2 year GCSE Scheme of Work

At the end of Year 9/start of Year 10, students should do the GCSE Baseline tests to help you to decide whether they should follow the Foundation or Higher route.

This 2-year scheme assumes 4 hours maths teaching per week.
The suggested teaching hours assume that students have already covered some of the material in their 3-year KS3 course, and that some of the lessons can be combined, set as homework or not taught.
Here are some suggestions for fitting the content into the suggested teaching times:
● Lessons where the content has previously been taught at KS3 can be combined, particularly in the earlier units.
● The Prior knowledge check, Check up and/or Unit test could be set as homework rather than taking up teaching time.
● It may not be necessary to cover all strategy problem-solving lessons in full with students who used our KS3 Maths Progress course as they will already be familiar with many of the strategies.
● The functional problem-solving lessons could be omitted, or saved for the revision period. These lessons provide richer activities in real-life contexts but do not contain any new teaching.

Year 1 - either Foundation or Higher

		Year 10 Teaching		Year 9 Teaching	
		Year 1 Hours	175	Year 1 Hours (inc. Numeracy x 19)	175
		Year 2 Hours	145	Year 2 Hours	175
		Teaching Hours		Year 3 Hours	145
GCSE (9-1) Foundation	**GCSE (9-1) Higher**	**Edexcel Suggested**	**RJA Suggested - Year 10**	**RJA Suggested - Year 9**	
Unit 1 Number	Unit 1 Number	11	17	24	
Unit 2 Algebra	Unit 2 Algebra	12	22	31	
Unit 3 Graphs, tables and charts	Unit 3 Interpreting and representing data	11	14	20	
Unit 4 Fractions and percentages	Unit 4 Fractions, ratio and proportion	10	19	27	
Unit 5 Equations, inequalities and sequences	Unit 5 Angles and trigonometry	12	17	24	
Unit 6 Angles	Unit 6 Graphs	11	18	26	
Unit 7 Averages and range	Unit 7 Area and volume	10	18		
Unit 8 Perimeter, area and volume 1	Unit 8 Transformation and constructions	10	17		
Unit 9 Graphs	Unit 9 Equations and inequalities	9	16		
Unit 10 Transformations	Unit 10 Probability	9	15		
Unit 11 Ratio and proportion	Unit 11 Multiplicative reasoning				
Unit 12 Right-angled triangles	Unit 12 Similarly and congruence				
Unit 13 Probability	Unit 13 More trigonometry				
Unit 14 Multiplicative reasoning	Unit 14 Further statistics				
Unit 15 Constructions, loci and bearings	Unit 15 Equations and graphs				

Year 2 - either Foundation or Higher

GCSE (9-1) Foundation	**GCSE (9-1) Higher**		
Unit 16 Quadratic equations and graphs	Unit 16 Circle theorems		
Unit 17 Perimeter, area and volume 2	Unit 17 More algebra		
Unit 18 Fractions, indices and standard form	Unit 18 Vectors and geometric proof		
Unit 19 Congruence, similarity and vectores	Unit 19 Proportion and graphs		
Unit 20 More algebra			

See Foundation and Higher tabs for detail

Foundation Year 1 Scheme of Work

Key: Italic specification references are assumed prior knowledge and are covered in the prior knowledge check rather than the main teaching.

Term	Unit/section title	Teaching hours	Prior knowledge	GCSE (9-1) Specification reference	Unit objectives
Autumn term	**1 Number** *(Edexcel Scheme of Work Unit 1: Number, powers, decimals, HCF and LCM, roots and rounding)*	**11**	**Students should have an appreciation of place value and be able to identify the value of digits in a whole number or decimal.** **Students should be able to round to the nearest integer, and round numbers to a given power of** **Students should be able to apply the four operations.** **Students should recall all multiplication facts to 10 × 10, and use them to derive quickly the corresponding division facts.** **Students should have knowledge of strategies for multiplying and dividing whole numbers by 2, 4, 5 and 10.** **Students should recognise odd and even numbers.** **Students should be able to use brackets and the hierarchy of operations (not including powers).** **Students should understand and use positive and negative numbers, both as positions and translations on a number line.** **Students should be able to interpret scales on thermometers using °F and °C (positive and negative).**	***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** **N6 use positive integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5** **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 appropriate** **N14 estimate answers; check calculations using approximation and estimation, including answers obtained using technology** **N15 round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures);**	
	1.1 Calculations		• Order positive and negative integers and decimals; • Use the symbols =, <, >; • Understand the meaning of the words less than. • Find a fraction of a number. • Recall square numbers. • Understand the meaning of 'total'. • Understand the commutative property of multiplication.	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 N6 use positive integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5	• Use priority of operations with positive and negative numbers. • Simplify calculations by cancelling. • Use inverse operations.
	1.2 Decimal numbers		• Identify place value. • Convert between metric measures.	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) N13 use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate N15 round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures); …	• Round to a given number of decimal places. • Multiply and divide decimal numbers.
	1.3 Place value		• Round to the nearest 100, 10 and whole number. • Multiply and divide by powers of 10.	N14 estimate answers; check calculations using approximation and estimation, including answers obtained using technology N15 round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures); ...	• Write decimal numbers of millions. • Round to a given number of significant figures. • Estimate answers to calculations. • Use one calculation to find the answer to another.
	1.4 Factors and multiples		• Understand the meaning of the words prime, factor, multiple and product. • List the multiples of a given number.	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	• Recognise 2-digit prime numbers. • Find factors and multiples of numbers. • Find common factors and common multiples of two numbers. • Find the HCF and LCM of two numbers by listing.
	1.5 Squares, cubes and roots		• Understand the meaning of the words prime, factor, multiple and product. • Round numbers to a specified degree of accuracy.	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 N6 use positive integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5 N7 calculate with roots and with integer indices	• Find square roots and cube roots. • Recognise powers of 2, 3, 4 and 5. • Understand surd notation on a calculator.
	1.6 Index notation		• Use simple powers of 10. • Convert between metric units. • Evaluate numeric expressions with powers.	N7 calculate with roots and with integer indices	• Use index notation for powers of 10. • Use index notation in calculations. • Use the laws of indices.
	1.7 Prime factors		• List the factors of numbers; identify which factors are prime. • Evaluate numeric expressions with powers.	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	• Write a number as the product of its prime factors. • Use prime factor decomposition and Venn diagrams to find the HCF and LCM.
	2 Algebra *(Edexcel Scheme of Work Unit 2: Expressions, substituting into simple formulae, expanding and factorising)*	**10**	**Students should be able to use the four operations with positive and negative integers.** **Students should recall and use the hierarchy of operations.** **Students should be able to evaluate numerical expressions involving powers and roots.** **Students should be able to multiply and divide numbers with indices.** **Students should be able to find the HCF of two numbers.** **Students should be able to simplify simple algebraic expressions.**	**N1 … 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** **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** **A1 use and interpret algebraic notation, including:** **• ab in place of a × b** **• 3y in place of y + y + y and 3 × y** **• a^2 in place of a × a, a^3 in place of a × a × a, a^2b in place of a × a × b**	

			• in place of a ÷ 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** **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 appropriate, 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**	
2.1 Algebraic expressions		● Simplify simple algebraic expressions.	A1 use and interpret algebraic notation, including: • ab in place of a × b • 3y in place of y + y + y and 3 × y • a^2 in place of a × a, a^3 in place of a × a × a, a^2b in place of a × a × b • in place of a ÷ b • coefficients written as fractions rather than as decimals • brackets 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	● Use correct algebraic notation. ● Write and simplify expressions.
2.2 Simplifying expressions		● Multiply and divide simple terms. ● Calculate with positive and negative integers. ● Use index notation.	A1 use and interpret algebraic notation, including: • ab in place of a × b • 3y in place of y + y + y and 3 × y • a^2 in place of a × a, a^3 in place of a × a × a, a^2b in place of a × a × b • in place of a ÷ b • coefficients written as fractions rather than as decimals • brackets 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	● Use the index laws. ● Multiply and divide expressions.
2.3 Substitution		● Recognise equivalent expressions. ● Calculate with positive and negative integers. ● Apply the four operations.	A1 use and interpret algebraic notation, including: • ab in place of a × b • 3y in place of y + y + y and 3 × y • a^2 in place of a × a, a^3 in place of a × a × a, a^2b in place of a × a × b • in place of a ÷ b • coefficients written as fractions rather than as decimals • brackets A2 substitute numerical values into formulae and expressions, including scientific formulae 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	● Substitute numbers into expressions.
2.4 Formulae		● Calculate with negative numbers and terms. ● Recall square numbers. ● Substitute into and evaluate expressions. ● Write simple expressions.	A1 use and interpret algebraic notation, including: • ab in place of a × b • 3y in place of y + y + y and 3 × y • a^2 in place of a × a, a^3 in place of a × a × a, a^2b in place of a × a × b • in place of a ÷ b • coefficients written as fractions rather than as decimals • brackets A2 substitute numerical values into formulae and expressions, including scientific formulae A7 where appropriate, 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	● Recognise the difference between a formula and an expression. ● Substitute numbers into a simple formula.

2.5 Expanding brackets		• Multiply negative and positive terms. • Simplify algebraic expressions. • Write simple formulae.	A1 use and interpret algebraic notation, including: • ab in place of a × b • 3y in place of y + y + y and 3 × y • a^2 in place of a × a, a^3 in place of a × a × a, a^2b in place of a × a × b • in place of a ÷ b • coefficients written as fractions rather than as decimals • brackets 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	• Expand brackets. • Simplify expressions with brackets. • Substitute numbers into expressions with brackets and powers.
2.6 Factorising		• Find HCFs of number pairs. • Multiply a single term over brackets.	N1 …; use the symbols =, ≠, <, >, ≤, ≥ 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 A1 use and interpret algebraic notation, including: • ab in place of a × b • 3y in place of y + y + y and 3 × y • a^2 in place of a × a, a^3 in place of a × a × a, a^2b in place of a × a × b • in place of a ÷ b • coefficients written as fractions rather than as decimals • brackets A3 understand and use the concepts and vocabulary of expressions, equations, formulae, identities, inequalities, terms and factors A4 simplify and manipulate algebraic expressions (including those involving surds) 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 A6 …; argue mathematically to show algebraic expressions are equivalent, and use algebra to support and construct arguments	• Recognise factors of algebraic terms. • Factorise algebraic expressions. • Use the identity symbol ≡ and the not equals symbol ≠
2.7 Using expressions and formulae		• Write simple expressions. • Substitute into and evaluate expressions.	A2 substitute numerical values into formulae and expressions, including scientific formulae A5 understand and use standard mathematical formulae A21 translate simple situations or procedures into algebraic expressions or formulae; derive an equation, solve the equation and interpret the solution	• Write expressions and simple formulae to solve problems. • Use maths and science formulae.
3 Graphs, tables and charts *(Edexcel Scheme of Work Unit 3: Drawing and interpreting graphs, tables and charts)*	**12**	**Students should be able to read scales on graphs and plot coordinates in the first quadrant.** **Students should be able to draw circles.** **Students should be able to measure and draw angles.** **Students should know that there are 360 degrees in a full turn and 180 degrees at a point on a straight line.** **Students should have experience of tally charts.** **Students will have used inequality notation.** **Students should be able to find the midpoint of two numbers.** **Students should be able to use the correct notation for time using 12- and 24-hour clocks.**	**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** **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 …** **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 appropriate use** **S4 interpret, analyse and compare the distributions of data sets from univariate empirical distributions through:** **• appropriate graphical representation involving discrete, continuous and grouped data** **• appropriate measures of central tendency (… 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**	
3.1 Frequency tables		• Addition of numbers. • Counting tally symbols and drawing tally charts. • Interpret a frequency table, including calculating the total population.	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 appropriate use	• Designing tables and data collection sheets. • Reading data from tables.
3.2 Two-way tables		• Convert between 12 and 24 hour clock times. • Calculate with time. • Understand use of fractions.	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 appropriate use S5 apply statistics to describe a population	• Use data from tables. • Design and use two-way tables.
3.3 Representing data		• Determine what features are missing from a graph. • Interpret bar charts.	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 appropriate use	• Draw and interpret comparative and composite bar charts. • Interpret and compare data shown in bar charts, line graphs and histograms.
3.4 Time series		• Write decimal numbers of millions. • Plot a line graph.	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 appropriate use	• Plot and interpret time series graphs. • Use trends to predict what might happen in the future.
3.5 Stem and leaf diagrams		• Place numbers in order of size.	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 appropriate use	• Construct and interpret stem and leaf and back-to-back stem and leaf diagrams.

3.6 Pie charts		• Express a part of a circle as a fraction or percentage of the whole. • Know the number of degrees in a circle. • Draw a circle. • Draw a given angle.	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 G15 measure line segments and angles in geometric figures … 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 appropriate use S4 interpret, analyse and compare the distributions of data sets from univariate empirical distributions through: • appropriate graphical representation involving discrete, continuous and grouped data • appropriate measures of central tendency (… mode and modal class) and spread (range, including consideration of outliers)	• Draw and interpret pie charts.
3.7 Scatter graphs		• Understand depreciation of value as things age, as well as an understanding of exceptions (e.g. classic cars) • Plot coordinates in the first quadrant.	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	• Plot and interpret scatter graphs. • Determine whether or not there is a relationship between sets of data.
3.8 Line of best fit		• Recall definitions of positive, negative and no correlation. • Read values from a graph.	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	• Draw a line of best fit on a scatter graph. • Use the line of best fit to predict values.
4 Fractions and percentages *(Edexcel Scheme of Work Unit 4: Fractions and percentages)*	**12**	**Students should be able to use the four operations of number.** **Students should be able to find common factors.** **Students have a basic understanding of fractions as being 'parts of a whole' and be able to write one value as a fraction of another.** **Students should be able to define percentage as 'number of parts per hundred'.** **Students should know number complements to 10 and multiplication tables.** **Students should be able to convert between common fractions, decimals and percentages.**	***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** **N8 calculate exactly with fractions …** **N10 work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and or 0.375 and)** **N12 interpret fractions and percentages as operators** **N15 round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures); …** **R3 express one quantity as a fraction of another, where the fraction is less than 1 or greater than 1** **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** **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 appropriate use**	
4.1 Working with fractions		• Identify equivalence in fractions. • Identify the denominator of a fraction. • Identify the numerator of a fraction. • Find the LCM. • Write fractions in their simplest form.	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) 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 N8 calculate exactly with fractions …	• Compare fractions. • Add and subtract fractions. • Use fractions to solve problems.
4.2 Operations with fractions		• Convert between units of length. • Add and subtract fractions. • Convert between mixed numbers and improper fractions.	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) N8 calculate exactly with fractions … N12 interpret fractions and percentages as operators	• Find a fraction of a quantity or measurement. • Use fractions to solve problems.
4.3 Multiplying fractions		• Find a fraction of a quantity. • Know that 1000 g = 1 kg. • Know the commutative rule a x b = b x a. • Write 1 million pounds as a figure.	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 N8 calculate exactly with fractions … N12 interpret fractions and percentages as operators	• Multiply whole numbers, fractions and mixed numbers. • Simplify calculations by cancelling.

