigonometry to solve problems in 3D shapes. Solve geometrical problems on coordinate axes including 3D coordinates. Solving Advanced Simultaneous Equations Solve a pair of simultaneous equadratic, using elimination and/or substitution. Solve a pair of	Investigating Linear Graphs Find the equation of a line through two given points. Work out graphs that are parallel or perpendicular to other graphs using a range of given information. Interpret and analyse parallel and perpendicular graphs in various contexts. Algebraic Fractions & Equations Simplify algebraic fractions. Add, subtract, multiply and divide algebraic fractions. Solve equations involving algebraic fractions. Change the subject of a formula/equation where the variables are in the denominators of the algebraic fractions.	Numerical & Geometric Vectors Understand and use vector notation, including column notation. Understand the notation used with parallel vectors and the direction of a vector. Represent vectors, combinations of vectors and scalar multiples in the plane pictorially. Calculate the sum, difference or scalar multiple of a vector using column vectors and including algebraic terms. Represent vectors using column vectors and including algebraic terms. Represent vectors using algebra. Solve geometric problems in 2D, where vectors are divided in half or in a given ratio. Produce geometrical and algebraic proofs to show that vectors are parallel or that points are colinear. Similarity in 3D Understand the effect of enlargement on	Functions Use function notation. Evaluate numerical functions, e.g. f(2) Add, subtract and find multiples of functions, numerically and algebraically. Find the inverse of a function and use correct notation to represent an inverse function. Find composite functions numerically and algebraically. Circle Theorems Recall the parts of a circle. Prove and use the following circle theorems: the angle subtended by an arc at the centre of a circle is twice the angle subtended at any point on the circumferenc e;	Real Life Graphs & Measures Draw and use straight line graphs for real- life situations including conversion graphs. Interpret the gradient and intercept in a range of real-life contexts on a linear or non- linear graph. Interpret the rate of change of graphs of containers filling and emptying. Draw distance- time graphs. Use distance- time graphs to calculate and interpret a range of measures: speed, average speed, distance, time (including estimates from non-linear graphs). Understand and use the compound measures of speed, distance and time. Convert between metric speed measurements. Draw velocity- time graphs Use velocity- time graphs to calculate and interpret a range
	Rearrange a higher power equation in either a 'show that' form or other, to begin the process of iteration.	simultaneous equations, one linear and one of a circle, using elimination and/or substitution.		angles, lengths, area and volume. Write the lengths, areas or volumes of shapes as a	the angle is a semi-circle is a right angle; the perpendicula r from the centre of a	of measures: acceleration, average acceleration, distance travelled including estimations from



Use iteration to find approximate solutions to complex equations. Consider and comment on the accuracy of a solution found through iteration.

Solve pairs of linear/quadratic or linear/circular graphically, including where graphs are given or need to be drawn. Accuracy & Bounds Calculate the upper and lowers bounds of numbers and measurements given to various degrees of accuracy. Calculate upper and lower bounds of calculations using all four operations, powers and roots, with various metric units and in various contexts.

Use inequality notation to write an error interval. Give calculations involving bounds to an appropriate degree of accuracy, justifying the choice.

ratio in its simplest form. Calculate the linear, area or volume scale factor from given 2D or 3D shapes. Know the relationship between the linear, area and volume scale factors and use one to calculate another. Find missing lengths, areas or volume from similar 2D and 3D shapes in a range of contexts.

circle to a chord bisects the chord; angles in the same segment are equal; opposite angles in a cyclic quadrilateral sum to 180°; the alternate segment theorem. Use the fact that the tangent at any point on a circle is perpendicula r to the radius at that point, and that tangents from an external point are equal in length. Use the fact that the angle between the tangent and radius is 90°. Solve a range of missing angles problems using circle theorems, angle properties and geometrical properties of shapes.

non-linear graphs.

Complex Solids & Measures Solve problems involving more complex solids including segments of circles and frustums. Solve problems involving frustums where missing lengths require the use of similar triangles. Find the surface area and volume of compound solids constructed from cubes, cuboids, cones, pyramids, sphere, hemispheres and cylinders.

Convert between metric measurements of volume and capacity. Understand and use the compound measures of mass, density and volume. Convert between metric density measurements. Understand and use the compound measures of force, pressure and area. Convert between metric pressure measures.

Graphs of
Trigonometric
Functions &
Transforming
Graphs
Recognise,
sketch and
interpret graphs
of trigonometric
functions (in
degrees) $y = \sin x, y = \cos x$ and $y = \tan x$ for angles
of any size.

