OCR Maths A (Modular) specification mapping (Higher tier is in italics)

Specification Point — Boardworks presentation(s)

All units

Solve problems using mathematical skills	
Candidates should be able to:	
a. select and use suitable problem solving strategies and efficient techniques to solve numerical problems;	Statistics and Probability 1; Statistics and Probability 2; Number and Algebra 1; Number and Algebra 2; Number and Algebra 3; Number and Algebra 4; Geometry and Measures 1; Geometry and Measures 2; Geometry and Measures 3; Geometry and Measures 4
b. identify what further information may be required in order to pursue a particular line of enquiry and give reasons for following or rejecting particular approaches;	Statistics and Probability 1; Statistics and Probability 2; Number and Algebra 1; Number and Algebra 2; Number and Algebra 3; Number and Algebra 4; Geometry and Measures 1; Geometry and Measures 2; Geometry and Measures 3; Geometry and Measures 4
c. break down a complex calculation into simpler steps before attempting to solve it and justify their choice of methods;	Statistics and Probability 1; Statistics and Probability 2; Number and Algebra 1; Number and Algebra 2; Number and Algebra 3; Number and Algebra 4; Geometry and Measures 1; Geometry and Measures 2; Geometry and Measures 3; Geometry and Measures 4
d. use notation and symbols correctly and consistently within a problem;	Statistics and Probability 1; Statistics and Probability 2; Number and Algebra 1; Number and Algebra 2; Number and Algebra 3; Number and Algebra 4; Geometry and Measures 1; Geometry and Measures 2; Geometry and Measures 3; Geometry and Measures 4
e. use a range of strategies to create numerical representations of a problem and its solution; move from one form of representation to another in order to get different perspectives on the problem;	Statistics and Probability 1; Statistics and Probability 2; Number and Algebra 1; Number and Algebra 2; Number and Algebra 3; Number and Algebra 4; Geometry and Measures 1; Geometry and Measures 2; Geometry and Measures 3; Geometry and Measures 4
f. interpret and discuss numerical information presented in a variety of forms;	Statistics and Probability 1; Statistics and Probability 2; Number and Algebra 1; Number and Algebra 2; Number and Algebra 3; Number and Algebra 4; Geometry and Measures 1; Geometry and Measures 2; Geometry and Measures 3; Geometry and Measures 4
g. present and interpret solutions in the context of the original problem;	Statistics and Probability 1; Statistics and Probability 2; Number and Algebra 1; Number and Algebra 2; Number and Algebra 3; Number and Algebra 4; Geometry and Measures 1; Geometry and Measures 2; Geometry and Measures 3; Geometry and Measures 4

h. review and justify their choice of mathematical presentation;	Statistics and Probability 1; Statistics and Probability 2; Number and Algebra 1; Number and Algebra 2; Number and Algebra 3; Number and Algebra 4; Geometry and Measures 1; Geometry and Measures 2; Geometry and Measures 3; Geometry and Measures 4
i. understand the importance of counter-example and identify exceptional cases when solving problems;	
j. show step-by-step deduction in solving a problem;	Statistics and Probability 1; Statistics and Probability 2; Number and Algebra 1; Number and Algebra 2; Number and Algebra 3; Number and Algebra 4; Geometry and Measures 1; Geometry and Measures 2; Geometry and Measures 3; Geometry and Measures 4
k. recognise the importance of assumptions when deducing results; recognise the limitations of any assumptions that are made and the effect that varying those assumptions may have on the solution to a problem.	Statistics and Probability 1; Statistics and Probability 2; Number and Algebra 1; Number and Algebra 2; Number and Algebra 3; Number and Algebra 4; Geometry and Measures 1; Geometry and Measures 2; Geometry and Measures 3; Geometry and Measures 4
l. draw on their knowledge of operations and inverse operations (including powers and roots), and of methods of simplification (including factorisation and the use of the commutative, associative and distributive laws of addition, multiplication and factorisation) in order to select and use suitable strategies and techniques to solve problems and word problems, including those involving ratio and proportion; fractions, percentages, measures and conversion between measures, and compound measures defined within a particular situation. (only Unit 3)	Statistics and Probability 1; Statistics and Probability 2; Number and Algebra 1; Number and Algebra 2; Number and Algebra 3; Number and Algebra 4; Geometry and Measures 1; Geometry and Measures 2; Geometry and Measures 3; Geometry and Measures 4; Ratio; Proportion; Fractions; Working with fractions; Percentages; Percentage changes; Decimal calculations; Measures; More measures
Unit A501/01 (Stats and Prob mainly)	
Add, subtract, multiply and divide any number	
Candidates should be able to:	
a. understand and use positive numbers and negative integers, both as positions and translations on a number line;	Integers
b. add, subtract, multiply and divide integers and then any number;	Integers
c. multiply or divide any number by powers of 10;	Decimals; Decimal calculations
d. multiply or divide any positive number by a number between 0 and 1;	Decimals; Decimal calculations
e. multiply and divide by a negative number.	Integers
Approximate to a specified or appropriate degree of accuracy	

