Year 10 Foundation

Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8		Week 9	Week 10
Unit 1 Number – Meet your calculator	Unit 1 Number – Written Calculations	Unit 2 Algebra – Algebraic notation	Unit 1 Number – Types of number	Unit 2 Algebra – Algebraic Calculation		Unit 5 Equations and Formulae	Unit 3 Graphs Tables Charts	**October Break**	Unit 3 Graphs Tables Charts	Assessment Preparation
Week	**Week**	**Week**	**Week**			**Week**	**Week**	**Week**	**Week**	**Week**
Assessments	Unit 3 Graphs Tables Charts	**Unit 4 Fractions decimals percentages**		**Christmas Break**	**Christmas Break**	Unit 5 Equations and inequalities		Unit 6 Angles		Unit 7 Averages
Week	**Week 21**	**Week**	**Week**	**Week**	**Week**	**Week**	**Week**			**Week**
Unit 7 Averages	**February Break**	UNIT 8 Perimeter and Volume		Assessment Preparation	Assessments	Unit 9 Graphs		**Easter Break**	**Easter Break**	Unit 10 Transformations
Unit 10 Transformations	11 Ratio and Proportion		Assessment Preparation		**May Break**	Mocks		Work experience	**Week 37**	**Week 38**

Unit: 10.1 Number

Time	Skills and Knowledge	Where learning sits	Keywords	4 E's
16 hrs	**Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task.** By the end of the sub-unit, students should be able to: **N1** order positive and negative integers, decimals and fractions; use the symbols =, ≠, <, >, ≤, ≥ **N2** apply the four operations, including formal written methods, to integers, decimals and simple fractions (proper and improper), and mixed numbers – all both positive and negative; understand and use place value (e.g. when working with very large or very small numbers, and when calculating with decimals) **N3** recognise and use relationships between operations, including inverse operations (e.g. cancellation to simplify calculations and expressions); use conventional notation for priority of operations, including brackets, powers, roots and reciprocals **N4** use the concepts and vocabulary of prime numbers, factors (divisors), multiples, common factors, common multiples, highest common factor, lowest common multiple, prime factorisation, including using product notation and the unique factorisation theorem **N5** apply systematic listing strategies including use of the product rule for counting (i.e. if there are $\boldsymbol{m}$ ways of doing one task and for each of these, there are $\boldsymbol{n}$ ways of doing another task, then the total number of ways the two tasks can be done is $\boldsymbol{m} \times \boldsymbol{n}$ ways) **N6** use positive integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5; estimate powers and roots of any given positive number **N7** calculate with roots and with integer and with integer indices **N13** use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where **N14** estimate answers; check calculations using approximation and estimation, including answers obtained using technology **N15** round numbers and measures to an degree of accuracy (e.g. to a specified number of decimal places or significant figures);	**Next** **New** **Prior** It is essential that students have a firm grasp of place value and be able to order integers and decimals and use the four operations. Students should have knowledge of integer complements to 10 and to 100, multiplication facts to 10 × 10, strategies for multiplying and dividing by 10, 100 and 1000. Students will have encountered squares, square roots, cubes and cube roots and have knowledge of classifying integers.	Integer, number, digit, negative, decimal, addition, subtraction, multiplication, division, remainder, operation, estimate, power, roots, factor, multiple, primes, square, cube, even, odd, surd, rational, irrational standard form, simplify	**Emerging** To solve calculations using decimals and large numbers. **Expected** To find factors and multiples of and up to 3 digit numbers **Exceeding** To understand and use index notation for LCM and HCF **Excelling** To use a variety of methods to find HCF and LCM of up to 3 numbers. **Resources to Support**

Real-life applications and Problem Solving	Misconceptions

Unit: 10.2 Algebra

Time	Skills and Knowledge	Where learning sits	Keywords	4 E's
11 hrs	**Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task.** By the end of the sub-unit, students should be able to: **N1** order positive and negative integers, decimals and fractions; use the symbols =, ≠, <, >, ≤, ≥ **N3** Recognise and use relationships between operations, including inverse operations (e.g. cancellation to simplify calculations and expressions); use conventional notation for priority of operations, including brackets, powers, roots and reciprocals **A1** use and interpret algebraic notation, including: ab in place of $a \times b$ $3y$ in place of $y + y + y$ and $3 \times y$ a^2 in place of $a \times a$, a^3 in place of $a \times a \times a$, a^2b in place of $a \times a \times b$ $\frac{a}{b}$ in place of $a \div b$ coefficients written as fractions rather than as decimals brackets **A2** substitute numerical values into formulae and expressions, including scientific formulae **A3** understand and use the concepts and vocabulary of expressions, equations, formulae, identities, inequalities, terms and factors **A4** simplify and manipulate algebraic expressions … by: collecting like terms multiplying a single term over a bracket taking out common factors simplifying expressions involving sums, products and powers, including the laws of indices **A5** understand and use standard mathematical formulae; rearrange formulae to change the subject **A6** know the difference between an equation and an identity; argue mathematically to show algebraic expressions are equivalent, and use algebra to support and construct arguments **A7** where , interpret simple expressions as functions with inputs and outputs **A21** translate simple situations or procedures into algebraic expressions or formulae; derive an equation, solve the equation and interpret the solution	**Next** **New** **Prior** The ability to use negative numbers with the four operations and recall and use hierarchy of operations and understand inverse operations; dealing with decimals and negatives on a calculator; using index laws numerically.	Expression, identity, equation, formula, substitute, term, 'like' terms, index, power, negative and fractional indices, collect, substitute, expand, bracket, factor, factorise, quadratic, linear, simplify, approximate, arithmetic, geometric, function, sequence, nth term, derive	**Emerging** To simplify algebraic expressions with 2 different terms **Expected** To use substitution within formulae **Exceeding** To expand and factorise expressions. **Excelling** Use a variety of algebra skills in area and perimeter problems **Resources to Support**

Real-life applications and Problem Solving	Misconceptions

Unit: 10.3 Graphs, Tables and charts

Time	Skills and Knowledge	Where learning sits	Keywords	4 E's
18 hrs	**Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task.** By the end of the sub-unit, students should be able to: **G14** Use standard units of measure and related concepts (length, area, volume/capacity, mass, time, money, etc.) **S2** interpret and construct tables, charts and diagrams, including frequency tables, bar charts, pie charts and pictograms for categorical data, vertical line charts for ungrouped discrete numerical data, tables and line graphs for time series data and know their use **S3** construct and interpret diagrams for grouped discrete data and continuous data i.e. histograms with equal and unequal class intervals … **S4** interpret, analyse and compare the distributions of data sets from univariate empirical distributions through: - graphical representation involving discrete, continuous and grouped data … - measures of central tendency (median, mode and modal class) and spread (range, including consideration of outliers) … **S5** apply statistics to describe a population **S6** use and interpret scatter graphs of bivariate data; recognise correlation and know that it does not indicate causation; draw estimated lines of best fit; make predictions; interpolate and extrapolate apparent trends whilst knowing the dangers of so doing	**Next** **New** **Prior** Students should be able to read scales on graphs, draw circles, measure angles and plot coordinates in the first quadrant. Students should have experience of tally charts. Students will have used inequality notation. Students must be able to find midpoint of two numbers.	Mean, median, mode, range, average, discrete, continuous, qualitative, quantitative, data, scatter graph, line of best fit, correlation, positive, negative, sample, population, stem and leaf, frequency, table, sort, pie chart, estimate	**Emerging** **Expected** **Exceeding** **Excelling** . **Resources to Support**

Real-life applications and Problem Solving	Misconceptions

Unit: 10.4 Fractions and Percentages

<table>
<tr><th>Time</th><th>Skills and Knowledge</th><th>Where learning sits</th><th>Keywords</th><th>4 E’s</th></tr>
<tr>
<td rowspan="2">12 hrs</td>
<td rowspan="2">Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task. By the end of the sub-unit, students should be able to:

N1- N7 See unit 10.1
N8 calculate exactly with fractions …
N10 work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and 72 or 0.375 and 38); change recurring decimals into their corresponding fractions and vice versa
N11 identify and work with fractions in ratio problems
N12 interpret fractions and percentages as operators
N13 use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where
R3 express one quantity as a fraction of another, where the fraction is less than 1 or greater than 1
R6 express a multiplicative relationship between two quantities as a ratio or a fraction
R9 define percentage as ‘number of parts per hundred’; interpret percentages and percentage changes as a fraction or a decimal, and interpret these multiplicatively; express one quantity as a percentage of another; compare two quantities using percentages; work with percentages greater than 100%; solve problems involving percentage change, including percentage increase/decrease, and original value problems and simple interest including in financial mathematics</td>
<td>Next</td>
<td rowspan="3">Addition, subtraction, multiplication, division, fractions, mixed, improper, recurring, reciprocal, integer, decimal, termination, percentage, VAT, increase, decrease, multiplier, profit, loss, ratio, proportion, share, parts</td>
<td><u>Emerging</u>

<u>Expected</u>

<u>Exceeding</u>

<u>Excelling</u>
.</td>
</tr>
<tr>
<td>New</td>
<td>Resources to Support</td>
</tr>
<tr>
<td colspan="2">Real-life applications and Problem Solving</td>
<td>Prior
Students should know the four operations of number, be able to find common factors, have a basic understanding of fractions as being ‘parts of a whole’, define percentage as ‘number of parts per hundred’, be aware that percentages are used in everyday life.</td>
<td colspan="2">Misconceptions</td>
</tr>
</table>

