

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
N5 apply systematic listing strategies

- Write a number as the product of its prime factors.
- Use prime factor decomposition and Venn diagrams to find the HCF and LCM.

<p>2 Algebra</p> <p><i>(Edexcel Scheme of Work Unit 2: Expressions, substituting into simple formulae, expanding and factorising)</i></p>	<p>12</p>	<p>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.</p>	<p>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 $a \times b$ • $3y$ in place of $y + y + y$ and $3 \times y$ • a2 in place of $a \times a$, a3 in place of $a \times a \times a$, a2b in place of $a \times a \times b$ • 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 (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 A5 understand and use standard mathematical formulae; ... A6 ...; 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</p>	
<p>2.1 Algebraic expressions</p>		<ul style="list-style-type: none"> Simplify simple algebraic expressions. 	<p>A1 use and interpret algebraic notation, including: • ab in place of $a \times b$ • $3y$ in place of $y + y + y$ and $3 \times y$ • a2 in place of $a \times a$, a3 in place of $a \times a \times a$, a2b in place of $a \times a \times b$ • 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 ... <i>... simplifying expressions involving sums, products and powers, including the laws of indices</i></p>	<ul style="list-style-type: none"> Use correct algebraic notation. Write and simplify expressions.
<p>2.2 Simplifying expressions</p>		<ul style="list-style-type: none"> Multiply and divide simple terms. Calculate with positive and negative integers. Use index notation. 	<p>A1 use and interpret algebraic notation, including: • ab in place of $a \times b$ • $3y$ in place of $y + y + y$ and $3 \times y$ • a2 in place of $a \times a$, a3 in place of $a \times a \times a$, a2b in place of $a \times a \times b$ • 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 ... <i>... simplifying expressions involving sums, products and powers, including the laws of indices</i></p>	<ul style="list-style-type: none"> Use the index laws. Multiply and divide expressions.
<p>2.3 Substitution</p>		<ul style="list-style-type: none"> Recognise equivalent expressions. Calculate with positive and negative integers. Apply the four operations. 	<p>A1 use and interpret algebraic notation, including: • ab in place of $a \times b$ • $3y$ in place of $y + y + y$ and $3 \times y$ • a2 in place of $a \times a$, a3 in place of $a \times a \times a$, a2b in place of $a \times a \times b$ • 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 ... <i>... simplifying expressions involving sums, products and powers, including the laws of indices</i></p>	<ul style="list-style-type: none"> Substitute numbers into expressions.
<p>2.4 Formulae</p>		<ul style="list-style-type: none"> Calculate with negative numbers and terms. Recall square numbers. Substitute into and evaluate expressions. Write simple expressions. 	<p>A1 use and interpret algebraic notation, including: • ab in place of $a \times b$ • $3y$ in place of $y + y + y$ and $3 \times y$ • a2 in place of $a \times a$, a3 in place of $a \times a \times a$, a2b in place of $a \times a \times b$ • 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</p>	<ul style="list-style-type: none"> Recognise the difference between a formula and an expression. Substitute numbers into a simple formula.

<p>2.5 Expanding brackets</p>	<ul style="list-style-type: none"> • Multiply negative and positive terms. • Simplify algebraic expressions. • Write simple formulae. 	<p>A1 use and interpret algebraic notation, including:</p> <ul style="list-style-type: none"> • ab in place of $a \times b$ • $3y$ in place of $y + y + y$ and $3 \times y$ • a2 in place of $a \times a$, a3 in place of $a \times a \times a$, a2b in place of $a \times a \times b$ • in place of $a + b$ • coefficients written as fractions rather than as decimals • brackets <p>A4 simplify and manipulate algebraic expressions ... by:</p> <ul style="list-style-type: none"> • collecting like terms • multiplying a single term over a bracket • taking out common factors ... 	<ul style="list-style-type: none"> • Expand brackets. • Simplify expressions with brackets. • Substitute numbers into expressions with brackets and powers.
<p>2.6 Factorising</p>	<ul style="list-style-type: none"> • Find HCFs of number pairs. • Multiply a single term over brackets. 	<p>N1 ... use the symbols =, \neq, $<$, $>$, \leq, \geq</p> <p>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</p> <p>A1 use and interpret algebraic notation, including:</p> <ul style="list-style-type: none"> • ab in place of $a \times b$ • $3y$ in place of $y + y + y$ and $3 \times y$ • a2 in place of $a \times a$, a3 in place of $a \times a \times a$, a2b in place of $a \times a \times b$ • in place of $a + b$ • coefficients written as fractions rather than as decimals • brackets <p>A3 understand and use the concepts and vocabulary of expressions, equations, formulae, identities, inequalities, terms and factors</p> <p>A4 simplify and manipulate algebraic expressions (including those involving surds) by:</p> <ul style="list-style-type: none"> • collecting like terms • multiplying a single term over a bracket • taking out common factors ... 	<ul style="list-style-type: none"> • Recognise factors of algebraic terms. • Factorise algebraic expressions. • Use the identity symbol \equiv and the not equals symbol \neq
<p>2.7 Using expressions and formulae</p>	<ul style="list-style-type: none"> • Write simple expressions. • Substitute into and evaluate expressions. 	<p>A2 substitute numerical values into formulae and expressions, including scientific formulae</p> <p>A21 translate simple situations or procedures into algebraic expressions or formulae; derive an equation, solve the equation and interpret the solution</p>	<ul style="list-style-type: none"> • Write expressions and simple formulae to solve problems. • Use maths and science formulae.
<p>End of term test</p>			

S P R I N G T E R M	3 Graphs, tables and charts <i>(Edexcel Scheme of Work Unit 3: Drawing and interpreting graphs, tables and charts)</i>	14	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) 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		<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Designing tables and data collection sheets. Reading data from tables.
	3.2 Two-way tables		<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Use data from tables. Design and use two-way tables.
	3.3 Representing data		<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Draw and interpret comparative and composite bar charts. Interpret and compare data shown in bar charts, line graphs and histograms.
	3.4 Time series		<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Plot and interpret time series graphs. Use trends to predict what might happen in the future.
	3.5 Stem and leaf diagrams		<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Construct and interpret stem and leaf and back-to-back stem and leaf diagrams.
	3.6 Pie charts		<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> Draw and interpret pie charts.
	3.7 Scatter graphs		<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Plot and interpret scatter graphs. Determine whether or not there is a relationship between sets of data.
	3.8 Line of best fit		<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Draw a line of best fit on a scatter graph. Use the line of best fit to predict values.