4.4 Dividing fractions		• Divide larger numbers by smaller numbers. • Convert between mixed numbers and improper fractions. • Multiply a whole number or a fraction by a fraction.	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 N8 calculate exactly with fractions … N12 interpret fractions and percentages as operators	• Divide a whole number by a fraction. • Divide a fraction by a whole number or a fraction.
4.5 Fractions and decimals		• Identify the (place) value of a digit in a decimal number. • Convert between common fractions and decimals. • Write one value as a fraction of another.	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) N8 calculate exactly with fractions … N10 work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and 7/2 or 0.375 and 3/8) N15 round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures); … R3 express one quantity as a fraction of another, where the fraction is less than 1 or greater than 1 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 appropriate use	• Convert fractions to decimals and vice versa. • Use decimals to find quantities. • Write one number as a fraction of another.
4.6 Fractions and percentages		• Write common fractions and decimals as percentages.	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 N8 calculate exactly with fractions … N10 work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and 7/2 or 0.375 and 3/8) N12 interpret fractions and percentages as operators 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 appropriate use	• Convert percentages to fractions and vice versa. • Write one number as a percentage of another.
4.7 Calculating percentages 1		• Find percentages of quantities. • Convert a fraction to a decimal. • Convert a percentage to a fraction.	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) N8 calculate exactly with fractions … N10 work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and 7/2 or 0.375 and 3/8) N12 interpret fractions and percentages as operators 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	• Convert percentages to decimals and vice versa. • Find a percentage of a quantity. • Use percentages to solve problems. • Calculate simple interest.
4.8 Calculating percentages 2		• Calculate with percentages. • Convert a percentage to a decimal. • Find a percentage of a quantity.	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 N12 interpret fractions and percentages as operators 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	• Calculate percentage increases and decreases. • Use percentages in real-life situations. • Calculate VAT (value added tax).
5 Equations, inequalities and sequences *(Edexcel Scheme of Work Unit 5: Equations, inequalities and sequences)*	**12**	**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.** **Students should be able to write the next terms in a sequence, and find the term to term rule.** **Students should be able to use function machines.** **Students should be able to multiply a term over brackets.** **Students should be able to substitute into and evaluate an expression.**	***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** **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 appropriate, 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 (rn where n is an integer, and r is a rational number > 0)** **A25 deduce expressions to calculate the nth term of linear sequences.**	

	5.1 Solving equations 1		● Understand the meaning of the term 'inverse operation'. ● Find the output of a function machine when given the input.	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 A7 where appropriate, 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	● Understand and use inverse equations. ● Rearrange simple linear equations. ● Solve simple linear equations.
	5.2 Solving equations 2		● Use all four operations to solve simple, single one-step equations. ● Work out the outputs of a function machine. ● Simplify expressions.	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	● Solve two-step equations.
	5.3 Solving equations with brackets		● Expand a single bracket, involving positive and negative numbers. ● Solve two-step equations.	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	● Solve linear equations with brackets. ● Solve equations with unknowns on both sides.
	5.4 Introducing inequalities		● Identify numbers that satisfy an inequality. ● Use the inequality signs between numbers.	A22 solve linear inequalities in one variable; represent the solution set on a number line	● Use correct notation to show inclusive and exclusive inequalities. ● Solve simple linear inequalities. ● Write down whole numbers which satisfy an inequality. ● Represent inequalities on a number line.
	5.5 More inequalities		● List integer values that satisfy an inequality.	A22 solve linear inequalities in one variable; represent the solution set on a number line	● Solve two-sided inequalities.
	5.6 More formulae		● Identify the inverse of all four operations. ● Substitute into and evaluate expressions.	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 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	● Substitute values into formulae and solve equations. ● Change the subject of a formula. ● Know the difference between an expression, an equation, a formula and an identity.
	5.7 Generating sequences		● Find the missing numbers in simple arithmetic sequences. ● Write down missing terms in sequences. ● Find the term-to-term rule.	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 (rn where n is an integer, and r is a rational number > 0)	● Recognise and extend sequences.
	5.8 Using the *n* th term of a sequence		● Substitute into a simple expression. ● Solve simple equations.	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 (rn where n is an integer, and r is a rational number > 0) A25 deduce expressions to calculate the nth term of linear sequences.	● Use the nth term to generate terms of a sequence. ● Find the nth term of an arithmetic sequence.
	End of term test				
Spring term	**6 Angles** *(Edexcel Scheme of Work Unit 6: Angles, polygons and parallel lines)*	**9**	**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.** **Students should know the preperties of special triangles and quadrilaterals.**	**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 appropriate language** **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** **G7 identify, describe and construct congruent and similar shapes, including on coordinate axes, by considering rotation, reflection, translation and enlargement (including fractional scale factors)** **G11 solve geometrical problems on coordinate axes**	

6.1 Properties of shapes		• Identify lines of symmetry and rotational symmetry in 2D shapes. • Draw angles. • Know that the angles in a quadrilateral sum to 360°.	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 appropriate language G7 identify, describe and construct congruent and similar shapes, including on coordinate axes, by considering rotation, reflection, translation and enlargement (including fractional scale factors) G11 solve geometrical problems on coordinate axes	• Solve geometric problems using side and angle properties of quadrilaterals. • Identify congruent shapes.
6.2 Angles in parallel lines		• Identify parallel and perpendicular lines. • Identify acute and obtuse angles.	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 appropriate language	• Understand and use the angle properties of parallel lines. • Find missing angles using corresponding and alternate angles.
6.3 Angles in triangles		• Identify different types of triangles. • Know that the angles in a triangle sum to 180°.	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) 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	• Solve angle problems in triangles. • Understand angle proofs about triangles.
6.4 Exterior and interior angles		• Recall the number of sides of different polygons. • Know the properties of special triangles and quadrilaterals.	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)	• Calculate the interior and exterior angles of regular polygons.
6.5 More exterior and interior angles		• Recall the number of interior angles in different polygons. • Identify exterior and interior angles.	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)	• Calculate the interior and exterior angles of polygons. • Explain why some polygons fit together and some others do not
6.6 Geometrical patterns		• Using angle facts to find missing angles. • Write an equation to solve a problem.	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 appropriate language	• Solve angle problems using equations. • Solve geometrical problems showing reasoning.
7 Averages and range *(Edexcel Scheme of Work Unit 7: Statistics, sampling and the averages)*	**9**	**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.** **Students should be able to calculate the mode, median and the range.**	**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 appropriate use** **S4 interpret, analyse and compare the distributions of data sets from univariate empirical distributions through: …** **• appropriate measures of central tendency (median, mean, mode and modal class) and spread (range, including consideration of outliers)** **S5 apply statistics to describe a population**	

7.1 Mean and range		• Understand that sharing equally involves dividing a total. • Identify the mode.	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 appropriate use S4 interpret, analyse and compare the distributions of data sets from univariate empirical distributions through: … • appropriate graphical representation involving discrete, continuous and grouped data • appropriate measures of central tendency (median, mean, mode and modal class) and spread (range, including consideration of outliers) S5 apply statistics to describe a population	• Calculate the mean from a list and from a frequency table. • Compare sets of data using the mean and range.
7.2 Mode, median and range		• Identify the mode, median and range. • Identify an incorrect value. • Draw a stem and leaf diagram. • Understand inequality notation.	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 appropriate use S4 interpret, analyse and compare the distributions of data sets from univariate empirical distributions through: … • appropriate graphical representation involving discrete, continuous and grouped data • appropriate measures of central tendency (median, mean, mode and modal class) and spread (range, including consideration of outliers)	• Find the mode, median and range from a stem and leaf diagram. • Identify outliers. • Estimate the range from a grouped frequency table.
7.3 Types of average		• Find the mode, median and mean.	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 appropriate use S4 interpret, analyse and compare the distributions of data sets from univariate empirical distributions through: … • appropriate graphical representation involving discrete, continuous and grouped data • appropriate measures of central tendency (median, mean, mode and modal class) and spread (range, including consideration of outliers)	• Recognise the advantages and disadvantages of each type of average. • Find the modal class. • Find the median from a frequency table.
7.4 Estimating the mean		• Calculate the value halfway between pairs of numbers. • Calculate the mean. • Read data from a frequency table.	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 appropriate use S4 interpret, analyse and compare the distributions of data sets from univariate empirical distributions through: … • appropriate graphical representation involving discrete, continuous and grouped data • appropriate measures of central tendency (median, mean, mode and modal class) and spread (range, including consideration of outliers)	• Estimate the mean of grouped data.
7.5 Sampling		• Understand the use of random numbers in a real-life situation.	S1 infer properties of populations or distributions from a sample, while knowing the limitations of sampling	• Understand the need for sampling. • Understand how to avoid bias.
8 Perimeter, area and volume 1 *(Edexcel Scheme of Work Unit 8: Perimeter, area and volume)*	**10**	**Students should be able to measure lines.** **Students should be able to recall the names of 2D shapes.** **Students should be able to identify and name common 3D solids: cubes, cuboids, prisms, cylinders, pyramids, cones and spheres.** **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.** **Students should be able to convert metric units to metric units.**	***N13 use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate*** **N14 estimate answers; check calculations using approximation and estimation, including answers obtained using technology** **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** ***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.)** **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** ***R1 change freely between related standard units (e.g. time, length, area, volume/capacity, mass) ...***	

8.1 Rectangles, parallelograms and triangles		● Understand the meaning of 'perpendicular'. ● Work out the perimeter and area of triangles and rectangles.	N14 estimate answers; check calculations using approximation and estimation, including answers obtained using technology G14 use standard units of measure and related concepts (length, area, volume/capacity, mass, time, money, etc.) 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	● Calculate the perimeter and area of rectangles, parallelograms and triangles. ● Estimate lengths, areas and costs. ● Calculate a missing length, given the area.
8.2 Trapezia and changing units		● Multiplying and dividing by powers of 10, converting between millimetres, centimetres and metres.	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 G16 know and apply formulae to calculate: area of triangles, parallelograms, trapezia; volume of cuboids and other right prisms (including cylinders)	● Calculate the area and perimeter of trapezia. ● Find the height of a trapezium given its area. ● Convert between area measures.
8.3 Area of compound shapes		● Know that 1 km = 1000 m ● Multiply and divide by powers of 10. ● Convert between metric measures of area.	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 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	● Calculate the perimeter and area of shapes made from triangles and rectangles. ● Calculate areas in hectares, and convert between ha and m2.
8.4 Surface area of 3D solids		● Describe shapes using correct vocabulary, including face, edge and vertex. ● Sketch the net of a cuboid. ● Work out the area of rectangles, triangles and trapezia.	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	● Calculate the surface area of a cuboid. ● Calculate the surface area of a prism.
8.5 Volume of prisms		● Identify cross sections of prisms. ● Decide whether a 3D solid is a prism.	G16 know and apply formulae to calculate: area of triangles, parallelograms, trapezia; volume of cuboids and other right prisms (including cylinders)	● Calculate the volume of a cuboid. ● Calculate the volume of a prism.
8.6 More volume and surface area		● Multiply and divide by large powers of 10. ● Know that 1 litre = 1000 ml. ● Work out the volume and surface area of a prism.	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 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	● Solve problems involving surface area and volume. ● Convert between measures of volume.
9 Graphs *(Edexcel Scheme of Work Unit 9: Real-life and algebraic linear graphs)*	**10**	**Students should be able to plot coordinates and read scales** **Students should be able to substitute into a formula.**	**N13 use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate** **A7 where appropriate, 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** **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** **G14 use standard units of measure and related concepts (length, area, volume/capacity, mass, time, money, etc.)**	
9.1 Coordinates		● Halve a number. ● Substitute into an equation, and solve for an unknown.	A8 work with coordinates in all four quadrants	● Find the midpoint of a line segment. ● Recognise, name and plot straight-line graphs parallel to the axes.
9.2 Linear graphs		● Use a function machine. ● Read scales	A7 where appropriate, interpret simple expressions as functions with inputs and outputs A9 plot graphs of equations that correspond to straight-line graphs in the coordinate plane; … 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	● Generate and plot coordinates from a rule. ● Plot straight-line graphs from tables of values. ● Draw graphs to represent relationships.
9.3 Gradient		● Understand that parallel lines will never meet. ● Identify which line is steepest.	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	● Find the gradient of a line. ● Identify and interpret the gradient from an equation. ● Understand that parallel lines have the same gradient.
9.4 *y = mx + c*		● Understand that in a linear equation, the coefficient of x is the gradient. ● Understand that parallel lines have the same gradient. ● Draw a line with a given gradient.	A9 plot graphs of equations that correspond to straight-line graphs in the coordinate plane; 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 linear functions …	● Understand what m and c represent in y = mx + c. ● Find the equations of straight-line graphs. ● Sketch graphs given the values of m and c.