Unit: 10.5 Equations, Inequalities and sequences

Time	Skills and Knowledge	Where learning sits	Keywords	4 E's
12 hrs	**Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task.** By the end of the sub-unit, students should be able to: **N1** order positive and negative integers, decimals and fractions; use the symbols =, ≠, <, >, ≤, ≥ **N15** round numbers and measures to an degree of accuracy (e.g. to a specified number of decimal places or significant figures); use inequality notation to specify simple error intervals due to truncation or rounding **N16** apply and interpret limits of accuracy **A2** substitute numerical values into formulae and expressions, including scientific formulae **A3** understand and use the concepts and vocabulary of expressions, equations, formulae, identities, inequalities, terms and factors **A5** understand and use standard mathematical formulae; rearrange formulae to change the subject **A7** where , interpret simple expressions as functions with inputs and outputs **A17** solve linear equations in one unknown algebraically (including those with the unknown on both sides of the equation); find approximate solutions using a graph **A21** translate simple situations or procedures into algebraic expressions or formulae; derive an equation, solve the equation and interpret the solution **A22** solve linear inequalities in one variable; represent the solution set on a number line **A23** generate terms of a sequence from either a term-to-term or a position-to-term rule **A24** recognise and use sequences of triangular, square and cube numbers, simple arithmetic progressions; Fibonacci type sequences and simple geometric progressions (r^n where n is an integer, and r is a rational number > 0) **A25** deduce expressions to calculate the nth term of linear sequences.	**Next** **New** **Prior** Students should be able to use inequality signs between numbers. Students should be able to use negative numbers with the four operations, recall and use the hierarchy of operations and understand inverse operations. Students should be able to deal with decimals and negatives on a calculator. Students should be able to use index laws numerically. Students should be able to draw a number line.	Arithmetic, geometric, function, sequence, nth term, derive, quadratic, triangular, cube, square, odd, even, solve, change, subject, inequality, represent, substitute, bracket, expand, linear, equation, balance, accuracy	**Emerging** **Expected** **Exceeding** **Excelling** . **Resources to Support**
Real-life applications and Problem Solving			**Misconceptions**	

Unit: 10.6 Angles

Time	Skills and Knowledge	Where learning sits	Keywords	4 E's
10 hrs	**Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task.** By the end of the sub-unit, students should be able to: **A8** work with coordinates in all four quadrants **G1** use conventional terms and notation: points, lines, vertices, edges, planes, parallel lines, perpendicular lines, right angles, polygons, regular polygons and polygons with reflection and/or rotation symmetries; use the standard conventions for labelling and referring to the sides and angles of triangles; draw diagrams from written description **G3** apply the properties of angles at a point, angles at a point on a straight line, vertically opposite angles; understand and use alternate and corresponding angles on parallel lines; derive and use the sum of angles in a triangle (e.g. to deduce and use the angle sum in any polygon, and to derive properties of regular polygons) **G4** derive and apply the properties and definitions of special types of quadrilaterals, including square, rectangle, parallelogram, trapezium, kite and rhombus; and triangles and other plane figures using language **G7** identify and describe congruent and similar shapes **G6** apply angle facts, triangle congruence, similarity and properties of quadrilaterals to conjecture and derive results about angles and sides, including … the fact that the base angles of an isosceles triangle are equal, and use known results to obtain simple proofs **G11** solve geometrical problems on coordinate axes **G15** measure line segments and angles in geometric figures	**Next** **New** **Prior** Students should be able to use a ruler and protractor. Students should have an understanding of angles as a measure of turning. Students should be able to name angles and distinguish between acute, obtuse, reflex and right angles. Students should recognise reflection symmetry, be able to identify and draw lines of symmetry, and complete diagrams with given number of lines of symmetry. Students should recognise rotation symmetry and be able to identify orders of rotational symmetry, and complete diagrams with given order of rotational symmetry.	Quadrilateral, angle, polygon, interior, exterior, proof, tessellation, rotational symmetry, parallel, corresponding, alternate, co-interior, vertices, edge, face, sides, triangle, perpendicular, isosceles, scalene, clockwise, anticlockwise, hexagons, heptagons, octagons, decagons, obtuse, acute, reflex, quadrilateral, triangle, regular, irregular, two-dimensional, three-dimensional, measure, line, angle, order, intersecting	**Emerging** **Expected** **Exceeding** **Excelling** . **Resources to Support**

Real-life applications and Problem Solving	Misconceptions

Unit: 10.7 Averages and Range

Time	Skills and Knowledge	Where learning sits	Keywords	4 E's
6 hrs	**Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task.** By the end of the sub-unit, students should be able to: **S1** infer properties of populations or distributions from a sample, while knowing the limitations of sampling **S2** interpret and construct tables, charts and diagrams, including frequency tables, bar charts, pie charts and pictograms for categorical data, vertical line charts for ungrouped discrete numerical data, tables and line graphs for time series data and know their use **S4** interpret, analyse and compare the distributions of data sets from univariate empirical distributions through: … measures of central tendency (median, mean, mode and modal class) and spread (range, including consideration of outliers)	**Next** **New** **Prior** Students should be able to calculate the midpoint of two numbers. Students will have drawn the statistical diagrams in unit 3. Students will have used inequality notation.	Mean, median, mode, range, average, discrete, continuous, qualitative, quantitative, data, sample, population, stem and leaf, frequency, table, sort, pie chart, estimate, primary, secondary, interval, midpoint, survey	**Emerging** **Expected** **Exceeding** **Excelling** **Resources to Support**
Real-life applications and Problem Solving			**Misconceptions**	

Unit: 10.8 Perimeter Area and Volume 1

Time	Skills and Knowledge	Where learning sits	Keywords	4 E's
8 hrs	**Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task.** By the end of the sub-unit, students should be able to: ***N14*** *estimate answers; check calculations using approximation and estimation, including answers obtained using technology* ***A5*** *understand and use standard mathematical formulae; …* ***R1*** *change freely between related standard units (e.g. time, length, area, volume/capacity, mass) and compound units (e.g. speed, rates of pay, prices, density, pressure) in numerical and algebraic contexts* ***G11*** *solve geometrical problems on coordinate axes* ***G12*** *identify properties of the faces, surfaces, edges and vertices of: cubes, cuboids, prisms, cylinders, pyramids, cones and spheres* ***G14*** *use standard units of measure and related concepts (length, area, volume/capacity, mass, time, money, etc.)* ***G15*** *measure line segments and angles in geometric figures …* ***G16*** *know and apply formulae to calculate: area of triangles, parallelograms, trapezia; volume of cuboids and other right prisms (including cylinders)* ***G17*** *… calculate: perimeters of 2D shapes, including … composite shapes*	**Next** **New** **Prior** Students should be able to measure lines and recall the names of 2D shapes. Students should be able to use strategies for multiplying and dividing by powers of 10. Students should be able to find areas by counting squares and volumes by counting cubes. Students should be able to interpret scales on a range of measuring instruments.	Triangle, rectangle, parallelogram, trapezium, area, perimeter, formula, length, width, prism, compound, measurement, polygon, cuboid, volume, symmetry, vertices, edge, face, units, conversion	**Emerging** **Expected** **Exceeding** **Excelling** . **Resources to Support**

Real-life applications and Problem Solving	Misconceptions

Unit: 10.9 Graphs

<table>
<tr><th>Time</th><th>Skills and Knowledge</th><th>Where learning sits</th><th>Keywords</th><th>4 E’s</th></tr>
<tr><td rowspan="2">12 hrs</td><td rowspan="2">Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task. By the end of the sub-unit, students should be able to:

N13 use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where
A7 where , interpret simple expressions as functions with inputs and outputs
A8 work with coordinates in all four quadrants
A9 plot graphs of equations that correspond to straight-line graphs in the coordinate plane; …
A10 identify and interpret gradients and intercepts of linear functions graphically and algebraically
A12 Recognise, sketch and interpret graphs of linear functions …
A14 plot and interpret … graphs of non-standard functions in real contexts, to find approximate solutions to problems such as simple kinematic problems involving distance, speed and acceleration
A17 solve linear equations in one unknown algebraically (including those with the unknown on both sides of the equation); find approximate solutions using a graph
R1 change freely between related standard units (e.g. time, length, area, volume/capacity, mass) and compound units (e.g. speed, rates of pay, prices, density, pressure) in numerical and algebraic contexts
R11 use compound units such as speed, … unit pricing, …
R14 interpret the gradient of a straight line graph as a rate of change; recognise and interpret graphs that illustrate direct and inverse proportion
G11 solve geometrical problems on coordinate axes
G14 use standard units of measure and related concepts (length, area, volume/capacity, mass, time, money, etc.)</td><td>Next</td><td rowspan="2">Linear, graph, distance, time, coordinate, quadrant, real-life graph, gradient, intercept, function, solution, parallel</td><td><u>Emerging</u>

<u>Expected</u>

<u>Exceeding</u>

<u>Excelling</u>
.</td></tr>
<tr><td>New

Prior
Students should be able to plot coordinates and read scales

Students should be able to substitute into a formula.</td><td>Resources to Support</td></tr>
<tr><td colspan="3">Real-life applications and Problem Solving</td><td colspan="2">Misconceptions</td></tr>
</table>