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Assessments Formative	Assessment 12 Open book End-of-topic quizzes. Regular use of whiteboards in lessons.	Assessment 13 Open book End-of-topic quizzes. Regular use of whiteboards in lessons.	Assessment 14 Open book End-of-topic quizzes. Regular use of whiteboards in lessons.	End-of-topic quizzes. Regular use of whiteboards in lessons.	Assessment 15 Open book End-of-topic quizzes. Regular use of whiteboards in lessons.	End-of-topic quizzes. Regular use of whiteboards in lessons.
Assessments Summative		Assessment Window 1				End-of-Year Assessment
Homework	Mathswatch: Advanced+ revision assignment 12 Independent homework tasks based on class teacher professional judgement	(Mock) Mathswatch: Advanced+ revision assignment 13 Mathswatch revision assignment for Window 1 assessment (mock). Independent homework tasks based on class teacher professional judgement	Mathswatch: Advanced+ revision assignment 14 Independent homework tasks based on class teacher professional judgement	Independent homework tasks based on class teacher professional judgement	Mathswatch: Advanced+ revision assignment 15 Independent homework tasks based on class teacher professional judgement	End-of-Year practice papers 6 x half papers 1A 1B 2A 2B 3A 3B End-of-year Advanced+ Mathswatch revision assignment Independent homework tasks based on class teacher professional judgement



SUBJECT: MATHEMATICS – Advanced

Year Group	Year 10					
Rationale		athematical thinking ebraic manipulation tyle questions.				
	Autumn Term 1	Autumn Term 2	Spring Term 1	Spring Term 2	Summer Term 1	Summer Term 2
Topics/Skills	 Sketching Circle Graphs, Using Quadratic Graphs & Inequalities Scales & Bearings Iteration & Triple Brackets 	 Further Trigonometry & Pythagoras Solving Advanced Simultaneous Equations Graphically Accuracy & Bounds 	 Investigating Linear Graphs Algebraic Fractions & Equations 	 Numerical & Geometric Vectors Similarity in 3D 	FunctionsCircle Theorems	 Real Life Graphs & Measures Complex Solids & Measures Graphs of Trigonometric Functions & Transforming Graphs
Knowledge	Sketching & Using Quadratic Graphs & Quadratic Inequalities Pupils will know how to sketch a quadratic graph, be able to identify from a graph if a quadratic has any real roots and find approximate solutions to a quadratic equation using a graph. Pupils will learn how to solve quadratic inequalities. Scales & Bearings Pupils will know how to interpret maps and scale drawings and know how to construct scale drawings and estimate reallife measures. Pupils will be able to draw and measure 3-figure bearings, including involving scale drawing and calculate bearings using	Further Trigonometry & Pythagoras Pupils will know how to calculate the area of a triangle using \(^1_2 ab \) sin \(^c\) formula and the sine and cosine rules to calculate missing lengths and angles in non-right-angled triangles. Pupils will be able to calculate the length of a diagonal on a cuboid, find the angle between a line and a plane and use Pythagoras' theorem and trigonometry to solve problems in 3D shapes. Solve and geometrical problems on coordinate axes including 3D coordinates. Solving Advanced Simultaneous Equations Pupils will be able to solve a pair of simultaneous equations, either one linear and one quadratic or one linear and	Linear Graphs Pupils will know how to draw graphs of the form ax + by = c and be able to identify and interpret gradient and intercept. Pupils will be able to find the equation of a line through one point with a given gradient and find the equation of a line through two given points. Pupils will know that parallel graphs have the same gradient and perpendicular graphs have gradients with a product of - 1. Pupils will be able to work out graphs that are parallel or perpendicular to other graphs using a range of given information and interpret parallel and perpendicular graphs in various contexts.	Numerical & Geometric Vectors Pupils will understand and use vector notation including parallel vectors and the direction of a vector. Pupils will be able to represent vectors, combinations of vectors and scalar multiples in the plane pictorially. Pupils will know how to work out the sum, difference or scalar multiple of a vector using column vectors and including algebraic terms. Pupils will be able to represent vectors using algebra and solve geometric problems in 2D. Pupils will develop their knowledge of producing geometrical and algebraic proofs to show that vectors are parallel or that points are co- linear.	Functions Pupils will be able to use function notation and evaluate numerical functions. Pupils will be able to add, subtract and find multiples of functions, numerically and algebraically. Pupils will know how to find the inverse of a function and use correct notation to represent an inverse function. Pupils will be able to find composite functions numerically and algebraically. Circle Theorems Pupils will remember the parts of a circle and be able to use (but not need to prove) the circle theorems. Pupils will be able to solve a range of missing angles problems using circle theorems and the angle & geometrical properties of shapes.	Real Life Graphs & Measures Pupils will know how to use straight line graphs for real- life situations. Pupils will be able to interpret the gradient and intercept on a linear or non- linear graph in a range of real-life contexts. Pupils will be able to interpret the rate of change of graphs of containers filling and emptying, draw distance- time graphs and use them to calculate and interpret a range of measures. Pupils will understand the compound measures of speed, distance and time and be able convert between metric speed measurements. Pupils will know how to draw velocity-time graphs and use them to calculate and interpret a range of measures.



Complex Solids

angle properties and trigonometry skills.

Iteration & Triple Brackets Pupils will be able to expand and simplify the product of three brackets, show that the solution to a higher power equation lies between two given values and rearrange a higher power equation in either 'show that' form or other, to begin the process of iteration. Pupils will know how to use iteration methods to find approximate solutions to complex equations, be able to comment on the accuracy of a solution found.

one a circle.
Pupils will know
how to solve
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or linear/circular
graphically.

Accuracy & Bounds Pupils will know how to calculate the upper and lowers bounds of numbers and measurements given to various degrees of accuracy and be able to calculate upper and lower bounds of calculations with all four operations, powers and roots, using various metric units and in differing contexts. Pupils will know how to use inequality notation to write an error interval and give calculations involving bounds to an appropriate degree of accuracy,

justifying the

choice.