	9.5 Real-life graphs		• Interpret scales. • Draw a graph of an equation in the form y = mx + c.	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 R14 interpret the gradient of a straight line graph as a rate of change... G14 use standard units of measure and related concepts (length, area, volume/capacity, mass, time, money, etc.)	• Draw and interpret graphs from real data.
	9.6 Distance-time graphs		• Understand and use the relationship between distance, average speed and time.	N13 use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate A10 identify and interpret gradients and intercepts of linear functions graphically and algebraically 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 R11 use compound units such as speed ... G14 use standard units of measure and related concepts (length, area, volume/capacity, mass, time, money, etc.)	• Use distance–time graphs to solve problems. • Draw distance–time graphs. • Interpret rate of change graphs.
	9.7 More real-life graphs		• Interpret a distance–time graph. • Recall the definitions of positive, negative and no correlation. • Find the equation of a line.	A10 identify and interpret gradients and intercepts of linear functions graphically and algebraically 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	• Draw and interpret a range of graphs. • Understand when predictions are reliable.
	10 Transformations *(Edexcel Scheme of Work Unit 10: Transformations)*	**10**	**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 reflect a shape in a mirror line.** **Students should be able to translate a shape on a squared grid using instructions such as left/right and up/down.** **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.**	**R6 express a multiplicative relationship between two quantities as a ratio or a fraction** ***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**	
	10.1 Translation		• Use the words left and right • List the four types of transformations • Describe translations using left/right and up/down.	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	• Translate a shape on a coordinate grid. • Use a column vector to describe a translation.
	10.2 Reflection		• Define the word perpendicular • Reflect a shape in a mirror line.	G7 identify, describe and construct congruent and similar shapes, including on coordinate axes, by considering rotation, reflection, translation and enlargement (including fractional scale factors)	• Draw a reflection of a shape in a mirror line. • Draw reflections on a coordinate grid. • Describe reflections on a coordinate grid.
	10.3 Rotation		• Know the number of degrees in fractions of a turn. • Use the words clockwise and anticlockwise.	G7 identify, describe and construct congruent and similar shapes, including on coordinate axes, by considering rotation, reflection, translation and enlargement (including fractional scale factors)	• Rotate a shape on a coordinate grid. • Describe a rotation.
	10.4 Enlargement		• Find scale factor from object to image and from image to object.	G7 identify, describe and construct congruent and similar shapes, including on coordinate axes, by considering rotation, reflection, translation and enlargement (including fractional scale factors)	• Enlarge a shape by a scale factor. • Enlarge a shape using a centre of enlargement.
	10.5 Describing enlargements		• Recognise the properties of enlargements. • Simplify fractions.	R6 express a multiplicative relationship between two quantities as a ratio or a fraction G7 identify, describe and construct congruent and similar shapes, including on coordinate axes, by considering rotation, reflection, translation and enlargement (including fractional scale factors)	• Identify the scale factor of an enlargement. • Find the centre of enlargement. • Describe an enlargement.
	10.6 Combining transformations		• State key information for describing transformations. • Identify the type of transformation used.	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	• Transform shapes using more than one transformation. • Describe combined transformations of shapes on a grid.
	End of term test				
S u m m e r t e r m	**11 Ratio and proportion** *(Edexcel Scheme of Work Unit 11: Ratio and Proportion)*	**10**	**Students should know the four operations of number.** **Students should have a basic understanding of fractions as being 'parts of a whole'.** **Students should be able to find the scale factor of an enlargement.** **Students should be able to draw a line graph from a table of values.**	**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 appropriate** **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** **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** **R11 use compound units such as speed, rates of pay, unit pricing, density and pressure** **R12 compare lengths, areas and volumes using ratio notation; make links to similarity (including trigonometric ratios) and scale factors** **R14 interpret the gradient of a straight line graph as a rate of change; recognise and interpret graphs that illustrate direct and inverse proportion**	
	11.1 Writing ratios		• Multiply and divide whole numbers. • Interpret bar charts.	N11 identify and work with fractions in ratio problems R4 use ratio notation, including reduction to simplest form	• Use ratio notation. • Write a ratio in its simplest form. • Solve problems using ratios.
	11.2 Using ratios 1		• Know and use metric conversions. • Find the HCF of a pair of numbers.	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)	• Solve simple problems using ratios.

11.3 Ratios and measures		• Convert units of weight, length, capacity and time. • Use index notation. • Work out areas of recangles and volumes of cubes.	N13 use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate 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 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) R12 compare lengths, areas and volumes using ratio notation; make links to similarity (including trigonometric ratios) and scale factors	• Use ratios to convert between units. • Write and use ratios for shapes and their enlargements.
11.4 Using ratios 2		• Write ratios using correct notation. • Round to a specified degree of accuracy. • Write a ratio in its 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)	• Divide a quantity into 2 parts in a given ratio.Divide a quantity into 3 parts in a given ratio. • Solve word problems using ratios.
11.5 Comparing using ratios		• Interpret ratios. • Write a ratio in its simplest form.	N11 identify and work with fractions in ratio problems 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	• Use ratios involving decimals. • Compare ratios. • Solve ratio and proportion problems.
11.6 Using proportion		• Understand and use place value to order decimals. • Write a ratio in the form 1 : n.	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) 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	• Use the unitary method to solve proportion problems. • Solve proportion problems in words. • Work out which product is better value for money.
11.7 Proportion and graphs		• Understand and use y = mx + c. • Use conversion graphs. • Plot a line graph from a table of values.	R10 solve problems involving direct and inverse proportion, including graphical and algebraic representations R14 interpret the gradient of a straight line graph as a rate of change; recognise and interpret graphs that illustrate direct and inverse proportion	• Recognise and use direct proportion on a graph. • Understand the link between the unit ratio and the gradient.
11.8 Proportion problems		• Relate common sense to real life problems.	R10 solve problems involving direct and inverse proportion, including graphical and algebraic representations	• Recognise different types of proportion. • Solve word problems involving direct and inverse proportion.
12 Right-angled triangles *(Edexcel Scheme of Work Unit 12: Right-angled triangles: Pythagoras and trigonometry)*	**10**	**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.** **Students should be able to round to a specified degree of accuracy.**	**N7 calculate with roots, and with integer indices** **N15 round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures); ...** **R12 compare lengths, areas and volumes using ratio notation; make links to similarity (including trigonometric ratios) and scale factors** **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** **G11 solve geometrical problems on coordinate axes** **G20 know the formulae for: Pythagoras' Theorem $a^2 + b^2 = c^2$ 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 θ = 0°, 30°, 45°, 60° and 90°; know the exact value of tan θ for θ = 0°, 30°, 45° and 60°**	
12.1 Pythagoras' theorem 1		• Calculate of simple squares and square roots. • Substitute into and evaluate expressions. • Round answers to a specified degree of accuracy.	N7 calculate with roots, and with integer indices N15 round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures); ... G6 apply angle facts, triangle congruence, similarity and properties of quadrilaterals to conjecture and derive results about angles and sides, including Pythagoras' Theorem ... G20 know the formulae for: Pythagoras' Theorem $a^2 + b^2 = c^2$ and the trigonometric ratios, sine, cosine and tan; apply them to find angles and lengths in right-angled triangles in two dimensional figures	• Understand Pythagoras' theorem. • Calculate the length of the hypotenuse in a right-angled triangle. • Solve problems using Pythagoras' theorem.
12.2 Pythagoras' theorem 2		• Understand the meaning of ≠. • Interpret a surd expression shown on the calculator display. • Identify the hypotenuse, and calculate its length.	N7 calculate with roots, and with integer indices N15 round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures); ... G11 solve geometrical problems on coordinate axes G20 know the formulae for: Pythagoras' Theorem $a^2 + b^2 = c^2$ and the trigonometric ratios, sine, cosine and tan; apply them to find angles and lengths in right-angled triangles in two dimensional figures	• Calculate the length of a line segment AB. • Calculate the length of a shorter side in a right-angled triangle.
12.3 Trigonometry: the sine ratio 1		• Simplify fractions. • Convert fractions to decimals using a calculator.	R12 compare lengths, areas and volumes using ratio notation; make links to similarity (including trigonometric ratios) and scale factors N15 round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures); ... G20 know the formulae for: Pythagoras' Theorem $a^2 + b^2 = c^2$ and the trigonometric ratios, sine, cosine and tan; apply them to find angles and lengths in right-angled triangles in two dimensional figures	• Understand and recall the sine ratio in right-angled triangles. • Use the sine ratio to calculate the length of a side in a right-angled triangle. • Use the sine ratio to solve problems.
12.4 Trigonometry: the sine ratio 2		• Calculate the sine of an angle in a right-angled triangle. • Use the sin key on a calculator.	N15 round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures); ... G20 know the formulae for: Pythagoras' Theorem $a^2 + b^2 = c^2$ and the trigonometric ratios, sine, cosine and tan; apply them to find angles and lengths in right-angled triangles in two dimensional figures	• Use the sine ratio to calculate an angle in a right-angled triangle. • Use the sine ratio to solve problems.

12.5 Trigonometry: the cosine ratio		● Identify the hypotenuse and adjacent side in a right-angled triangle.	G20 know the formulae for: Pythagoras' Theorem $a^2 + b^2 = c^2$ and the trigonometric ratios, sine, cosine and tan; apply them to find angles and lengths in right-angled triangles in two dimensional figures	● Understand and recall the cosine ratio in right-angled triangles. ● Use the cosine ratio to calculate the length of a side in a right-angled triangle. ● Use the cosine ratio to calculate an angle in a right-angled triangle. ● Use the cosine ratio to solve problems.
12.6 Trigonometry: the tangent ratio		● Identify the opposite and adjacent sides in right-angled triangles.	G20 know the formulae for: Pythagoras' Theorem $a^2 + b^2 = c^2$ and the trigonometric ratios, sine, cosine and tan; apply them to find angles and lengths in right-angled triangles in two dimensional figures	● Understand and recall the tangent ratio in right-angled triangles. ● Use the tangent ratio to calculate the length of a side in a right-angled triangle. ● Use the tangent ratio to calculate an angle in a right-angled triangle. ● Solve problems using an angle of elevation or depression.
12.7 Finding lengths and angles using trigonometry		● Identify the sine, cosine and tangent ratios.	G20 know the formulae for: Pythagoras' Theorem $a^2 + b^2 = c^2$ 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 θ = 0°, 30°, 45°, 60° and 90°; know the exact value of tan θ for θ = 0°, 30°, 45° and 60°	● Understand and recall trigonometric ratios in right-angled triangles. ● Use trigonometric ratios to solve problems. ● Know the exact values of the sine, cosine and tangent of some angles.
13 Probability *(Edexcel Scheme of Work Unit 13: Probability)*	**9**	**Students should know how to add and multiply fractions and decimals.** **Students should have experience of expressing one number as a fraction or percentage of another number.** **Students should be able to convert between fractions, decimals and percentages.** **Students should understand the terms impossible, unlikely, even chance, likely, certain.** **Students should be able to calculate theoretical probabilities for simple situations, e.g. spinner landing on a given colour.**	**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 appropriate 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**	
13.1 Calculating probability		● Write probability as a fraction, a decimal and a percentage. ● Add and subtract fractions.	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 appropriate 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	● Calculate simple probabilities from equally likely events. ● Understand mutually exclusive and exhaustive outcomes.
13.2 Two events		● List outcomes. ● Simplify fractions.	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 appropriate 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 P7 construct theoretical possibility spaces for single and combined experiments with equally likely outcomes and use these to calculate theoretical probabilities	● Use two-way tables to record the outcomes from two events. ● Work out probabilities from sample space diagrams.
13.3 Experimental probability		● Convert fractions, decimals and percentages. ● Compare fractions. ● Understand theoretical probability (single event). ● Use two-way tables.	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 appropriate 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 P7 construct theoretical possibility spaces for single and combined experiments with equally likely outcomes and use these to calculate theoretical probabilities	● Find and interpret probabilities based on experimental data. ● Make predictions from experimental data.
13.4 Venn diagrams		● Add and subtracting equivalent fractions. ● List primes and multiples. ● Calculate probabilities.	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 appropriate 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	● Use Venn diagrams to work out probabilities. ● Understand the language of sets and Venn diagrams.

13.5 Tree diagrams		● Calculate with fractions. ● List the possible outcomes for two events. ● Work out the probability of something not happening. ● Calculate probabilities.	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 appropriate 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 P8 calculate the probability of independent and dependent combined events, including using tree diagrams and other representations, and know the underlying assumptions	● Use frequency trees and tree diagrams. ● Work out probabilities using tree diagrams. ● Understand independent events.
13.6 More tree diagrams		● Calculate with and simplify fractions. ● Work out probabilities using tree diagrams.	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 appropriate 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 P8 calculate the probability of independent and dependent combined events, including using tree diagrams and other representations, and know the underlying assumptions	● Understand when events are not independent. ● Solve probability problems involving events that are not independent.
14 Multiplicative reasoning *(Edexcel Scheme of Work Unit 14: Multiplicative reasoning: more percentages, rates of change, compound measures)*	**9**	**Students should be able to interpret scales on a range of measuring instruments.** **Students should be able to convert between metric measures.** **Students should understand ratio notation, and be able to write a ratio in its simplest form.** **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.** **Students should be able to find the equation of a line from a graph.** **Students should be able to identify a graph showing direct proportion.**	**N13 use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate** **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** **R7 understand and use proportion as equality of ratios** **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, 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 ; 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)**	
14.1 Percentages		● Convert percentages to decimals. ● Express one number as a percentage of another. ● Work out percentage increases and decreases.	R9 … express one quantity as a percentage of another; … solve problems involving percentage change, … and original value problems … including in financial mathematics	● Calculate a percentage profit or loss. ● Express a given number as a percentage of another in more complex situations. ● Find the original amount given the final amount after a percentage increase or decrease
14.2 Growth and decay		● Write powers of numbers in index form. ● Relate percentages to decimals.	R16 set up, solve and interpret the answers in growth and decay problems, including compound interest	● Find an amount after repeated percentage change. ● Solve growth and decay problems.
14.3 Compound measures		● Understand 'rate' as a mathematical concept. ● Substitute into and solve equations. ● Rearrange equations. ● Convert between metric units of volume. ● Calculate the area of a trapezium. ● Calculate the volume of a prism.	N13 use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate 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, rates of pay, unit pricing, density and pressure G14 use standard units of measure and related concepts (length, area, volume/capacity, mass, time, money, etc)	● Solve problems involving compound measures.
14.4 Distance, speed and time		● Find speed in km/h, given distance travelled in minutes. ● Convert between metric units of length.	N13 use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate 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, rates of pay, unit pricing, density and pressure G14 use standard units of measure and related concepts (length, area, volume/capacity, mass, time, money, etc)	● Convert between metric speed measures. ● Calculate average speed, distance and time. ● Use formulae to calculate speed and acceleration.
14.5 Direct and inverse proportion		● Identify graphs showing direct proportion. ● Write a ratio as a unit ratio.	R7 understand and use proportion as equality of ratios R10 solve problems involving direct and inverse proportion, including graphical and algebraic representations R13 understand that X is inversely proportional to Y is equivalent to X is proportional to ; interpret equations that describe direct and inverse proportion	● Use ratio and proportion in measures and conversions. ● Use inverse proportions.