Candidates should be able to:	
a. use their previous understanding of integers and place value to deal with arbitrarily large positive numbers;	Integers; Rounding; Decimals
b. round numbers to a given power of 10;	Rounding
c. round to the nearest integer, to a given number of decimal places and to one significant figure.	Rounding; Decimals; Decimal calculations
Use calculators effectively and efficiently, including statistical and trigonometrical functions	
Candidates should be able to:	
a. use calculators effectively and efficiently;	Decimals; Decimal calculations; Rounding; LCM and HCF; Multiples, factors and prime numbers; Percentages; Percentage change; Ratio; Proportion; Powers and proportion; Powers and roots; Fractions; Working with fractions; Factorizing; Formulae; Manipulating formulae; Index laws; Working with brackets
b. know how to enter complex calculations and use function keys for reciprocals, squares and powers;	Decimals; Decimal calculations; Rounding; LCM and HCF; Multiples, factors and prime numbers; Percentages; Percentage change; Ratio; Proportion; Powers and proportion; Powers and roots; Fractions; Working with fractions; Factorizing; Formulae; Manipulating formulae; Index laws; Working with brackets
c. enter a range of calculations, including those involving measures.	Decimals; Decimal calculations; Rounding; LCM and HCF; Multiples, factors and prime numbers; Percentages; Percentage change; Ratio; Proportion; Powers and proportion; Powers and roots; Fractions; Working with fractions; Factorizing; Formulae; Manipulating formulae; Index laws; Working with brackets; Measures
Understand and use number operations and the relationships between them, including inverse operations and hierarchy of operations	
Candidates should be able to:	
a. use brackets and the hierarchy of operations.	Decimals; Decimal calculations; Rounding; LCM and HCF; Multiples, factors and prime numbers; Percentages; Percentage change; Ratio; Proportion; Powers and proportion; Powers and roots; Fractions; Working with fractions; Factorizing; Formulae; Manipulating formulae; Index laws; Working with brackets

Use ratio notation, including reduction to its simplest form and its various links to fraction notation	
Candidates should be able to:	
a. use ratio notation, including reduction to its simplest form;	Ratio
b. know its various links to fraction notation.	Ratio
Divide a quantity in a given ratio	
Candidates should be able to:	
a. divide a quantity in a given ratio;	Ratio
b. determine the original quantity by knowing the size of one part of the divided quantity;	Ratio
c. solve word problems about ratio, including using informal strategies and the unitary method of solution.	Ratio
Factors, multiples and primes	
Candidates should be able to:	
a. use the concepts and vocabulary of factor (divisor), multiple, common factor, highest common factor, least common multiple, prime number and prime factor decomposition;	HCF and LCM; Multiples; factors and prime numbers
b. find the prime factor decomposition of positive integers.	HCF and LCM; Multiples; factors and prime numbers
Symbols and notation	
Candidates should be able to:	
a. distinguish the different roles played by letter symbols in algebra, using the correct notational conventions for multiplying or dividing by a given number;	Linear equations; Formulae; Manipulating formulae; Linear graphs; Graphs of non-linear functions; Functions
b. know that letter symbols represent definite unknown numbers in equations, defined quantities or variables in formulae and general, unspecified independent numbers in identities;	Linear equations; Formulae; Manipulating formulae; Linear graphs; Graphs of non-linear functions; Functions
c. know that in functions, letter symbols define new expressions or quantities by referring to known quantities.	Functions
Algebraic terminology	
Candidates should be able to:	

a. distinguish in meaning between the words ‘equation’, ‘formula’ and ‘expression’.	Linear equations; Formulae; Manipulating formulae; Linear graphs; Graphs of non-linear functions; Functions
b. know the meaning of and use the words ‘equation’, ‘formula’, ‘identity’ and ‘expression’.	Linear equations; Formulae; Manipulating formulae; Linear graphs; Graphs of non-linear functions; Functions
Use the conventions for coordinates in the plane	
Candidates should be able to:	
a. use the conventions for coordinates in the plane; plot points in all four quadrants;	Linear graphs; Graphs of non-linear functions
b. understand that one coordinate identifies a point on a number line, two coordinates identify a point in a plane using the terms ‘1D’ and ‘2D’;	Linear graphs; Graphs of non-linear functions
c. use axes and coordinates to specify points in all four quadrants;	Linear graphs; Graphs of non-linear functions
d. locate points with given coordinates;	Linear graphs; Graphs of non-linear functions
e. find the coordinates of the midpoint of the line segment AB, given points A and B, then calculate the length AB.	Linear graphs; Graphs of non-linear functions
Derive a formula, substitute numbers into a formula and change the subject of a formula	
Candidates should be able to:	
a. use formulae from mathematics and other subjects expressed initially in words and then using letters and symbols;	Formulae; Manipulating formulae
b. substitute numbers into a formula; derive a formula and change its subject.	Formulae; Manipulating formulae
Generate terms of a sequence using term-to-term and position-to-term definitions of the sequence	
Candidates should be able to:	
a. generate terms of a sequence using term-to-term and position-to-term definitions of the sequence;	Generating sequences
b. generate common integer sequences (including sequences of odd or even integers, squared integers, powers of 2, powers of 10, triangular numbers).	Integers; Generating sequences; Geometric sequences; other sequences

Use linear expressions to describe the nth term of an arithmetic sequence	
Candidates should be able to:	
a. use linear expressions to describe the nth term of an arithmetic sequence, justifying its form by referring to the activity or context from which it was generated.	Generating sequences; Geometric sequences; Other sequences
Manipulate algebraic expressions	
Candidates should be able to:	
a. understand that the transformation of algebraic expressions obeys and generalises the rules of generalised arithmetic;	Linear equations
b. manipulate algebraic expressions by collecting like terms, by multiplying a single term over a bracket, and by taking out common factors.	Linear equations; Working with brackets; Factorizing
Set up and solve simple equations	
Candidates should be able to:	
a. set up simple equations;	Linear equations; Formulae; Manipulating formulae
b. solve simple equations by using inverse operations or by transforming both sides in the same way;	Linear equations; Formulae; Manipulating formulae
c. solve linear equations, with integer coefficients, in which the unknown appears on either side or on both sides of the equation;	Linear equations; Formulae; Manipulating formulae
d. solve linear equations that require prior simplification of brackets, including those that have negative signs occurring anywhere in the equation, and those with a negative solution.	Linear equations; Formulae; Manipulating formulae; Working with brackets
Interpret scales and use measurements	
Candidates should be able to:	
a. interpret scales on a range of measuring instruments, including those for time and mass;	Measures; More measures
b. know that measurements using real numbers depend on the choice of unit;	Measures
c. understand angle measures using the associated language;	More measures; Lines and angles
d. make sensible estimates of a range of measures in everyday settings;	Measures
e. convert measurements from one unit to another;	Measures