Algebraic
Fractions &
Equations
Pupil will be
able to
simplify, use
the rules of
arithmetic and
solve
equations
involving
algebraic
fractions.

Similarity in 3D Pupils will understand the effect of enlargement on angles, lengths, area and volume. Pupils will be able to write the lengths, areas or volumes of shapes as ratio in their simplest form and be able to calculate the linear, area or volume scale factor from given 2D or 3D shapes. Pupils will know the relationship between linear, area and volume scale factors, using one to calculate another and find missing lengths, areas or volume from similar 2D and 3D shapes in a range of context

& Measures Pupils will know how to solve a range of problems involving complex solids including segments of circles and frustums. Pupils will be able to find the surface area and volume of compound solids constructed from cubes, cuboids, cones, pyramids, sphere, hemispheres and cylinders. Pupils will know how to convert between metric measurements of volume and capacity. Pupils will understand the compound measures of mass, density and volume and be able to convert between metric density measurements. Pupils will understand and use the compound measures of force, pressure and area and be able to convert between metric pressure measures.

Graphs of Trigonometric Functions & Transforming **Graphs** Recognise, sketch and interpret graphs of trigonometric functions (in degrees) y = $\sin x, y =$ $\cos x$ and y = $\tan x$ for angles of any size. Apply to the graph of y =f(x) (including sketching or



						representing
						algebraically)
						the
						transformations
						of reflection $(y =$
						-f(x) and $y =$
						f(-x)) and
						translation $(y =$
						f(x) + a and
						y = f(x + a)
						including for
						linear, quadratic,
						cubic, reciprocal
						and
						trigonometrical
						functions.
Skills	Sketching &	Further	Investigating	Numerical &	Functions	Real Life
	Using	Trigonometry &	Linear Graphs	Geometric	Use function	Graphs &
	Quadratic	Pythagoras	Plot and draw	Vectors	notation.	Measures
	Graphs &	Calculate the	graphs of the	Understand and	Evaluate	Draw and use
	<u>Quadratic</u>	area of a	form ax + by =	use vector	numerical	straight-line
	<u>Inequalities</u>	triangle and	C.	notation,	functions, e.g.	graphs for real-
	Sketch a	solve problems	Identify and	including column	f(2)	life situations
	quadratic	4	interpret	notation.	Add, subtract	including
		using $\frac{1}{2}ab$ sin c				•
	graph, finding	formula.	gradient and	Understand the	and find	conversion
	roots from	Use the sine	intercept from	notation used	multiples of	graphs.
	factorising or	_	graphs of the	with parallel	functions,	Interpret the
	using the	and cosine rules	form ax + by =	vectors and the	numerically and	gradient and
	quadratic	to calculate	<u> </u>	direction of a	algebraically.	intercept in a
		missing lengths	C.			
	formula.	and angles in	Find the	vector.	Find the inverse	range of real-life
	Identify from a	non-right angled	equation of a	Represent	of a function and	contexts on a
	graph whether		line through	vectors,	use correct	linear or non-
	a quadratic	triangles.	one point with	combinations of	notation to	linear graph.
		Calculate the				
	has any real	length of a	a given	vectors and	represent an	Interpret the rate
	roots.	diagonal on a	gradient.	scalar multiples	inverse function.	of change of
	Find	cuboid.	Find the	in the plane	Find composite	graphs of
	approximate		equation of a	pictorially.	functions	containers filling
	solutions to a	Find the angle	line through	Calculate the	numerically and	and emptying.
		between a line	•			
	quadratic	and a plane.	two given	sum, difference	algebraically	Draw distance-
	equation using	Use both	points.	or scalar	with very simple	time graphs.
	a graph.		Know and use	multiple of a	examples.	Use distance-
	Estimate the	Pythagoras'	the fact that	vector using	•	time graphs to
	gradient at a	theorem and	parallel graphs	column vectors	Circle Theorems	calculate and
	J	basic				
	point, on a	trigonometry to	have the same	and including	Recall the parts	interpret a range
	quadratic	solve simple	gradient and	algebraic terms.	of a circle.	of measures:
	graph.		perpendicular	Represent	Know and use	speed, average
	Draw circles	problems in 3D	graphs have	vectors using	(but not prove)	speed, distance,
	with a centre	shapes.	gradients with	algebra.	the following	time (including
			•			
	at the origin, in	Solving	a product of -	Solve geometric	circle theorems:	estimates from
	the form x ² +	Advanced	1.	problems in 2D,	the angle	non-linear
	$y^2 = r^2$	<u>Simultaneous</u>	Work out	where vectors	subtended by an	graphs).
	Solve		graphs that	are divided in	arc at the centre	Understand and
	quadratic	Equations	are parallel or	half or in a given	of a circle is	use the
	•	Solve a pair of	·		twice the angle	compound
	inequalities	simultaneous	perpendicular	ratio.		
	including by	equations	to other	Produce	subtended at	measures of
	factorising and	graphically only,	graphs using a	geometrical and	any point on the	speed, distance
	sketch to find	• • • • • • • • • • • • • • • • • • • •	range of given	algebraic proofs	circumference.	and time.
	critical values.	including:	information.	to show that	the angle is a	Convert
	Silioui valuos.	one linear and				
		one quadratic.	Interpret and	vectors are	semi-circle is a	between metric
	Scales &	one linear and	analyse	parallel or that	right angle.	speed
	<u>Bearings</u>		parallel and	points are co-	the	measurements.
	Interpret maps	one of a circle,	perpendicular	inear, in simple	perpendicular	Draw velocity-
	and scale	including where	graphs in	cases.	from the centre	time graphs.
		graphs are given	- :			
	drawings using	or need to be	various	Similarity in 3D	of a circle to a	Use velocity-
	a variety of	drawn.	contexts.	Understand the	chord bisects	time graphs to
	scales and	arawii.	Algebraic	effect of	the chord;	calculate and
	metric units.		Fractions &	enlargement on	angles in the	interpret a range
	Construct	Accuracy &	Equations	angles, lengths,	same segment	of measures:
		<u>Bounds</u>				
	scale	Calculate the	Simplify	area and	are equal;	acceleration,
	drawings.	upper and	algebraic	volume.	opposite angles	average
	Estimate real		fractions.	Write the	in a cyclic	acceleration,
	life measures.	lowers bounds		lengths, areas or		distance
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Draw and measure 3-figure bearings, including involving scale drawing. Calculate bearings using angle properties and trigonometry where required.