15 Constructions, loci and bearings *(Edexcel Scheme of Work Unit 15: Constructions: triangles, nets, plan and elevation, loci, scale drawings and bearings)*	**10**	**Students should be able to measure and draw lines.** **Students should be able to write a ratio in the form 1 : m and in its simplest form.** **Students should know the 8 points of the compass.** **Students should be able to draw a net of a 3D shape.** **Students should know clockwise, anticlockwise.** **Students should be able to identify congruent shapes.**	**R2 use scale factors, scale diagrams and maps** **R6 express a multiplicative relationship between two quantities as a ratio or a fraction** **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** **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 appropriate language** **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 Pythagoras' theorem and the fact that the base angles of an isosceles triangle are equal, 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)** **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**	
15.1 3D solids		● Recall names of common 2D shapes.	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; 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 appropriate language G12 identify properties of the faces, surfaces, edges and vertices of: cubes, cuboids, prisms, cylinders, pyramids, cones and spheres	● Recognise 3D shapes and their properties. ● Describe 3D shapes using the correct mathematical words. ● Understand the 2D shapes that make up 3D objects.
15.2 Plans and elevations		● Identify names of 2D shapes from faces of 3D solids. ● Recall names of common 3D shapes. ● Know the properties of special triangles and quadrilaterals.	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	● Identify and sketch planes of symmetry of 3D shapes. ● Understand and draw plans and elevations of 3D shapes. ● Sketch 3D shapes based on their plans and elevations.
15.3 Accurate drawings 1		● Understand of the meaning of 'congruence'. ● Draw lines, angles and circles accurately	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 Pythagoras' theorem and the fact that the base angles of an isosceles triangle are equal, 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)	● Make accurate drawings of triangles using a ruler, protractor and compasses. ● Identify SSS, ASA, SAS and RHS triangles as unique from a given description. ● Identify congruent triangles
15.4 Scale drawings and maps		● Work out scale factor of an enlargement. ● Write a ratio in the form 1 : m, and write equivalent ratios. ● Convert between metric measurements of length.	R2 use scale factors, scale diagrams and maps R6 express a multiplicative relationship between two quantities as a ratio or a fraction G15 measure line segments and angles in geometric figures, including interpreting maps and scale drawings and use of bearings	● Draw diagrams to scale. ● Correctly interpret scales in real-life contexts. ● Use scales on maps and diagrams to work out lengths and distances. ● Know when to use exact measurements and estimations on scale drawings and maps. ● Draw lengths and distances correctly on given scale drawings.
15.5 Accurate drawings 2		● Knowledge of scale factors of enlargement. ● Identify a solid from its net.	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 G12 identify properties of the faces, surfaces, edges and vertices of: cubes, cuboids, prisms, cylinders, pyramids, cones and spheres	● Accurately draw angles and 2D shapes using a ruler, protractor and compasses. ● Construct a polygon inside a circle. ● Recognise nets and make accurate drawings of nets of common 3D objects.
15.6 Constructions		● Identify parallel and perpendicular lines. ● Draw lines accurately.	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	● Draw accurately using rulers and compasses. ● Bisect angles and lines using rulers and compasses.
15.7 Loci and regions		● Convert distances from map scale to real life distance and vice versa. ● Construct the perpendicular bisector.	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	● Draw loci for the path of points that follow a given rule. ● Identify regions bounded by loci to solve practical problems.

	15.8 Bearings		• Working out the complement to 180 or 360 (addition and subtraction). • Recall the properties of angles at a point, angles on a straight line, alternate and corrsponding angles.	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 G15 measure line segments and angles in geometric figures, including interpreting maps and scale drawings and use of bearings	• Find and use three-figure bearings. • Use angles at parallel lines to work out bearings. • Solve problems involving bearings and scale diagrams.
	End of year test				

Foundation Year 2 Scheme of Work

Term	Unit/section title	Teaching hours	Prior knowledge	GCSE (9-1) Specification reference	Unit objectives
Autumn term	**16 Quadratic equations and graphs** *(Edexcel Scheme of Work Unit 16: Algebra: quadratic equations and graphs)*	**11**	**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.**	**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** **A1 use and interpret algebraic manipulation, including:** **- ab in place of a × b** **- 3y in place of y + y + y and 3 × y** **- a^2 in place of a × a, a^3 in place of a × a × a, a^2b in place of a × a × b** **- a/b in place of a ÷ b** **- coefficients written as fractions rather than as decimals** **- brackets** **A3 understand and use the concepts and vocabulary of expressions, equations, formulae, identities, inequalities, terms and factors** **A4 simplify and manipulate algebraic expressions by: … expanding products of two binomials; factorising freturn to overview expressions of the form $x^2 + bx + c$, including the difference of two squares; …** **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** **A8 work with coordinates in all four quadrants** **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**	
	16.1 Expanding double brackets		• Be able to work out area of a shape using algebraic terms. • Simplify algebraic expressions. • Multiply a single term over brackets.	A1 use and interpret algebraic manipulation, including: - ab in place of a × b - 3y in place of y + y + y and 3 × y - a^2 in place of a × a, a^3 in place of a × a × a, a^2b in place of a × a × b - a/b in place of a ÷ b - coefficients written as fractions rather than as decimals - brackets A4 simplify and manipulate algebraic expressions by: … expanding products of two binomials; factorising freturn to overview expressions of the form $x^2 + bx + c$, including the difference of two squares; …	• Multiply double brackets. • Recognise quadratic expressions. • Square single brackets.
	16.2 Plotting quadratic graphs		• Be able to square terms. • Identify the equation of the mirror line. • Copy and complete a table of values and plot a straight line graph.	A8 work with coordinates in all four quadrants A11 identify and interpret roots, intercepts, turning points of quadratic functions graphically; deduce roots algebraically A12 recognise, sketch and interpret graphs of … quadratic functions; …	• Plot graphs of quadratic functions. • Recognise a quadratic function. • Use quadratic graphs to solve problems.
	16.3 Using quadratic graphs		• Define the origin and x-axis on a graph. • Copy and complete a table of values and plot a quadratic graph.	A8 work with coordinates in all four quadrants 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	• Solve quadratic equations $ax^2 + bx + c = 0$ using a graph. • Solve quadratic equations $ax^2 + bx + c = k$ • Using a graph.

16.4 Factorising quadratic expressions		• Work out factor pairs of negative numbers • Multiply double brackets.	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 A1 use and interpret algebraic manipulation, including: - ab in place of a × b - 3y in place of y + y + y and 3 × y - a^2 in place of a × a, a^3 in place of a × a × a, a^2b in place of a × a × b - a/b in place of a ÷ b - coefficients written as fractions rather than as decimals - brackets A3 understand and use the concepts and vocabulary of expressions, equations, formulae, identities, inequalities, terms and factors A4 simplify and manipulate algebraic expressions by: … expanding products of two binomials; factorising freturn to overview expressions of the form $x^2 + bx + c$, including the difference of two squares; …	• Factorise quadratic expressions.
16.5 Solving quadratic equations algebraically		• Know that taking the square root of a number will result in both a positive and a negative answer. • Factorise quadratic expressions.	A1 use and interpret algebraic manipulation, including: - ab in place of a × b - 3y in place of y + y + y and 3 × y - a^2 in place of a × a, a^3 in place of a × a × a, a^2b in place of a × a × b - a/b in place of a ÷ b - coefficients written as fractions rather than as decimals - brackets A3 understand and use the concepts and vocabulary of expressions, equations, formulae, identities, inequalities, terms and factors A4 simplify and manipulate algebraic expressions by: … expanding products of two binomials; factorising freturn to overview expressions of the form $x^2 + bx + c$, including the difference of two squares; … 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 A18 solve quadratic equations algebraically by factorising; find approximate solutions using a graph	• Solve quadratic functions algebraically.
17 Perimeter, area and volume 2 *(Edexcel Scheme of Work Unit 17: Perimeter, area and volume 2: circles, cylinders, cones and spheres)*	**12**	**Students should know the formula for calculating the area of a rectangle.** **Students should know how to use the four operations on a calculator.** **Students should be able to name common 3D shapes.** **Students should be able to define centre, radius and diameter for a circle.** **Students should be able to substitute into formulae and solve for the unknown.** **Students should be able to work out the volume of cuboids and prisms.**	**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 appropriate 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** **G9 identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment** **G14 use standard units of measure and related concepts (length, area, volume/capacity, mass, time, money, etc.)** **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 = 2πr = πd, area of a circle = $πr^2$; 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**	
17.1 Circumference of a circle 1		• Round accurately to a given number of significant figures or decimal place. • Rearrange equations.	G9 identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment G17 know the formulae: circumference of a circle = 2πr = πd, area of a circle = $πr^2$; calculate: perimeters of 2D shapes, including circles; areas of circles and composite shapes; surface area and volume of spheres, pyramids, cones and composite solids	• Calculate the circumference of a circle. • Solve problems involving the circumference of a circle.
17.2 Circumference of a circle 2		• Round to nearest metre. • Solve equations. • Understand inequality notation. • Rearrange equations.	N8 calculate exactly with multiples of π N15 round numbers and measures to an appropriate 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 G9 identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment G17 know the formulae: circumference of a circle = 2πr = πd, area of a circle = $πr^2$; calculate: perimeters of 2D shapes, including circles; areas of circles and composite shapes; surface area and volume of spheres, pyramids, cones and composite solids	• Calculate the circumference and radius of a circle. • Work out percentage error intervals.
17.3 Area of a circle		• Evaluate squares and square roots. • Substitute into formulae and solve for the unknown.	N8 calculate exactly with multiples of π N15 round numbers and measures to an appropriate 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 G9 identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment G17 know the formulae: circumference of a circle = 2πr = πd, area of a circle = $πr^2$; calculate: perimeters of 2D shapes, including circles; areas of circles and composite shapes; surface area and volume of spheres, pyramids, cones and composite solids	• Work out the area of a circle. • Work out the radius or diameter of a circle. • Solve problems involving the area of a circle. • Give answers in terms of π.

17.4 Semicircles and sectors		• Know number of degrees in a full turn, half turn or quarter turn. • Simplify fractions. • Find the area and circumference of a circle.	N15 round numbers and measures to an appropriate 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 G9 identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment G17 know the formulae: circumference of a circle = 2πr = πd, area of a circle = πr^2; 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	• Understand and use maths language for circles and perimeters. • Work out areas of semicircles and quarter circle and perimeters. • Solve problems involving sectors of circles.
17.5 Composite 2D shapes and cylinders		• Know and use the formula for the volume of a prism. • Sketch the net of a cylinder. • Work out the area and perimeter of rectangles, semicircles and quarter circles. • Give answers in terms of π.	N15 round numbers and measures to an appropriate 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 G9 identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment G14 use standard units of measure and related concepts (length, area, volume/capacity, mass, time, money, etc.) 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 = 2πr = πd, area of a circle = πr^2; 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	• Solve problems involving areas and perimeters of 2D shapes. • Work out the volume and surface area of cylinders.
17.6 Pyramids and cones		• Understand and use maths language for 3-D shapes. • Work out the area of 2D shapes. • Give answers in terms of π.	N14 estimate answers; check calculations using approximation and estimation, including answers obtained using technology G17 know the formulae: circumference of a circle = 2πr = πd, area of a circle = πr^2; calculate: perimeters of 2D shapes, including circles; areas of circles and composite shapes; surface area and volume of spheres, pyramids, cones and composite solids	• Work out the volume of a pyramid. • Work out the surface area of a pyramid. • Work out the volume of a cone. • Work out the surface area of a cone.
17.7 Spheres and composite solids		• Know volume and surface area formulae. • Work out the length of the hypotenuse using Pythagoras' theorem.	G17 know the formulae: circumference of a circle = 2πr = πd, area of a circle = πr^2; calculate: perimeters of 2D shapes, including circles; areas of circles and composite shapes; surface area and volume of spheres, pyramids, cones and composite solids	• Work out the volume of a sphere. • Work out the surface area of a sphere. • Work out the volume and surface area of composite solids.
18 Fractions, indices and standard form *(Edexcel Scheme of Work Unit 18: More fractions, reciprocals, standard form, zero and negative indices)*	**10**	**Students should know how to do the four operations with fractions.** **Students should be able to convert between improper fractions and mixed numbers.** **Students should be able to write powers of 10 in index form and recognise and recall powers of 10, i.e. $10^2 = 100$.** **Students should recall the index laws for multiplying and dividing positive integer powers.**	**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** **N6 use positive integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5** **N7 calculate with roots, and with integer indices** **N8 calculate exactly with fractions and multiples of π** **N9 calculate with and interpret standard form A x 10^n, where 1 ≤ A < 10 and n is an integer.**	
18.1 Multiplying and dividing fractions		• Convert between fractions, mixed numbers and improper fractions. • Work out reciprocals of whole numbers, fractions, and decimals. • Four operations with fractions.	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 N8 calculate exactly with fractions and multiples of π	• Multiply and divide mixed numbers and fractions.
18.2 The laws of indices		• Evaluate simple powers. • Recall the index laws for multiplying and dividing positive integer powers.	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 N6 use positive integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5 N7 calculate with roots, and with integer indices	• To know and use the laws of indices.
18.3 Writing large numbers in standard form		• Evaluate powers of 10. • Write 1 million and 1 billion in figures.	N9 calculate with and interpret standard form A x 10^n, where 1 ≤ A < 10 and n is an integer.	• Write large numbers in standard form. • Convert large numbers from standard form into ordinary numbers.
18.4 Writing small numbers in standard form		• Divide integers and decimals by powers of ten.	N9 calculate with and interpret standard form A x 10^n, where 1 ≤ A < 10 and n is an integer.	• Write small numbers in standard form. • Convert numbers from standard form with negative powers of ordinary numbers
18.5 Calculating with standard form		• Use correct priority of operations. • Write numbers in standard form.	N9 calculate with and interpret standard form A x 10^n, where 1 ≤ A < 10 and n is an integer.	• To multiply and divide numbers in standard form. • To add and subtract numbers in standard form.