<p>4 Fractions and percentages <i>(Edexcel Scheme of Work Unit 4: Fractions and percentages)</i></p>	<p>14</p>	<p>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.</p>	<p>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 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</p>	
<p>4.1 Working with fractions</p>		<ul style="list-style-type: none"> 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. 	<p>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 ...</p>	<ul style="list-style-type: none"> Compare fractions. Add and subtract fractions. Use fractions to solve problems.
<p>4.2 Operations with fractions</p>		<ul style="list-style-type: none"> Convert between units of length. Add and subtract fractions. Convert between mixed numbers and improper fractions. 	<p>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</p>	<ul style="list-style-type: none"> Find a fraction of a quantity or measurement. Use fractions to solve problems.
<p>4.3 Multiplying fractions</p>		<ul style="list-style-type: none"> Find a fraction of a quantity. Know that 1000 g = 1 kg. Know the commutative rule $a \times b = b \times a$. Write 1 million pounds as a figure. 	<p>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</p>	<ul style="list-style-type: none"> Multiply whole numbers, fractions and mixed numbers. Simplify calculations by cancelling.
<p>4.4 Dividing fractions</p>		<ul style="list-style-type: none"> Divide larger numbers by smaller numbers. Convert between mixed numbers and improper fractions. Multiply a whole number or a fraction by a fraction. 	<p>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</p>	<ul style="list-style-type: none"> Divide a whole number by a fraction. Divide a fraction by a whole number or a fraction.
<p>4.5 Fractions and decimals</p>		<ul style="list-style-type: none"> 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. 	<p>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 0.375 and) 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</p>	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Write common fractions and decimals as percentages. 	<p>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)</p> <p>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</p> <p>N8 calculate exactly with fractions ...</p> <p>N10 work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and 0.375 and $\frac{3}{8}$)</p> <p>N12 interpret fractions and percentages as operators</p> <p>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</p>	<ul style="list-style-type: none"> Convert percentages to fractions and vice versa. Write one number as a percentage of another.
4.7 Calculating percentages 1	<ul style="list-style-type: none"> Find percentages of quantities. Convert a fraction to a decimal. Convert a percentage to a fraction. 	<p>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)</p> <p>N8 calculate exactly with fractions ...</p> <p>N10 work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and 0.375 and $\frac{3}{8}$)</p> <p>N12 interpret fractions and percentages as operators</p> <p>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</p>	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Calculate with percentages. Convert a percentage to a decimal. Find a percentage of a quantity. 	<p>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)</p> <p>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</p> <p>N12 interpret fractions and percentages as operators</p> <p>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</p>	<ul style="list-style-type: none"> Calculate percentage increases and decreases. Use percentages in real-life situations. Calculate VAT (value added tax).

<p>5 Equations, inequalities and sequences</p> <p><i>(Edexcel Scheme of Work Unit 5: Equations, inequalities and sequences)</i></p>	<p>14</p>	<p>Students should be able to use inequality signs between numbers.</p> <p>Students should be able to use negative numbers with the four operations, recall and use the hierarchy of operations and understand inverse operations.</p> <p>Students should be able to deal with decimals and negatives on a calculator.</p> <p>Students should be able to use index laws numerically.</p> <p>Students should be able to draw a number line.</p> <p>Students should be able to write the next terms in a sequence, and find the term to term rule.</p> <p>Students should be able to use function machines.</p> <p>Students should be able to multiply a term over brackets.</p> <p>Students should be able to substitute into and evaluate an expression.</p>	<p>N1 order positive and negative integers, decimals and fractions; use the symbols =, ≠, <, >, ≤, ≥</p> <p>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</p> <p>A2 substitute numerical values into formulae and expressions, including scientific formulae</p> <p>A3 understand and use the concepts and vocabulary of expressions, equations, formulae, identities, inequalities, terms and factors</p> <p>A5 understand and use standard mathematical formulae; rearrange formulae to change the subject</p> <p>A7 where appropriate, interpret simple expressions as functions with inputs and outputs</p> <p>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</p> <p>A21 translate simple situations or procedures into algebraic expressions or formulae; derive an equation, solve the equation and interpret the solution</p> <p>A22 solve linear inequalities in one variable; represent the solution set on a number line</p> <p>A23 generate terms of a sequence from either a term-to-term or a position-to-term rule</p> <p>A24 recognise and use sequences of triangular, square and cube numbers, simple arithmetic progressions; Fibonacci type sequences and simple geometric progressions (r where n is an integer, and r is a rational number > 0)</p> <p>A25 deduce expressions to calculate the nth term of linear sequences.</p>	
<p>5.1 Solving equations 1</p>		<ul style="list-style-type: none"> Understand the meaning of the term 'inverse operation'. Find the output of a function machine when given the input. 	<p>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</p> <p>A7 where appropriate, interpret simple expressions as functions with inputs and outputs</p> <p>A21 translate simple situations or procedures into algebraic expressions or formulae; derive an equation, solve the equation and interpret the solution</p>	<ul style="list-style-type: none"> Understand and use inverse equations. Rearrange simple linear equations. Solve simple linear equations.
<p>5.2 Solving equations 2</p>		<ul style="list-style-type: none"> Use all four operations to solve simple, single one-step equations. Work out the outputs of a function machine. Simplify expressions. 	<p>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</p> <p>A21 translate simple situations or procedures into algebraic expressions or formulae; derive an equation, solve the equation and interpret the solution</p>	<ul style="list-style-type: none"> Solve two-step equations.
<p>5.3 Solving equations with brackets</p>		<ul style="list-style-type: none"> Expand a single bracket, involving positive and negative numbers. Solve two-step equations. 	<p>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</p> <p>A21 translate simple situations or procedures into algebraic expressions or formulae; derive an equation, solve the equation and interpret the solution</p>	<ul style="list-style-type: none"> Solve linear equations with brackets. Solve equations with unknowns on both sides.
<p>5.4 Introducing inequalities</p>		<ul style="list-style-type: none"> Identify numbers that satisfy an inequality. Use the inequality signs between numbers. 	<p>A22 solve linear inequalities in one variable; represent the solution set on a number line</p>	<ul style="list-style-type: none"> 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.
<p>5.5 More inequalities</p>		<ul style="list-style-type: none"> List integer values that satisfy an inequality. 	<p>A22 solve linear inequalities in one variable; represent the solution set on a number line</p>	<ul style="list-style-type: none"> Solve two-sided inequalities.
<p>5.6 More formulae</p>		<ul style="list-style-type: none"> Identify the inverse of all four operations. Substitute into and evaluate expressions. 	<p>A2 substitute numerical values into formulae and expressions, including scientific formulae</p> <p>A3 understand and use the concepts and vocabulary of expressions, equations, formulae, identities, inequalities, terms and factors</p> <p>A5 understand and use standard mathematical formulae; rearrange formulae to change the subject</p> <p>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</p>	<ul style="list-style-type: none"> 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.
<p>5.7 Generating sequences</p>		<ul style="list-style-type: none"> Find the missing numbers in simple arithmetic sequences. Write down missing terms in sequences. Find the term-to-term rule. 	<p>A23 generate terms of a sequence from either a term-to-term or a position-to-term rule</p> <p>A24 recognise and use sequences of triangular, square and cube numbers, simple arithmetic progressions; Fibonacci type sequences and simple geometric progressions (m where n is an integer, and r is a rational number > 0)</p>	<ul style="list-style-type: none"> Recognise and extend sequences.
<p>5.8 Using the nth term of a sequence</p>		<ul style="list-style-type: none"> Substitute into a simple expression. Solve simple equations. 	<p>A23 generate terms of a sequence from either a term-to-term or a position-to-term rule</p> <p>A24 recognise and use sequences of triangular, square and cube numbers, simple arithmetic progressions; Fibonacci type sequences and simple geometric progressions (m where n is an integer, and r is a rational number > 0)</p> <p>A25 deduce expressions to calculate the nth term of linear sequences.</p>	<ul style="list-style-type: none"> Use the nth term to generate terms of a sequence. Find the nth term of an arithmetic sequence.
<p>End of term test</p>				

