Mathematics	This is a summary of the full Scheme of Learning available on the ESW wiki site		Coombeshead Academy (Year 7-11) and South Devon UTC (Year 10/11 only)			
Year	**Year Overview**	**When**	**Overview**	**Core Knowledge**	**Planned Recall**	**Assessments**
Year 7	*Pupils will have learnt to use the function buttons on their new calculators and use it to solve problems. They will be able to apply knowledge learnt to solve problems using: Pythagoras' Theorem, angle facts, perimeter and area of 2D shapes, solving equations, percentages.*	**Cycle 1**	*Using calculators and rounding, Pythagoras' theorem, fractions, area of rectilinear shapes and percentage mental calculations.* *Teaching to use their new calculator functions, solve new challenging problems.*	**Declarative Knowledge** Pupils will Know that: The Hypotenuse is the longest side of a right angled triangle. Pythagoras is the sum of the squares of the shorter sides equals the square on the hypotenuse $a^2 + b^2 = c^2$, area of rectangle = $l \times w$, area of a triangle = $base \times height \div 2$, area of parallelogram = $b \times h$, area of trapezium = $\frac{1}{2}(a+b)h$, 10% = 1/10, 50% =1/2. 25% = ¼. Calculator functions e..g square root. **Procedural Knowledge** Pupils will know how: to round (to whole, d.p. & sig.fig), to use functions on my calculator, to operate on fractions, to calculate a percentage of an amount without a calculator (find 10% by dividing by 10 then use multiples and fractions of this). To find the missing sides of a right angled triangle using Pythagoras' theorem. **Conditional knowledge** Pupils will know when: to add or subtract using Pythagoras' theorem, to use which area formula. When to use which area formula. To use which fraction operation for a given problem.	Fractions (primary) Area of 2D shapes (primary) Percentages (Primary)	Baseline assessment on arrival in school. Low stakes mastery tests, pre-tests and end of cycle assessment.
		Cycle 2	Pythagoras' Theorem in context, increase & decrease by a percentage & processes, perimeter of 2 D shapes, negative numbers, an introduction to algebra. measure and construct angles.	**Declarative Knowledge** Pupils will know; Pythagoras' theorem, the circumference of a circle = $diameter \times \pi$, equivalent percentage and decimals. 2m means 2 x m. m^3 = m x m x m. a/b means a ÷ b. Inverse operations. Circle geometry names. **Procedural Knowledge** Pupils will know how: to convert percentages to equivalent decimals, to increase and decrease by a percentage, to reverse a percentage problem to find the original, to operate on negative numbers by considering a number line, to find the perimeter of rectilinear shapes, to write expressions using algebraic notation, to substitute values into formula, to solve simple equations using the balance method, to measure and draw angles, **Conditional knowledge** Pupils will know when: to increase or decrease in percentage problems. To find the original amount in a % problem. When to use which inverse operation.	Pythagoras (Y7 C1) Percentages (Y7 C1). Perimeter (primary) Negative numbers (primary)	Low stakes mastery tests, pre-tests and end of cycle assessment.

		Cycle 3	Basic angle facts, angles in parallel lines, forming and solving equations, ratio, rearranging formulas, sequences, area of a circle.	**Declarative knowledge** Pupils will know that: Angle facts in parallel lines, formula for the area of a circle = $r^2 \times \pi$, special sequences are the square numbers, triangle numbers and Fibonacci. Sum is adding, difference is subtraction. Notation for iterative sequences. Circle geometry names. **Procedural Knowledge** Pupils will know how: to simplify a ratio, to write a ratio as a fraction. share in a given ratio, to rearrange a formula, to find the nth term of a sequence. To use an iterative formula. To find the area of a full/simple fraction of a circle. **Conditional knowledge** Pupils will know when: To use which angle fact. To use which fact to form an equation. To use which ratio operation.	Angles on a straight line, angles at a point, angles in a triangle, angles in a quadrilateral, angle facts of the special Quadrilaterals (primary)	Low stakes mastery tests, pre-tests and end of cycle assessment.