f. know rough metric equivalents of pounds, feet, miles, pints and gallons.	Measures
Draw triangles and other 2D shapes using a ruler and protractor	
Candidates should be able to:	
a. measure and draw lines to the nearest millimetre, and angles to the nearest degree;	Measures
b. draw triangles and other 2D shapes using a ruler and protractor, given information about their side lengths and angles.	Construction; triangles and quadrilaterals; Polygons
Use straight edge and a pair of compasses to do constructions	
Candidates should be able to:	
a. use straight edge and a pair of compasses to do standard constructions, including;	
i. an equilateral triangle with a given side,	Construction
ii. the midpoint and perpendicular bisector of a line segment,	Construction
iii. the perpendicular from a point to a line, the perpendicular from a point on a line,	Construction
iv. the bisector of an angle.	Construction
Construct loci	
Candidates should be able to:	
a. find loci, by reasoning to produce shapes and paths.	Loci
Maps, bearings and drawings	
Candidates should be able to:	
a. use and interpret maps and scale drawings;	Congruence and similarity; More measures
b. use bearings to specify direction and to solve problems.	More measeures
Solve 2D problems	
Candidates should be able to:	
a. understand, recall and use trigonometrical relationships in right-angled triangles, and use these to solve problems, including those involving bearings.	Trigonometry; Applying trigonometry; Trig graphs and rules; Further trigonometry

Use Pythagoras' theorem	
Candidates should be able to:	
a. understand, recall and use Pythagoras' theorem to solve simple cases in 2D, *then 3D problems.*	Pythagoras' Theorem; Applying Pythagoras' Theorem
Understand and use statistical problem solving process/handling data cycle	
Candidates should be able to:	
a. carry out each of the four aspects of the handling data cycle to solve problems:	
i. specify the problem and plan: formulate questions in terms of the data needed, and consider what inferences can be drawn from the data; decide what data to collect (including sample size and data format) and what statistical analysis is needed;	The data handling cycle; Data collection
ii. collect data from a variety of suitable sources, including experiments and surveys, and primary and secondary sources;	The data handling cycle; Data collection
iii. process and represent the data: turn the raw data into usable information that gives insight into the problem;	Data collection; Bar charts; line graphs and pie charts; Continuous data; Drawing frequency diagrams; Stem-and-leaf and scatter graphs; The data handling cycle
iv. interpret and discuss the data: answer the initial question by drawing conclusions from the data.	Data collection; Bar charts; line graphs and pie charts; Continuous data; Drawing frequency diagrams; Stem-and-leaf and scatter graphs; The data handling cycle
Experimenting	
Candidates should be able to:	
a. discuss how data relate to a problem, identify possible sources of bias and plan to minimise it;	The data handling cycle; Data collection
b. identify key questions that can be addressed by statistical methods;	The data handling cycle; Data collection
c. design an experiment or survey and decide what primary and secondary data to use;	The data handling cycle; Data collection
d. design and use data-collection sheets for grouped discrete and continuous data;	The data handling cycle; Data collection; Continuous data
e. gather data from secondary sources, including printed tables and lists from ICT-based sources;	The data handling cycle; Data collection
f. design and use two-way tables for discrete and grouped data.	Bar charts, line graphs and pie charts

Processing	
Candidates should be able to:	
a. draw and produce pie charts for categorical data, and diagrams for continuous data, frequency diagrams (bar charts, frequency polygons and fixed interval histograms) and stem and leaf diagrams;	Bar charts, line graphs and pie charts; Continuous data; Drawing frequency diagrams; Stem-and-leaf and scatter graphs
b. calculate mean, range and median of small data sets with discrete then continuous data;	Calculating averages; Continuous data
c. identify the modal class for grouped data;	Calculating averages; Continuous data
d. find the median for large data sets and calculate an estimate of the mean for large data sets with grouped data.	Calculating averages; Continuous data
e. draw and produce cumulative frequency tables and diagrams, box plots and histograms for grouped continuous data;	Cumulative frequency and box plots
f. find the quartiles and interquartile range for large data sets.	Cumulative frequency and box plots
Interpreting	
Candidates should be able to:	
a. look at data to find patterns and exceptions;	Bar charts, line graphs and pie charts; Continuous data; Drawing frequency diagrams; Stem-and-leaf and scatter graphs
b. interpret a wide range of graphs and diagrams and draw conclusions;	Bar charts, line graphs and pie charts; Continuous data; Drawing frequency diagrams; Stem-and-leaf and scatter graphs
c. interpret social statistics including index numbers, and survey data;	
d. compare distributions and make inferences, using the shapes of distributions and measures of average and range;	Calculating averages; Continuous data
e. understand that if they repeat an experiment, they may – and usually will – get different outcomes, and that increasing sample size generally leads to better population characteristics.	Experimental probability; Sampling methods
f. compare distributions and make inferences, using shapes of distributions and measures of average and spread, including median and quartiles;	Calculating averages; Continuous data; Cumulative frequency and box plots
g. understand and use frequency density.	Drawing frequency diagrams
Unit A502/01 (Number and Algebra mainly)	