Iteration & **Triple Brackets** Expand and simplify the product of three brackets. Show that the solution to a higher power equation lies between two given values. Rearrange a simple higher power equation in either a 'show that' form or other, to begin the process of iteration.

Given x₀, Use iteration to find approximate solutions to different equations. Consider and comment on the accuracy of a solution found through iteration.

of numbers and measurements given to various degrees of accuracy. Calculate upper and lower bounds of calculations using all four operations, powers and roots and with various metric units and in various

powers and roots and with various metric units and in various contexts. Use inequality notation to write an error interval. Give calculations involving bounds to an appropriate degree of accuracy, justifying the choice.

Add, subtract, multiply and divide algebraic fractions. Solve equations involving algebraic fractions.

volumes of shapes as a ratio in its simplest form. Calculate the linear, area or volume scale factor from given 2D or 3D shapes. Know the relationship between the linear, area and volume scale factors and use one to calculate another. Find missing lengths, areas or volume from similar 2D and 3D shapes in a range of contexts.

quadrilateral sum to 180°; the alternate segment theorem; the tangent at any point on a circle is perpendicular to the radius at that point: tangents from an external point are equal in length; the angle between the tangent and radius is 90°. Solve a range of missing angles problems using circle theorems, angle properties and geometrical properties of shapes.

travelled including estimations from non-linear graphs.

Complex Solids & Measures Solve problems involving more complex solids including seaments of circles and frustums. Solve problems involving frustums where missing lengths require the use of similar triangles. Find the surface area and volume of compound solids constructed from cubes, cuboids, cones. pyramids, sphere, hemispheres and cylinders. Convert between metric measurements of volume and capacity. Understand and use the compound measures of mass, density and volume. Convert between metric density measurements. Understand and use the compound measures of force, pressure and area. Convert between metric pressure measures. Graphs of <u>Trigonometric</u> Functions & Transforming **Graphs** Recognise, sketch and interpret graphs of trigonometric functions (in degrees) y = $\sin x, y =$ $\cos x$ and y =

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Assessments Formative	Assessment 12 Open book End-of-topic quizzes. Regular use of whiteboards in	Assessment 13 Open book End-of-topic quizzes. Regular use of whiteboards in lessons.	Assessment 14 Open book End-of-topic quizzes. Regular use of whiteboards in	End-of-topic quizzes. Regular use of whiteboards in lessons.	Assessment 15 Open book End-of-topic quizzes. Regular use of whiteboards in lessons.	tan x for angles of any size. Apply to the graph of $y = f(x)$ (including sketching or representing algebraically) the transformations of reflection $(y = -f(x))$ and $y = f(-x)$ and translation $y = f(x) + a$ and trigonometrical functions. End-of-topic quizzes. Regular use of whiteboards in lessons.
Assessments Summative	lessons.	Assessment Window 1 (Mock)	lessons.			End-of-Year Assessment
Homework	Mathswatch: Advanced Revision assignment 12 Independent homework tasks based on class teacher professional judgement	Mathswatch: Advanced Revision assignment 13 Mathswatch revision assignment for Window 1 assessment (mock). Independent homework tasks based on class teacher professional judgement	Mathswatch: Advanced Revision assignment 14 Independent homework tasks based on class teacher professional judgement	Independent homework tasks based on class teacher professional judgement	Mathswatch: Advanced Revision assignment 15 Independent homework tasks based on class teacher professional judgement	EOY practice papers 6 x half papers 1A 1B 2A 2B 3A 3B End-of-year Advanced Mathswatch revision assignment