S u m m e r t e r m	6 Angles <i>(Edexcel Scheme of Work Unit 5: Angles, polygons and parallel lines)</i>	12	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 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) 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		<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Solve geometric problems using side and angle properties of quadrilaterals. Identify congruent shapes.
	6.2 Angles in parallel lines		<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Understand and use the angle properties of parallel lines. Find missing angles using corresponding and alternate angles.
	6.3 Angles in triangles		<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Solve angle problems in triangles. Understand angle proofs about triangles.
	6.4 Exterior and interior angles		<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> Calculate the interior and exterior angles of regular polygons.
	6.5 More exterior and interior angles		<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> Calculate the interior and exterior angles of polygons. Explain why some polygons fit together and some others do not
	6.6 Geometrical patterns		<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Solve angle problems using equations. Solve geometrical problems showing reasoning.

7 Averages and range <i>(Edexcel Scheme of Work Unit 5: Averages and range, sampling, collecting data, analysing data)</i>	11	<p>Students should be able to calculate the midpoint of two numbers.</p> <p>Students will have drawn the statistical diagrams in unit 3.</p> <p>Students will have used inequality notation.</p> <p>Students should be able to calculate the mode, median and the range.</p>	<p>S1 infer properties of populations or distributions from a sample, while knowing the limitations of sampling</p> <p>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</p> <p>S4 interpret, analyse and compare the distributions of data sets from univariate empirical distributions through: ...</p> <ul style="list-style-type: none"> * 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) <p>S5 apply statistics to describe a population</p>	
7.1 Mean and range		<ul style="list-style-type: none"> • Understand that sharing equally involves dividing a total. • Identify the mode. 	<p>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</p> <p>S4 interpret, analyse and compare the distributions of data sets from univariate empirical distributions through: ...</p> <ul style="list-style-type: none"> * 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) <p>S5 apply statistics to describe a population</p>	<ul style="list-style-type: none"> • 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		<ul style="list-style-type: none"> • Identify the mode, median and range. • Identify an incorrect value. • Draw a stem and leaf diagram. • Understand inequality notation. 	<p>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</p> <p>S4 interpret, analyse and compare the distributions of data sets from univariate empirical distributions through: ...</p> <ul style="list-style-type: none"> * 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) 	<ul style="list-style-type: none"> • 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		<ul style="list-style-type: none"> • Find the mode, median and mean. 	<p>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</p> <p>S4 interpret, analyse and compare the distributions of data sets from univariate empirical distributions through: ...</p> <ul style="list-style-type: none"> * 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) 	<ul style="list-style-type: none"> • 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		<ul style="list-style-type: none"> • Calculate the value halfway between pairs of numbers. • Calculate the mean. • Read data from a frequency table. 	<p>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</p> <p>S4 interpret, analyse and compare the distributions of data sets from univariate empirical distributions through: ...</p> <ul style="list-style-type: none"> * 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) 	<ul style="list-style-type: none"> • Estimate the mean of grouped data.
7.5 Sampling		<ul style="list-style-type: none"> • Understand the use of random numbers in a real-life situation. 	<p>S1 infer properties of populations or distributions from a sample, while knowing the limitations of sampling</p>	<ul style="list-style-type: none"> • Understand the need for sampling. • Understand how to avoid bias.