Add, subtract, multiply and divide any number	
Candidates should be able to:	
a. derive integer complements to 100;	Integers
b. recall all multiplication facts to 10 × 10, and use them to derive quickly the corresponding division facts;	Integers; Decimals; Decimal calculations; Rounding; LCM and HCF; Multiples, factors and prime numbers; Percentages; Percentage change; Ratio; Proportion; Powers and proportion; Powers and roots; Fractions; Working with fractions; Factorizing; Formulae; Manipulating formulae; Index laws; Working with brackets
c. develop a range of strategies for mental calculation; derive unknown facts from those they know;	Integers; Decimals; Decimal calculations; Rounding; LCM and HCF; Multiples, factors and prime numbers; Percentages; Percentage change; Ratio; Proportion; Powers and proportion; Powers and roots; Fractions; Working with fractions; Factorizing; Formulae; Manipulating formulae; Index laws; Working with brackets
d. add and subtract mentally numbers with up to two decimal places;	Decimals; Decimal calculations
e. multiply and divide numbers with no more than one decimal place, using place value adjustments, factorisation and the commutative, associative, and distributive laws, where possible;	Decimals
f. use a variety of methods for addition and subtraction of integers and decimals, understanding where to position the decimal point;	Integers; Decimals; Decimal calculations
g. perform a calculation involving division by a decimal (up to two decimal places) by transforming it to a calculation involving division by an integer.	Cecimals; Decimal calculations
Approximate to a specified or appropriate degree of accuracy	
Candidates should be able to:	
a. round to the nearest integer, to any number of decimal places and to one significant figure;	Rounding
b. estimate answers to problems involving decimals;	Decimals; Decimal calculations
c. estimate and check answers to problems;	Integers; Decimals; Decimal calculations; Rounding; LCM and HCF; Multiples, factors and prime numbers; Percentages; Percentage change; Ratio; Proportion; Powers and proportion; Powers and roots; Fractions; Working with fractions; Factorizing; Formulae; Manipulating formulae; Index laws; Working with brackets

d. use a variety of checking procedures, including working the problem backwards, and considering whether a result is of the right order of magnitude.	Integers; Decimals; Decimal calculations; Rounding; LCM and HCF; Multiples, factors and prime numbers; Percentages; Percentage change; Ratio; Proportion; Powers and proportion; Powers and roots; Fractions; Working with fractions; Factorizing; Formulae; Manipulating formulae; Index laws; Working with brackets
e. round to a given number of significant figures;	Rounding
f. select, and use, an appropriate degree of accuracy in solving a problem;	Rounding
g. develop a range of strategies for mental calculation;	Integers; Decimals; Decimal calculations; Rounding; LCM and HCF; Multiples, factors and prime numbers; Percentages; Percentage change; Ratio; Proportion; Powers and proportion; Powers and roots; Fractions; Working with fractions; Factorizing; Formulae; Manipulating formulae; Index laws; Working with brackets
h. derive unknown facts from those they already know.	Integers; Decimals; Decimal calculations; Rounding; LCM and HCF; Multiples, factors and prime numbers; Percentages; Percentage change; Ratio; Proportion; Powers and proportion; Powers and roots; Fractions; Working with fractions; Factorizing; Formulae; Manipulating formulae; Index laws; Working with brackets
Calculate with fractions	
Candidates should be able to:	
a. calculate a given fraction of a given quantity, expressing the answer as a fraction;	Fractions; Working with fractions
b. express a given number as a fraction of another;	Fractions; Working with fractions
c. add and subtract fractions by writing them with a common denominator;	Fractions; Working with fractions
d. perform short division to convert a simple fraction to a decimal;	Fractions; Working with fractions; Decimals
e. multiply and divide a fraction by an integer and by a unit fraction;	Fractions; Working with fractions
f. understand and use unit fractions as multiplicative inverses;	Fractions; Working with fractions
g. use efficient methods to calculate with fractions, including mixed numbers;	Fractions; Working with fractions
h. recognise that, in some cases, only a fraction can express the exact answer;	Fractions; Working with fractions; Decimals
i. understand ‘reciprocal’ as multiplicative inverse and know that any non-zero number multiplied by its reciprocal is 1 (and that zero has no reciprocal, since division by zero is not defined).	Index laws; Fractions; Working with fractions
j. multiply and divide a fraction by a general fraction.	Fractions; Working with fractions

Order rational numbers	
Candidates should be able to:	
a. order integers;	Integers
b. order fractions by rewriting them with a common denominator;	Fractions; Working with fractions
c. order decimals.	Decimals; Decimal calculations
Understand equivalent fractions	
Candidates should be able to:	
a. understand equivalent fractions and simplify a fraction by cancelling all common factors.	Fractions; Working with fractions
Use decimal notation	
Candidates should be able to:	
a. use decimal notation and recognise that each terminating decimal is a fraction;	Decimals
b. recognise that recurring decimals are exact fractions;	Decimals
c. know that some exact fractions are recurring decimals.	Decimals
d. distinguish between fractions with denominators that have only prime factors of 2 and 5 (which are represented by terminating decimals), and other fractions;	Decimals
e. convert a recurring decimal to a fraction.	Decimals
Understand percentage	
Candidates should be able to:	
a. understand that ‘percentage’ means ‘number of parts per 100’ and use this to compare proportions;	Percentages
b. know the fraction-to-percentage (or decimal) conversion of familiar simple fractions.	Fractions; Working with fractions; Percentages; Decimals; Decimal calculations
Interpret fractions, decimals and percentages as operators	
Candidates should be able to:	
a. interpret percentage as the operator ‘so many hundredths of’;	Percentages
b. convert simple fractions of a whole to percentages of the whole, and vice versa;	Fractions; Working with fractions; Percentages