SUBJECT: MATHEMATICS - Core+

Year Group	Year 10					
Rationale	Communicate m	ebraic manipulatio		rtional reasoning. U	areas of study. Be m se a scientific calcul	
	Autumn Term	Autumn Term 2	Spring Term 1	Spring Term 2	Summer Term	Summer Term 2
Topic/Unit	 Ratio & Fractions Applications of Scatter Graphs Trigonometr y 	 Changing the Subject of a Formula Working with Linear Graphs Real Life Graphs Similarity in 2D Shapes 	Transformatio nsSimultaneous Equations	 Working with Circles in 2D & 3D Multiplicative Reasoning 	 Proportion Relative Frequency & Tree Diagrams 	 Quadratic Expressions, Equations & Graphs Scales, Scale Drawing & Bearings
Knowledge	Ratio & Fractions Pupils will know how to write and simplify ratios, share values in a ratio and find the other value in a ratio when given one part or total amount. Pupils will be able to apply the four rules of arithmetic to fractions and find fractions of amounts. Applications of Scatter Graphs Pupils will know how to plot and interpret scatter graphs, identify outliers and consider what they show, recognise correlation, & interpret patterns in the context of the problem. Pupils will be able to draw/use the line of best fit to make predictions for unknown data and assess the reliability of predictions based on	Changing the Subject of a Formula Pupils will be able to rearrange equations and formula and change the subject of an equation or formula involving the use of squares, cubes, square roots and cube roots. Pupils will know how to change the subject of an equation or formula where the subject appears more than once, in simple cases. Working with Linear Graphs Pupils will be able to accurately draw, label and scale axes. Pupils will identify and plot coordinates in all 4 quadrants and find the co-ordinates of the midpoint of a line segment. Pupils will be able to draw linear graphs of the form ax	Transformations Pupils will recognise, describe and draw rotations using centre of rotation and angle & direction. Pupils will recognise, describe and draw reflections using a mirror line and the equation. Pupils will recognise, describe and draw translations using a column vector. Pupils will recognise, describe and draw translations using a column vector. Pupils will recognise, describe and draw enlargements using a centre of enlargement and a scale factor, including fractional values. Pupils will be able to describe the effect of combined transformations as a single transformation. Simultaneous Equations Pupils will be able to solve a pair of linear simultaneous equations using elimination and	Working with Circles in 2D & 3D Pupils will be able to calculate angles, arc lengths and the area of sectors of a circle. Pupils will know how to find the surface area and volume of cylinders, spheres, cones, pyramids and composite solids. Multiplicative Reasoning Pupils will be able to express a given number as a percentage of another number in complex situations and solving problems. Pupils will know how to calculate percentage profit and loss, find values after repeated percentage change, find the original amount after knowing the final amount due to a percentage increase or decrease and calculate compound interest or depreciation.	Proportion Pupils will understand the difference between direct and inverse proportion, recognise direct and inverse proportion from graphs and use graphs to solve problems. Pupils will be able to find missing values in tables of direct/inverse data and solve direct and inverse proportion problems in a range of contexts. Relative Frequency & Tree Diagrams Pupils will know how to find the probability of an event happening using relative frequency and estimate the number of times an event will happen from given information. Pupils will be able to compare relative frequencies from different sample sizes and find the probability of successive events.	Quadratic Expressions, Equations & Graphs Pupils will be able to factorise quadratic expressions of the form x² + bx + c and of the form x² - a². Pupils will know how to solve simple quadratic equations by factorising and how to find the roots of a quadratic function algebraically. Pupils will be able to generate points and plot quadratic function, identifying the turning point, roots and line of symmetry and know how to find approximate solutions to a quadratic equation using its graph. Pupils will be able to generate points and plot cubic and reciprocal functions. Scales, Scale Drawing & Bearings Pupils will know how to interpret maps and scale drawings,
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Trigonometry Pupils will know and apply the trigonometric ratios sine, cosine and tangent, using them to find unknown sides and angles in right-angled triangles. Pupils will be able to find angles of elevation and depression. Pupils will be able to solve problems using the trig. ratios alongside known angle properties or Pythagoras' theorem. Pupils will know the exact values of $\sin \theta$, $\cos \theta$ and \tan θ for 0°, 30°, 45° and 60° and 90° for sin θ and $\cos \theta$ only.

Pupils will know how to find the equation of a straight line from its graph, through one point and a given gradient, though two given points and be able to find approximate solutions to linear equations from graphs.

Real Life Graphs Pupils will know how to draw and interpret straight line graphs for real-life situations and find/interpret the gradient of a real-life graph, in the context of the question. Pupils will be able to draw distance-time graphs, interpret them and calculate the speed of individual sections, the total distance and the total time. Pupils will also be able to draw velocitytime graphs. Pupils will know how to interpret the gradient as the rate of change in distancetime, speedtime graphs, graphs of containers emptying and unit-price

negative and fractional solutions. Pupils will know how to identify the solutions of simultaneous equations drawn graphically. Pupils will be able to set up simultaneous equations to represent a situation and solve them within the context of the problem.

tree diagrams and use them to calculate the probability of two independent or dependent events. diagram and draw to scale accurately. Pupils will be able to draw and measure threefigure bearings and mark on a diagram the position of point B given its bearing from point A. Pupils will be able to apply their knowledge of bearings in drawing scale diagrams.

graphs.