Hinterland. In Year 7 students will be exposed to the real world application of the types of mathematics studied such as; Financial applications of percentages, geometrical applications of Pythagoras including the length of a line between points,

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Year 8	*Pupils will have learnt the rules of indices, standard form notation and further algebraic processes. Plotting straight lines, calculating area and volume, finding missing angles in polygons.*	**Cycle 1**	Rules of Indices, standard form notation, expanding and factorising expressions, solving equations, arc length and sector area, averages and spread.	**Declarative Knowledge** Pupils will know that: $a^m \times a^n = a^{m+n}, a^m \div a^n = a^{m-n}, (a^m)^n = a^{mn,}, \frac{angle}{360} \times d \times \pi, \frac{angle}{360} \times r^2 \times \pi,$ **Procedural Knowledge** Pupils will know how: to write a number in standard form, to expand single brackets, to factorise in to one bracket, to calculate the mean from a table, to find the mode and median from a table, to know grouped data procedures. **Conditional knowledge** Pupils will know when:	Area of triangle using Pythagoras' theorem. (Y7 C1) Arc length, area of circle (Y7 – C2, C3) Mean (Y6) Inequality notation (Y7 C2**)**	Low stakes mastery tests, pre-tests and end of cycle assessment.
		Cycle 2	Forming and solving equations with perimeter, straight line graphs, proportion, introduction to quadratics, calculating volume, factorising quadratics,	**Declarative Knowledge** Pupils will know that: $y = mx + c$, volume of Cube & cuboid = $l \times w \times h$, volume of triangular prism = $area\ of\ triangle \times length$, **Procedural Knowledge** Pupils will know how: to find the equations of parallel and perpendicular lines, to expand double brackets, to factorise in to two brackets, to use the unitary method, **Conditional knowledge** Pupils will know when:	Plotting co-ordinates (Y6) Sequences (Y7 C3) Expanding brackets (Y8 C1) Volume of cuboids (Y6) Factorising (Y8 C1)	Low stakes mastery tests, pre-tests and end of cycle assessment
		Cycle 3	Prime factor decomposition, volume of cylinder, simple probability, angles in polygons, surface area, bearings and scale diagrams.	**Declarative Knowledge** Pupils will know that: the volume of cylinder = $\pi r^2 \times h$, exterior angle sum of any polygon = 360° , interior angle sum of polygon = $(n - 2) \times 180°$, **Procedural Knowledge** Pupils will know how: to decompose to find the product of prime factors, use a protractor to draw angles in pie chart, use a protractor to draw/measure a bearing, **Conditional knowledge** Pupils will know when:	Multiplication facts (primary) Volume of cuboids (Y8 C2) Angles (Y7 C3) Area (Y7 C2) Protractor work (Y6)	Low stakes mastery tests, pre-tests and end of cycle assessment

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Year 9	*Pupils will have learnt how to solve probability problems using a tree diagram, solve simultaneous equations, plot quadratic graphs and understand density. Be introduced to vectors, multipliers*	Cycle 1	Using probability trees, solving simultaneous equations algebraically and graphically. Plotting and solving quadratic graphs, density calculations, volumes of 3D solids.	**Declarative Knowledge** Pupils will know that: Volume of a prism = $area\ of\ cross\ section \times length$, volume of a cone or pyramid = $\frac{1}{3} area\ of\ base \times height$, & sphere = $\frac{4}{3}\pi r^3$, Density = $\frac{mass}{volume}$. the quadratic formula $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$ **Procedural Knowledge** Pupils will know how: to draw a tree diagram, to substitute, eliminate & plot graphs in order to solve simultaneous equations, to substitute values into volume formulas, to rearrange/reverse formulas to find missing lengths in volume formula or density formula, to plot a quadratic, to complete the square, to sketch a quadratic from three forms, to substitute values into the quadratic formula, to find the limits of a number that has been rounded. **Conditional knowledge** Pupils will know when:	Volumes of prisms (Y8 C2 C3) Rounding (Y7 C1) Plotting straight lines (Y8 C2) Simple probability (Y8 C3) Solving equations (Y8 C2)	Low stakes mastery tests, pre-tests and end of cycle assessment