<p>8 Perimeter, area and volume 1</p> <p><i>(Edexcel Scheme of Work Unit 8: Perimeter, area and volume 1)</i></p>	<p>12</p>	<p>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.</p>	<p><i>N13 use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate</i> <i>N14 estimate answers; check calculations using approximation and estimation, including answers obtained using technology</i> <i>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</i> <i>G12 identify properties of the faces, surfaces, edges and vertices of: cubes, cuboids, prisms, cylinders, pyramids, cones and spheres</i> <i>G14 use standard units of measure and related concepts (length, area, volume/capacity, mass, time, money, etc.)</i> <i>G16 know and apply formulae to calculate: area of triangles, parallelograms, trapezia; volume of cuboids and other right prisms (including cylinders)</i> <i>G17 ... calculate: perimeters of 2D shapes, including ... composite shapes</i> <i>R1 change freely between related standard units (e.g. time, length, area, volume/capacity, mass) ...</i></p>	
<p>8.1 Rectangles, parallelograms and triangles</p>		<ul style="list-style-type: none"> Understand the meaning of 'perpendicular'. Work out the perimeter and area of triangles and rectangles. 	<p><i>N14 estimate answers; check calculations using approximation and estimation, including answers obtained using technology</i> <i>G14 use standard units of measure and related concepts (length, area, volume/capacity, mass, time, money, etc.)</i> <i>G16 know and apply formulae to calculate: area of triangles, parallelograms, trapezia; volume of cuboids and other right prisms (including cylinders)</i> <i>G17 ... calculate: perimeters of 2D shapes, including ... composite shapes</i></p>	<ul style="list-style-type: none"> Calculate the perimeter and area of rectangles, parallelograms and triangles. Estimate lengths, areas and costs. Calculate a missing length, given the area.
<p>8.2 Trapezia and changing units</p>		<ul style="list-style-type: none"> Multiplying and dividing by powers of 10, converting between millimetres, centimetres and metres. 	<p><i>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</i> <i>G16 know and apply formulae to calculate: area of triangles, parallelograms, trapezia; volume of cuboids and other right prisms (including cylinders)</i></p>	<ul style="list-style-type: none"> Calculate the area and perimeter of trapezia. Find the height of a trapezium given its area. Convert between area measures.
<p>8.3 Area of compound shapes</p>		<ul style="list-style-type: none"> Know that 1 km = 1000 m Multiply and divide by powers of 10. Convert between metric measures of area. 	<p><i>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</i> <i>G16 know and apply formulae to calculate: area of triangles, parallelograms, trapezia; volume of cuboids and other right prisms (including cylinders)</i> <i>G17 ... calculate: perimeters of 2D shapes, including ... composite shapes</i></p>	<ul style="list-style-type: none"> Calculate the perimeter and area of shapes made from triangles and rectangles. Calculate areas in hectares, and convert between ha and m².
<p>8.4 Surface area of 3D solids</p>		<ul style="list-style-type: none"> 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. 	<p><i>G16 know and apply formulae to calculate: area of triangles, parallelograms, trapezia; volume of cuboids and other right prisms (including cylinders)</i> <i>G17 ... calculate: perimeters of 2D shapes, including ... composite shapes</i></p>	<ul style="list-style-type: none"> Calculate the surface area of a cuboid. Calculate the surface area of a prism.
<p>8.5 Volume of prisms</p>		<ul style="list-style-type: none"> Identify cross sections of prisms. Decide whether a 3D solid is a prism. 	<p><i>G16 know and apply formulae to calculate: area of triangles, parallelograms, trapezia; volume of cuboids and other right prisms (including cylinders)</i></p>	<ul style="list-style-type: none"> Calculate the volume of a cuboid. Calculate the volume of a prism.
<p>8.6 More volume and surface area</p>		<ul style="list-style-type: none"> Multiply and divide by large powers of 10. Know that 1 litre = 1000 ml. Work out the volume and surface area of a prism. 	<p><i>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</i> <i>G16 know and apply formulae to calculate: area of triangles, parallelograms, trapezia; volume of cuboids and other right prisms (including cylinders)</i> <i>G17 ... calculate: perimeters of 2D shapes, including ... composite shapes</i></p>	<ul style="list-style-type: none"> Solve problems involving surface area and volume. Convert between measures of volume.
<p>End of year test</p>				

Foundation Year 4 Scheme of Work					
Term	Unit/section title	Teaching hours	Prior knowledge	GCSE (9-1) Specification reference	Unit objectives
Autumn	9 Graphs <i>(Edexcel Scheme of Work Unit 9: Real-life and algebraic linear graphs)</i>	13	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; 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 ... 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 ... 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.)	
	9.1 Coordinates		<ul style="list-style-type: none"> Halve a number. Substitute into an equation, and solve for an unknown. 	A8 work with coordinates in all four quadrants	<ul style="list-style-type: none"> Find the midpoint of a line segment. Recognise, name and plot straight-line graphs parallel to the axes. Recognise, name and plot the graphs of $y = x$ and $y = -x$.
	9.2 Linear graphs		<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Generate and plot coordinates from a rule. Plot straight-line graphs from tables of values. Draw graphs to represent relationships.
	9.3 Gradient		<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Find the gradient of a line. Identify and interpret the gradient from an equation. Understand that parallel lines have the same gradient.
	9.4 $y = mx + c$		<ul style="list-style-type: none"> 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 ...	<ul style="list-style-type: none"> 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		<ul style="list-style-type: none"> 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.)	<ul style="list-style-type: none"> Draw and interpret graphs from real data.
	9.6 Distance-time graphs		<ul style="list-style-type: none"> 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.)	<ul style="list-style-type: none"> Use distance–time graphs to solve problems. Draw distance–time graphs. Interpret rate of change graphs.
	9.7 More real-life graphs		<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Draw and interpret a range of graphs. Understand when predictions are reliable.