Similarity in 2D
Shapes
Pupils will be able to write the lengths of two shapes as



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fit to make predictions for unknown data. Assess the reliability of predictions based on whether they come from interpolation or extrapolation. **Trigonometry** Know and use trigonometric ratios sine, cosine and tangent and use them to find unknown sides and angles in rightangled triangles. Find angles of elevation and depression. Solve problems using the trig. ratios, including Pythagoras' theorem and angle properties. Know the exact values of $\sin \theta$, $\cos \theta$ and $\tan \theta$ for 0°, 30°, 45° and 60° and 90° for $\sin \theta$ and $\cos \theta$ only.

of the form ax + by = c. Find the equation of a straight line from its graph. Find the equation of the straight line through one point and a given gradient. Find the equation of the straight line through two given points. Find approximate solutions to linear equations from graphs. Real Life <u>Graphs</u> Draw and interpret straight line graphs for real-life situations including conversion graphs. Find and interpret the gradient of a real-life graph, in the context of the question. Draw distancetime graphs. Interpret distance-time graphs and calculate the speed of individual sections, total distance and total time. Draw velocitytime graphs. Interpret gradient as the rate of change in distancetime and speed-time graphs, graphs of containers emptying and unit price graphs. Similarity in 2D <u>Shapes</u>

Write the lengths of two shapes as a ratio in its simplest form.

negatives increase or solutions. decrease. Identify the Calculate solutions of compound simultaneous interest and equations drawn depreciation, graphically. including the Set up amount of simultaneous interest or the equations to final amount. represent a

Find the probability of successive events, such as several throws of a dice. Complete tree diagrams from given information. Use tree diagrams to calculate the probability of two independent events and of two dependent events.

Interpret maps and scale drawings. Estimate lengths using a scale diagram or knowledge of real-life lengths. Make an accurate scale drawing from a diagram. Draw and measure threefigure bearings. Mark on a diagram the position of point B given its bearing from point A and vice versa. Use bearings with scale diagrams.

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Assessments Formative Assessments Summative	Assessment 12 Open book End-of-topic quizzes. Regular use of whiteboards in lessons.	Understand the conditions that make shapes similar, for both lengths and angles. Prove that two shapes are similar using angle properties and/or enlargement. Identify the scale factor that links similar shapes and use it to find missing lengths in a range of situations (including the use of fractional scale factors) Assessment 13 Open book End-of-topic quizzes. Regular use of whiteboards in lessons. Assessment Window 1	Assessment 14 Open book End-of-topic quizzes. Regular use of whiteboards in lessons.	End-of-topic quizzes. Regular use of whiteboards in lessons.	Assessment 15 Open book End-of-topic quizzes. Regular use of whiteboards in lessons.	End-of-topic quizzes. Regular use of whiteboards in lessons. End-of-Year Assessment
		(Mock)				
Homework	Mathswatch: Core+ revision assignment 12 Independent homework tasks based on class teacher professional judgement	Mathswatch: Core+ revision assignment 13 Independent homework tasks based on class teacher professional judgement	Mathswatch: Core+ revision assignment 14 Independent homework tasks based on class teacher professional judgement	Independent homework tasks based on class teacher professional judgement	Mathswatch: Core+ revision assignment 15 Independent homework tasks based on class teacher professional judgement	EOY practice papers 6 x half papers 1A 1B 2A 2B 3A 3B Independent homework tasks based on class teacher professional judgement