		Cycle 2	Trigonometry, solving equations and inequalities, basic vectors, ratio, form and solve quadratic equations, percentage multipliers to calculate growth and decay.	**Declarative Knowledge** Pupils will know that: Trigonometric ratios as Soh Cah Toa, vector notation, **Procedural Knowledge** Pupils will know how: to use and write Inequality notation, to solve linear and quadratic inequalities, to draw and operate vectors, to manipulation, to use percentage multipliers to increase and decrease, to use representations to solve hard ratio problems, to solve quadratics by factorising,	Pythagoras' theorem (Y7 C1) Factorising (Y8 C2)	Low stakes mastery tests, pre-tests and end of cycle assessment
		Cycle 3		**Declarative knowledge** Pupils will know that: **Procedural Knowledge** Pupils will know how: **Conditional knowledge** Pupils will know when:		Low stakes mastery tests, pre-tests and end of cycle assessment

Year	Year Overview	When	Overview	Core Knowledge	Planned Recall	Assessments
Year 10 Foundation	Pupils will have learnt to understand proportion problems, workout fractions, solve equations and inequalities, calculate percentages, present data, calculate missing angles, understand sequences, use trigonometry, calculate averages and spread, plot straight lines and quadratic graphs, calculate angles in polygons, surface area and transform shapes.	Cycle 1	Proportion, best buys & conversion graphs, fractions, algebra, equations and inequalities, percentages, presenting data, (bar, picto, pie, frequency polygon)	**Declarative knowledge** Pupils will know that: area of a rectangle $=l \times w$, area of a triangle $=b \times h \div 2$, area of parallelogram $= b \times h$, area of trapezium $= \frac{1}{2}(a+b)h$, area of a circle $= r^2 \times \pi$, 10% is the same as finding $\frac{1}{10}$ **Procedural Knowledge** Pupils will know how: to operate on fractions, to expand brackets and simplify, to solve equations and inequalities, to calculate percentages without a calculator, to calculate compound areas, to draw bar charts, pictograms and pie charts,	Ratio (Y9 C3) Fractions (Y7 C1) Area (Y7 C1)(Y8 C3) Algebra (Y9 C2) Inequalities (Y9 C2) Presenting data (Y6) Percentages (Y9 C3)	Low stakes mastery tests, pre-tests and end of cycle assessment. 40% new 60% prior topics.
		Cycle 2	Angle facts, sequences, scatter graphs, simultaneous equations, Pythagoras and trigonometry, averages and spread,	**Declarative knowledge** Pupils will know that: ±correlation means a relationship between the two axes of a scatter graph, angles on a straight line add up to 180° , angles around a point add up to 360°, angles in a triangle add up to 180°, angles in a quadrilateral add up to 360,° angle facts in parallel lines CIAO, Trigonometric ratios as Soh Cah Toa, **Procedural Knowledge** Pupils will know how: to draw a scatter graph and line of best fit, to solve simultaneous equations by substitution and elimination, to continue a sequence and find the nth term, to calculate mean from list and frequency table, to find mode and median from list and table.	Angles (Y8 C3) Sequences (Y7 C3) Representing data (Y10 C1) Trigonometry (Y9 C2) Mean (Y6)	Low stakes mastery tests, pre-tests and end of cycle assessment. 40% new 60% prior topics.
		Cycle 3	Straight lines, proportion and unitary method, volume, quadratic graphs, angles in polygons, surface area, transformations, equations – choosing, forming & solving.	**Declarative knowledge** Pupils will know that: $y = mx + c$, volume of Cube & cuboid = $l \times w \times h$, volume of triangular prism = $area\ of\ triangle \times length$, the volume of cylinder = $\pi r^2 \times h$, exterior angles in a polygon add up to 360°, $i$nterior angle sum of polygon = $(n-2) \times 180°$, **Procedural Knowledge** Pupils will know how: to plot straight lines finding co-ordinates and gradient intercept method, to write ratios as fractions and percentages, to solve questions using correct ratio notation, to calculate surface area, to transform shapes – reflect, rotate, enlarge, translate, to solve one and two step equations	Straight line graphs (Y8 C2) Ratio & Proportion (Y10 C1) Volume (Y8 C2 C3) Quadratic graphs (Y9 C1) Angles (Y10 C2) Area (Y8 C3) Equations (Y10 C1)	Low stakes mastery tests, pre-tests and end of cycle assessment. 40% new 60% prior topics/years.