Unit: 10.10 Transformations

Time	Skills and Knowledge	Where learning sits	Keywords	4 E's
6 hrs	**Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task.** By the end of the sub-unit, students should be able to: ***R6*** *express a multiplicative relationship between two quantities as a ratio or a fraction* ***R12*** *… make links to similarity … and scale factors* ***G1*** *use conventional terms and notations: points, lines, vertices, edges, planes, parallel lines, perpendicular lines, right angles, polygons, regular polygons and polygons with reflection and/or rotation symmetries; …* ***G7*** *identify, describe and construct congruent and similar shapes, including on coordinate axes, by considering rotation, reflection, translation and enlargement (including fractional scale factors)* ***G24*** *describe translations as 2D vectors*	**Next** **New** **Prior** Students should recall basic shapes. Students should be able to plot points in all four quadrants. Students should have an understanding of the concept of rotation. Students should be able to draw and recognise lines parallel to axes and $y = x$, $y = -x$. Students will have encountered the terms clockwise and anticlockwise previously.	Transformation, rotation, reflection, enlargement, translation, single, combination, scale factor, mirror line, centre of rotation, centre of enlargement, column vector, vector, similarity, congruent, angle, direction, coordinate, describe	**Emerging** **Expected** **Exceeding** **Excelling** . **Resources to Support**
Real-life applications and Problem Solving			**Misconceptions**	

Unit: 10.11 Ratio and Proportions

Time	Skills and Knowledge	Where learning sits	Keywords	4 E's
12 hrs	**Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task.** By the end of the sub-unit, students should be able to: ***N11*** *identify and work with fractions in ratio problems* ***N13*** *use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where* ***R1*** *change freely between related standard units (e.g. time, length, area, volume/capacity, mass) and compound units (e.g. speed, rates of pay, prices, density, pressure) in numerical and algebraic contexts* ***R2*** *use scale factors, scale diagrams and maps* ***R3*** *express one quantity as a fraction of another* ***R4*** *use ratio notation, including reduction to simplest form* ***R5*** *divide a given quantity into two parts in a given part : part or part : whole ratio; express the division of a quantity into two parts as a ratio; apply ratio to real contexts and problems (such as those involving conversion, comparison, scaling, mixing, concentrations)* ***R6*** *express a multiplicative relationship between two quantities as a ratio or a fraction* ***R7*** *understand and use proportion as equality of ratios* ***R8*** *relate ratios to fractions and to linear functions* ***R10*** *solve problems involving direct and inverse proportion, including graphical and algebraic representations* ***R12*** *compare lengths, areas and volumes using ratio notation; make links to similarity (including trigonometric ratios) and scale factors* ***R13*** *understand that X is inversely proportional to Y is equivalent to X is proportional to $1Y$; interpret equations that describe direct and inverse proportion* ***R14*** *interpret the gradient of a straight line graph as a rate of change; recognise and interpret graphs that illustrate direct and inverse proportion*	**Next** **New** **Prior** Students should know the four operations of number. Students should have a basic understanding of fractions as being 'parts of a whole'.	Ratio, proportion, share, parts, fraction, function, direct proportion, inverse proportion, graphical, linear, compare	**Emerging** **Expected** **Exceeding** **Excelling** . **Resources to Support**
Real-life applications and Problem Solving				**Misconceptions**

Unit: 10.12 Right angled Triangles

Time	Skills and Knowledge	Where learning sits	Keywords	4 E's
6 hrs	**Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task.** By the end of the sub-unit, students should be able to: ***N7*** *calculate with roots, and with integer indices* ***N15*** *round numbers and measures to an degree of accuracy (e.g. to a specified number of decimal places or significant figures); …* ***A4*** *simplify and manipulate algebraic expressions (including those involving surds) by: collecting like terms, multiplying a single term over a bracket, …* ***A5*** *understand and use standard mathematical formulae; …* ***R12*** *… make links to similarity (including trigonometric ratios) …* ***G6*** *apply angle facts, triangle congruence, similarity and properties of quadrilaterals to conjecture and derive results about angles and sides, including Pythagoras' Theorem and the fact that the base angles of an isosceles triangle are equal, and use known results to obtain simple proofs* ***G20*** *know the formulae for: Pythagoras' Theorem $a2 + b2 = c2$ and the trigonometric ratios, sine, cosine and tan; apply them to find angles and lengths in right-angled triangles in two dimensional figures* ***G21*** *know the exact values of sin θ and cos θ for $\theta = 0°, 30°, 45°, 60°$ and 90°; know the exact value of tan θ for $\vartheta = 0°, 30°, 45°$ and 60°*	**Next** **New** **Prior** students should be able to rearrange simple formulae and equations, as preparation for rearranging trigonometric formulae. Students should recall basic angle facts. Students should understand when to leave an answer in surd form. Students can plot coordinates in all four quadrants and draw axes.	Triangle, right angle, angle, Pythagoras' Theorem, sine, cosine, tan, trigonometry, opposite, hypotenuse, adjacent, ratio, elevation, depression, length, accuracy	**Emerging** **Expected** **Exceeding** **Excelling** . **Resources to Support**

Real-life applications and Problem Solving	Misconceptions

Unit: 10.13 Probability

Time	Skills and Knowledge	Where learning sits	Keywords	4 E's
12 hrs	**Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task.** By the end of the sub-unit, students should be able to: ***N5*** *apply systematic listing strategies* ***P1*** *record, describe and analyse the frequency of outcomes of probability experiments using tables and frequency trees* ***P2*** *apply ideas of randomness, fairness and equally likely events to calculate expected outcomes of multiple future experiments* ***P3*** *relate relative expected frequencies to theoretical probability, using language and the 0-1 probability scale* ***P4*** *apply the property that the probabilities of an exhaustive set of outcomes sum to one; apply the property that the probabilities of an exhaustive set of mutually exclusive events sum to one* ***P5*** *understand that empirical unbiased samples tend towards theoretical probability distributions, with increasing sample size* ***P6*** *enumerate sets and combinations of sets systematically, using tables, grids, Venn diagrams and tree diagrams* ***P7*** *construct theoretical possibility spaces for single and combined experiments with equally likely outcomes and use these to calculate theoretical probabilities* ***P8*** *calculate the probability of independent and dependent combined events, including using tree diagrams and other representations, and know the underlying assumptions*	**Next** **New** **Prior** Students should know how to add and multiply fractions and decimals. Students should have experience of expressing one number as a fraction of another number.	Probability, dependent, independent, conditional, tree diagrams, sample space, outcomes, theoretical, relative frequency, fairness, experimental	**Emerging** **Expected** **Exceeding** **Excelling** . **Resources to Support**

Real-life applications and Problem Solving	Misconceptions

Unit: 10.14 Multiplicative Reasoning

Time	Skills and Knowledge	Where learning sits	Keywords	4 E's
6 hrs	**Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task.** By the end of the sub-unit, students should be able to: ***N12*** *interpret fractions and percentages as operators* ***N13*** *use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where* ***A5*** *understand and use standard mathematical formulae; rearrange formulae to change the subject* ***R1*** *change freely between related standard units (e.g. time, length, area, volume/capacity, mass) and compound units (e.g. speed, rates of pay, prices, density, pressure) in numerical and algebraic contexts* ***R9*** *… express one quantity as a percentage of another; … solve problems involving percentage change, … and original value problems … including in financial mathematics* ***R10*** *solve problems involving direct and inverse proportion …* ***R11*** *use compound units such as speed, rates of pay, unit pricing, density and pressure* ***R13*** *understand that X is inversely proportional to Y is equivalent to X is proportional to $1Y$; interpret equations that describe direct and inverse proportion* ***R16*** *set up, solve and interpret the answers in growth and decay problems, including compound interest* ***G14*** *use standard units of measure and related concepts (length, area, volume/capacity, mass, time, money, etc)*	**Next** **New** **Prior** Students should be able to interpret scales on a range of measuring instruments. Students should be able to find a percentage of an amount and relate percentages to decimals. Students should be able to rearrange equations and use these to solve problems. Students should know speed = distance/time, density = mass/volume.	Ratio, proportion, best value, proportional change, compound measure, density, mass, volume, speed, distance, time, density, mass, volume, pressure, acceleration, velocity, inverse, direct	**Emerging** **Expected** **Exceeding** **Excelling** . **Resources to Support**
Real-life applications and Problem Solving			**Misconceptions**	

Unit: 10.15 Construction Loci and Bearings

Time	Skills and Knowledge	Where learning sits	Keywords	4 E's
8 hrs	**Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task.** By the end of the sub-unit, students should be able to: ***R2*** *use scale factors, scale diagrams and maps* ***G1*** *use conventional terms and notation: points, lines, vertices, edges, planes, parallel lines, perpendicular lines, right angles, polygons, regular polygons and polygons with reflection and/or rotation symmetries; use the standard conventions for labelling and referring to the sides and angles of triangles; draw diagrams from written description;* ***G2*** *use the standard ruler and compass constructions (perpendicular bisector of a line segment, constructing a perpendicular to a given line from/at a given point, bisecting a given angle); use these to construct given figures and solve loci problems; know that the perpendicular distance from a point to a line is the shortest distance to the line* ***G5*** *use the basic congruence criteria for triangles (SSS, SAS, ASA, RHS)* ***G9*** *identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment* ***G12*** *identify properties of the faces, surfaces, edges and vertices of: cubes, cuboids, prisms, cylinders, pyramids, cones and spheres* ***G13*** *construct and interpret plans and elevations of 3D shapes* ***G15*** *measure line segments and angles in geometric figures, including interpreting maps and scale drawings and use of bearings*	**Next** **New** **Prior** Students should be able to measure and draw lines.	Construct, circle, arc, sector, face, edge, vertex, two-dimensional, three-dimensional, solid, elevations, congruent, angles, regular, irregular, bearing, degree, bisect, perpendicular, loci, map, scale, plan, region	**Emerging** **Expected** **Exceeding** **Excelling** . **Resources to Support**
Real-life applications and Problem Solving			**Misconceptions**	