10 Transformations <i>(Edexcel Scheme of Work Unit 10: Transformations)</i>	12	<p>Students should recall basic shapes.</p> <p>Students should be able to plot points in all four quadrants.</p> <p>Students should have an understanding of the concept of rotation.</p> <p>Students should be able to reflect a shape in a mirror line.</p> <p>Students should be able to translate a shape on a squared grid using instructions such as left/right and up/down.</p> <p>Students should be able to draw and recognise lines parallel to axes and $y = x$, $y = -x$.</p>	<p>R6 express a multiplicative relationship between two quantities as a ratio or a fraction</p> <p><i>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; ...</i></p> <p>G7 identify, describe and construct congruent and similar shapes, including on coordinate axes, by considering rotation, reflection, translation and enlargement (including fractional scale factors)</p> <p>G24 describe translations as 2D vectors</p>	
10.1 Translation		<ul style="list-style-type: none"> Use the words left and right List the four types of transformations Describe translations using left/right and up/down 	<p>G7 identify, describe and construct congruent and similar shapes, including on coordinate axes, by considering rotation, reflection, translation and enlargement (including fractional scale factors)</p> <p>G24 describe translations as 2D vectors</p>	<ul style="list-style-type: none"> Translate a shape on a coordinate grid. Use a column vector to describe a translation.
10.2 Reflection		<ul style="list-style-type: none"> Define the word perpendicular Reflect a shape in a mirror line. 	<p>G7 identify, describe and construct congruent and similar shapes, including on coordinate axes, by considering rotation, reflection, translation and enlargement (including fractional scale factors)</p>	<ul style="list-style-type: none"> 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		<ul style="list-style-type: none"> Know the number of degrees in fractions of a turn. Use the words clockwise and anticlockwise. 	<p>G7 identify, describe and construct congruent and similar shapes, including on coordinate axes, by considering rotation, reflection, translation and enlargement (including fractional scale factors)</p>	<ul style="list-style-type: none"> Rotate a shape on a coordinate grid. Describe a rotation.
10.4 Enlargement		<ul style="list-style-type: none"> Find scale factor from object to image and from image to object. 	<p>G7 identify, describe and construct congruent and similar shapes, including on coordinate axes, by considering rotation, reflection, translation and enlargement (including fractional scale factors)</p>	<ul style="list-style-type: none"> Enlarge a shape by a scale factor. Enlarge a shape using a centre of enlargement.
10.5 Describing enlargements		<ul style="list-style-type: none"> Recognise the properties of enlargements. Simplify fractions. 	<p>R6 express a multiplicative relationship between two quantities as a ratio or a fraction</p> <p>G7 identify, describe and construct congruent and similar shapes, including on coordinate axes, by considering rotation, reflection, translation and enlargement (including fractional scale factors)</p>	<ul style="list-style-type: none"> Identify the scale factor of an enlargement. Find the centre of enlargement. Describe an enlargement.
10.6 Combining transformations		<ul style="list-style-type: none"> State key information for describing transformations. Identify the type of transformation used. 	<p>G7 identify, describe and construct congruent and similar shapes, including on coordinate axes, by considering rotation, reflection, translation and enlargement (including fractional scale factors)</p> <p>G24 describe translations as 2D vectors</p>	<ul style="list-style-type: none"> Transform shapes using more than one transformation. Describe combined transformations of shapes on a grid.

11 Ratio and proportion <i>(Edexcel Scheme of Work Unit 11: Ratio and Proportion)</i>	13	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		<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Use ratio notation. • Write a ratio in its simplest form. • Solve problems using ratios.
11.2 Using ratios 1		<ul style="list-style-type: none"> • 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)	<ul style="list-style-type: none"> • Solve simple problems using ratios.
11.3 Ratios and measures		<ul style="list-style-type: none"> • Convert units of weight, length, capacity and time. • Use index notation. • Work out areas of rectangles 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)	<ul style="list-style-type: none"> • Use ratios to convert between units. • Write and use ratios for shapes and their enlargements.
11.4 Using ratios 2		<ul style="list-style-type: none"> • 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)	<ul style="list-style-type: none"> • 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		<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Use ratios involving decimals. • Compare ratios. • Solve ratio and proportion problems.
11.6 Using proportion		<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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		<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Recognise and use direct proportion on a graph. • Understand the link between the unit ratio and the gradient.
11.8 Proportion problems		<ul style="list-style-type: none"> • Relate common sense to real life problems. 	R10 solve problems involving direct and inverse proportion, including graphical and algebraic representations	<ul style="list-style-type: none"> • Recognise different types of proportion. • Solve word problems involving direct and inverse proportion.
End of term test				

<p>12 Right-angled triangles <i>(Edexcel Scheme of Work Unit 12: Right-angled triangles; Pythagoras and trigonometry)</i></p>	<p>13</p>	<p>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.</p>	<p>R12 compare lengths, areas and volumes using ratio notation; make links to similarity (including trigonometric ratios) and scale factors 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 ... 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 $\theta = 0^\circ, 30^\circ, 45^\circ, 60^\circ$ and 90°; know the exact value of tan θ for $\theta = 0^\circ, 30^\circ, 45^\circ$ and 60°</p>	
<p>12.1 Pythagoras' theorem 1</p>		<ul style="list-style-type: none"> Calculate of simple squares and square roots. Substitute into and evaluate expressions. Round answers to a specified degree of accuracy. 	<p>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 ...</p>	<ul style="list-style-type: none"> Understand Pythagoras' theorem. Calculate the length of the hypotenuse in a right-angled triangle. Solve problems using Pythagoras' theorem.
<p>12.2 Pythagoras' theorem 2</p>		<ul style="list-style-type: none"> Understand the meaning of \neq. Interpret a surd expression shown on the calculator display. Identify the hypotenuse, and calculate its length. 	<p>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</p>	<ul style="list-style-type: none"> Calculate the length of a line segment AB. Calculate the length of a shorter side in a right-angled triangle.
<p>12.3 Trigonometry: the sine ratio 1</p>		<ul style="list-style-type: none"> Simplify fractions. Convert fractions to decimals using a calculator. 	<p>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</p>	<ul style="list-style-type: none"> 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.
<p>12.4 Trigonometry: the sine ratio 2</p>		<ul style="list-style-type: none"> Calculate the sine of an angle in a right-angled triangle. Use the sin key on a calculator. 	<p>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</p>	<ul style="list-style-type: none"> Use the sine ratio to calculate an angle in a right-angled triangle. Use the sine ratio to solve problems.
<p>12.5 Trigonometry: the cosine ratio</p>		<ul style="list-style-type: none"> Identify the hypotenuse and adjacent side in a right-angled triangle. 	<p>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</p>	<ul style="list-style-type: none"> 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.
<p>12.6 Trigonometry: the tangent ratio</p>		<ul style="list-style-type: none"> Identify the opposite and adjacent sides in right-angled triangles. 	<p>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</p>	<ul style="list-style-type: none"> 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.
<p>12.7 Finding lengths and angles using trigonometry</p>		<ul style="list-style-type: none"> Identify the sine, cosine and tangent ratios. 	<p>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 $\theta = 0^\circ, 30^\circ, 45^\circ, 60^\circ$ and 90°; know the exact value of tan θ for $\theta = 0^\circ, 30^\circ, 45^\circ$ and 60°</p>	<ul style="list-style-type: none"> 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.

