	Year:10 Higher		Subject:	Maths	Spring 2		Summer 1		Summer 2	
Intent	**Subject Concepts (Substantive knowledge)** 		5 concepts areas: 1) Number 2) Algebra 3) Geometry & Measure 4) Statistics & Probability 5) Ratio & Proportion		**Trigonometry 13** • Graphs of sin, cos and tan • Accuracy • Area of any triangle • Sine and Cosine rule • 3D problems • Transforming trigonometric graphs	Prior Knowledge: • Use axes and coordinates to specify points in all four quadrants. • Recall and apply Pythagoras' Theorem and trigonometric ratios. • Substitute into formulae. Takeaway Learning: • Understand and use upper and lower bounds in calculations involving trigonometry. • Understand how to find the sine of any angle. • Know the graph of the sine function and use it to solve equations. • Understand how to find the cosine of any angle. • Know the graph of the cosine function and use it to solve equations. • Understand how to find the tangent of any angle. • Know the graph of the tangent function and use it to solve equations. • Find the area of a triangle and a segment of a circle. • Use the sine rule to solve 2D problems. • Use the cosine rule to solve 2D problems. • Solve bearings problems using trigonometry. • Use Pythagoras' theorem in 3D. • Use trigonometry in 3D. • Recognise how changes in a function affect trigonometric graphs. Recognise how changes in a function affect trigonometric graphs.	**Further Statistics 14** • Sampling • Cumulative Frequency • Box Plots • Histograms • Comparing Data	Prior Knowledge: • Understand the different types of data: discrete/continuous. • Have experience of inequality notation. • Multiply a fraction by a number. • Understand the data handling cycle. Takeaway Learning: • Understand how to take a simple random sample. • Understand how to take a stratified sample. • Draw and interpret cumulative frequency tables and diagrams. • Work out the median, quartiles and interquartile range from a cumulative frequency diagram. • Find the quartiles and the interquartile range from stem-and-leaf diagrams. • Draw and interpret box plots. • Understand frequency density. • Draw histograms. • Interpret histograms. Compare two sets of data.	**Equations and Graphs 15** • Simultaneous Equations and inequalities on a graph • Quadratic Equations on a Graph • Cubic Graphs	Prior Knowledge: • Solve quadratics and linear equations. • Solve simultaneous equations algebraically. • Have practical experience of drawing circles with compasses. Takeaway Learning: • Solve simultaneous equations graphically. • Represent inequalities on graphs. • Interpret graphs of inequalities. • Recognise and draw quadratic functions. • Find approximate solutions to quadratic equations graphically. • Solve quadratic equations using an iterative process. • Find the roots of cubic equations. • Sketch graphs of cubic functions. • Solve cubic equations using an iterative process.
						Prior Knowledge: •		Prior Knowledge: •	**Circle Theorems 16** • Radii and chords • Tangents • Angles in circles Applying circle theorems	Prior Knowledge: • Recall the words, centre, radius, diameter, circumference, arc, sector and segment • Recall the relationship of the gradient between two perpendicular lines. • Find the equation of the straight line, given a gradient and a coordinate.

				Takeaway Learning: •		Takeaway Learning: •	Takeaway Learning: • Solve problems involving angles, triangles and circles. • Understand and use facts about chords and their distance from the centre of a circle. • Solve problems involving chords and radii. • Understand and use facts about tangents at a point and from a point. • Give reasons for angle and length calculations involving tangents. • Understand, prove and use facts about angles subtended at the centre and the circumference of circles. • Understand, prove and use facts about the angle in a semicircle being a right angle. • Find missing angles using these theorems and give reasons for answers. • Understand, prove and use facts about angles subtended at the circumference of a circle. • Understand, prove and use facts about cyclic quadrilaterals. • Prove the alternate segment theorem. • Solve angle problems using circle theorems. Give reasons for angle sizes using mathematical language. Find the equation of the tangent to a circle at a given point.