19 Congruence, similarity and vectors *(Edexcel Scheme of Work Unit 19: Congruence, similarity and vectors)*	**12**	**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.** **Students should know the properties of alternate, corresponding and vertically opposite angles.** **Students should be able to identify congruent and similar shapes.**	**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** **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)** **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** **G7 identify, describe and construct congruent and similar shapes, including on coordinate axes, by considering rotation, reflection, translation and enlargement (including fractional scale factors)** **G17 know the formulae: circumference of a circle = 2πr = πd , area of a circle = πr2; calculate: perimeters of 2D shapes, including circles; areas of circles and composite shapes; surface area and volume of spheres, pyramids, cones and composite solids** **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**	
19.1 Similarity and enlargement		• Understand the scale factor of an enlargement. • Equivalent fractions.	R12 compare lengths, areas and volumes using ratio notation; make links to similarity (including trigonometric ratios) and scale factors 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 G7 identify, describe and construct congruent and similar shapes, including on coordinate axes, by considering rotation, reflection, translation and enlargement (including fractional scale factors)	• Understand similarity. • Use similarity to solve angle problems.
19.2 More similarity		• Calculating fractions of whole numbers. • Using similarity of triangles to identify equal angles and lengths of corresponding sides. • Identify similar shapes.	R6 express a multiplicative relationship between two quantities as a ratio or a fraction 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 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	• Find the scale factor of an enlargement. • Use similarity to solve problems.
19.3 Using similarity		• Understand squares and cubes of whole numbers and decimals. • Use similarity to find unknown lengths.	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 G7 identify, describe and construct congruent and similar shapes, including on coordinate axes, by considering rotation, reflection, translation and enlargement (including fractional scale factors) G17 know the formulae: circumference of a circle = 2πr = πd , area of a circle = $πr^2$; calculate: perimeters of 2D shapes, including circles; areas of circles and composite shapes; surface area and volume of spheres, pyramids, cones and composite solids G19 apply the concepts of congruence and similarity, including the relationships between lengths in similar figures	• Understand the similarity of regular polygons. • Calculate perimeters of similar shapes.
19.4 Congruence 1		• Know that the sum of the angles in a triangle must be 180°. • Identify congrent shapes.	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 Pythagoras' theorem and the fact that the base angles of an isosceles triangle are equal, 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	• Recognise congruent shapes. • Use congruence to work out unknown angles.
19.5 Congruence 2		• Recognise corresponding and alternate angles. • Find angles using corresponding and alternate angles. • Draw triangles accurately.	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) 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 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	• Use congruence to work out unknown sides.
19.6 Vectors 1		• Add and subtract with negative numbers. • Use column vectors.	G25 apply addition and subtraction of vectors, multiplication by vectors by a scalar, and diagrammatic and column representations of vectors	• Add and subtract vectors. • Find the resultant of two vectors.
19.7 Vectors 2		• Calculate with negative numbers. • Find the resultant of two vectors.	G25 apply addition and subtraction of vectors, multiplication by vectors by a scalar, and diagrammatic and column representations of vectors	• Subtract vectors. • Find multiples of a vector.

	20 More algebra *(Edexcel Scheme of Work Unit 20: Rearranging equations, graphs of cubic and reciprocal functions and simultaneous equations)*	**12**	**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 priority of operations and use of inequality symbols.**	**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** **A6 ... argue mathematically to show algebraic expressions are equivalent, and use algebra to support and construct arguments** **A12 recognise, sketch and interpret graphs of ... the reciprocal function y = 1/x with x ≠ 0** **A14 plot and interpret ... reciprocal graphs ...** **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** **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** **R13 understand that *X* is inversely proportional to *Y* is equivalent to *X* is proportional to 1/*Y*; interpret equations that describe direct and inverse proportion** **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**	
	20.1 Graphs of cubic and reciprocal functions		● Recognise the shape of linear and quadratic graphs. ● Find reciprocals of fractions and integers.	A12 recognise, sketch and interpret graphs of ... the reciprocal function y = 1/x with x ≠ 0	● Draw and interpret graphs of cubic functions. ● Draw and interpret graphs of y = 1/x.
	20.2 Non-linear graphs		● Recognise statements and equations describing direct and indirect proportion. ● Recognise the graphs of y = x and y = 1/x.	A14 plot and interpret ... reciprocal graphs … R10 solve problems involving direct and inverse proportion, including graphical and algebraic representations R13 understand that *X* is inversely proportional to *Y* is equivalent to *X* is proportional to 1/*Y*; interpret equations that describe direct and inverse proportion 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	● Draw and interpret non-linear graphs to solve problems.
	20.3 Solving simultaneous equations graphically		● Write algebraic expressions.	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.	● Solve simultaneous equations by drawing a graph. ● Write and solve simultaneous equations.
	20.4 Solving simultaneous equations algebraically		● Add and subtract positive and negative terms, substitute integer and decimal values into a simple expression.	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.	● Solve simultaneous equations algebraically.
	20.5 Rearranging formulae		● Identify inverse operations for algebraic terms. ● Identify parallel lines from the equations of the lines.	A2 substitute numerical values into formulae and expressions, including scientific formulae A5 understand and use standard mathematical formulae; rearrange formulae to change the subject 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	● Change the subject of a formula.
	20.6 Proof		● Identify expressions, formulae and equations from a list.	A6 ... argue mathematically to show algebraic expressions are equivalent, and use algebra to support and construct arguments	● Identify expressions, equations, formulae and identities. ● Prove results using algebra.
	End of term test				

Higher Year 1 Scheme of Work

Key: Italic specification references are assumed prior knowledge and are covered in the prior knowledge check rather than the main teaching.

Term	Unit/section title	Teaching hours	Prior knowledge	GCSE (9-1) Specification reference	Unit objectives
Autumn term	**1 Number** *(Edexcel Scheme of Work Unit 1: Powers, decimals, HCF and LCM, positive and negative, roots, rounding, reciprocals, standard form, indices and surds)*	**11**	**Students should 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.**	***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 × 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** **N8 calculate exactly with … surds; … simplify surd expressions involving squares (e.g. $\sqrt{12} = \sqrt{(4 \times 3)} = \sqrt{4} \times \sqrt{3} = 2\sqrt{3}$)** **N9 calculate with and interpret standard form A x 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 appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures); …**	
	1.1 Number problems and reasoning		• Multiply numbers in a similar format to questions later in the section. • List possible outcomes from two events.	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 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 × n ways)	• Work out the total number of ways of performing a series of tasks.
	1.2 Place value and estimating		• Estimate the value of a square root. • Round numbers to a specified degree of accuracy. • Apply the four operations.	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 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 N14 estimate answers; check calculations using approximation and estimation, including answers obtained using technology N15 round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures); …	• Estimate an answer. • Use place value to answer questions.
	1.3 HCF and LCM		• Multiply prime factors together. • List the factors of a number.	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	• Write a number of the product of its prime factors. • Find the HCF and LCM of two numbers.
	1.4 Calculating with powers (indices)		• Work out simple powers. • Apply the four operations.	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 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	• Use powers and roots in calculations. • Multiply and divide using index laws. • Work out a power raised to a power.
	1.5 Zero, negative and fractional indices		• Convert between fractions and decimals. • Use the laws of indices for positive indices.	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 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	• Use negative indices. • Use fractional indices.
	1.6 Powers of 10 and standard form		• Multiply by powers of 10 when the number is written as an ordinary number and not an index. • Review different ways to divide by 10. • Use negative indices.	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 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 N9 calculate with and interpret standard form A x 10^n, where $1 \leq A < 10$ and n is an integer.	• Write a number in standard form. • Calculate with numbers in standard form.

1.7 Surds		● Review the meaning of the dot in the recurring notation. ● Identify the missing multiple which practices the skills of searching for a perfect square factor.	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 … surds; … simplify surd expressions involving squares (e.g. $\sqrt{12} = \sqrt{(4 \times 3)} = \sqrt{4} \times \sqrt{3} = 2\sqrt{3}$)	● Understand the difference between rational and irrational numbers. ● Simplify a surd. ● Rationalise a denominator.
2 Algebra *(Edexcel Scheme of Work Unit 2: Expressions, substituting into simple formulae, expanding and factorising, equations, sequences and inequalities, simple proof)*	**12**	**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.** **Students should be able to use and interpret algebraic notation.** **Students should be able to set up and solve simple equations.** **Students should recall the definitions of geometric and arithmetic sequences.**	**N1 … 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*** **N8 calculate exactly with fractions …** **N9 calculate with and interpret standard form A × 10^n, where 1 ≤ A < 10 and n is an integer.** ***A1 use and interpret algebraic notation, including:*** ***• ab in place of a × b*** ***• 3y in place of y + y + y and 3 × y*** ***• a^2 in place of a × a, a^3 in place of a × a × a, a^2b in place of a × a × b*** ***• a/b in place of a ÷ 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 $x^2 + bx + c$, 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 appropriate, 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** **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** **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), recognise and use other sequences or a surd)** **A25 deduce expressions to calculate the nth term of linear sequences.**	
2.1 Algebraic indices		● Recognise that squaring and taking the square roots, and cubing and taking the cube root, are inverse operations. ●Calculate with powers.	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 $x^2 + bx + c$, including the difference of two squares; … • simplifying expressions involving sums, products and powers, including the laws of indices	● Use the rules of indices to simplify algebraic expressions.
2.2 Expanding and factorising		● Simplify algebraic terms, including using index notation. ● Multiply a single term over a bracket. ● Find highest common factors.	N1 … use the symbols =, ≠, <, >, ≤, ≥ 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 $x^2 + bx + c$, including the difference of two squares; … • simplifying expressions involving sums, products and powers, including the laws of indices 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	● Expand brackets. ● Factorise algebraic expressions.

2.3 Equations		• Solve a simple equation expressed in words. • Solve simple algrebraic equations • Find lowest common multiples.	N8 calculate exactly with fractions … 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 $x^2 + bx + c$, including the difference of two squares; … • simplifying expressions involving sums, products and powers, including the laws of indices 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	• Solve equations involving brackets and numerical fractions. • Use equations to solve problems.
2.4 Formulae		• Substitute values into a one-step formula. • Write numbers in standard form.	N9 calculate with and interpret standard form A × 10n, where 1 ≤ A < 10 and n is an integer. 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 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	• Substitute numbers into formulae. • Rearrange formulae. • Distinguish between expressions, equations, formulae and identities.
2.5 Linear sequences		• Find the next term of a given arithmetic sequence. • Substitute values in a simple linear expression. • Write terms in a sequence given the nth term. • Use a function machine to find outputs.	A7 where appropriate, interpret simple expressions as functions with inputs and outputs; … 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 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.	• Find a general formula for the nth term of an arithmetic sequence. • Determine whether a particular number is a term of a given arithmetic sequence.
2.6 Non-linear sequences		• Find the next term of given sequences. • Identify arithmetic and geometric sequences. • Find the term-to-term rule for a sequence.	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 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 (rn where n is an integer, and r is a rational number > 0), recognise and use other sequences or a surd) A25 deduce expressions to calculate the nth term of linear sequences.	• Solve problems using geometric sequences. • Work out terms in Fibonnaci-like sequences. • Find the nth term of a quadratic sequence.
2.7 More expanding and factorising		• Recalling a square root. • Finding the factor pairs of small integers.	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 $x^2 + bx + c$, including the difference of two squares; … • simplifying expressions involving sums, products and powers, including the laws of indices	• Expand the product of two brackets. • Use the difference of two squares. • Factorise quadratics of the form $x^2 + bx + c$.
3 Interpreting and representing data *(Edexcel Scheme of Work Unit 3: Averages and range, collecting data, representing data)*	**11**	**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.** **Students should be able to find the range, mean, median and mode of a data set.**	***G14 use standard units of measure and related concepts (length, area, volume/capacity, mass, time, money, etc.)*** **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 appropriate 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:** **• appropriate graphical representation involving discrete, continuous and grouped data …** **• appropriate 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**	
3.1 Statistical diagrams 1		• Work out mode, median and range from a list of numbers.	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 appropriate use S3 construct and interpret diagrams for grouped discrete data and continuous data i.e. histograms with equal and unequal class intervals …	• Construct and use back-to-back stem and leaf diagrams. • Construct and use frequency polygons and pie charts.
3.2 Time series		• Identify trends by noticing whether sequences of numbers increase, decrease or oscillate.	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 appropriate use	• Plot and interpret time series graphs. • Use trends to predict what might happen in the future.
3.3 Scatter graphs		• Recognise when a line has a positive, negative or zero gradient. • Plot points on a coordinate grid, and identify points that do not lie on a straight line.	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	• Plot and interpret scatter graphs. • Determine whether or not there is a linear relationship between two variables.
3.4 Line of best fit		• Understand and be able to define the meaning of correlation. • Read values from graphs.	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	• Draw a line of best fit on a scatter graph. • Use the line of best fit to predict values.

3.5 Averages and range		• Find the range of a list of numbers. • Find the midpoint of two numbers.	S4 interpret, analyse and compare the distributions of data sets from univariate empirical distributions through: • appropriate graphical representation involving discrete, continuous and grouped data … • appropriate measures of central tendency (median, mode and modal class) and spread (range, including consideration of outliers) … S5 apply statistics to describe a population	• Decide which average is best for a set of data. • Estimate the mean and range from a grouped frequency table. • Find the modal class and the group containing the median.
3.6 Statistical diagrams 2		• Use subtraction to find missing values. • Draw a bar chart. • Draw a pie chart.	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 appropriate use	• Construct and use two-way tables. • Choose appropriate diagrams to display data. • Recognise misleading graphs.
4 Fractions, ratio and percentages *(Edexcel Scheme of Work Unit 4: Fractions, percentages, ratio and proportion)*	**10**	**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.** **Students should be able use ratio notation, and to write a ratio in its simplest form**	**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; …** **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 …** **N10 work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and or 0.375 and); 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 appropriate** **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** **R8 relate ratios to fractions and to linear functions** **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; …**	
4.1 Fractions		• Identify unit fractions, improper fractions and mixed numbers. • Multiply a whole number by a fraction. • Know the priority of operations.	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; … 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	• Add, subtract, multiply and divide fractions and mixed numbers. • Find the reciprocal of an integer, decimal or fraction.
4.2 Ratios		• Multiply a fraction by its reciprocal for a product of 1. • Simplify ratios. • Write ratios in the form n : 1.	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 appropriate 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)	• Write ratios in the form 1 : n or n : 1. • Compare ratios. • Find quantities using ratios. • Solve problems involving ratios.
4.3 Ratio and proportion		• Write one number as a proportion of the total. • Identify equivalent ratios.	N13 use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate 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 (R8 relate ratios to fractions and to linear functions) R10 solve problems involving direct proportion; …	• Convert between currencies and measures. • Recognise and use direct proportion. • Solve problems involving ratios and proportion.
4.4 Percentages		• Find a percentage of a given amount. • Work out percentage multipliers.	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 appropriate 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	• Work out percentage increases and decreases. • Solve real-life problems involving percentages.