<p>13 Probability (Edexcel Scheme of Work Unit 13: Probability)</p>	<p>11</p>	<p>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.</p>	<p>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</p>	
<p>13.1 Calculating probability</p>		<ul style="list-style-type: none"> Write probability as a fraction, a decimal and a percentage. Add and subtract fractions. 	<p>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</p>	<ul style="list-style-type: none"> Calculate simple probabilities from equally likely events. Understand mutually exclusive and exhaustive outcomes.
<p>13.2 Two events</p>		<ul style="list-style-type: none"> List outcomes. Simplify fractions. 	<p>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</p>	<ul style="list-style-type: none"> Use two-way tables to record the outcomes from two events. Work out probabilities from sample space diagrams.
<p>13.3 Experimental probability</p>		<ul style="list-style-type: none"> Convert fractions, decimals and percentages. Compare fractions. Understand theoretical probability (single event). Use two-way tables. 	<p>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</p>	<ul style="list-style-type: none"> Find and interpret probabilities based on experimental data. Make predictions from experimental data.
<p>13.4 Venn diagrams</p>		<ul style="list-style-type: none"> Add and subtracting equivalent fractions. List primes and multiples. Calculate probabilities. 	<p>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</p>	<ul style="list-style-type: none"> Use Venn diagrams to work out probabilities. Understand the language of sets and Venn diagrams.
<p>13.5 Tree diagrams</p>		<ul style="list-style-type: none"> Calculate with fractions. List the possible outcomes for two events. Work out the probability of something not happening. Calculate probabilities. 	<p>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</p>	<ul style="list-style-type: none"> Use frequency trees and tree diagrams. Work out probabilities using tree diagrams. Understand independent events.
<p>13.6 More tree diagrams</p>		<ul style="list-style-type: none"> Calculate with and simplify fractions. Work out probabilities using tree diagrams. 	<p>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</p>	<ul style="list-style-type: none"> Understand when events are not independent. Solve probability problems involving events that are not independent.

<p>14 Multiplicative reasoning <i>(Edexcel Scheme of Work Unit 14: Multiplicative reasoning: more percentages, rates of change, compound measures)</i></p>	<p>11</p>	<p>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.</p>	<p>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)</p>	
<p>14.1 Percentages</p>		<ul style="list-style-type: none"> Convert percentages to decimals. Express one number as a percentage of another. Work out percentage increases and decreases. 	<p>R9 ... express one quantity as a percentage of another; ... solve problems involving percentage change, ... and original value problems ... including in financial mathematics</p>	<ul style="list-style-type: none"> 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
<p>14.2 Growth and decay</p>		<ul style="list-style-type: none"> Write powers of numbers in index form. Relate percentages to decimals. 	<p>R16 set up, solve and interpret the answers in growth and decay problems, including compound interest</p>	<ul style="list-style-type: none"> Find an amount after repeated percentage change. Solve growth and decay problems.
<p>14.3 Compound measures</p>		<ul style="list-style-type: none"> 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. 	<p>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)</p>	<ul style="list-style-type: none"> Solve problems involving compound measures.
<p>14.4 Distance, speed and time</p>		<ul style="list-style-type: none"> Find speed in km/h, given distance travelled in minutes. Convert between metric units of length. 	<p>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)</p>	<ul style="list-style-type: none"> Convert between metric speed measures. Calculate average speed, distance and time. Use formulae to calculate speed and acceleration.
<p>14.5 Direct and inverse proportion</p>		<ul style="list-style-type: none"> Identify graphs showing direct proportion. Write a ratio as a unit ratio. 	<p>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</p>	<ul style="list-style-type: none"> Use ratio and proportion in measures and conversions. Use inverse proportions.
<p>End of term test</p>				

S u m m e r t e r m	15 Constructions, loci and bearings <i>(Edexcel Scheme of Work Unit 15: Constructions: triangles, nets, plan and elevation, loci, scale drawings and bearings)</i>	13	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		<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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		<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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		<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> 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		<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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
	15.5 Accurate drawings 2		<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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		<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Draw accurately using rulers and compasses. Bisect angles and lines using rulers and compasses.
	15.7 Loci and regions		<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Draw loci for the path of points that follow a given rule. Identify regions bounded by loci to solve practical problems.
	15.8 Bearings		<ul style="list-style-type: none"> 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 corresponding 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	<ul style="list-style-type: none"> Find and use three-figure bearings. Use angles at parallel lines to work out bearings. Solve problems involving bearings and scale diagrams.

<p>16 Quadratic equations and graphs</p> <p><i>(Edexcel Scheme of Work Unit 16: Algebra: quadratic equations and graphs)</i></p>	<p>11</p>	<p>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.</p>	<p>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 $a \times b$ - 3y in place of $y + y + y$ and $3 \times y$ - a^2 in place of $a \times a$, a^3 in place of $a \times a \times a$, a^2b in place of $a \times a \times b$ - a/b in place of $a \div b$ - 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 return 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</p>	
<p>16.1 Expanding double brackets</p>		<ul style="list-style-type: none"> Be able to work out area of a shape using algebraic terms. Simplify algebraic expressions. Multiply a single term over brackets. 	<p>A1 use and interpret algebraic manipulation, including: - ab in place of $a \times b$ - 3y in place of $y + y + y$ and $3 \times y$ - a^2 in place of $a \times a$, a^3 in place of $a \times a \times a$, a^2b in place of $a \times a \times b$ - a/b in place of $a \div b$ - coefficients written as fractions rather than as decimals - brackets A4 simplify and manipulate algebraic expressions by: ... expanding products of two binomials; factorising return to overview expressions of the form $x^2 + bx + c$, including the difference of two squares; ...</p>	<ul style="list-style-type: none"> Multiply double brackets. Recognise quadratic expressions. Square single brackets.
<p>16.2 Plotting quadratic graphs</p>		<ul style="list-style-type: none"> 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. 	<p>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; ...</p>	<ul style="list-style-type: none"> Plot graphs of quadratic functions. Recognise a quadratic function. Use quadratic graphs to solve problems.
<p>16.3 Using quadratic graphs</p>		<ul style="list-style-type: none"> Define the origin and x-axis on a graph. Copy and complete a table of values and plot a quadratic graph. 	<p>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</p>	<ul style="list-style-type: none"> Solve quadratic equations $ax^2 + bx + c = 0$ using a graph. Solve quadratic equations $ax^2 + bx + c = k$ Using a graph.
<p>16.4 Factorising quadratic expressions</p>		<ul style="list-style-type: none"> Work out factor pairs of negative numbers Multiply double brackets. 	<p>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 $a \times b$ - 3y in place of $y + y + y$ and $3 \times y$ - a^2 in place of $a \times a$, a^3 in place of $a \times a \times a$, a^2b in place of $a \times a \times b$ - a/b in place of $a \div b$ - 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 return to overview expressions of the form $x^2 + bx + c$, including the difference of two squares; ...</p>	<ul style="list-style-type: none"> Factorise quadratic expressions.
<p>16.5 Solving quadratic equations algebraically</p>		<ul style="list-style-type: none"> Know that taking the square root of a number will result in both a positive and a negative answer. Factorise quadratic expressions. 	<p>A1 use and interpret algebraic manipulation, including: - ab in place of $a \times b$ - 3y in place of $y + y + y$ and $3 \times y$ - a^2 in place of $a \times a$, a^3 in place of $a \times a \times a$, a^2b in place of $a \times a \times b$ - a/b in place of $a \div b$ - 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 return 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</p>	<ul style="list-style-type: none"> Solve quadratic functions algebraically.