	Disciplinary Knowledge		**Trigonometry 13** Properties of Shape progression map		**Further Statistics 14** Statistics progression map		**Equations and Graphs 15** Algebra progression map **Circle Theorems 16** Properties of Shape progression map
Implementation	**Common Misconceptions**		**Trigonometry 13** • A bound ending in .4 or .49 • Mixing up sin, cos and tan graphs • Not starting bearings from north • Some students may not appreciate the fact that adjacent and opposite labels are not fixed, and are only relevant to a particular acute angle. In situations where both angles are given this can cause difficulties. • Some students may not balance an equation such as sin35 = 4/x correctly, believing that the next step is (sin35)/4 = x • Some students may think that $\sin^{-1}\theta = 1 \div \sin\theta$ • Some students may think that $\sin\theta$ means $\sin \times \theta$	**Further Statistics 14** • Mixing up c f diagrams with a histogram • (n+1) ÷ 2 vs n ÷ 2 • Frequency instead of frequency density on axis • Some pupils may plot the cumulative frequencies against the midpoints or lower bounds of grouped data • Some pupils may try to construct a cumulative frequency curve by plotting the frequencies against the upper bound of grouped data • Some pupils may try to construct a cumulative frequency curve by joining the points with straight lines rather than a smooth curve • Some pupils may forget to add the 'whiskers' when constructing a 'box and whisker' plot.	**Equations and Graphs 15** • Y = 2 and x = 2 etc misxed up • Substituting in a negative value incorrectly • Feathering the drawing of a quadratic or cubic graph • Some pupils do not rearrange the equation of a straight line correctly to find the gradient of a straight line. For example, they think that the line y – 2x = 6 has a gradient of -2. • Some pupils may think that gradient = (change in x) / (change in y) when trying to equation of a line through two given points. • Some pupils may think that the equation of a circle is $(x-a)^2+(y-b)^2 = r$ **Circle Theorems 16** • Radius and diameter mixed up • Mixing up correct circle theorems • Not stating circle theorem correctly • Some students may think that a cyclic quadrilateral is formed using three points on the circumference along with the centre of the circle • Some students may not appreciate the significance of standard geometrical notation for equal lengths and angles, and think that lengths / angles are equal 'because they look equal' • Some students may not realise that they can extend the lines on diagrams to help establish necessary facts
		SEND Students	**Trigonometry 13** • Overview of difference between when sine rule and cosine rule is applied	**Further Statistics 14** • Pre-drawn axes templates provided		**Equations and Graphs 15** • Pre-drawn axes templates provided	

	Enabling or Adapting the Curriculum		• All formulae provided with examples • Scaffolding worksheets to gradually build to independence • Modelled examples • Sentence starters and writing frames	• Using mathematical equipment (ruler, protractor, calculator etc) • Drawing a straight line • Using a template to draw graphs and charts • Scaffolding worksheets to gradually build to independence • Modelled examples • Sentence starters and writing frames	• Using mathematical equipment (ruler, protractor, calculator etc) • Drawing a straight line • Using a template to draw graphs and charts • Scaffolding worksheets to gradually build to independence • Modelled examples • Sentence starters and writing frames **Circle Theorems 16** • All circle theorems shared and stuck in book • Access to interactive proof of theorems via ipad on mymaths • Scaffolding worksheets to gradually build to independence • Modelled examples • Sentence starters and writing frames
		Disadvantaged Students	• Scaffolding worksheets to gradually build to independence • Modelled examples • Sentence starters and writing frames when answering problem solving questions • Necessary equipment to support in lessons	• Scaffolding worksheets to gradually build to independence • Modelled examples • Sentence starters and writing frames when answering problem solving questions • Necessary equipment to support in lessons	• Scaffolding worksheets to gradually build to independence • Modelled examples • Sentence starters and writing frames when answering problem solving questions • Necessary equipment to support in lessons
			•	•	•