	4.5 Fractions, decimals and percentages		• Convert between fractions, decimals and percentages. • Solve simple equations.	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; … N8 calculate exactly with fractions … N10 work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and or 0.375 and); change recurring decimals into their corresponding fractions and vice versa 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	• Calculate using fractions, decimals and percentages. • Convert a recurring decimal to a fraction.
	5 Angles and trigonometry *(Edexcel Scheme of Work Unit 5: Angles, polygons, parallel lines; Right-angled triangles: Pythagoras and trigonometry)*	**12**	**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.** **Students should recall the properties of special types of triangles and quadrilaterals.**	**N7 Calculate with roots and with integer and fractional indices** **N8 calculate exactly with fractions and surds …** **N15 round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures); …** **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 (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; …** **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 $a^2 + b^2 = c^2$, 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 θ = 0°, 30°, 45°, 60° and 90°; know the exact value of tan θ for θ = 0°, 30°, 45° and 60°**	
	5.1 Angle properties of triangles and quadrilaterals		• Recognise special types of triangle and quadrilateral. • Recall basic angle facts.	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 (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; … 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	• Derive and use the sum of angles in a triangle and in a quadrilateral. • Derive and use the fact that the exterior angle of a triangle is equal to the sum of the two opposite interior angles.
	5.2 Interior angles of a polygon		• Name polygons and understand the meaning of 'regular polygon'. • Substitute numbers into an expression. • Find missing angles in triangles, quadrilaterals and at a point.	G3 … 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)	• Calculate the sum of the interior angles of a polygon. • Use the interior angles of polygons to solve problems.
	5.3 Exterior angles of a polygon		• Find missing angles on a straight line. • Calculate the sum of interior angles of a polygon.	G3 … 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)	• Know the sum of the exterior angles of a polygon. • Use the angles of polygons to solve problems.
	5.4 Pythagoras' theorem 1		• Recall square numbers and square roots. • Find the area of a square.	N15 round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures); … G20 know the formulae for: Pythagoras' theorem $a^2 + b^2 = c^2$, and the trigonometric ratios sine, cosine and tan; apply them to find angles and lengths in right-angled triangles … and in two dimensional figures	• Calculate the length of the hypotenuse in a right-angled triangle. • Solve problems using Pythagoras' theorem.
	5.5 Pythagoras' theorem 2		• Find square roots. • Recognise perfect squares. • Use Pythagoras' theorem to find the length of the hypotenuse.	N7 Calculate with roots and with integer and fractional indices N8 calculate exactly with fractions and surds … G20 know the formulae for: Pythagoras' theorem $a^2 + b^2 = c^2$, and the trigonometric ratios sine, cosine and tan; apply them to find angles and lengths in right-angled triangles … and in two dimensional figures	• Calculate the length of a shorter side in a right-angled triangle. • Solve problems using Pythagoras' theorem.
	5.6 Trigonometry 1		• Convert fractions to decimals. • Identify the hypotenuse. • Use the angle sum of a triangle to work out missing angles.	G20 know the formulae for: Pythagoras' theorem $a^2 + b^2 = c^2$, and the trigonometric ratios sine, cosine and tan; apply them to find angles and lengths in right-angled triangles … and in two dimensional figures	• Use trigonometric ratios to find lengths in a right-angled triangle. • Use trigonometric ratios to solve problems.
	5.7 Trigonometry 2		• Identify the opposite and adjacent sides of a given angle in right-angled triangles. • Use the trigonometric ratios to find lengths in right-angled triangles.	G20 know the formulae for: Pythagoras' theorem $a^2 + b^2 = c^2$, 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 θ = 0°, 30°, 45°, 60° and 90°; know the exact value of tan θ for θ = 0°, 30°, 45° and 60°	• Use trigonometric ratios to calculate an angle in a right-angled triangle. • Find angles of elevation and angles of depression. • Use trigonometric ratios to solve problems. • Know the exact values of the sine, cosine and tangent of some angles.
	End of term test				

S p r i n g t e r m	**6 Graphs** *(Edexcel Scheme of Work Unit 6: Real-life and algebraic linear graphs, quadratic and cubic graphs, the equation of a circle, plus rates of change and area under graphs made from straight lines)*	**11**	**Students should be able to identify coordinates of given points in the first quadrant or all four quadrants.** **Students should be able to write the equation for a straight line graph.** **Students should be able to use and draw conversion graphs.** **Students should be able to use function machines and inverse operations.** **Students should be able to use compound units, such a speed.**	***N13 use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate*** **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 $y = 1/x$ 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** **G11 solve geometrical problems on coordinate axes** **R8 relate ratios to fractions and to linear functions** **R10 solve problems involving direct ... proportion, including graphical ... representations** **R11 use compound units such as speed, ... unit pricing, ...**	
	6.1 Linear graphs		• Identify positive and negative gradients and intercepts from graphs. • Rearrange equations.	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	• Find the gradient and y-intercept from a linear equation. • Rearrange an equation into the form $y = mx + c$. • Compare two graphs from their equations. • Plot graphs with equations $ax + by = c$.
	6.2 More linear graphs		• Identify lines with the same gradient or y-intercept from their equations. • Write the equation of a line from a graph.	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 A17 solve linear equations in one unknown ... (including those with the unknown on both sides of the equation); find approximate solutions using a graph	• Sketch graphs using the gradient and intercepts. • Find the equation of a line, given its gradient and one point on the line. • Find the gradient of a line through two points.
	6.3 Graphing rates of change		• Find speed from given distance and time. • Find the area of triangles and rectangles.	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) R10 solve problems involving direct ... proportion, including graphical ... representations R11 use compound units such as speed, ... unit pricing, ...	• Draw and interpret distance–time graphs. • Calculate average speed from a distance–time graph. • Understand velocity–time graphs. • Find acceleration and distance from velocity–time graphs.
	6.4 Real-life graphs		• Write the equation of a line from a sketch graph. • Plot a graph using values given in a table.	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 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) R8 relate ratios to fractions and to linear functions R10 solve problems involving direct ... proportion, including graphical ... representations	• Draw and interpret real-life linear graphs. • Recognise direct proportion. • Draw and use a line of best fit.
	6.5 Line segments		• Identify parallel and perpendicular lines • Know properties of gradients of parallel lines. • Identify the gradient and intercept from an equation in the form y = mx + c.	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 G11 solve geometrical problems on coordinate axes	• Find the coordinates of the midpoint of a line segment. • Find the gradient and length of a line segment. • Find the equations of lines parallel or perpendicular to a given line.
	6.6 Quadratic graphs		• Identify quadratic expressions. • Write the equation of a line from a graph.	A8 work with coordinates in all four quadrants 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 = 1/x with x ≠ 0, ...	• Draw quadratic graphs. • Solve quadratic equations using graphs. • Identify the line of symmetry of a quadratic graph. • Interpret quadratic graphs relating to real-life situations.
	6.7 Cubic and reciprocal graphs		• Know the shape of linear and quadratic graphs.	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 = 1/x with x ≠ 0, ...	• Draw graphs of cubic functions. • Solve cubic equations using graphs. • Draw graphs of reciprocal functions. • Recognise a graph from its shape.

6.8 More graphs		• Match the shape of a container to the graph of depth of water against time. • Read values from graphs.	A12 recognise, sketch and interpret graphs of linear functions, quadratic functions, simple cubic functions, the reciprocal function $y = 1/x$ 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 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	• Interpret linear and non-linear real-life graphs. • Draw the graph of a circle.
7 Area and volume *(Edexcel Scheme of Work Unit 7: Perimeter, area and volume, plane shapes and prisms, circles, cylinders, spheres, cones; Accuracy and bounds)*	**10**	**Students should know the names and properties of 3D shapes.** **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 appropriate degree of accuracy.** **Students should know the various metric units.** **Students should be able to identify planes of symmetry of 3D solids.** **Students should be able to sketch a net of a 3D shape.** **Students should be able to work out the volume of a 3D solid made of cuboids.** **Students should recall Pythagoras' theorem.**	**N8 calculate exactly with … multiples of π; …** **N13 use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate** **N14 estimate answers; check calculations using approximation and estimation, including answers obtained using technology** **N15 round numbers and measures to an appropriate 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, including upper and lower bounds** **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*** **G14 use standard units of measure and related concepts (length, area, volume/capacity, mass, time, money, etc)** **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 = πr^2; 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**	
7.1 Perimeter and area		• Recognising units of length (perimeter) and area. • Work out the area and perimeter of rectangles, triangles and parallelograms.	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 = πr^2; calculate: perimeters of 2D shapes, including circles; areas of circles and composite shapes; surface area and volume of spheres, pyramids, cones and composite solids	• Find the perimeter and area of compound shapes. • Recall and use the formula for the area of a trapezium.
7.2 Units and accuracy		• Recall the formulae for the area of quadrilaterals and triangles. Identify the possible integer values of x from an inequality. • Round numbers to a specified degree of accuracy. • Work out percentages of quantities.	N13 use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate N14 estimate answers; check calculations using approximation and estimation, including answers obtained using technology N15 round numbers and measures to an appropriate 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, including upper and lower bounds R1 change freely between related standard units (e.g. time, length, area, volume/capacity, mass) … in numerical and algebraic contexts G14 use standard units of measure and related concepts (length, area, volume/capacity, mass, time, money, etc) G16 know and apply formulae to calculate: area of triangles, parallelograms, trapezia; volume of cuboids and other right prisms (including cylinders)	• Convert between metric units of area. • Calculate the maximum and minimum possible values of a measurement.
7.3 Prisms		• Calculate the volume and surface area of a cuboid. • Calculate the volume of a shape made from cuboids.	N13 use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate N14 estimate answers; check calculations using approximation and estimation, including answers obtained using technology N15 round numbers and measures to an appropriate 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 R1 change freely between related standard units (e.g. time, length, area, volume/capacity, mass) … in numerical and algebraic contexts G16 know and apply formulae to calculate: area of triangles, parallelograms, trapezia; volume of cuboids and other right prisms (including cylinders)	• Convert between metric units of volume. • Calculate volumes and surface areas of prisms.
7.4 Circles		• Understand 'radius' and 'diameter'. • Solve and rearrange simple equations.	N8 calculate exactly with … multiples of π; … G9 identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment G17 know the formulae: circumference of a circle = $2\pi r = \pi d$, area of a circle = πr^2; calculate: perimeters of 2D shapes, including circles; areas of circles and composite shapes; surface area and volume of spheres, pyramids, cones and composite solids	• Calculate the area and circumference of a circle. • Calculate area and circumference in terms of π.

7.5 Sectors of circles		• Work out fractions of a circle given the angle of a sector. • Simplify equations.	N8 calculate exactly with … multiples of π; … N16 apply and interpret limits of accuracy, including upper and lower bounds G9 identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment G17 know the formulae: circumference of a circle = 2πr = πd, area of a circle = πr2; 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	• Calculate the perimeter and area of semicircles and quarter circles. • Calculate arc lengths, angles and areas of sectors of circles.
7.6 Cylinders and spheres		• Find the area and circumference of a circle in terms of π. • Sketch a net of a cylinder. • Solve simple equations.	N16 apply and interpret limits of accuracy, including upper and lower bounds 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 = 2πr = πd, area of a circle = πr2; calculate: perimeters of 2D shapes, including circles; areas of circles and composite shapes; surface area and volume of spheres, pyramids, cones and composite solids	• Calculate volume and surface area of a cylinder and a sphere. • Solve problems involving volumes and surface areas.
7.7 Pyramids and cones		• Find the volume of a cube. • Find the side length of a cube given its volume. • Calculate the area of a triangle. • Use Pythagoras' theorem to work out the length of the hypotenuse.	G17 know the formulae: circumference of a circle = 2πr = πd, area of a circle = πr2; calculate: perimeters of 2D shapes, including circles; areas of circles and composite shapes; surface area and volume of spheres, pyramids, cones and composite solids	• Calculate volume and surface area of pyramids and cones. • Solve problems involving pyramids and cones.
8 Transformations and constructions *(Edexcel Scheme of Work Unit 8: Transformations; Constructions: triangles, nets, plan and elevation, loci, scale drawings and bearings)*	**10**	**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.** **Students should be able to convert metric measures.** **Students should be able to recognise congruent and similar shapes.** **Students should be able to transform shapes using translation, reflection, rotation and enlargement.**	**R2 use scale factors, scale diagrams and maps** **R6 express a multiplicative relationship between two quantities as a ratio or a fraction** **G1 … 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** **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 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** **G24 describe translations as 2D vectors** **G25 apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors; …**	
8.1 3D solids		• Draw 3D shapes on an isometric grid. • Recognise dimensions of a cuboid.	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	• Draw plans and elevations of 3D solids.
8.2 Reflection and rotation		• Draw simple straight lines on a coordinate grid. • Know whether the image is congruent to the original following a reflection or a rotation.	G8 describe the changes and invariance achieved by combinations of rotations, reflections and translations	• Refl ect a 2D shape in a mirror line. • Rotate a 2D shape about a centre of rotation. • Describe refl ections and rotations.
8.3 Enlargement		• Enlarge shapes on a coordinate grid in one quadrant.	R2 use scale factors R6 express a multiplicative relationship between two quantities as a ratio or a fraction	•Enlarge shapes by fractional and negative scale factors about a centre of enlargement.
8.4 Transformations and combinations of transformations		• Describe translations	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) G24 describe translations as 2D vectors G25 apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors; …	• Translate a shape using a vector. • Carry out and describe combinations of transformations.
8.5 Bearings and scale drawings		• Convert metric measures and apply to scales. • Accurate drawing of right-angled triangle.	G1 … draw diagrams from written description R2 use scale factors, scale diagrams and maps G15 measure line segments and angles in geometric figures, including interpreting maps and scale drawings and use of bearings	• Draw and use scales on maps and scale drawings. • Solve problems involving bearings.
8.6 Constructions 1		• Accurate drawings of triangles given SSS and ASA. • Know the meaning of the terms perpendicular, bisect, arc.	G1 … 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); 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	• Construct triangles using a ruler and compasses. • Construct the perpendicular bisector of a line. • Construct the shortest distance from a point to a line using a ruler and compasses.