Year 10 Higher

Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8		Week 9	Week 10
Unit 1 Number			Unit 2 Algebra			Unit 3 Interpreting and representing Data			Unit 4 Fractions decimals percentages	Assessment Preparation
Week	Week	Week	Week			Week	Week	Week	Week	Week
Assessments	Unit 4 Fractions decimals percentages		Unit 5 Trigonometry and Angles	Christmas Break	Christmas Break	Unit 5 Trigonometry and Angles	Unit 6 Graphs and Quadratics			Unit 7 Area and Volume
Week	Week 21	Week	Week	Week	Week	Week	Week			Week
Unit 7 Area and Volume	February Break	Unit 8 Transformations and constructions		Assessment Preparation	Assessments	Unit 9 Equations and Inequalities		Easter Break	Easter Break	Unit 10 Probability
Unit 10 Probability	11 Multiplicative reasoning		Assessment Preparation		May Break	Mocks		Work experience	Week 37	Week 38

Unit: 10.1 Number

Time Allocation	Skills and Knowledge	Where learning sits	Keywords - Be explicitly clear on terminology and language	4 E's
16 hrs	**Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task.** By the end of the sub-unit, students should be able to: ***N2*** *apply the four operations, including formal written methods, to integers, decimals … both positive and negative; understand and use place value (e.g. working with very large or very small numbers, and when calculating with decimals)* ***N3*** *recognise and use relationships between operations, including inverse operations (e.g. cancellation to simplify calculations and expressions); use conventional notation for priority of operations, including brackets, powers, roots and reciprocals* ***N4*** *use the concepts and vocabulary of prime numbers, factors (divisors), multiples, common factors, common multiples, highest common factor, lowest common multiple, prime factorisation, including using product notation and the unique factorisation theorem* ***N5*** *apply systematic listing strategies including use of the product rule for counting (i.e. if there are* m *ways of doing one task and for each of these, there are* n *ways of doing another task, then the total number of ways the two tasks can be done is* $m \times n$ *ways)* ***N6*** *use positive integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5; estimate powers and roots of any given positive number* ***N7*** *calculate with roots and with integer and fractional indices* *calculate exactly with … surds; … simplify surd expressions involving squares (e.g.* $\sqrt{12} = (\sqrt{4} \times \sqrt{3}) = 2\sqrt{3}$*)* ***N9*** ***c****alculate with and interpret standard form* $A \times 10^n$*, where* $1 \leq A < 10$ *and* n *is an integer.* ***N14*** *estimate answers; check calculations using approximation and estimation, including answers obtained using technology* ***N15*** *round numbers and measures to an degree of accuracy (e.g. to a specified number of decimal places or significant figures); …*	**Next** **New** **Prior** It is essential that students have a firm grasp of place value and be able to order integers and decimals and use the four operations. Students should have knowledge of integer complements to 10 and to 100, multiplication facts to 10 × 10, strategies for multiplying and dividing by 10, 100 and 1000. Students will have encountered squares, square roots, cubes and cube roots and have knowledge of classifying integers.	Integer, number, digit, negative, decimal, addition, subtraction, multiplication, division, remainder, operation, estimate, power, roots, factor, multiple, primes, square, cube, even, odd, surd, rational, irrational standard form, simplify	**Emerging** To solve number problems following bidmas **Expected** Use a variety of methods for HCF and LCM problems **Exceeding** To calculate with laws of indices **Excelling** .Use surds and standard form to solve problems. **Resources to Support**
Real-life applications and Problem Solving			**Misconceptions**	

Unit: 10.2 Algebra

Time Allocation	Skills and Knowledge	Where learning sits	Keywords - Be explicitly clear on terminology and language	4 E's
12 hrs	**Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task.** By the end of the sub-unit, students should be able to: ***A1*** *use and interpret algebraic notation, including:* *ab in place of $a \times b$ $3y$ in place of $y + y + y$ and $3 \times y$ $a2$ in place of $a \times a$, $a3$ in place of $a \times a \times a$, $a2b$ in place of $a \times a \times b$ ab in place of $a \div b$* *coefficients written as fractions rather than as decimals brackets* ***A2*** *substitute numerical values into formulae and expressions, including scientific formulae* ***A3*** *understand and use the concepts and vocabulary of expressions, equations, formulae, identities, inequalities, terms and factors* ***A4*** *simplify and manipulate algebraic expressions … by: collecting like terms* *multiplying a single term over a bracket taking out common factors* *expanding products of two … binomials factorising quadratic expressions of the form $x2 + bx + c$, including the difference of two squares; … simplifying expressions involving sums, products and powers, including the laws of indices* ***A5*** *understand and use standard mathematical formulae; rearrange formulae to change the subject* ***A6*** *know the difference between an equation and an identity; argue mathematically to show algebraic expressions are equivalent, and use algebra to support and construct arguments and proofs* ***A7*** *where , interpret simple expressions as functions with inputs and outputs;* ***A17*** *solve linear equations in one unknown algebraically …;* ***A21*** *translate simple situations or procedures into algebraic expressions or formulae; derive an equation …, solve the equation and interpret the solution* ***A23*** *generate terms of a sequence from either a term-to-term or a position-to-term rule* ***A25*** *deduce expressions to calculate the nth term of linear sequences.*	**Next** **New** **Prior** Students should have prior knowledge of some of these topics, as they are encountered at Key Stage 3: the ability to use negative numbers with the four operations and recall and use hierarchy of operations and understand inverse operations; dealing with decimals and negatives on a calculator; using index laws numerically.	Expression, identity, equation, formula, substitute, term, 'like' terms, index, power, negative and fractional indices, collect, substitute, expand, bracket, factor, factorise, quadratic, linear, simplify, approximate, arithmetic, geometric, function, sequence, nth term, derive	**Emerging** Use algebraic indices to simplify expressions **Expected** To expand and factorise in different contexts **Exceeding** Use and rearrange different formulae **Excelling** Solve using nth term formulae and expand/factorise expressions with more than 3 terms. **Resources to Support**
Real-life applications and Problem Solving			**Misconceptions**	

Unit: 10.3 Interpreting and Representing Data

<table>
<tr><th>Time Allocation</th><th>Skills and Knowledge</th><th>Where learning sits</th><th>Keywords
- Be explicitly clear on terminology and language</th><th>4 E's</th></tr>
<tr><td rowspan="4">8 hrs</td><td rowspan="4">Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task. By the end of the sub-unit, students should be able to:
G14 use standard units of measure and related concepts (length, area, volume/capacity, mass, time, money, etc.)
S2interpret and construct tables, charts and diagrams, including frequency tables, bar charts, pie charts and pictograms for categorical data, vertical line charts for ungrouped discrete numerical data, tables and line graphs for time series data and know their use
S3 construct and interpret diagrams for grouped discrete data and continuous data i.e. histograms with equal and unequal class intervals …
S4 interpret, analyse and compare the distributions of data sets from univariate empirical distributions through: graphical representation involving discrete, continuous and grouped data … measures of central tendency (median, mode and modal class) and spread (range, including consideration of outliers) …
S5apply statistics to describe a population
S6 use and interpret scatter graphs of bivariate data; recognise correlation and know that it does not indicate causation; draw estimated lines of best fit; make predictions; interpolate and extrapolate apparent trends whilst knowing the dangers of so doing</td><td>Next</td><td rowspan="4">Mean, median, mode, range, average, discrete, continuous, qualitative, quantitative, data, scatter graph, line of best fit, correlation, positive, negative, sample, population, stem and leaf, frequency, table, sort, pie chart, estimate</td><td><u>Emerging</u>

<u>Expected</u>

<u>Exceeding</u>

<u>Excelling</u>
.</td></tr>
<tr><td>New</td><td>Resources to Support</td></tr>
<tr><td>Prior
Students should be able to read scales on graphs, draw circles, measure angles and plot coordinates in the first quadrant.

Students should have experience of tally charts.

Students will have used inequality notation.

Students must be able to find midpoint of two numbers.</td><td></td></tr>
<tr><td colspan="3">Real-life applications and Problem Solving</td><td colspan="2">Misconceptions</td></tr>
</table>

Unit: 10.4 Fractions Ratios and Percentages

Time Allocation	Skills and Knowledge	Where learning sits	Keywords - Be explicitly clear on terminology and language	4 E's
20 hrs	**Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task.** By the end of the sub-unit, students should be able to: ***N1*** *order positive and negative integers, decimals and fractions; …* ***N3*** *recognise and use relationships between operations, including inverse operations (e.g. cancellation to simplify calculations and expressions); use conventional notation for priority of operations, including brackets, powers, roots and reciprocals* ***N8*** *calculate exactly with fractions …* ***N1*** *work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and 72 or 0.375 and 38); change recurring decimals into their corresponding fractions and vice versa* ***N11 i****dentify and work with fractions in ratio problems* ***N12*** *interpret fractions and percentages as operators* ***N13*** *use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where* ***R2*** *use scale factors, scale diagrams and maps* ***R3*** *express one quantity as a fraction of another, where the fraction is less than 1 or greater than 1* ***R4*** *use ratio notation, including reduction to simplest form* ***R5*** *divide a given quantity into two parts in a given part:part or whole:part ratio; express the division of a quantity into two parts as a ratio; apply ratio to real contexts and problems (such as those involving conversion, comparison, scaling, mixing, concentrations)* ***R6*** *express a multiplicative relationship between two quantities as a ratio or a fraction* ***R7*** *understand and use proportion as equality of ratios* ***R9*** *define percentage as 'number of parts per hundred'; interpret percentages and percentage changes as a fraction or a decimal, and interpret these multiplicatively; express one quantity as a percentage of another; compare two quantities using percentages; work with percentages greater than 100%; solve problems involving percentage change, including percentage increase/decrease, and original value problems and simple interest including in financial mathematics* ***R10*** *solve problems involving direct proportion; …*	**Next** **New** **Prior** Students should know the four operations of number. Students should be able to find common factors. Students should have a basic understanding of fractions as being 'parts of a whole'. Students can define percentage as 'number of parts per hundred'. Students are aware that percentages are used in everyday life.	Addition, subtraction, multiplication, division, fractions, mixed, improper, recurring, reciprocal, integer, decimal, termination, percentage, VAT, increase, decrease, multiplier, profit, loss, ratio, proportion, share, parts	**Emerging** **Expected** **Exceeding** **Excelling** . **Resources to Support**