c. understand the multiplicative nature of percentages as operators.	Percentages; Percentage change
Common index numbers	
Candidates should be able to:	
a. use the terms ‘square’, ‘positive square root’, ‘negative square root’, ‘cube’ and ‘cube root’;	Powers and roots
b. recall integer squares from 11 × 11 to 15 × 15 and the corresponding square roots;	Powers and roots
c. recall the cubes of 2, 3, 4, 5 and 10.	Powers and roots
Use index notation	
Candidates should be able to:	
a. use index notation for squares, cubes and powers of 10;	Powers and roots; Index laws
b. use index notation for simple integer powers;	Powers and roots; Index laws
c. use index laws for multiplication and division of integer powers;	Index laws
d. use index laws to simplify, and calculate the value of, numerical expressions involving multiplication and division of integer powers.	Index laws
e. know that $n^0 = 1$; understand that the inverse operation of raising a positive number to power n is raising the result of this operation to power 1/n;	Index laws; Index laws 2
f. know that $n^{-1} = 1/n$ (undefined for n = 0), and that $n^{1/2} = \sqrt{n}$ and $n^{1/3} = \sqrt[3]{n}$ for any positive number n;	Index laws; Index laws 2; Powers and roots
g. use index laws to simplify, and calculate the value of, numerical expressions involving multiplication and division of integer, fractional and negative powers.	Index laws 2
Use surds in exact calculations	
Candidates should be able to:	
a. use surds in exact calculations without a calculator;	Surds
b. rationalise a denominator.	Surds
Symbols and notation	
Candidates should be able to:	

a. distinguish the different roles played by letter symbols in algebra, using the correct notational conventions for multiplying or dividing by a given number;	Linear equations; Formulae; Manipulating formulae
b. know that letter symbols represent definite unknown numbers in equations, defined quantities or variables in formulae and general, unspecified independent numbers in identities;	Linear equations; Formulae; Manipulating formulae
c. know that in functions, letter symbols define new expressions or quantities by referring to known quantities.	Functions
Algebraic terminology	
Candidates should be able to:	
a. distinguish in meaning between the words ‘equation’, ‘formula’ and ‘expression’.	Linear equations; Formulae; Manipulating formulae
b. know the meaning of and use the words ‘equation’, ‘formula’, ‘identity’ and ‘expression’.	Linear equations; Formulae; Manipulating formulae
Use the conventions for coordinates in the plane	
Candidates should be able to:	
a. use the conventions for coordinates in the plane; plot points in all four quadrants;	Linear graphs; Graphs of non-linear functions
b. understand that one coordinate identifies a point on a number line, two coordinates identify a point in a plane using the terms ‘1D’ and ‘2D’;	Linear graphs; Graphs of non-linear functions
c. use axes and coordinates to specify points in all four quadrants;	Linear graphs; Graphs of non-linear functions
d. locate points with given coordinates.	Linear graphs; Graphs of non-linear functions
Functions from real life	
Candidates should be able to:	
a. construct linear functions from real life problems and plot their corresponding graphs;	Real-life graphs
b. discuss and interpret linear graphs modelling real situations;	Linear graphs; Real-life graphs
c. draw a line of best fit through a set of linearly-related points.	Linear graphs; Real-life graphs
Set up and solve simple equations including simultaneous equations in two unknowns	

Candidates should be able to:	
a. understand that the point of intersection of two different lines in the same two variables that simultaneously describe a real situation is the solution to the simultaneous equations represented by the lines.	Simultaneous equations 1; Simultaneous equations 2
b. solve exactly, by elimination of an unknown, two simultaneous equations in two unknowns, both of which are linear in each unknown.	Simultaneous equations 1; Simultaneous equations 2
Recognise and plot equations that correspond to straight-line graphs in the coordinate plane, including finding gradients	
Candidates should be able to:	
a. recognise (when values are given for m and c) that equations of the form y = mx + c correspond to straight-line graphs in the coordinate plane;	Linear graphs
b. find the gradient of lines given by equations of the form y = mx + c (when values are given for m and c); investigate the gradients of parallel lines;	Linear graphs
c. plot graphs of functions in which y is given explicitly in terms of x, or implicitly, where no table or axes are given.	Linear graphs
Solve linear inequalities in one variable	
Candidates should be able to:	
a. solve simple linear inequalities in one variable, and represent the solution set on a number line.	Simple inequalities
b. solve several linear inequalities in two variables, represent the inequalities on a suitable diagram, and find the solution set.	Advanced inequalities
Interpret scales and use measurements	
Candidates should be able to:	
a. interpret scales on a range of measuring instruments, including those for time and mass;	Measures
b. convert measurements from one unit to another.	Measures
Lines and angles	
Candidates should be able to:	