8.7 Constructions 2		• Draw angles with a protractor. • Construct triangles and deduce infomration from them.	G1 … draw diagrams from written description R2 use scale diagrams and maps 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	• Bisect an angle using a ruler and compasses. • Construct angles using a ruler and compasses. • Construct shapes made from triangles using a ruler and compasses.
8.8 Loci			G1 … draw diagrams from written description R2 use scale diagrams G2 construct given figures and solve loci problems	• Draw a locus. • Use loci to solve problems.
9 Equations and inequalities *(Edexcel Scheme of Work Unit 9: Algebra: Solving quadratic equations and inequalities, solving simultaneous equations algebraically)*	**9**	**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.**	***N1 order positive and negative integers, decimals and fractions; use the symbols =, ≠, <, >, ≤, ≥*** **N8 calculate exactly with … surds; … simplify surd expressions involving squares (e.g. $\sqrt{12} = \sqrt{(4 \times 3)} = \sqrt{4} \times \sqrt{3} = 2\sqrt{3}$)** **A3 understand and use the concepts and vocabulary of expressions, equations, formulae, identities, inequalities, terms and factors** **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**	
9.1 Solving quadratic equations 1		• Know that a square has two possible roots • Find the factors of a given number. • Factorise expressions. • Solve simple equations containing a squared term.	A3 understand and use the concepts and vocabulary of expressions, equations, formulae, identities, inequalities, terms and factors A4 simplify and manipulate algebraic expressions (including those involving surds …) by: … factorising quadratic expressions of the form $ax^2 + bx + c$ 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; …	• Find the roots of quadratic functions. • Rearrange and solve simple quadratic equations.
9.2 Solving quadratic equations 2		• Understand the term quadratic • Find positive and negative square roots. • Solve quadratic equations by factorising. • Expand two pairs of brackets. • Simplify surds.	N8 calculate exactly with … surds; … simplify surd expressions involving squares (e.g. $\sqrt{12} = \sqrt{(4 \times 3)} = \sqrt{4} \times \sqrt{3} = 2\sqrt{3}$) A3 understand and use the concepts and vocabulary of expressions, equations, formulae, identities, inequalities, terms and factors A4 simplify and manipulate algebraic expressions (including those involving surds …) by: … factorising quadratic expressions of the form $ax^2 + bx + c$ A18 solve quadratic equations (including those that require rearrangement) algebraically by factorising, by completing the square and by using the quadratic formula; …	• Solve more complex quadratic equations. • Use the quadratic formula to solve a quadratic equation.
9.3 Completing the square		• Expand and simplify a square bracket. • Simplify surds. • Solve simple equations, giving the answer in surd form.	A3 understand and use the concepts and vocabulary of expressions, equations, formulae, identities, inequalities, terms and factors 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 A18 solve quadratic equations (including those that require rearrangement) algebraically by factorising, by completing the square and by using the quadratic formula; …	• Complete the square for a quadratic expression. • Solve quadratic equations by completing the square.
9.4 Solving simple simultaneous equations		• Substitute into simple algebraic expressions. • Rearrange equations.	A3 understand and use the concepts and vocabulary of expressions, equations, formulae, identities, inequalities, terms and factors 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 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.	• Solve simple simultaneous equations. • Solve simultaneous equations for real-life situations.

9.5 More simultaneous equations		• Recall the equation of a straight line. • Solve simple simultaneous equations.	A3 understand and use the concepts and vocabulary of expressions, equations, formulae, identities, inequalities, terms and factors 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 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.	• Use simultaneous equations to find the equation of a straight line. • Solve linear simultaneous equations where both equations are multiplied. • Interpret real-life situations involving two unknowns and solve them.
9.6 Solving linear and quadratic simultaneous equations		• Identify different types of equations. • Solve quadraric equations.	A3 understand and use the concepts and vocabulary of expressions, equations, formulae, identities, inequalities, terms and factors 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 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.	• Solve simultaneous equations with one quadratic equation. • Use real-life situations to construct quadratic and linear equations and solve them.
9.7 Solving linear inequalities		• Understand inequality signs • Construct correct inequalities from given information	A3 understand and use the concepts and vocabulary of expressions, equations, formulae, identities, inequalities, terms and factors 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 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	• Solve inequalities and show the solution on a number line and using set notation.
10 Probability *(Edexcel Scheme of Work Unit 10: Probability)*	**9**	**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.** **Students should be able to list all outcomes for a single event systematically.** **Students should be able to make predictions from experimental data.** **Students should be able to complete a two-way table.**	**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 appropriate 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**	
10.1 Combined events		• List all outcomes for a single event systematically. • List all outcomes for two events systemaically.	N5 apply systematic listing strategies, .. 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	• Use the product rule for finding the number of outcomes for two or more events. • List all the possible outcomes of two events in a sample space diagram.
10.2 Mutually exclusive events		• Add decimals. Subtract decimals and fractions from 1. • Understand the relationship between ratios and fractions.	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 P8 calculate the probability of independent and dependent combined events, including using tree diagrams and other representations, and know the underlying assumptions	• Identify mutually exclusive outcomes and events. • Find the probabilities of mutually exclusive outcomes and events. • Find the probability of an event not happening.
10.3 Experimental probability		• Simplify fractions. • Multilply whole numbers by decimals.	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 appropriate language and the 0–1 probability scale P5 understand that empirical unbiased samples tend towards theoretical probability distributions, with increasing sample size	• Work out the expected results for experimental and theoretical probabilities. • Compare real results with theoretical expected values to see if a game is fair.
10.4 Independent events and tree diagrams		• Add and multiply fractions and decimals.	P1 record, describe and analyse the frequency of outcomes of probability experiments using tables and frequency trees 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 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	• Draw and use frequency trees. • Calculate probabilities of repeated events. • Draw and use probability tree diagrams.

	10.5 Conditional probability		● Know that the probability of something not happening is 1 minus the probability of the event happening. ● Draw and use probability tree diagrams.	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 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	● Decide if two events are independent. ● Draw and use tree diagrams to calculate conditional probability. ● Draw and use tree diagrams without replacement. ● Use two-way tables to calculate conditional probability.
	10.6 Venn diagrams and set notation		● Interpret inequalities. ● Use Venn diagrams.	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 P6 enumerate sets and combinations of sets systematically, using tables, grids, Venn diagrams and tree diagrams 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	● Use Venn diagrams to calculate conditional probability. ● Use set notation.
	End of term test				
Summer term	**11 Multiplicative reasoning** *(Edexcel Scheme of Work Unit 11: Multiplicative reasoning: direct and inverse proportion, relating to graph form for direct, compound measures, repeated proportional change)*	**8**	**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.** **Students should be able to convert between metric units.** **Students should be able to solve simple direct and indirect proportion problems, including currency conversion.**	**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 appropriate** **A2 substitute numerical values into formulae and expressions, including scientific formulae** **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** **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** **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 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 1/*Y*; construct and interpret equations that describe direct and inverse proportion** **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**	
	11.1 Growth and decay		● Understand the use of indices. ● Work out the decimal multiplier for a percentage increase/decrease.	N12 interpret fractions and percentages as operators 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 R16 set up, solve and interpret the answers in growth and decay problems, including compound interest and work with general iterative processes	● Find an amount after repeated percentage changes. ● Solve growth and decay problems.
	11.2 Compound measures		● Calculate simple rates. ● Substitute numbers into equations, and solve for the unknown. ● Use speed = distance/time to solve problems.	A2 substitute numerical values into formulae and expressions, including scientific 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 R11 use compound units such as speed, rates of pay, unit pricing, density and pressure	● Calculate rates. ● Convert between metric speed measures. ● Use a formula to calculate speed and acceleration.
	11.3 More compound measures		● Convert between metric units. ● Recall the formulae for the area of a circle and volume of a prism.	N13 use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate 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, rates of pay, unit pricing, density and pressure	● Solve problems involving compound measures.
	11.4 Ratio and proportion		● Rearrange formulae. ● Recognise graphs of y = x and y = 1/x. ● Find the gradient of a line given its equation. ● Decide whether quantities are in direct proportion.	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 R6 express a multiplicative relationship between two quantities as a ratio or a fraction R10 solve problems involving direct and inverse proportion, including graphical and algebraic representations R13 understand that *X* is inversely proportional to *Y* is equivalent to *X* is proportional to 1/*Y*; construct and interpret equations that describe direct and inverse proportion R14 … recognise and interpret graphs that illustrate direct and inverse proportion	● Use relationships involving ratio. ● Use direct and indirect proportion.

12 Similarity and congruence *(Edexcel Scheme of Work Unit 12: Similarity and congruence in 2D and 3D)*	**8**	**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.** **Students should be able to recognise congruent shapes.** **Students should know basic angle facts.**	**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** **G7 identify, describe and construct congruent and similar shapes, including on coordinate axes, by considering rotation, reflection, translation and enlargement (including fractional and negative scale factors)** **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**	
12.1 Congruence		• Know the angle sum of interior angles of a triangle. • Recognisse congruent shapes. • Recall basic angle facts. • Find missing lengths using Pythagoras' theorem.	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	• Show that two triangles are congruent. • Know the conditions of congruence.
12.2 Geometric proof and congruence		• Know the conditions of congruence and use correct mathematical notation for equal angles and sides. • Recall the properties of special triangles and quadrilaterals.	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	• Prove shapes are congruent. • Solve problems involving congruence.
12.3 Similarity		• Use geometric properties to find similarities and differences between given polygons. • Calculate scale factors.	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 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 G7 identify, describe and construct congruent and similar shapes, including on coordinate axes, by considering rotation, reflection, translation and enlargement (including fractional and negative scale factors)	• Use the ratio of corresponding sides to work out scale factors. • Find missing lengths on similar shapes.
12.4 More similarity		• Find area scale factor, given length scale factor.	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 G7 identify, describe and construct congruent and similar shapes, including on coordinate axes, by considering rotation, reflection, translation and enlargement (including fractional and negative scale factors) G19 apply the concepts of congruence and similarity, including the relationships between lengths, areas and volumes in similar figures	• Use similar triangles to work out lengths in real life. • Use the link between linear scale factor and area scale factor to solve problems.
12.5 Similarity in 3D solids		• Work out the volume and surface area of a cube. • Convert between metric units. • Work out cubes and cube roots.	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	• Use the link between scale factors for length, area and volume to solve problems.
13 More trigonometry *(Edexcel Scheme of Work Unit 13: Sine and cosine rules, (1/2)ab sin C, trigonometry and Pythagoras' Theorem in 3D, trigonometric graphs, and accuracy and bounds)*	**13**	**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.**	**N16 apply and interpret limits of accuracy, including upper and lower bounds** **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 $y = 1/x$ with $x \neq 0$, exponential, functions $y = k^x$ 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** **G20 know the formulae for: Pythagoras' Theorem $a^2 + b^2 = c^2$ 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** **G22 know and apply the sine rule $a/(\sin A) = b/(\sin B) = c/(\sin C)$, and cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$, to find unknown lengths and angles** **G23 know and apply Area = (1/2)$ab \sin C$ to calculate the area, sides or angles of any triangle**	
13.1 Accuracy		• Find upper and lower bounds of a given measurement.	N16 apply and interpret limits of accuracy, including upper and lower bounds	• Understand and use upper and lower bounds in calculations involving trigonometry.
13.2 Graph of the sine function		• Know the exact values of sin θ for θ = 30°, 45° , 60° and 90° • Use Pythagoras' theorem. • Find angles using the sin function.	A8 work with coordinates in all four quadrants A12 recognise, sketch and interpret graphs of the trigonometric functions (with arguments in degrees) y = sin x for angles of any size G21 know the exact values of sin θ for θ = 0°, 30°, 45° , 60° and 90°	• Understand how to fi nd the sine of any angle. • Know the graph of the sine function and use it to solve equations.

13.3 Graph of the cosine function		• Know the exact values of cos θ for θ = 30°, 45° , 60° and 90° • Use Pythagoras' theorem. • Find angles using the cos function.	A8 work with coordinates in all four quadrants A12 recognise, sketch and interpret graphs of the trigonometric functions (with arguments in degrees) y = cos x for angles of any size G21 know the exact values ofcos θ for θ = 0°, 30°, 45° , 60° and 90°	• Understand how to fi nd the cosine of any angle. • Know the graph of the cosine function and use it to solve equations.
13.4 The tangent function		• Know the exact values of tan θ for θ = 30°, 45° , 60° • Use Pythagoras' theorem. • Find angles using the tan function.	A8 work with coordinates in all four quadrants A12 recognise, sketch and interpret graphs of the trigonometric functions (with arguments in degrees) y = tan x for angles of any size G21 know the exact values of tan θ for θ = 0°, 30°, 45° and 60°	• Understand how to fi nd the tangent of any angle. • Know the graph of the tangent function and use it to solve equations.
13.5 Calculating areas and the sine rule		• Calculate the area of a triangle using (1/2)b × h • Know the formula for calculating the area of a circle. • Use trigonometry	G23 know and apply Area = (1/2)ab sin C to calculate the area, sides or angles of any triangle. G22 know and apply the sine rule a/(sin A) = b/(sin B) = c/(sin C) to find unknown lengths and angles	• Find the area of a triangle and a segment of a circle. • Use the sine rule to solve 2D problems.
13.6 The cosine rule and 2D trigonometric problems		• Use bearings • Calculate the area of a triangle. • Solve calculations.	G22 know and apply the cosine rule $a^2 = b^2 + c^2 – 2bc \cos A$, to find unknown lengths and angles	• Use the cosine rule to solve 2D problems. • Solve bearings problems using trigonometry.
13.7 Solving problems in 3D		• Use the sine and cosine rule.	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	• Use Pythagoras' theorem in 3D. • Use trigonometry in 3D.
13.8 Transforming trigonometric graphs 1		• Reflect and rotate a coordiante point. • Know the exact values of sin θ and cos θ for θ = 0°, 30°, 45° , 60° and 90°; know the exact value of tan θ for θ = 0°, 30°, 45° and 60° • Sketch the curves y = sin x and y = cos x for x from 0° to 360°	A8 work with coordinates in all four quadrants A13 sketch translations and reflections of a given function	• Recognise how changes in a function aff ect trigonometric graphs.
13.9 Transforming trigonometric graphs 2		• Translate coordinate points by column vectors. • Understand negative translations.	A8 work with coordinates in all four quadrants A13 sketch translations and reflections of a given function	• Recognise how changes in a function aff ect trigonometric graphs.
14 Further statistics *(Edexcel Scheme of Work Unit 14: Statistics and sampling, cumulative frequency and histograms)*	**10**	**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.**	**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 appropriate use** **S4 interpret, analyse and compare the distributions of data sets from univariate empirical distributions through:** **• Appropriate graphical representation involving discrete, continuous and grouped data, including box plots** **• appropriate measures of central tendency (median, mean, mode and modal class) and spread (range, including consideration of outliers, quartiles and inter-quartile range)**	
14.1 Sampling		• Use fractions and percentages to work out data from a table.	S1 infer properties of populations or distributions from a sample, whilst knowing the limitations of sampling apply statistics to describe a population	•Understand how to take a simple random sample. • Understand how to take a stratifi ed sample.
14.2 Cumulative frequency		• Find the median of a data set.	S3 interpret and construct diagrams for grouped discrete data and continuous data, i.e. cumulative frequency graphs, and know their appropriate use	• Draw and interpret cumulative frequency tables and diagrams. • Work out the median, quartiles and interquartile range from a cumulative
14.3 Box plots		• Find the median and range from a stem-and-leaf diagram.	S4 interpret, analyse and compare the distributions of data sets from univariate empirical distributions through: • Appropriate graphical representation involving discrete, continuous and grouped data, including box plots	• Find the quartiles and the interquartile range from stem-and-leaf diagrams. • Draw and interpret box plots.
14.4 Drawing histograms		• Division calculations • Draw a frequency diagram. • Write the modal class • Estimate the mean mass	S3 interpret and construct diagrams for grouped discrete data and continuous data, i.e. histograms with equal and unequal class intervals, and know their appropriate use	• Understand frequency density. • Draw histograms.
14.5 Interpreting histograms		• Write the modal class • Estimate the mean mass.	S3 interpret and construct diagrams for grouped discrete data and continuous data, i.e. histograms with equal and unequal class intervals, and know their appropriate use	• Interpret histograms.
14.6 Comparing and describing populations		• Work out the mean, median and mode of data sets. • Work out the mean and range from a table.	S4 interpret, analyse and compare the distributions of data sets from univariate empirical distributions through: • appropriate measures of central tendency (median, mean, mode and modal class) and spread (range, including consideration of outliers, quartiles and inter-quartile range)	•Compare two sets of data.
15 Equations and graphs *(Edexcel Scheme of Work Unit 15: Quadratics, expanding more than two brackets, sketching graphs, graphs of circles, cubes and quadratics)*	**9**	**Students should be able to solve quadratics and linear equations.** **Students should be able to solve simultaneous equations algebraically.**	**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**	
15.1 Solving simultaneous equations graphically		• Know and draw graphs of circles.	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.	• Solve simultaneous equations graphically.
15.2 Representing inequalities graphically		• Know which integers satisfy an inequality • Solve inequalitites with one variable and show solution using set notation.	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	• Represent inequalities on graphs. • Interpret graphs of inequalities.