Real-life applications and Problem Solving	Misconceptions

Unit: 10.5 Angles and Trigonometry

Time Allocation	Skills and Knowledge	Where learning sits	Keywords - Be explicitly clear on terminology and language	4 E's
12 hrs	**Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task.** By the end of the sub-unit, students should be able to: ***N7*** *Calculate with roots and with integer and fractional indices* ***N8*** *calculate exactly with fractions and surds* ***N15*** *round numbers and measures to an degree of accuracy* ***A4*** *simplify and manipulate algebraic expressions (including those involving surds) by collecting like terms* ***A5*** *understand and use standard mathematical formulae* ***R12*** *compare lengths, areas and volumes using ratio notation; make links to similarity (including trigonometric ratios) scale factors* ***G1*** *use conventional terms and notations: points, lines, vertices, edges, planes, parallel lines, perpendicular lines, right angles, polygons, regular polygons and polygons with reflection and/or rotation symmetries;* ***G3*** *… understand and use alternate and corresponding angles on parallel lines; derive and use the sum of angles in a triangle* ***G4*** *derive and apply the properties and definitions of: special types of quadrilaterals, including square, rectangle, parallelogram, trapezium, kite and rhombus; …* ***G6*** *Apply angle facts, triangle congruence, similarity and properties of quadrilaterals to conjecture and derive results about angles and sides, including Pythagoras' theorem and the fact that the base angles of an isosceles triangle are equal, and use known results to obtain simple proofs* ***G20*** *know the formulae for: Pythagoras' theorem $a2 + b2 = c2$, and the trigonometric ratios sine, cosine and tan; apply them to find angles and lengths in right-angled triangles … and in two dimensional figures* ***G21*** *know the exact values of sin θ and cos θ for $\theta = 0°, 30°, 45°, 60°$ and $90°$; know the exact value of tan θ for $\theta = 0°, 30°, 45°$ and $60°$*	**Next** **New** **Prior** Students should be able to rearrange simple formulae and equations, as preparation for rearranging trig formulae. Students should recall basic angle facts. Students should understand that fractions are more accurate in calculations than rounded percentage or decimal equivalents.	Quadrilateral, angle, polygon, interior, exterior, proof, tessellation, symmetry, parallel, corresponding, alternate, co-interior, vertices, edge, face, sides, Pythagoras' Theorem, sine, cosine, tan, trigonometry, opposite, hypotenuse, adjacent, ratio, elevation, depression, segment, length	**Emerging** **Expected** **Exceeding** **Excelling** . **Resources to Support**
Real-life applications and Problem Solving			**Misconceptions**	

Unit: 10.6 Graphs

Time Allocation	Skills and Knowledge	Where learning sits	Keywords - Be explicitly clear on terminology and language	4 E's
4 hrs	**Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task.** By the end of the sub-unit, students should be able to: **N13** use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where **A8** work with coordinates in all four quadrants **A9** plot graphs of equations that correspond to straight-line graphs in the coordinate plane; use the form $y = mx + c$ to identify parallel and perpendicular lines; find the equation of the line through two given points, or through one point with a given gradient **A10** identify and interpret gradients and intercepts of linear functions graphically and algebraically **A11** identify and interpret roots, intercepts, turning points of quadratic functions graphically; … **A12** recognise, sketch and interpret graphs of linear functions, quadratic functions, simple cubic functions, the reciprocal function $y=1x$ with $x \neq 0$, … **A14** plot and interpret … graphs of non-standard functions in real contexts to find approximate solutions to problems such as simple kinematic problems involving distance, speed and acceleration **A15** calculate or estimate gradients of graphs and areas under graphs (including quadratic and non-linear graphs) and interpret results in cases such as distance-time graphs, velocity-time graphs … (this does not include calculus) **A16** recognise and use the equation of a circle with centre at the origin; find the equation of a tangent to a circle at a given point **A17** solve linear equations in one unknown … (including those with the unknown on both sides of the equation); find approximate solutions using a graph **A18** solve quadratic equations (including those that require rearrangement) algebraically by factorising, by completing the square and by using the quadratic formula; find approximate solutions using a graph **R1 c**hange freely between related standard units (e.g. time, length, area, volume/capacity, mass) and compound units (e.g. speed, rates of pay, prices, density, pressure) in numerical and algebraic contexts **R10** solve problems involving direct … proportion, including graphical … representations **R11** use compound units such as speed, … unit pricing, … **R14**… recognise and interpret graphs that illustrate direct and inverse proportion	**Next** **New** **Prior** Students can identify coordinates of given points in the first quadrant or all four quadrants. Students can use Pythagoras' Theorem and calculate the area of compound shapes. Students can use and draw conversion graphs for these units. Students can use function machines and inverse operations.	Coordinate, axes, 3D, Pythagoras, graph, speed, distance, time, velocity, quadratic, solution, root, function, linear, circle, cubic, approximate, gradient, perpendicular, parallel, equation	**Emerging** **Expected** **Exceeding** **Excelling** . **Resources to Support**
Real-life applications and Problem Solving			**Misconceptions**	

Unit: 10.7 Area and Volume

Time Allocation	Skills and Knowledge	Where learning sits	Keywords - Be explicitly clear on terminology and language	4 E's
16 hrs	**Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task.** By the end of the sub-unit, students should be able to: ***N8*** *calculate exactly with …multiples of π; …* ***N14*** *estimate answers; check calculations using approximation and estimation, including answers obtained using technology* ***N15*** *round numbers and measures to a degree of accuracy* ***N16*** *apply and interpret limits of accuracy, including upper and lower bounds* ***A5*** *understand and use standard mathematical formulae; rearrange formulae to change the subject* ***A21*** *translate simple situations or procedures into algebraic expressions or formulae; derive an equation (or two simultaneous equations), solve the equation(s) and interpret the solution* ***R1*** *change freely between related standard units (e.g. time, length, area, volume/capacity, mass) … in numerical and algebraic contexts* ***G1*** *use conventional terms and notations: points, lines, vertices, edges, planes, parallel lines, perpendicular lines, right angles, polygons, regular polygons and polygons with reflection and/or rotation symmetries; …* ***G9*** *identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment* ***G12*** *identify properties of the faces, surfaces, edges and vertices of: cubes, cuboids, prisms, cylinders, pyramids, cones and spheres* ***G13*** *construct and interpret plans and elevations of 3D shapes.* ***G16*** *know and apply formulae to calculate: area of triangles, parallelograms, trapezia; volume of cuboids and other right prisms (including cylinders)* ***G17*** *know the formulae of simple 3d shapes* ***G18*** *calculate arc lengths, angles and areas of sectors of circles*	**Next** **New** **Prior** Students should know the names and properties of 3D forms. The concept of perimeter and area by measuring lengths of sides will be familiar to students. Students should be able to substitute numbers into an equation and give answers to an degree of accuracy. Students should know the various metric units.	Triangle, rectangle, parallelogram, trapezium, area, perimeter, formula, length, width, prism, compound, measurement, polygon, cuboid, volume, nets, isometric, symmetry, vertices, edge, face, circle, segment, arc, sector, cylinder, circumference, radius, diameter, pi, composite, sphere, cone, capacity, hemisphere, segment, frustum, bounds, accuracy, surface area	**Emerging** **Expected** **Exceeding** **Excelling** . **Resources to Support**

Real-life applications and Problem Solving	Misconceptions

Unit: 10.8 Transformations and Constructions

Time Allocation	Skills and Knowledge	Where learning sits	Keywords - Be explicitly clear on terminology and language	4 E's
12 hrs	**Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task.** By the end of the sub-unit, students should be able to: ***R**2 use scale factors, scale diagrams and maps* ***R6** express a multiplicative relationship between two quantities as a ratio or a fraction* ***G2** use the standard ruler and compass constructions (perpendicular bisector of a line segment, constructing a perpendicular to a given line from/at a given point, bisecting a given angle); use these to construct given figures and solve loci problems; know that the perpendicular distance from a point to a line is the shortest distance to the line* ***G3** apply the properties of angles at a point, angles at a point on a straight line, vertically opposite angles; understand and use alternate and corresponding angles on parallel lines; derive and use the sum of angles in a triangle (e.g. to deduce and use the angle sum in any polygon, and to derive properties of regular polygons)* ***G5** use the basic congruence criteria for triangles (SSS, SAS, ASA, RHS)* ***G7** identify, describe and construct congruent and similar shapes, including on a coordinate axis, by considering rotation, reflection, translation and enlargement (including fractional and negative scale factors)* ***G8** describe the changes and invariance achieved by combinations of rotations, reflections and translations* ***G12 I**dentify properties of the faces, surfaces, edges and vertices of: cubes, cuboids, prisms, cylinders, pyramids, cones and spheres* ***G13** construct and interpret plans and elevations of 3D shapes* ***G15** measure line segments and angles in geometric figures, including interpreting maps and scale drawings and use of bearings* ***G24** describe translations as 2D vector* ***G25** apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors; …*	**Next** **New** **Prior** Students should be able to recognise 2D shapes. Students should be able to plot coordinates in four quadrants and linear equations parallel to the coordinate axes.	Rotation, reflection, translation, transformation, enlargement, scale factor, vector, centre, angle, direction, mirror line, centre of enlargement, describe, distance, congruence, similar, combinations, single, corresponding, constructions, compasses, protractor, bisector, bisect, line segment, perpendicular, loci, bearing	**Emerging** **Expected** **Exceeding** **Excelling** . **Resources to Support**
Real-life applications and Problem Solving			**Misconceptions**	