SUBJECT: MATHEMATICS – Core Pathway

Year Group	YEAR 10						
Rationale	Communicate mathematical thinking more clearly within more advanced areas of study. Be more confident						
	working with number calculations and proportional reasoning. Use a scientific calculator effectively. Become more familiar with the differences between AO1, AO2 and AO3 style questions.						
	Autumn	Autumn Term 2	Spring Term 1	Spring Term 2	Summer Term	Summer Term	
Topic/Unit	Term 1 ■ Ratio &	Working with	■ Transform-	■ Real Life	1 ■ Percentage	2 ■ Relative	
1 opio/omit	Fractions	Linear Graphs	ations	Measurement	Calculations	Frequency &	
	revisit	■ Solving Linear	■ Working with	S - \\(\langle - \rangle \rangle \rangle - \rangle \r	■ Ratio &	Tree	
	ScatterGraphs	Equations revisit	Inequalities	 Working with Shapes in 2D 	Proportion revisit	Diagrams ■ Quadratic	
	revisit	■ Real Life		& 3D	Toviole	Equations,	
	■ Linking	Graphs				Expressions &	
	Fractions &	Similarity & Congruency in				Graphs ■ Scales, Scale	
	Decimals	2D Shapes				Drawing &	
	Changing	·				Bearings	
	the Subject of						
	a Formula						
Knowledge	Ratio &	Working with	Transformations	Measurements	<u>Percentage</u>	Relative	
	<u>Fractions</u>	Linear Graphs	Pupils will	Pupils will know	Calculations Pupils will be	Frequency &	
	<u>revisit</u> Pupils will	Pupils will be able to draw,	recognise, describe and	how to use correct notation	able to convert	<u>Tree Diagrams</u> Pupils will be	
	remember	label and	draw rotations	for 12- and 24-	between and	able to find the	
	how to state	accurately scale	using angle,	hour clock and	order fractions,	probability of an	
	and simplify ratios from	axes and identify and plot	direction and centre of	convert between the two.	decimals and percentages.	event happening using relative	
	given	co-ordinates in	rotation.	Pupils will be	Pupils will know	frequency and	
	information.	all 4 quadrants.	Pupils will	able to work out	how to express	estimate the	
	Pupils will know how to	Pupils will know how to find the	identify, describe and	the time taken for a journey	a given number as a percentage	number of times an event will	
	share values	co-ordinates of	draw reflections	and calculate	of another.	happen from	
	in each ratio	the midpoint of a	using a mirror	time intervals in	Pupils will be	given	
	in a range of contexts.	line segment, with and without	line and its equation.	hours, minutes or a mixture of	able to find percentages of	information. Pupils will know	
	Pupils will	a given diagram	Pupils will	both.	amounts with	how to compare	
	know how to	and draw and	recognise,	Pupils will know	and without a	relative	
	find the value of one	identify graphs	describe and draw	how to use a calculator with	calculator, calculate the	frequencies from	
	part of a	that are parallel to the axes, as	translations	time calculations	amount of a	different sample sizes and find	
	ratio when	well as y = x and	using a column	and be able to	percentage	the probability of	
	given the	y = -x. Pupils will	vector.	read from and	increase or	successive	
	other. Pupils will be	be able to plot and draw linear	Pupils will know how to describe	use timetables and mileage	decrease and use percentages	events. Pupils will	
	able to apply	graphs of the	and draw	charts.	to solve	complete tree	
	the four rules	form y = mx + c	enlargements	Pupils will be	problems and in	diagrams from	
	of arithmetic to fractions	using a table of values.	using a scale factor and	able to choose an appropriate	real-life contexts such as VAT,	given information and	
	and find	Pupils will know	with/without a	unit of	profit & loss and	use tree	
	fractions of	how to find and	centre of	measurement	simple interest.	diagrams to	
	amounts in problem	interpret the gradient and	enlargement. Pupils will be	for a range of situations and	Ratio &	calculate the probability of	
	solving	intercept of a	able to describe	be able to	Proportion	two events	
	situations.	simple line from	the effect of	convert between	revisit	happening.	
	<u>Scatter</u>	its equation or its graph. Pupils	combined transformations	metric measurements.	Pupils will remember how	<u>Quadratic</u>	
	<u>Graphs</u>	will be able to	as a single		to change	Expressions,	
	<u>revisit</u>	find the equation	transformation,	Working with	between	Equations &	
	Pupils will be able to plot	of a simple straight line from	in simple cases.	Shapes in 2D & 3D	fractions and ratios and how	Graphs Pupils will be	
	and interpret	its graph and	Working with	Pupils will be	to simplify ratios	able to simplify	
	scatter	identify parallel	Inequalities	able to find the	including those	expressions	
	graphs in a	lines from their	Pupils will be	perimeter and	in simple unitary	involving single	
	range of contexts,	equations. Pupils will be	able to show inequalities on	area of rectangles,	form. Pupils will be	brackets and develop their	
	identify	able to find	number lines	triangles,	able to share a	knowledge of	
	outliers	approximate	using open and	parallelograms	quantity in each	expressions that	



considering what they show. recognise correlation and interpret what it means in the context of the question. Pupils will be able to draw/use a line of best fit to make predictions for unknown data.

Linking Fractions & **Decimals** Pupils will be able to convert between fractions and decimals. Pupils will recognise recurring decimals and convert fractions into recurring decimals. Pupils will know how to compare and order fractions, decimals and integers.

Changing the Subject of a Formula Pupils will be able to rearrange simple equations and formula and be able to change the subject of an equation or formula involving the use of squares, cubes, square and roots.

solutions to linear equations from graphs.

Solving Linear **Equations revisit** Pupils will be able to write simple expressions or equations from given information. Pupils will know how to solve linear equations with integer coefficients where the unknown appears on either or both sides in simple cases. Pupils will know how to solve equations involving brackets and those with negative solutions.

Real Life **Graphs** Pupils will be able to draw and interpret straight line graphs for real-life situations including conversion graphs. Pupils will be able to draw and interpret distance-time graphs. Pupils will know how to draw very simple velocity-time graphs.

Similarity & Congruency in <u>2D</u> **Shapes** Pupils will recognise and name different polygons. Pupils will be able to identify which shapes are similar by knowing and applying the conditions that make shapes

similar.

closed circles and write down all integers that satisfy an inequality. Pupils will be able to solve linear inequalities in one variable and represent the solution on a number line. Pupils will know how to use inequality notation to express error intervals for rounding and

possibly

truncation.

and trapezia, including composite shapes. Pupils will develop their understanding of finding the surface area and volume of basic 3D shapes.

ratio, change between currencies. manipulate recipes, justify which product offers the best value, use a ratio to compare a scale model to a real-life object and solve proportion problems using the unitary method.

involve the expanding and simplifying of more than one bracket. Pupils will be able to fully factorise an expression into a single bracket. Pupils will know how to expand and simplify simple double brackets. Pupils will develop their understanding of factorise quadratic expressions of the form $x^2 + bx$ + c where all coefficients are positive. Pupils will know how to generate points, plot quadratic functions using a table of values and find approximate solutions to a quadratic equation using its graph. Pupils will be able to identify the turning point, roots and line of symmetry from a quadratic graph.