<p>17 Perimeter, area and volume 2</p> <p><i>(Edexcel Scheme of Work Unit 17: Perimeter, area and volume 2: circles, cylinders, cones and spheres)</i></p>	<p>12</p>	<p>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.</p>	<p>N8 calculate exactly with multiples of π</p> <p>N14 estimate answers; check calculations using approximation and estimation, including answers obtained using technology</p> <p>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</p> <p>N16 apply and interpret limits of accuracy</p> <p>G9 identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment</p> <p>G14 use standard units of measure and related concepts (length, area, volume/capacity, mass, time, money, etc.)</p> <p>G16 know and apply formulae to calculate: area of triangles, parallelograms, trapezia; volume of cuboids and other right prisms (including cylinders)</p> <p>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</p> <p>G18 calculate arc lengths, angles and areas of sectors of circles</p>	
<p>17.1 Circumference of a circle 1</p>		<ul style="list-style-type: none"> Round accurately to a given number of significant figures or decimal place. Rearrange equations. 	<p>G9 identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment</p> <p>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</p>	<ul style="list-style-type: none"> Calculate the circumference of a circle. Solve problems involving the circumference of a circle.
<p>17.2 Circumference of a circle 2</p>		<ul style="list-style-type: none"> Round to nearest metre. Solve equations. Understand inequality notation. Rearrange equations. 	<p>N8 calculate exactly with multiples of π</p> <p>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</p> <p>N16 apply and interpret limits of accuracy</p> <p>G9 identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment</p> <p>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</p>	<ul style="list-style-type: none"> Calculate the circumference and radius of a circle. Work out percentage error intervals.
<p>17.3 Area of a circle</p>		<ul style="list-style-type: none"> Evaluate squares and square roots. Substitute into formulae and solve for the unknown. 	<p>N8 calculate exactly with multiples of π</p> <p>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</p> <p>N16 apply and interpret limits of accuracy</p> <p>G9 identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment</p> <p>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</p>	<ul style="list-style-type: none"> 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.
<p>17.4 Semicircles and sectors</p>		<ul style="list-style-type: none"> Know number of degrees in a full turn, half turn or quarter turn. Simplify fractions. Find the area and circumference of a circle. 	<p>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</p> <p>G9 identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment</p> <p>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</p> <p>G18 calculate arc lengths, angles and areas of sectors of circles</p>	<ul style="list-style-type: none"> 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.
<p>17.5 Composite 2D shapes and cylinders</p>		<ul style="list-style-type: none"> 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. 	<p>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</p> <p>G9 identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment</p> <p>G14 use standard units of measure and related concepts (length, area, volume/capacity, mass, time, money, etc.)</p> <p>G16 know and apply formulae to calculate: area of triangles, parallelograms, trapezia; volume of cuboids and other right prisms (including cylinders)</p> <p>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</p> <p>G18 calculate arc lengths, angles and areas of sectors of circles</p>	<ul style="list-style-type: none"> Solve problems involving areas and perimeters of 2D shapes. Work out the volume and surface area of cylinders.
<p>17.6 Pyramids and cones</p>		<ul style="list-style-type: none"> Understand and use maths language for 3-D shapes. Work out the area of 2D shapes. Give answers in terms of π. 	<p>N14 estimate answers; check calculations using approximation and estimation, including answers obtained using technology</p> <p>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</p>	<ul style="list-style-type: none"> 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.
<p>17.7 Spheres and composite solids</p>		<ul style="list-style-type: none"> Know volume and surface area formulae. Work out the length of the hypotenuse using Pythagoras' theorem. 	<p>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</p>	<ul style="list-style-type: none"> 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.
<p>End of year test</p>				

Foundation Year 5 Scheme of Work

Term	Unit/section title	Teaching hours	Prior knowledge	GCSE (9-1) Specification reference	Unit objectives
Autumn	18 Fractions, indices and standard form <i>(Edexcel Scheme of Work Unit 18: More fractions, reciprocals, standard form, zero and negative indices)</i>	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. $10^3 = 1000$. 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 $A \times 10^n$, where $1 \leq A < 10$ and n is an integer.	
	18.1 Multiplying and dividing fractions		<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Multiply and divide mixed numbers and fractions.
	18.2 The laws of indices		<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> To know and use the laws of indices.
	18.3 Writing large numbers in standard form		<ul style="list-style-type: none"> Evaluate powers of 10. Write 1 million and 1 billion in figures. 	N9 calculate with and interpret standard form $A \times 10^n$, where $1 \leq A < 10$ and n is an integer.	<ul style="list-style-type: none"> Write large numbers in standard form. Convert large numbers from standard form into ordinary numbers.
	18.4 Writing small numbers in standard form		<ul style="list-style-type: none"> Divide integers and decimals by powers of ten. 	N9 calculate with and interpret standard form $A \times 10^n$, where $1 \leq A < 10$ and n is an integer.	<ul style="list-style-type: none"> Write small numbers in standard form. Convert numbers from standard form with negative powers of ordinary numbers
	18.5 Calculating with standard form		<ul style="list-style-type: none"> Use correct priority of operations. Write numbers in standard form. 	N9 calculate with and interpret standard form $A \times 10^n$, where $1 \leq A < 10$ and n is an integer.	<ul style="list-style-type: none"> To multiply and divide numbers in standard form. To add and subtract numbers in standard form.