Unit: 10.9 Equations and Inequalities

Time Allocation	Skills and Knowledge	Where learning sits	Keywords - Be explicitly clear on terminology and language	4 E's
12 hrs	**Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task.** By the end of the sub-unit, students should be able to: **N1** order positive and negative integers, decimals and fractions; use the symbols =, ≠, <, >, ≤, ≥ **N8** calculate exactly with … surds; … simplify surd expressions involving squares (e.g. $\sqrt{12}$ = ($\sqrt{4}\times\sqrt{3}$) = $\sqrt{4}\times\sqrt{3}$ = $2\sqrt{3}$) **A4** simplify and manipulate algebraic expressions (including those involving surds …) by: … factorising quadratic expressions of the form $ax^2 + bx + c$ **A5** understand and use standard mathematical formulae; rearrange formulae to change the subject **A9**… find the equation of the line through two given points, or through one point with a given gradient **A11** identify and interpret roots … of quadratic functions algebraically … **A18** solve quadratic equations (including those that require rearrangement) algebraically by factorising, by completing the square and by using the quadratic formula; … **A19** solve two simultaneous equations in two variables (linear/linear or linear/quadratic) algebraically; find approximate solutions using a graph **A21**… derive an equation (or two simultaneous equations), solve the equation(s) and interpret the solution. **A22** solve linear inequalities in one or two variable(s), and quadratic inequalities in one variable; represent the solution set on a number line, using set notation and on a graph	**Next** **New** **Prior** Students should understand the ≥ and ≤ symbols. Students can substitute into, solve and rearrange linear equations. Students should be able to factorise simple quadratic expressions. Students should be able to recognise the equation of a circle	Quadratic, solution, root, linear, solve, simultaneous, inequality, completing the square, factorise, rearrange, surd, function, solve, circle, sets, union, intersection	**Emerging** **Expected** **Exceeding** **Excelling** . **Resources to Support**
Real-life applications and Problem Solving			**Misconceptions**	

Unit: 10.10 Probability

Time Allocation	Skills and Knowledge	Where learning sits	Keywords - Be explicitly clear on terminology and language	4 E's
8 hrs	**Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task.** By the end of the sub-unit, students should be able to: ***N5*** *apply systematic listing strategies, including use of the product rule for counting …* ***P1*** *record, describe and analyse the frequency of outcomes of probability experiments using tables and frequency trees* ***P2*** *apply ideas of randomness, fairness and equally likely events to calculate expected outcomes of multiple future experiments* ***P3*** *relate relative expected frequencies to theoretical probability, using language and the 0-1 probability scale* ***P4*** *apply the property that the probabilities of an exhaustive set of outcomes sum to one; apply the property that the probabilities of an exhaustive set of mutually exclusive events sum to one* ***P5*** *understand that empirical unbiased samples tend towards theoretical probability distributions, with increasing sample size* ***P6*** *enumerate sets and combinations of sets systematically, using tables, grids, Venn diagrams and tree diagrams* ***P7*** *construct theoretical possibility spaces for single and combined experiments with equally likely outcomes and use these to calculate theoretical probabilities* ***P8*** *calculate the probability of independent and dependent combined events, including using tree diagrams and other representations, and know the underlying assumptions* ***P9*** *calculate and interpret conditional probabilities through representation using expected frequencies with two-way tables, tree diagrams and Venn diagrams*	**Next** **New** **Prior** Students should understand that a probability is a number between 0 and 1, and distinguish between events which are impossible, unlikely, even chance, likely, and certain to occur. Students should be able to mark events and/or probabilities on a probability scale of 0 to 1. Students should know how to add and multiply fractions and decimals. Students should have experience of expressing one number as a fraction of another number.	Probability, mutually exclusive, conditional, tree diagrams, sample space, outcomes, theoretical, relative frequency, Venn diagram, fairness, experimental	**Emerging** **Expected** **Exceeding** **Excelling** . **Resources to Support**
Real-life applications and Problem Solving			**Misconceptions**	

Unit: 10.11 Multiplicative Reasoning

Time Allocation	Skills and Knowledge	Where learning sits	Keywords - Be explicitly clear on terminology and language	4 E's
8 hrs	**Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task.** By the end of the sub-unit, students should be able to: ***N3*** *recognise and use relationships between operations, including inverse operations (e.g. cancellation to simplify calculations and expressions); …* ***N12*** *interpret fractions and percentages as operators* ***N13*** *use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where* ***R1*** *change freely between related standard units (e.g. time, length, area, volume/capacity, mass) and compound units (e.g. speed, rates of pay, prices, density, pressure) in numerical and algebraic contexts* ***R6*** *express a multiplicative relationship between two quantities as a ratio or a fraction* ***R8*** *relate ratios to fractions and to linear functions* ***R10*** *solve problems involving direct and inverse proportion, including graphical and algebraic representations* ***R11*** *use compound units such as speed, rates of pay, unit pricing, density and pressure* ***R13*** *understand that X is inversely proportional to Y is equivalent to X is proportional to $1Y$; …* ***R14*** *… recognise and interpret graphs that illustrate direct and inverse proportion* ***R16*** *set up, solve and interpret the answers in growth and decay problems, including compound interest and work with general iterative processes*	**Next** **New** **Prior** Students should be able to find a percentage of an amount and relate percentages to decimals. Students should be able to rearrange equations and use these to solve problems. Knowledge of speed = distance/time, density = mass/volume.	Ration, proportion, best value, unitary, proportional change, compound measure, density, mass, volume, speed, distance, time, density, mass, volume, pressure, acceleration, velocity, inverse, direct, constant of proportionality	**Emerging** **Expected** **Exceeding** **Excelling** . **Resources to Support**
Real-life applications and Problem Solving			**Misconceptions**	

Unit: 10.12 Similarity and Congruence

Time Allocation	Skills and Knowledge	Where learning sits	Keywords - Be explicitly clear on terminology and language	4 E's
4 hrs	**Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task.** By the end of the sub-unit, students should be able to: ***R6*** *express a multiplicative relationship between two quantities as a ratio or a fraction* ***R12*** *compare lengths, areas and volumes using ratio notation; make links to similarity (including trigonometric ratios) and scale factors* ***G5*** *use the basic congruence criteria for triangles (SSS, SAS, ASA, RHS)* ***G6*** *apply angle facts, triangle congruence, similarity and properties of quadrilaterals to conjecture and derive results about angles and sides, including … the fact that the base angles of an isosceles triangle are equal, and use known results to obtain simple proofs* ***G17*** *… calculate: surface area and volume of spheres, pyramids, cones and composite solids* ***G19*** *apply the concepts of congruence and similarity, including the relationships between lengths, areas and volumes in similar figures*	**Next** **New** **Prior** Students should be able to recognise and enlarge shapes and calculate scale factors. Students should have knowledge of how to calculate area and volume in various metric measures. Students should be able to measure lines and angles, and use compasses, ruler and protractor to construct standard constructions.	Congruence, side, angle, compass, construction, shape, volume, length, area, volume, scale factor, enlargement, similar, perimeter, frustum	**Emerging** **Expected** **Exceeding** **Excelling** . **Resources to Support**
Real-life applications and Problem Solving			**Misconceptions**	

Unit: 10.13 More Trig

Time Allocation	Skills and Knowledge	Where learning sits	Keywords - Be explicitly clear on terminology and language	4 E's
12 hrs	**Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task.** By the end of the sub-unit, students should be able to: ***N16*** *apply and interpret limits of accuracy, including upper and lower bounds* ***A5*** *understand and use standard mathematical formulae; rearrange formulae to change the subject* ***A8*** *work with coordinates in all four quadrants* ***A12*** *recognise, sketch and interpret graphs of linear functions, quadratic functions, simple cubic functions, the reciprocal function $y=1x$ with $x \neq 0$, exponential, functions $y = kx$ for positive values of k, and the trigonometric functions (with arguments in degrees) $y = \sin x$, $y = \cos x$ and $y = \tan x$ for angles of any size* ***A13*** *sketch translations and reflections of a given function* ***G11*** *solve geometrical problems on coordinate axes* ***G20*** *know the formulae for: Pythagoras' Theorem $a2 + b2 = c2$ and the trigonometric ratios, sine, cosine and tan; apply them to find angles and lengths in right-angled triangles and, where possible, general triangles in two and three dimensional figures* ***G21*** *know the exact values of $\sin\theta$ and $\cos\theta$ for $\theta = 0°, 30°, 45°, 60°$ and $90°$; know the exact value of $\tan\theta$ for $\theta = 0°, 30°, 45°$ and $60°$* ***G22*** *know and apply the sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$, and cosine rule $a2 = b2 + c2 - 2bc\cos A$, to find unknown lengths and angles* ***G23*** *know and apply Area = $12ab\sin C$ to calculate the area, sides or angles of any triangle*	**Next** **New** **Prior** Students should be able to use axes and coordinates to specify points in all four quadrants. Students should be able to recall and apply Pythagoras' Theorem and trigonometric ratios. Students should be able to substitute into formulae.	Axes, coordinates, sine, cosine, tan, angle, graph, transformations, side, angle, inverse, square root, 2D, 3D, diagonal, plane, cuboid	**Emerging** **Expected** **Exceeding** **Excelling** . **Resources to Support**
Real-life applications and Problem Solving			**Misconceptions**	