a. recall and use properties of angles at a point, angles at a point on a straight line (including right angles), perpendicular lines, and opposite angles at a vertex;	Lines and angles
b. distinguish between acute, obtuse, reflex and right angles; estimate the size of an angle in degrees;	Lines and angles
c. distinguish between lines and line segments;	Lines and angles; Cirles
d. use parallel lines, alternate angles and corresponding angles;	Lines and angles
e. understand the consequent properties of parallelograms and a proof that the angle sum of a triangle is 180°;	Triangles and quadrilaterals
f. understand a proof that an exterior angle of a triangle is equal to the sum of the interior angles at the other two vertices.	Triangles and quadrilaterals
Properties of shapes	
Candidates should be able to:	
a. use angle properties of triangles;	Triangles and quadrilaterals
b. explain why the angle sum of a quadrilateral is 360°;	Triangles and quadrilaterals
c. recall the essential properties and definitions of special types of quadrilateral, including square, rectangle, parallelogram, trapezium and rhombus;	Triangles and quadrilaterals
d. classify quadrilaterals by their geometric properties;	Triangles and quadrilaterals
e. recall the definition of a circle and the meaning of related terms, including centre, radius, chord, diameter, circumference, tangent, arc, sector and segment;	Circles
f. understand that inscribed regular polygons can be constructed by equal division of a circle.	
Angles and polygons	
Candidates should be able to:	
a. calculate and use the sums of the interior and exterior angles of quadrilaterals, pentagons and hexagons;	Polygons
b. calculate and use the angles of regular polygons.	Polygons
Proofs and circle theorems	
Candidates should be able to:	

a. understand and use the fact that the tangent at any point on a circle is perpendicular to the radius at that point;	Circles
b. understand and use the fact that tangents meeting at an external point are equal in length;	Circles
c. explain why the perpendicular from the centre to a chord bisects that chord;	Circles
d. prove and use these facts:	Circles
i. the angle subtended by an arc at the centre of a circle is twice the angle subtended at any point on the circumference;	Circles
ii. the angle subtended at the circumference in a semicircle is a right angle;	Circles
iii. angles in the same segment are equal;	Circles
iv. the alternate segment theorem;	
v. opposite angles of a cyclic quadrilateral sum to 180°.	Circles
Congruence and similarity	
Candidates should be able to:	
a. understand congruence;	Congruence and similarity
b. understand similarity of plane figures.	Congruence and similarity
Transform 2D shapes	
Candidates should be able to:	
a. recognise and visualise rotations, reflections and translations, including reflection symmetry of 2D and 3D shapes, and rotation symmetry of 2D shapes;	Symmetry and reflection; Translation and rotation
b. understand that rotations are specified by a centre and an (anticlockwise) angle;	Translation and roation
c. understand that reflections are specified by a mirror line, at first using a line parallel to an axis, then a mirror line such as y = x or y = -x;	Symmetry and reflaction
d. understand that translations are specified by a column vector;	Translation and roation
e. transform triangles and other 2D shapes by translation, rotation and reflection and by combinations of these transformations;	Symmetry and reflection; Translation and rotation

f. recognise that these transformations preserve length and angle, and hence that any figure is congruent to its image under any of these transformations;	Enlagement; Congruence and similarity
g. understand that enlargements are specified by a centre and positive scale factor;	Enlargement
h. recognise, visualise and construct enlargements of shapes using positive scale factors greater than one at first, then positive scale factors less than one;	Enlargement; Construction
i. understand from this that any two circles and any two squares are mathematically similar, while, in general, two rectangles are not;	Enlargement; Construction
j. distinguish properties that are preserved under particular transformations.	Symmetry and reflection; Translation and rotation
Use vectors	
Candidates should be able to:	
a. understand and use vector notation;	Vectors
b. calculate and represent graphically the sum of two vectors, the difference of two vectors and a scalar multiple of a vector;	Vectors; Using vectors
c. calculate the resultant of two vectors;	Vectors; Using vectors
d. understand and use the commutative and associative properties of vector addition;	Vectors; Using vectors
e. solve simple geometrical problems in 2D using vector methods.	Vectors; Using vectors
Use charts and correlation	
Candidates should be able to:	
a. draw and interpret scatter graphs;	Stem-and-leaf and scatter graphs
b. appreciate that correlation is a measure of the strength of the association between two variables;	Stem-and-leaf and scatter graphs
c. distinguish between positive, negative and zero correlation using lines of best fit;	Stem-and-leaf and scatter graphs
d. appreciate that zero correlation does not necessarily imply ‘no relationship’ but merely ‘no linear relationship’;	Stem-and-leaf and scatter graphs
e. draw lines of best fit by eye and understand what these represent;	Stem-and-leaf and scatter graphs
f. draw line graphs for time series;	

g. interpret time series.	
Unit A503/01 (Geometry and Measures mainly)	
Add, subtract, multiply and divide any number	
Candidates should be able to:	
a. derive integer complements to 100;	Integers
b. recall all multiplication facts to 10 × 10, and use them to derive quickly the corresponding division facts;	Integers; Decimals; Decimal calculations; Rounding; LCM and HCF; Multiples, factors and prime numbers; Percentages; Percentage change; Ratio; Proportion; Powers and proportion; Powers and roots; Fractions; Working with fractions; Factorizing; Formulae; Manipulating formulae; Index laws; Working with brackets
c. understand and use positive and negative numbers both as positions and translations on a number line;	Integers
d. calculate a given fraction of a given quantity, expressing the answer as a fraction;	Fractions; Working with fractions
e. express a given number as a fraction of another;	Fractions; Working with fractions
f. add and subtract fractions by writing them with a common denominator;	Fractions; Working with fractions
g. multiply and divide a fraction by an integer and by a unit fraction;	Fractions; Working with fractions
h. understand and use unit fractions as multiplicative inverses.	Fractions; Working with fractions
i. multiply and divide a fraction by a general fraction.	Fractions; Working with fractions
Approximate to a specified or appropriate degree of accuracy	
Candidates should be able to:	
a. round to the nearest integer, to any number of decimal places, specified or appropriate, and to any number of significant figures;	Rounding
b. understand the calculator display, knowing when to interpret the display, when the display has been rounded by the calculator, and not to round during the intermediate steps of a calculation;	Integers; Decimals; Decimal calculations; Rounding; LCM and HCF; Multiples, factors and prime numbers; Percentages; Percentage change; Ratio; Proportion; Powers and proportion; Powers and roots; Fractions; Working with fractions; Factorizing; Formulae; Manipulating formulae; Index laws; Working with brackets
c. give solutions in the context of the problem to an appropriate degree of accuracy, interpreting the solution shown on a calculator display, and recognising limitations on the accuracy of data and measurements.	Integers; Decimals; Decimal calculations; Rounding; LCM and HCF; Multiples, factors and prime numbers; Percentages; Percentage change; Ratio; Proportion; Powers and proportion; Powers and roots; Fractions; Working with fractions; Factorizing; Formulae; Manipulating formulae; Index laws; Working with brackets