		More Able Students	• Show me an angle and its exact sine (cosine / tangent). And another … • Convince me that you have chosen the correct trigonometric function (When exploring sets of similar triangles and working out ratios in corresponding cases) why do you think that the results are all similar, but not the same? Could we do anything differently to get results that are closer? How could we make a final conclusion for each ratio?	• Show me a box plot with a large/small interquartile range. And another. And another. • What's the same and what's different: inter-quartile range, median, mean, mode • Convince me how to construct a cumulative frequency curve Always/Sometimes/Never: The median is greater than the inter-quartile range	**Equations and Graphs 15** • Show me a sketch of an exponential graph. And another. And another … • What is the same and what is different: $y = x^2$, $y = 2^x$, $y=1/2x$ and $y = (1/2)^x$? • Always/Sometimes/Never: The gradient of a function is constant. • Sketch a speed/time graph of your journey to school. What is the same and what is different with the graph of a classmate? **Circle Theorems 16** • How can you use a set square to find the centre of a circle? • Show me a radius of this circle. And another, and another … (What does this tell you about the lengths? About the triangle?) • Provide the steps for a geometrical proof of a circle theorem and ask students to 'unjumble' them and create the proof, explaining their thinking at each step Use the 'Always / Sometimes / Never' approach to introduce a circle theorem
	Literacy/Numeracy Skills 	**LITERACY** **Reading:**	**Trigonometry 13** Key Words Similar Opposite Adjacent Hypotenuse Trigonometry Function Ratio Sine Cosine Tangent Angle of elevation, angle of depression •	**Further Statistics 14** Key Words Categorical data, Discrete data Continuous data, Grouped data Axis, axes Population Sample Cumulative frequency Box plot, box-and-whisker diagram Central tendency Mean, median, mode Spread, dispersion, consistency Range, Interquartile range Skewness	**Equations and Graphs 15** • Key Word Function, equation Linear, non-linear Parallel Perpendicular Gradient y-intercept, x-intercept, root Sketch, plot Centre (of a circle) Radius Tangent **Circle Theorems 16** Key Words Radius, radii

				Tangent Chord Theorem Conjecture Derive Prove, proof Counterexample
	Writing:	Writing reasoning with correct punctuation & use of mathematical keywords & symbols. Example of writing fluency in maths: $\frac{\sin\theta}{20} = \frac{\sin 70}{100}$ $\sin\theta = \frac{20\sin 70}{100}$ $\sin\theta = 0.1879$ $\theta = \sin^{-1}(0.1879) = 10.8°$	Writing reasoning with correct punctuation & use of mathematical keywords & symbols. Example of writing fluency in maths: Field mice: $\frac{10}{800} \times 540 = 6.75$ Harvest mice: $\frac{10}{800} \times 260 = 3.25$	Writing reasoning with correct punctuation & use of mathematical keywords & symbols. Example of writing fluency in maths: $2x^2 - 8x - 4 = 3x - x^2$ $2x^2 + x^2 - 8x - 3x - 4 = 0$ $3x^2 - 11x - 4 = 0$
	Oracy:	Incidental language based on ability groups. Example of spoken fluency in maths: • The graph does not pass through the origin unlike the graphs for $sin(\theta)$ and $tan(\theta)$ • The graph repeats every $360°$ • The maximum value is 1 and the minimum value is -1.	Incidental language based on ability groups. Example of spoken fluency in maths: English has a higher median (38) than maths (27) so on average English marks are better.	Incidental language based on ability groups. Example of spoken fluency in maths: A **cubic graph** is a graphical representation of a cubic function. A cubic is a polynomial which has an x^3 term as the highest power of x.
	NUMERACY	Number skills Numeracy check-up every week via: • Maths Box weekly check-up/numeracy starters/math-drills.com Staff to reflect on reasoning	Number skills Numeracy check-up every week via: • Maths Box weekly check-up/numeracy starters/math-drills.com Staff to reflect on reasoning	Number skills Numeracy check-up every week via: • Maths Box weekly check-up/numeracy starters/math-drills.com Staff to reflect on reasoning
	Digital Strategy 	KM: From set squares to trigonometry KM: Trigonometry flowchart NRICH: Trigonometric protractor NRICH: Sine and cosine Hwb: Greenhouse	KM: Stick on the Maths HD1: Statistics, HD2: Comparing Distributions KM: Cumulative Frequency and Box Plots NRICH: The Live of Presidents NRICH: Olympic Triathlon NRICH: Box Plot Match OCR: Sampling, Analysing Data	KM: The gradient of perpendicular lines KM: Introducing the equation of a circle KM: The general equation of a circle KM: The general equation of a circle NRICH: Perpendicular lines NRICH: At Right Angles FMSP: Geogebra – Equation of a tangent to a circle KM: Right angle challenge KM: Thales Theorem KM: 6 point circles, 8 point circles, 12 point circles KM: Dynamic diagrams NRICH: Circle theorems Hwb: Cadair Idris Hwb: Cyclic quadrilaterals
	Home Learning	• Either internet based work or worksheets. Homework to be set weekly based on topics covered that week and/or lesson. Work is differentiated to support the least able and stretch the most able.	• Either internet based work or worksheets. Homework to be set weekly based on topics covered that week and/or lesson. Work is differentiated to support the least able and stretch the most able.	• Either internet based work or worksheets. Homework to be set weekly based on topics covered that week and/or lesson. Work is differentiated to support the least able and stretch the most able.

Impact	**Composite Assessment** Interleaving assessments throughout the year. End of unit PLC assessment after each Unit. End of term test Autumn 2 and Spring 2. End of year test Summer 2.	Date:	TBD	Content:	**<u>Unit Test</u>** Unit 13	Date:	TBD	Content:	**<u>Unit Test</u>** Unit 14 **<u>Autumn 2 assessment</u>** Unit 1 to 13	Date:	TBD	Content:	**<u>Unit Tests</u>** Unit 15 Unit 16