Unit: 10.14 Further Statistics

Time Allocation	Skills and Knowledge	Where learning sits	Keywords - Be explicitly clear on terminology and language	4 E's
8 hrs	**Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task.** By the end of the sub-unit, students should be able to: ***S1*** *infer properties of populations or distributions from a sample, whilst knowing the limitations of sampling apply statistics to describe a population* ***S3*** *interpret and construct diagrams for grouped discrete data and continuous data, i.e. histograms with equal and unequal class intervals and cumulative frequency graphs, and know their use* ***S4*** *interpret, analyse and compare the distributions of data sets from univariate empirical distributions through graphical representation involving discrete, continuous and grouped data, including box plots measures of central tendency (median, mean, mode and modal class) and spread (range, including consideration of outliers, quartiles and inter-quartile range)* ***S5*** *apply statistics to describe a population*	**Next** **New** **Prior** Students should understand the different types of data: discrete/continuous. Students should have experience of inequality notation. Students should be able to multiply a fraction by a number. Students should understand the data handling cycle.	Sample, population, fraction, decimal, percentage, bias, stratified sample, random, cumulative frequency, box plot, histogram, frequency density, frequency, mean, median, mode, range, lower quartile, upper quartile, interquartile range, spread, comparison, outlier	**Emerging** **Expected** **Exceeding** **Excelling** . **Resources to Support**
Real-life applications and Problem Solving			**Misconceptions**	

Unit: 10.15 Equations and Graphs

Time Allocation	Skills and Knowledge	Where learning sits	Keywords - Be explicitly clear on terminology and language	4 E's
8 hrs	**Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task.** By the end of the sub-unit, students should be able to: ***N8****Calculate exactly with … surds …* ***A4*** *simplify and manipulate algebraic expressions … by: expanding products of two or more binomials* ***A11*** *identify and interpret roots, intercepts, turning points of quadratic functions graphically; … identify turning points by completing the square* ***A12*** *recognise, sketch and interpret graphs of … quadratic functions, simple cubic functions …* ***A18*** *solve quadratic equations (including those that require rearrangement) …; find approximate solutions using a graph* ***A19*** *solve two simultaneous equations in two variables (linear/linear or linear/quadratic) algebraically; find approximate solutions using a graph* ***A20*** *find approximate solutions to equations numerically using iteration* ***A21*** *… derive an equation (or two simultaneous equations), solve the equation(s) and interpret the solution.* ***A22*** *solve linear inequalities in one or two variable(s), and quadratic inequalities in one variable; represent the solution set on a number line, using set notation and on a graph* ***R16*** *… work with general iterative processes*	**Next** **New** **Prior** Students should be able to solve quadratics and linear equations. Students should be able to solve simultaneous equations algebraically.	Sketch, estimate, quadratic, cubic, function, factorising, simultaneous equation, graphical, algebraic	**Emerging** **Expected** **Exceeding** **Excelling** . **Resources to Support**
Real-life applications and Problem Solving			**Misconceptions**	

Year 11 adapted based on mock feedback

Unit: 11.16 Quadratic Equations and Graphs

<table>
<tr><th>Time Allocation</th><th>Skills and Knowledge</th><th>Where learning sits</th><th>Keywords
- Be explicitly clear on terminology and language</th><th>4 E’s</th></tr>
<tr><td rowspan="4">8 hrs</td><td rowspan="4">Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task. By the end of the sub-unit, students should be able to:
A4 simplify and manipulate algebraic expressions by: … expanding products of two binomials; factorising quadratic expressions of the form $x2 + bx + c$, including the difference of two squares; …
A11 identify and interpret roots, intercepts, turning points of quadratic functions graphically; deduce roots algebraically
A12 recognise, sketch and interpret graphs of … quadratic functions; …
A14 plot and interpret graphs (including reciprocal graphs) and graphs of non-standard functions in real contexts to find approximate solutions to problems such as simple kinematic problems involving distance, speed and acceleration
A18 solve quadratic equations algebraically by factorising; find approximate solutions using a graph</td><td>Next</td><td rowspan="4">Quadratic, function, solve, expand, factorise, simplify, expression, graph, curve, factor, coefficient, bracket</td><td><u>Emerging</u>
To expand and solve quadratics using quadratic formula or otherwise.
<u>Expected</u>
To plot quadratic graphs using a table and predict key features based on the general form.
<u>Exceeding</u>
Factorise and find points of intersection
<u>Excelling</u>
Solve a variety of quadratics and identify turning points.</td></tr>
<tr><td>New</td><td rowspan="2">Resources to Support</td></tr>
<tr><td>Prior
Students should be able to square negative numbers.

Students should be able to substitute into formulae.

Students should be able to plot points on a coordinate grid.

Students should be able to expand single brackets and collect ‘like’ terms.</td></tr>
<tr><td></td></tr>
<tr><td colspan="3">Real-life applications and Problem Solving</td><td colspan="2">Misconceptions</td></tr>
</table>

Unit: 11.17 Perimeter Area and Volume

<table>
<tr><th>Time Allocation</th><th>Skills and Knowledge</th><th>Where learning sits</th><th>Keywords
- Be explicitly clear on terminology and language</th><th>4 E’s</th></tr>
<tr><td rowspan="4">16 hrs</td><td rowspan="4">Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task. By the end of the sub-unit, students should be able to:

N8 calculate exactly with multiples of π
N14 estimate answers; check calculations using approximation and estimation, including answers obtained using technology
N15 round numbers and measures to an degree of accuracy; …
A5 understand and use standard mathematical formulae; rearrange formulae to change the subject
G9 identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment
G16 know and apply formulae to calculate: area of triangles, parallelograms, trapezia; volume of cuboids and other right prisms (including cylinders)
G17 know the formulae: circumference of a circle = $2\pi r = \pi d$, area of a circle = $\pi r2$; calculate: perimeters of 2D shapes, including circles; areas of circles and composite shapes; surface area and volume of spheres, pyramids, cones and composite solids
G18 calculate arc lengths, angles and areas of sectors of circles</td><td>Next</td><td rowspan="4">Area, perimeter, formula, length, width, measurement, volume, circle, segment, arc, sector, cylinder, circumference, radius, diameter, pi, sphere, cone, hemisphere, segment, accuracy, surface area</td><td><u>Emerging</u>
Identify key features of shapes needed to solve for area
<u>Expected</u>
Use formula and substitute based on given values
<u>Exceeding</u>
Rearrange formula to find missing measurements.
<u>Excelling</u>
Use formula to find areas and volumes of composite solids.</td></tr>
<tr><td>New</td><td>Resources to Support</td></tr>
<tr><td>Prior
Students should know the formula for calculating the area of a rectangle.

Students should know how to use the four operations on a calculator.</td><td></td></tr>
<tr><td colspan="2">Real-life applications and Problem Solving</td><td colspan="2">Misconceptions</td></tr>
</table>

Unit: 11.18 Fractions, Indices and Standard Form

Time Allocation	Skills and Knowledge	Where learning sits	Keywords - Be explicitly clear on terminology and language	4 E's
8 hrs	**Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task.** By the end of the sub-unit, students should be able to: ***N2*** *apply the four operations, including formal written methods, to integers, decimals and simple fractions (proper and improper), and mixed numbers – all both positive and negative; understand and use place value (e.g. when working with very large or very small numbers, and when calculating with decimals)* ***N3*** *recognise and use relationships between operations, including inverse operations (e.g. cancellation to simplify calculations and expressions); use conventional notation for priority of operations, including brackets, powers, roots and reciprocals* ***N7*** *calculate with roots, and with integer indices* ***N8*** *calculate exactly with fractions …* ***N9*** *calculate with and interpret standard form A x 10n, where $1 \leq A < 10$ and n is an integer.*	**Next** **New** **Prior** Students should know how to do the four operations with fractions. Students should be able to write powers of 10 in index form and recognise and recall powers of 10, i.e. 102 = 100. Students should recall the index laws.	Add, subtract, multiply, divide, mixed, improper, fraction, decimal, indices, standard form, power, reciprocal, index	**Emerging** **Expected** **Exceeding** . **Excelling** . **Resources to Support**
Real-life applications and Problem Solving			**Misconceptions**	

Unit: 11.19 Congruency, Similarity and Vectors

Time Allocation	Skills and Knowledge	Where learning sits	Keywords - Be explicitly clear on terminology and language	4 E's
18 hrs	**Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task.** By the end of the sub-unit, students should be able to: ***R6*** *express a multiplicative relationship between two quantities as a ratio or a fraction* ***R12*** *compare lengths, areas and volumes using ratio notation; make links to similarity (including trigonometric ratios) and scale factors* ***G5*** *use the basic congruence criteria for triangles (SSS, SAS, ASA, RHS)* ***G6*** *apply angle facts, triangle congruence, similarity and properties of quadrilaterals to conjecture and derive results about angles and sides … and use known results to obtain simple proofs* ***G7*** *identify, describe and construct congruent and similar shapes, including on coordinate axes, by considering rotation, reflection, translation and enlargement (including fractional scale factors)* ***G19*** *apply the concepts of congruence and similarity, including the relationships between lengths in similar figures* ***G24*** *describe translations as 2D vectors* ***G25*** *apply addition and subtraction of vectors, multiplication by vectors by a scalar, and diagrammatic and column representations of vectors*	**Next** **New** **Prior** Students will have used column vectors when dealing with translations. Students can recall and apply Pythagoras' Theorem on a coordinate grid. Students should be able to recognise and enlarge shapes and calculate scale factors. Students know how to calculate area and volume in various metric measures. Students should be able to measure lines and angles and using compasses, ruler and protractor, and construct standard constructions.	Vector, direction, magnitude, scalar, multiple, parallel, collinear, ratio, column vector, congruence, side, angle, compass, construction, shape, volume, length, area, volume, scale factor, enlargement, similar, perimeter,	**Emerging** **Expected** . **Exceeding** **Excelling** . **Resources to Support**