Use calculators effectively and efficiently	
Candidates should be able to:	
a. use calculators effectively and efficiently;	Integers; Decimals; Decimal calculations; Rounding; LCM and HCF; Multiples, factors and prime numbers; Percentages; Percentage change; Ratio; Proportion; Powers and proportion; Powers and roots; Fractions; Working with fractions; Factorizing; Formulae; Manipulating formulae; Index laws; Working with brackets
b. know how to enter complex calculations and use function keys for reciprocals, squares and powers	Integers; Decimals; Decimal calculations; Rounding; LCM and HCF; Multiples, factors and prime numbers; Percentages; Percentage change; Ratio; Proportion; Powers and proportion; Powers and roots; Fractions; Working with fractions; Factorizing; Formulae; Manipulating formulae; Index laws; Working with brackets
c. enter a range of calculations, including measures;	Integers; Decimals; Decimal calculations; Rounding; LCM and HCF; Multiples, factors and prime numbers; Percentages; Percentage change; Ratio; Proportion; Powers and proportion; Powers and roots; Fractions; Working with fractions; Factorizing; Formulae; Manipulating formulae; Index laws; Working with brackets; Measures
d. understand the calculator display, knowing when to interpret the display, when the display has been rounded by the calculator, and not to round during the intermediate steps of a calculation.	Integers; Decimals; Decimal calculations; Rounding; LCM and HCF; Multiples, factors and prime numbers; Percentages; Percentage change; Ratio; Proportion; Powers and proportion; Powers and roots; Fractions; Working with fractions; Factorizing; Formulae; Manipulating formulae; Index laws; Working with brackets
e. use an extended range of function keys, including trigonometrical and statistical functions;	Sampling methods; Trigonometry; Further trigonometry; Applying trigonometry; Trig graphs and rules
f. use calculators for reverse percentage calculations.	Percentage change
Substitute numbers into expressions involving indices	
Candidates should be able to:	
a. substitute positive and negative numbers into expressions such as $3x^2 + 4$ and $2x^3$ and evaluate the outcome	Powers and roots
Standard index form	
Candidates should be able to:	
a. use and express standard index form expressed in conventional notation and on a calculator display;	Standard form
b. order with numbers written in standard form;	Standard form
c. calculate with standard index form;	Standard form

d. convert between ordinary and standard index form representations, converting to standard index form to make sensible estimates for calculations involving multiplication and/or division.	Standard form
Inaccuracy in measurement	
Candidates should be able to:	
a. recognise that measurements given to the nearest whole unit may be inaccurate by up to one half in either direction.	Measures
b. use calculators, or written methods, to calculate the upper and lower bounds of calculations, in particular, when working with measurements;	Measures; Rounding
c. recognise limitations on the accuracy of data and measurements.	Measures; Rounding
Apply problem solving skills	
Candidates should be able to:	
a. analyse real life problems using mathematical skills;	Statistics and Probability 1; Statistics and Probability 2; Number and Algebra 1; Number and Algebra 2; Number and Algebra 3; Number and Algebra 4; Geometry and Measures 1; Geometry and Measures 2; Geometry and Measures 3; Geometry and Measures 4
b. apply mathematical skills when solving real life problems;	Statistics and Probability 1; Statistics and Probability 2; Number and Algebra 1; Number and Algebra 2; Number and Algebra 3; Number and Algebra 4; Geometry and Measures 1; Geometry and Measures 2; Geometry and Measures 3; Geometry and Measures 4
c. communicate findings from solutions to real life problems;	Statistics and Probability 1; Statistics and Probability 2; Number and Algebra 1; Number and Algebra 2; Number and Algebra 3; Number and Algebra 4; Geometry and Measures 1; Geometry and Measures 2; Geometry and Measures 3; Geometry and Measures 4
d. interpret solutions to real life problems.	Statistics and Probability 1; Statistics and Probability 2; Number and Algebra 1; Number and Algebra 2; Number and Algebra 3; Number and Algebra 4; Geometry and Measures 1; Geometry and Measures 2; Geometry and Measures 3; Geometry and Measures 4
Use percentage and repeated percentage change	
Candidates should be able to:	
a. solve simple percentage problems in real life situations, including increase and decrease.	Percentages; Percentage change
b. calculate an original amount when given the transformed amount after a percentage change;	Percentage change