Year	Year Overview	When	Overview	Core Knowledge	Planned Recall	Assessments
Year 11 Foundation	*Pupils will have learnt to plot straight lines and recognise other types of graphs, calculate using standard form, use the rules of indices to simplify, solve part and whole circle problems, draw and interpret vectors, solve problems with units of time and compound measures, solve construction problems, rearrange and solve equations, understand probability.*	**Cycle 1**	Straight line graphs review, sequences, standard form and rules of indices, area of circle & sector, circumference of circle & length of arc, multiplier method for percentages, vectors.	**Declarative knowledge** Pupils will know that: $y = mx + c$, : $a^m \times a^n = a^{m+n}, a^m \div a^n = a^{m-n}, (a^m)^n = a^{mn,}$, the circumference of a circle = $diameter \times \pi$, area of a circle = $r^2 \times \pi$, $\frac{angle}{360} \times d \times \pi$, $\frac{angle}{360} \times r^2 \times \pi$, column vector notation $\binom{x}{y}$ **Procedural Knowledge** Pupils will know how: to plot straight lines finding co-ordinates and gradient intercept method, to convert numbers between ordinary and standard form, to calculate percentages using multiplier method, to draw and describe a vector using correct notation. **Conditional knowledge** Pupils will know when:	Straight line graphs (Y10 C3) Rules of indices (Y8 C1) Sequences (Y10 C2) Area of circle (Y10 C3)(Y8 C3) Circumference of circle (Y10 C3) Percentages (Y10 C1) Translation (vectors) (Y10 C3)	Low stakes mastery tests, pre-tests and end of cycle assessment. 40% new 60% prior topics.
		Cycle 2	Calculations using time, compound measures of speed, density and pressure, mixed ratio problems, constructions, types of graphs, equations and rearranging formula, probability.	**Declarative knowledge** Pupils will know that: *speed* = $\frac{distance}{time}$, $density = \frac{mass}{volume}$, $pressure = \frac{area}{force}$, graphs can be recognised by special features in their equations, **Procedural Knowledge** Pupils will know how: to convert between 12 and 24 hr, to solve 3 part ratio problems, to construct: triangles, angle bisector, perpendicular bisector using compass and ruler, to solve and rearrange formula using the balance method, **Conditional knowledge** Pupils will know when:	Time (Y5) Speed (Y9 C3) Density (Y9 C1) Ratio (Y10 C3) Graphs (Y11 C1)(Y10 C3) Probability (Y9 C1, C3)	Low stakes mastery tests, pre-tests and end of cycle assessment. 40% new 60% prior topics/years.

Year	Year Overview	When	Overview	Core Knowledge	Planned Recall	Assessments
Year 10 Higher	*Pupils will have learnt to solve direct and indirect proportion, solve algebraic fractions, use the circle theorems to solve angle problems, fractional indices, surds, co-ordinate geometry, scatter graphs, frequency polygons, cumulative frequency curve and histograms. Further trigonometry, further sequences, inequalities and regions, functions and enlargement.*	Cycle 1	Direct and inverse proportion and their graphs, algebraic fractions, the circle theorems, rules of indices with fractional and/or negative powers, simplifying & manipulating surds,	**Declarative knowledge** Pupils will know that: $y \propto x \; becomes \; y = kx$, $y \propto \frac{1}{x} \; becomes \; y = \frac{k}{x}$, angles in a semi-circle = 90°, angle at the centre is twice angle at circumference, angles in the same segment are equal, opposite angles of a cyclic quadrilateral are supplementary, angle between a tangent and a radius is a right-angle, angle between a tangent and a chord is equal to opposite interior angle. $a^{\frac{1}{n}} = \sqrt[n]{\sqrt{a}}$, **Procedural Knowledge** Pupils will know how: to recognise direct and indirect proportion graphs, simplify surds, to rationalise the denominator,	Proportion (Y9 C3) Graphs (Y9 C1) Rules of Indices (Y8 C1) Angles (Y8 C3)	Low stakes mastery tests, pre-tests and end of cycle assessment. 40% new 60% prior topics.