Real-life applications and Problem Solving	Misconceptions

Unit: 11.20 More Algebra

<table>
<tr><th>Time Allocation</th><th>Skills and Knowledge</th><th>Where learning sits</th><th>Keywords - Be explicitly clear on terminology and language</th><th>4 E’s</th></tr>
<tr><td rowspan="2">6 hrs</td><td rowspan="2">Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task. By the end of the sub-unit, students should be able to:

N1 order positive and negative integers, decimals and fractions; use the symbols =, ≠, <, >, ≤, ≥
A3 understand and use the concepts and vocabulary of expressions, equations, formulae, identities, inequalities, terms and factors
A5 understand and use standard mathematical formulae; rearrange formulae to change the subject
A6 … argue mathematically to show algebraic expressions are equivalent, and use algebra to support and construct arguments
A9 … use the form $y = mx + c$ to identify parallel lines; find the equation of the line through two given points, or through one point with a given gradient
A10 identify and interpret gradients and intercepts of linear functions graphically and algebraically
A12 recognise, sketch and interpret graphs of … the reciprocal function $y=-1x$ with $x \neq 0$
A14 plot and interpret … reciprocal graphs …
A19 solve two simultaneous equations in two variables (linear/linear) algebraically; find approximate solutions using a graph
A21 translate simple situations or procedures into algebraic expressions or formulae; derive an equation (or two simultaneous equations), solve the equation(s) and interpret the solution.
R10 solve problems involving direct and inverse proportion, including graphical and algebraic representations
R14… recognise and interpret graphs that illustrate direct and inverse proportion</td><td>Next

New

Prior
Students should be able to draw linear graphs.

Students should be able to plot coordinates and sketch simple functions with a table of values.

Students should be able to substitute into and solve equations.

Students should have experience of using formulae.

Students should recall and use the hierarchy of operations and use of inequality symbols</td><td rowspan="2">eciprocal, linear, gradient, functions, direct, indirect, estimate, cubic, subject, rearrange, simultaneous, substitution, elimination, proof</td><td><u>Emerging</u>
.
<u>Expected</u>

<u>Exceeding</u>

<u>Excelling</u>
Resources to Support</td></tr>
<tr><td colspan="2">Real-life applications and Problem Solving</td><td>Misconceptions</td></tr>
</table>

Year 11 adapted based on mock feedback

Unit: 11.16 Circle Theorems

<table>
<tr><th>Time Allocation</th><th>Skills and Knowledge</th><th>Where learning sits</th><th>Keywords
- Be explicitly clear on terminology and language</th><th>4 E’s</th></tr>
<tr><td rowspan="4">8hrs</td><td rowspan="4">Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task. By the end of the sub-unit, students should be able to:

A16 recognise and use the equation of a circle with centre at the origin; find the equation of a tangent to a circle at a given point
G9 identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment
G10 apply and prove the standard circle theorems concerning angles, radii, tangents and chords, and use them to prove related results</td><td>Next</td><td rowspan="4">Radius, centre, tangent, circumference, diameter, gradient, perpendicular, reciprocal, coordinate, equation, substitution, chord, triangle, isosceles, angles, degrees, cyclic quadrilateral, alternate, segment, semicircle, arc, theorem</td><td><u>Emerging</u>
Identify parts of circles and use them in context of questions
<u>Expected</u>
Identify and solve missing angles using circle theorems

<u>Exceeding</u>
Use multiple circle theorems in a single questions
<u>Excelling#</u>
Prove circle theorems using generalised algebra and geometric reasoning.</td></tr>
<tr><td>New</td><td>Resources to Support</td></tr>
<tr><td>Prior
Students should have practical experience of drawing circles with compasses.

Students should recall the words, centre, radius, diameter and circumference.

Students should recall the relationship of the gradient between two perpendicular lines.

Students should be able to find the equation of the straight line, given a gradient and a coordinate.</td><td>)</td></tr>
<tr><td colspan="2">Real-life applications and Problem Solving</td><td colspan="2">Misconceptions</td></tr>
</table>

Unit: 11.17 More Algebra

Time Allocation	Skills and Knowledge	Where learning sits	Keywords - Be explicitly clear on terminology and language	4 E's
8 hrs	**Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task.** By the end of the sub-unit, students should be able to: ***N8****… simplify surd expressions involving squares (e.g.* $\sqrt{12} = \sqrt{(4\times3)} = \sqrt{4}\times\sqrt{3} = 2\sqrt{3}$*) and rationalise denominators* ***A4*** *simplify and manipulate algebraic expressions (including those involving surds and algebraic fractions) by:* *collecting like terms* *multiplying a single term over a bracket* *taking out common factors* *expanding products of two or more binomials* *factorising quadratic expressions of the form* x^2+bx+c*, including the difference of two squares; factorising quadratic expressions of the form* ax^2+bx+c *simplifying expressions involving sums, products and powers, including the laws of indices* ***A5****… rearrange formulae to change the subject* ***A6****… argue mathematically to show algebraic expressions are equivalent, and use algebra to support and construct arguments and proofs* ***A7****where , interpret simple expressions as functions with inputs and outputs; interpret the reverse process as the 'inverse function'; interpret the succession of two functions as a 'composite function' (the use of formal function notation is expected)* ***A18*** *solve quadratic equations (including those that require rearrangement) algebraically by factorising, …*	**Next** **New** **Prior** Students should be able to simplify surds. Students should be able to use negative numbers with all four operations. Students should be able to recall and use the hierarchy of operations.	Rationalise, denominator, surd, rational, irrational, fraction, equation, rearrange, subject, proof, function notation, inverse, evaluate	**<u>Emerging</u>** Rearrange formula and functions **<u>Expected</u>** **Simplify algebraic fractions with more than 1 term** **<u>Exceeding</u>** **Solve using composite functions** **<u>Excelling</u>** Use mathematical proof for a cohesive argument. **Resources to Support**
Real-life applications and Problem Solving			**Misconceptions**	

Unit: 11.18 Vectors and Geometric Proof

<table>
<tr><th>Time Allocation</th><th>Skills and Knowledge</th><th>Where learning sits</th><th>Keywords
- Be explicitly clear on terminology and language</th><th>4 E’s</th></tr>
<tr><td rowspan="4">8 hrs</td><td rowspan="4">Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task. By the end of the sub-unit, students should be able to:
G25
apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors; use vectors to construct geometric arguments and proof</td><td>Next</td><td rowspan="4">Vector, direction, magnitude, scalar, multiple, parallel, collinear, proof, ratio, column vector</td><td><u>Emerging</u>

<u>Expected</u>
.

<u>Exceeding</u>

<u>Excelling</u>
.</td></tr>
<tr><td>New</td><td>Resources to Support</td></tr>
<tr><td>Prior
Students will have used vectors to describe translations and will have knowledge of Pythagoras’ Theorem and the properties of triangles and quadrilaterals.</td><td></td></tr>
<tr><td colspan="2">Real-life applications and Problem Solving</td><td colspan="2">Misconceptions</td></tr>
</table>

Unit: 11.19 Proportion and Graphs

Time Allocation	Skills and Knowledge	Where learning sits	Keywords - Be explicitly clear on terminology and language	4 E's
12 hrs	**Not every objective needs to be a full lesson. There are times when some could be used as a starter / warm up task.** By the end of the sub-unit, students should be able to: ***A7*** *where , interpret simple expressions as functions with inputs and outputs; …* ***A12*** *recognise, sketch and interpret graphs of the reciprocal function $y=1x$ with $x \neq 0$, exponential functions $y = kx$ for positive values of k …* ***A13*** *sketch translations and reflections of a given function* ***A14*** *plot and interpret reciprocal graphs and exponential graphs …* ***A15*** *calculate or estimate gradients of graphs and areas under graphs (including quadratic and other non-linear graphs) and interpret results in cases such distance-time graphs, velocity-time graphs and graphs in financial contexts (this does not include calculus)* ***A21*** *translate simple situations or procedures into algebraic expressions or formulae; …* ***R7*** *understand and use proportion as equality of ratios* ***R10*** *solve problems involving direct and inverse proportion, including graphical and algebraic representations* ***R11*** *use compound units such as speed, rates of pay, unit pricing, density and pressure* ***R13*** *understand that X is inversely proportional to Y is equivalent to X is proportional to $1Y$; construct and interpret equations that describe direct and inverse proportion* ***R14*** *interpret the gradient of a straight line graph as a rate of change; recognise and interpret graphs that illustrate direct and inverse proportion* ***R15*** *interpret the gradient at a point on a curve as the instantaneous rate of change; apply the concepts of average and instantaneous rate of change (gradients of chords and tangents) in numerical, algebraic and graphical contexts (this does not include calculus* ***R16*** *set up, solve and interpret the answers in growth and decay problems …*	**Next** **New** **Prior** Students should be able to draw linear and quadratic graphs. Students should be able to calculate the gradient of a linear function between two points. Students should recall transformations of trigonometric functions. Students should have knowledge of writing statements of direct proportion and forming an equation to find values.	Reciprocal, linear, gradient, quadratic, exponential, functions, direct, indirect, proportion, estimate, area, rate of change, distance, time, velocity, transformations, cubic, transformation, constant of proportionality	**Emerging** **Expected** **Exceeding**. **Excelling** **Resources to Support**
Real-life applications and Problem Solving			**Misconceptions**	