Scales, Scale Drawing & **Bearings** Interpret maps and scale drawings. Estimate lengths using a scale diagram or knowledge of real-life lengths. Make an accurate scale drawing from a diagram. Draw and measure threefigure bearings. Mark on a diagram the position of point B given its bearing from point A and vice versa. Use bearings with scale diagrams.



Pupils will know how to identify the scale factor that links similar shapes. Pupils will know how to solve problems finding missing length for simple scale factors and how to identify shapes which are congruent, by eye. Skills Ratio & Working with Linear Graphs revisit Identify and plot Write and simplify ratios from given information. Miles and condinates of the information. Miles and condinates in the wood or dinates of the information. Recognise, the two. Recognise, the two. Compare and frequency the two. Compare and frequency the work in the two. Compare and frequency the work in the wood in the similar shapes. Percentage Relative Measurements Description of the probability and plot describe and direction. Recognise, and direction. Recognise, the two. Compare and frequency the two. Compare and frequency the frequency the first the wood in the similar shapes. Pupils will know the s	rams / of an pening tive /. the f times will om
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fractions in the form y = mx enlargements Read from and percentage probabilit	/ of
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range of cases. Show perimeter of <u>Proportion</u> <u>Graphs</u>	_
contexts. Identify parallel inequalities on rectangles, revisit Simplify	
Identify lines from their number lines triangles, Simplify ratios expression	ns
outliers and equations. using open and parallelograms including writing involving	
	Single
consider Find the closed circles. and trapezia, ratios in simple brackets	
what they equation of a Write down all including unitary form. including	
show. straight line from integers that composite Share a quantity expanding	
Identify its graph in very satisfy a given shapes. in a given ratio simplifyin	g more
correlation simple cases. inequality. Find the area of including 3 part than one	
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predictions for unknown data. Assess the reliability of predictions based. Linking Fractions & Decimals Convert hetween fractions and decimals. Recognise recurring decimals and converts fractions into recurring decimals. Compare and order fractions, decimals and integers, including using inequality signs. Changing the Subject of a Formula Rearrange simple equations and formula. Change the subject of an equation or formula involving the use of squares, cubes, square roots and cube roots.

Write simple expressions or equations from given information. Solve linear equations with integer coefficients where the unknown appears on either side. extending to both sides in simple cases. Solve equations involving brackets. Solve linear equation including those with negative solutions. Rearrange simple equations.

Real Life Graphs Draw and interpret straight line graphs for real-life situations including conversion graphs. Draw distancetime graphs. Interpret simple distance-time graphs. Draw very simple velocitytime graphs. Similarity & Congruency in 2D **Shapes** Recognise and name different polygons. Identify shapes which are similar, understanding the conditions that make shapes similar, for both lengths and angles. Identify the scale factor that links similar shapes. Solve problems to find missing

length for simple scale factors

Find the surface area of basic 3D shapes.
Find the volume of basic 3D prisms including a cylinder.

range of contexts. Manipulate recipes in a range of contexts. Solve proportion problems using the unitary method. Work out and justify which product offers the best value for money, in simple cases. Use a ratio to compare a scale model to a real life object.

Factorise quadratic expressions of the form $x^2 + bx$ + c where all coefficients are positive. Generate points and plot quadratic functions using a table of values. Find approximate solutions to a quadratic equation using its graph. Identify the turning point, roots and line of symmetry from a quadratic graph. Scales, Scale Drawing & **Bearings** Interpret maps and scale drawings. Estimate lengths using a scale diagram or knowledge of real-life lengths.

Make an accurate scale drawing from a diagram. Draw and measure threefigure bearings in simple diagrams. Mark on a diagram the position of point B given its bearing from point A. Use bearings with scale diagrams.

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		such as 2, 3 or 0.5. Identify shapes which are congruent, by eye.				
Assessments Formative	Assessment 12 Open book End-of-topic quizzes. Regular use of whiteboards in lessons.	Assessment 13 Open book End-of-topic quizzes. Regular use of whiteboards in lessons.	Assessment 14 Open book End-of-topic quizzes. Regular use of whiteboards in lessons.	End-of-topic quizzes. Regular use of whiteboards in lessons.	Assessment 15 Open book End-of-topic quizzes. Regular use of whiteboards in lessons.	End-of-topic quizzes. Regular use of whiteboards in lessons.
Assessments Summative		Assessment Window 1 (Mock)				End-of-Year Assessment
Homework	Mathswatch: Core revision assignment 12 Independent homework tasks based on class teacher professional judgement	Mathswatch: Core revision assignment 13 Independent homework tasks based on class teacher professional judgement	Mathswatch: Core revision assignment 14 Independent homework tasks based on class teacher professional judgement	Independent homework tasks based on class teacher professional judgement	Mathswatch: Core revision assignment 15 Independent homework tasks based on class teacher professional judgement	EOY practice papers 6 x half papers 1A 1B 2A 2B 3A 3B Independent homework tasks based on class teacher professional judgement