	15.3 Graphs of quadratic functions		• Solve quadratic equations by factorising. • Sketch simple quadratic graphs • Find coordinates of maximum point.	A11 identify and interpret roots, intercepts, turning points of quadratic functions graphically; … identify turning points by completing the square N8 Calculate exactly with … surds … A12 recognise, sketch and interpret graphs of … quadratic functions	• Recognise and draw quadratic functions.
	15.4 Solving quadratic equations graphically		• Understand manimum and minimum points. • Find roots of an equation by completing the square and using the quadratic formula.	A18 solve quadratic equations (including those that require rearrangement) …; find approximate solutions using a graph A20 find approximate solutions to equations numerically using iteration N8 Calculate exactly with … surds …	• Find approximate solutions to quadratic equations graphically. • Solve quadratic equations using an iterative process.
	15.5 Graphs of cubic functions		• Know where a graph will cross the x-axis • Expand and simplify double brackets • Find roots of a quadratic equation by completing the square	A12 recognise, sketch and interpret graphs of … simple cubic functions … A20 find approximate solutions to equations numerically using iteration A4 simplify and manipulate algebraic expressions … by: expanding products of two or more binomials	• Find the roots of cubic equations. • Sketch graphs of cubic functions. • Solve cubic equations using an iterative process.
	End of year test				

Higher Year 2 Scheme of Work

Term	Unit/section title	Teaching hours	Prior knowledge	GCSE (9-1) Specification reference	Unit objectives
Autumn term	**16 Circle theorems** *(Edexcel Scheme of Work Unit 16: Circle theorems and circle geometry)*	**10**	**Students should have practical experience of drawing circles with compasses.** **Students should recall the words, centre, radius, diameter, circumference, arc, sector and segment** **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.**	**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**	
	16.1 Radii and chords		• Recall the properties of an isosceles triangle and the language of a circle. • 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 G10 apply and prove the standard circle theorems concerning angles, radii, tangents and chords, and use them to prove related results	• Solve problems involving angles, triangles and circles. • Understand and use facts about chords and their distance from the centre of a circle. • Solve problems involving chords and radii.
	16.2 Tangents		• Recall that the line drawn from the centre of a circle to the midpoint of a chord is at right angles to the chord. • Know that the sum of the angles in a triangle must be 180° • Recall the correct maths language for parts of a circle	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	• Understand and use facts about tangents at a point and from a point. • Give reasons for angle and length calculations involving tangents.
	16.3 Angles in circles 1		• Recall simple maths facts. • Recall the correct maths language for parts of a circle	G10 apply and prove the standard circle theorems concerning angles, radii, tangents and chords, and use them to prove related results	• Understand, prove and use facts about angles subtended at the centre and the circumference of circles. • Understand, prove and use facts about the angle in a semicircle being a right angle. • Find missing angles using these theorems and give reasons for answers.
	16.4 Angles in circles 2		• Recall sum of angles of a triangle and a quadrilateral • Recall correct maths language for parts of a circle.	G10 apply and prove the standard circle theorems concerning angles, radii, tangents and chords, and use them to prove related results	• Understand, prove and use facts about angles subtended at the circumference of a circle. • Understand, prove and use facts about cyclic quadrilaterals. • Prove the alternate segment theorem.
	16.5 Applying circle theorems		• Understand that $x^2 + y^2 = r^2$ is the equation of a circle with centre at the origin. • Find the gradient of a line from its equation and know the gradient of a line perpendicular to it. • Find the equation of the straight line, given a gradient and a coordinate. • Recall circle theorems	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 G10 apply and prove the standard circle theorems concerning angles, radii, tangents and chords, and use them to prove related results	• Solve angle problems using circle theorems. • Give reasons for angle sizes using mathematical language. • Find the equation of the tangent to a circle at a given point.
	17 More algebra *(Edexcel Scheme of Work Unit 17: Changing the subject of formulae (more complex), algebraic fractions, solving equations arising from algebraic fractions, rationalising surds, proof)*	**13**	**Students should be able to simplify surds.** **Students should be able to use negative numbers with all four operations.** **Students should be able to add and multiply numeric fractions.** **Students should be able to recall and use the hierarchy of operations.** **Students should be able to manipulate algebraic expressions.** **Students should be able to recall and use the quadratic formula.**	**N8 … simplify surd expressions involving squares (e.g. $\sqrt{12} = \sqrt{(4 \times 3)} = \sqrt{4} \times \sqrt{3} = 2\sqrt{3}$) 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 appropriate, 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, …**	

17.1 Rearranging formulae		• Substitute into linear equations. • Change the subject of a formula. • Factorise linear expressions.	A5 … rearrange formulae to change the subject	• Change the subject of a formula where the power of the subject appears. • Change the subject of a formula where the subject appears twice.
17.2 Algebraic fractions		• Simplify numeric fractions and fractions containing simple algebraic terms. • Add and multiply numeric fractions.	A4 simplify and manipulate algebraic expressions (including those involving ... 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 x2 + bx + c, including the difference of two squares; factorising quadratic expressions of the form ax2 + bx + c • simplifying expressions involving sums, products and powers, including the laws of indices A5 … rearrange formulae to change the subject	• Add and subtract algebraic fractions. • Multiply and divide algebraic fractions. • Change the subject of a formula involving fractions where all the variables are in the denominators.
17.3 Simplifying algebraic fractions		• Factorise expressions by identifying the common factor between two terms. • Simplify fractions containing simple algebraic terms. • Factorise quadratic expressions of the form x2 + bx + c	A4 simplify and manipulate algebraic expressions (including those involving ... 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 x2 + bx + c, including the difference of two squares; factorising quadratic expressions of the form ax2 + bx + c • simplifying expressions involving sums, products and powers, including the laws of indices	• Simplify algebraic fractions.
17.4 More algebraic fractions		• Simplify algebraic fractions by cancelling common factors. • Add, subtract, divide and multiply fractions containing simple algebraic terms.	A4 simplify and manipulate algebraic expressions (including those involving ... 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 x2 + bx + c, including the difference of two squares; factorising quadratic expressions of the form ax2 + bx + c • simplifying expressions involving sums, products and powers, including the laws of indices	• Add and subtract more complex algebraic fractions. • Multiply and divide more complex algebraic fractions.
17.5 Surds		• Decide whether each number is rational or irrational.	N8 … simplify surd expressions involving squares (e.g. $\sqrt{12} = \sqrt{(4 \times 3)} = \sqrt{4} \times \sqrt{3} = 2\sqrt{3}$) and rationalise denominators A4 simplify and manipulate algebraic expressions (including those involving ... surds) 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 x2 + bx + c, including the difference of two squares; factorising quadratic expressions of the form ax2 + bx + c • simplifying expressions involving sums, products and powers, including the laws of indices	• Simplify expressions involving surds. • Expand expressions involving surds. • Rationalise the denominator of a fraction.
17.6 Solving algebraic fraction equations		• Find the lowest common multiple of two algebraic fractions. • Solve quadratic equations by factorising. • Manipulate expressions containing simple algebraic fractions.	A18 solve quadratic equations (including those that require rearrangement) algebraically by factorising, …	• Solve equations that involve algebraic fractions.
17.7 Functions		• Calculate the output from a function machine for three different inputs. • Solve simple equations • Write expressions using function machines	A7 where appropriate, 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)	• Use function notation. • Find composite functions. • Find inverse functions.
17.8 Proof		• Identify an odd number and an even number written algebraically. • Recall the definitions of equations and identities.	A6 … argue mathematically to show algebraic expressions are equivalent, and use algebra to support and construct arguments and proofs	• Prove a result using algebra.
18 Vectors and geometric proof *(Edexcel Scheme of Work Unit 18: Vectors and geometric proof)*	**10**	**Students should be able to use vectors to describe translations.** **Students should be able to recall and use Pythagoras' Theorem.** **Students should recall the properties of triangles and quadrilaterals.** **Students should be able to express the relationship between two quantities as a ratio.** **Students should be able to simplify surds.**	**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**	
18.1 Vectors and vector notation		• Use vectors to describe translations. • Recall and use Pythagoras' Theorem. • Simplify surds.	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	• Understand and use vector notation. • Work out the magnitude of a vector.
18.2 Vector arithmetic		• Understand the components of a vector and use vectors to describe translations. • Recall properties of triangles and quadrilaterals.	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	• Calculate using vectors and represent the solutions graphically. • Calculate the resultant of two vectors.
18.3 More vector arithmetic		• Use properties of a parallelogram to identify equal and parallel lines. • Add two column vectors.	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	• Solve problems using vectors. • Use the resultant of two vectors to solve vector problems.
18.4 Parallel vectors and collinear points		• Identify parallel column vectors. • Add and subtract column vectors.	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	• Express points as position vectors. • Prove lines are parallel. • Prove points are collinear.

18.5 Solving geometric problems		● Understand the relationship between ratio and fractional parts ● Identify parallel vectors	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	● Solve geometric problems in two dimensions using vector methods. ● Apply vector methods for simple geometric proofs.
19 Proportion and graphs *(Edexcel Scheme of Work Unit 19: Direct and indirect proportion: using statements of proportionality, reciprocal and exponential graphs, rates of change in graphs, functions, transformations of graphs)*	**13**	**Students should be able to draw linear and quadratic graphs.** **Students should recognise 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.** **Students should be able to recognise a graph showing direct proportion.** **Students should be able to recall and use the formula speed = distance ÷ time.**	**A7 where appropriate, interpret simple expressions as functions with inputs and outputs; ...** **A12 recognise, sketch and interpret graphs of the reciprocal function $y = 1/x$ with $x \neq 0$, exponential functions $y = k^x$ for positive values of k and integer values of x** **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)** **R7 understand and use proportion as equality of ratios** **R10 solve problems involving direct and inverse proportion, including graphical and algebraic representations** **R13 understand that X is inversely proportional to Y is equivalent to X is proportional to $1/Y$; 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, including compound interest ...**	
19.1 Direct proportion		● Recognise direct proportion ● Write equations for quantities in direct proportion.	R7 understand and use proportion as equality of ratios R10 solve problems involving direct ... proportion, including graphical and algebraic representations R13 ...construct and interpret equations that describe direct... proportion R14 interpret the gradient of a straight line graph as a rate of change; recognise and interpret graphs that illustrate direct ... proportion	● Write and use equations to solve problems involving direct proportion.
19.2 More direct proportion		● Use direct proportion. ● Find the constant of proportionality.	R13 ...construct and interpret equations that describe direct... proportion	● Write and use equations to solve problems involving direct proportion. ● Solve problems involving square and cubic proportionality.
19.3 Inverse proportion		● Using inverse proportion to solve simple problems. ● Write equations for quantities in direct proportion.	A12 recognise, sketch and interpret graphs of the reciprocal function y = 1/x with x ≠ 0… A14 plot and interpret reciprocal graphs and exponential graphs … R10 solve problems involving direct and inverse proportion, including graphical and algebraic representations R13 understand that X is inversely proportional to Y is equivalent to X is proportional to 1/Y; construct and interpret equations that describe direct and inverse proportion	● Write and use equations to solve problems involving inverse proportion. ● Use and recognise graphs showing inverse proportion.
19.4 Exponential functions		● Evaluate indices	A12 recognise, sketch and interpret graphs of …. exponential functions y = kx for positive values of k and integer values of x A14 plot and interpret reciprocal graphs and exponential graphs … R16 set up, solve and interpret the answers in growth and decay problems, including compound interest …	● Recognise graphs of exponential functions. ● Sketch graphs of exponential functions.
19.5 Non-linear graphs		● Work out the area of a trapezium ● Recall and use the formula speed = distance ÷ time. ● Find the gradient of a line between two given points.	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) R14 interpret the gradient of a straight line graph as a rate of change... 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	● Calculate the gradient of a tangent at a point. ● Estimate the area under a non-linear graph.
19.6 Translating graphs of functions		● Translating coordinates ● Function notation	A7 where appropriate, interpret simple expressions as functions with inputs and outputs; … A13 sketch translations and reflections of a given function	● Understand the relationship between translating a graph and the change in its function notation.
19.7 Reflecting and stretching graphs of functions		● Transformation of functions	A13 sketch translations and reflections of a given function	● Understand the effect stretching a curve parallel to one of the axes has on its function form. ● Understand the effect reflecting a curve in one of the axes has on its function form.
End of term test				