<p>19 Congruence, similarity and vectors</p> <p><i>(Edexcel Scheme of Work Unit 19: Congruence, similarity and vectors)</i></p>	<p>12</p>	<p>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.</p>	<p>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 = $2\pi r = \pi d$, 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 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</p>	
<p>19.1 Similarity and enlargement</p>		<ul style="list-style-type: none"> Understand the scale factor of an enlargement. Equivalent fractions. 	<p>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)</p>	<ul style="list-style-type: none"> Understand similarity. Use similarity to solve angle problems.
<p>19.2 More similarity</p>		<ul style="list-style-type: none"> Calculating fractions of whole numbers. Using similarity of triangles to identify equal angles and lengths of corresponding sides. Identify similar shapes. 	<p>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</p>	<ul style="list-style-type: none"> Find the scale factor of an enlargement. Use similarity to solve problems.
<p>19.3 Using similarity</p>		<ul style="list-style-type: none"> Understand squares and cubes of whole numbers and decimals. Use similarity to find unknown lengths. 	<p>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 = $2\pi r = \pi d$, 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 G19 apply the concepts of congruence and similarity, including the relationships between lengths in similar figures</p>	<ul style="list-style-type: none"> Understand the similarity of regular polygons. Calculate perimeters of similar shapes.
<p>19.4 Congruence 1</p>		<ul style="list-style-type: none"> Know that the sum of the angles in a triangle must be 180°. Identify congruent shapes. 	<p>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</p>	<ul style="list-style-type: none"> Recognise congruent shapes. Use congruence to work out unknown angles.
<p>19.5 Congruence 2</p>		<ul style="list-style-type: none"> Recognise corresponding and alternate angles. Find angles using corresponding and alternate angles. Draw triangles accurately. 	<p>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</p>	<ul style="list-style-type: none"> Use congruence to work out unknown sides.
<p>19.6 Vectors 1</p>		<ul style="list-style-type: none"> Add and subtract with negative numbers. Use column vectors. 	<p>G25 apply addition and subtraction of vectors, multiplication by vectors by a scalar, and diagrammatic and column representations of vectors</p>	<ul style="list-style-type: none"> Add and subtract vectors. Find the resultant of two vectors.
<p>19.7 Vectors 2</p>		<ul style="list-style-type: none"> Calculate with negative numbers. Find the resultant of two vectors. 	<p>G25 apply addition and subtraction of vectors, multiplication by vectors by a scalar, and diagrammatic and column representations of vectors</p>	<ul style="list-style-type: none"> Subtract vectors. Find multiples of a vector.

<p>20 More algebra</p> <p><i>(Edexcel Scheme of Work Unit 20: Rearranging equations, graphs of cubic and reciprocal functions and simultaneous equations)</i></p>	12	<p>Students should be able to draw linear graphs.</p> <p>Students should be able to plot coordinates and sketch simple functions with a table of values.</p> <p>Students should be able to substitute into and solve equations.</p> <p>Students should have experience of using formulae.</p> <p>Students should recall and use the priority of operations and use of inequality symbols.</p>	<p>A2 substitute numerical values into formulae and expressions, including scientific formulae</p> <p>A3 understand and use the concepts and vocabulary of expressions, equations, formulae, identities, inequalities, terms and factors</p> <p>A5 understand and use standard mathematical formulae; rearrange formulae to change the subject</p> <p>A6 ... argue mathematically to show algebraic expressions are equivalent, and use algebra to support and construct arguments</p> <p>A12 recognise, sketch and interpret graphs of ... the reciprocal function $y = 1/x$ with $x \neq 0$</p> <p>A14 plot and interpret ... reciprocal graphs ...</p> <p>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</p> <p>A19 solve two simultaneous equations in two variables (linear/linear) algebraically; find approximate solutions using a graph</p> <p>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.</p> <p>R10 solve problems involving direct and inverse proportion, including graphical and algebraic representations</p> <p>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</p> <p>R14 ... recognise and interpret graphs that illustrate direct and inverse proportion</p> <p>R16 set up, solve and interpret the answers in growth and decay problems, including compound interest</p>	
<p>20.1 Graphs of cubic and reciprocal functions</p>		<ul style="list-style-type: none"> 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 $x \neq 0$	<ul style="list-style-type: none"> Draw and interpret graphs of cubic functions. Draw and interpret graphs of $y = 1/x$.
<p>20.2 Non-linear graphs</p>		<ul style="list-style-type: none"> Recognise statements and equations describing direct and indirect proportion. Recognise the graphs of $y = x$ and $y = 1/x$. 	<p>A14 plot and interpret ... reciprocal graphs ...</p> <p>R10 solve problems involving direct and inverse proportion, including graphical and algebraic representations</p> <p>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</p> <p>R14 ... recognise and interpret graphs that illustrate direct and inverse proportion</p> <p>R16 set up, solve and interpret the answers in growth and decay problems, including compound interest</p>	<ul style="list-style-type: none"> Draw and interpret non-linear graphs to solve problems.
<p>20.3 Solving simultaneous equations graphically</p>		<ul style="list-style-type: none"> Write algebraic expressions. 	<p>A19 solve two simultaneous equations in two variables (linear/linear) algebraically; find approximate solutions using a graph</p> <p>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.</p>	<ul style="list-style-type: none"> Solve simultaneous equations by drawing a graph. Write and solve simultaneous equations.
<p>20.4 Solving simultaneous equations algebraically</p>		<ul style="list-style-type: none"> Add and subtract positive and negative terms, substitute integer and decimal values into a simple expression. 	<p>A19 solve two simultaneous equations in two variables (linear/linear) algebraically; find approximate solutions using a graph</p> <p>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.</p>	<ul style="list-style-type: none"> Solve simultaneous equations algebraically.
<p>20.5 Rearranging formulae</p>		<ul style="list-style-type: none"> Identify inverse operations for algebraic terms. Identify parallel lines from the equations of the lines. 	<p>A2 substitute numerical values into formulae and expressions, including scientific formulae</p> <p>A5 understand and use standard mathematical formulae; rearrange formulae to change the subject</p> <p>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</p>	<ul style="list-style-type: none"> Change the subject of a formula.
<p>20.6 Proof</p>		<ul style="list-style-type: none"> Identify expressions, formulae and equations from a list. 	<p>A6 ... argue mathematically to show algebraic expressions are equivalent, and use algebra to support and construct arguments</p>	<ul style="list-style-type: none"> Identify expressions, equations, formulae and identities. Prove results using algebra.
End of term test				