		Cycle 2	Co-ordinate geometry, scatter graphs & frequency polygons, sine rule & cosine rule, rearranging formula, quadratic and geometric sequences, regions and solving quadratic inequalities.	**Declarative knowledge** Pupils will know that: $y = mx + c$, ±correlation means a relationship between the two axes of a scatter graph, $\frac{sinA}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$, $\cos A = \frac{b^2+c^2-a^2}{2bc}$, $area \; of \; triangle = \frac{1}{2}ab \sin C$, **Procedural Knowledge** Pupils will know how: to determine if a point is on a line, find the equation of a line given a point and gradient, to calculate the gradient from two points, to find the equation given two points, to plot and interpret a scatter graph, to draw a line of best fit, to find the nth term of quadratic sequence, to recognise geometric sequences and link to growth/decay, to plot regions and solve inequalities,	Graphs (Y8 C2) Trigonometry (Y9 C2) Sequences (Y7 C3) Inequalities (Y9 C2)	Low stakes mastery tests, pre-tests and end of cycle assessment. 40% new 60% prior topics.
		Cycle 3	Cumulative frequency, tangent to a curve, velocity time graphs, histogram, functions, combined compound measures, enlargement negative scale factor.	**Declarative knowledge** Pupils will know that: the inter-quartile range = $Q3 - Q1$, the gradient of tangent = $\frac{change \; in \; y}{change \; in \; x}$, speed = area under the curve, frequency density = $\frac{frequency}{class \; width}$, $speed = \frac{distance}{time}$, $density = \frac{mass}{volume}$, $pressure = \frac{area}{force}$, **Procedural Knowledge** Pupils will know how: to plot a cumulative frequency curve, find the median and quartiles and plot a box and whisker plot, to draw and find the gradient of tangent to a curve, to estimate area under the curve, to plot a histogram, can interpret and manipulate functions, to enlarge by a negative scale factor,	Mean (Y6) Illustrating data (Y6) Area of a trapezium (Y7 C1) Transformations (Y9 C3)	Low stakes mastery tests, pre-tests and end of cycle assessment. 40% new 60% prior topics/years.

Year	Year Overview	When	Overview	Core Knowledge	Planned Recall (knowledge that this builds on)	Assessments
Year 11 Higher	*Pupils will have learnt how to expand polynomials, convert recurring decimals to a fraction, demonstrate algebraic, geometric and vector proof, to plot circles, further solving of equations, constructions, iterative methods, capture re-capture probability,*	Cycle 1	Expanding polynomials, recurring decimals to fractions, algebraic and geometric reasoning and proof, equations of circle and tangents, solving linear and quadratic simultaneous equations,	**Declarative knowledge** Pupils will know that: there are conditions for congruency, equation of a circle = $x^2 + y^2 = r^2$, **Procedural Knowledge** Pupils will know how: to expand polynomials, to convert recurring decimals to a fraction using algebraic method, to use algebra in a proof, to solve simultaneous equations linear & quadratic, **Conditional knowledge** Pupils will know when:	Similarity & congruency (Y9 C3) Types of graphs (Y10 C2) Tangent to curve (Y10 C3) Simultaneous equations (Y9 C1)	Low stakes mastery tests, pre-tests and end of cycle assessment 40% new 60% prior topics.
		Cycle 2	Combinations & probability, algebraic vector proof, ratio and equations, loci and constructions, iteration, capture-recapture, graph transformations,	**Declarative knowledge** Pupils will know: the product rule, **Procedural Knowledge** Pupils will know how: to solve equations involving ratio, to bisect an angle, to construct a perpendicular bisector, to construct a given triangle, to substitute into and rearrange a cubic equation for iterative processes, to sketch translations and reflections of graphs, to estimate probability using capture re-capture method. **Conditional knowledge** Pupils will know when:	Probability (Y9 C3) Vectors (Y9 C2) Equations (Sequences (Y10 C2) Transformations enlargement (Y11 C1)	Low stakes mastery tests, pre-tests and end of cycle assessment. 40% new 60% prior topics/years.