c. reverse percentage problems;	Percentage change
d. represent repeated percentage change using a multiplier raised to a power. Contexts may include VAT, annual rate of inflation, income tax, discounts, simple interest, compound interest	Percentage change
Understand and use direct and indirect proportion	
Candidates should be able to:	
a. solve word problems about proportion, including using informal strategies and the unitary method of solution.	Proportion; Powers and proportion
b. calculate an unknown quantity from quantities that vary in direct or inverse proportion;	Powers and proportion
c. set up and use equations to solve word and other problems involving direct proportion or inverse proportion and relate algebraic solutions to graphical representation of the equations.	Powers and proportion
Exponential growth	
Candidates should be able to:	
a. use calculators to explore exponential growth and decay using a multiplier and the power key.	
Solve real life problems involving measures	
Candidates should be able to:	
a. explore and solve problems in real life contexts that use common measures (including time, money, mass, length, area and volume);	Measures; More measures
b. explore and solve problems in real life contexts that use common compound measures such as speed and density;	Measures; More measures
c. use checking procedures, including inverse operations; work to stated levels of accuracy.	Measures; More measures
Symbols and notation	
Candidates should be able to:	
a. distinguish the different roles played by letter symbols in algebra, using the correct notational conventions for multiplying or dividing by a given number;	Linear equations; Formulae; Manipulating formulae

b. know that letter symbols represent definite unknown numbers in equations, defined quantities or variables in formulae and general, unspecified independent numbers in identities;	Linear equations; Formulae; Manipulating formulae
c. know that in functions, letter symbols define new expressions or quantities by referring to known quantities.	Functions
Algebraic terminology	
Candidates should be able to:	
a. distinguish in meaning between the words 'equation', 'formula' and 'expression'.	Linear equations; Formulae; Manipulating formulae
b. know the meaning of and use the words 'equation', 'formula', 'identity' and 'expression'.	Linear equations; Formulae; Manipulating formulae; Algebraic fractions
Use the conventions for coordinates in the plane	
Candidates should be able to:	
a. use the conventions for coordinates in the plane; plot points in all four quadrants;	Linear graphs; Graphs of non-linear functions
b. understand that one coordinate identifies a point on a number line, two coordinates identify a point in a plane and three coordinates identify a point in space, using the terms '1D', '2D' and '3D';	Linear graphs; Graphs of non-linear functions
c. use axes and coordinates to specify points in all four quadrants;	Linear graphs; Graphs of non-linear functions
d. locate points with given coordinates.	Linear graphs; Graphs of non-linear functions
Manipulate algebraic expressions	
Candidates should be able to:	
a. understand that the transformation of algebraic expressions obeys and generalises the rules of general arithmetic,	Linear equations; Formulae; Manipulating formulae
b. manipulate algebraic expressions by collecting like terms, by multiplying a single term over a bracket, and by taking out common factors.	Linear equations; Factorizing; Working with brackets
c. expand the product of two linear expressions;	Working with brackets
d. manipulate algebraic expressions by, factorising quadratic expressions including the difference of two squares. Simplify rational expressions.	Factorizing; Solving quadratics; More quadratics; Algebraic fractions

Use trial and improvement to solve equations	
Candidates should be able to:	
a. use systematic trial and improvement to find approximate solutions of equations where there is no simple analytical method of solving them.	Functions
Solve quadratic equations	
Candidates should be able to:	
a. solve simple quadratic equations by factorisation, completing the square and using the quadratic formula;	Factorizing; Solving quadratics; More quadratics
b. solve exactly, by elimination of an unknown, two simultaneous equations in two unknowns, where the first equation is linear in each unknown and the second equation is either linear in each unknown or linear in one unknown and quadratic in the other.	Simultaneous equations 1; Simultaneous equations 2; Graphs of non-linear functions
Functions from real life	
Candidates should be able to:	
a. discuss and interpret graphs modelling real situations.	Real-life graphs; Number and Algebra 4
Distance time graphs, mobile phone charges, electricity bills	Real-life graphs; Number and Algebra 4
Plot graphs of simple quadratic functions	
Candidates should be able to:	
a. generate points and plot graphs of simple quadratic functions;	Graphs of non-linear functions
b. find approximate solutions of a quadratic equation from the graph of the corresponding quadratic function.	Graphs of non-linear functions
c. generate points and plot graphs of more general quadratic functions;	Graphs of non-linear functions
d. construct quadratic and other functions from real life problems and plot their corresponding graphs.	Graphs of non-linear functions
Find approximate solutions of a pair of linear and quadratic functions	
Candidates should be able to:	
a. find the intersection points of the graphs of a linear and a quadratic function and know that these are the approximate solutions of the simultaneous equations representing the two functions.	Graphs of non-linear functions

Construct non-linear graphs	
Candidates should be able to:	
a. plot graphs of simple cubic functions, the reciprocal function y =1/x with x ≠ 0, the exponential function y = kx for integer values of x and simple positive values of k and the circular functions y = sinx and y = cosx;	Graphs of non-linear functions; Trig graphs and rules
b. recognise the characteristic shapes of all these functions.	Graphs of non-linear functions; Trig graphs and rules
Transform functions	
Candidates should be able to:	
a. apply to the graph of y = f(x) the transformations y = f(x) + a, y = f(ax), y = f(x + a) and y = af(x) for linear, quadratic, sine and cosine functions f(x).	Functions
Interpret scales and use measurements	
Candidates should be able to:	
a. interpret scales on a range of measuring instruments, including those for time and mass;	Measures
b. know that measurements using real numbers depend on the choice of unit;	Measures
c. understand angle measures using the associated language;	Lines and angles
d. convert measurements from one unit to another;	Measures
e. know approximate metric equivalents of pounds, feet, miles, pints and gallons;	Measures
f. recognise that measurements given to the nearest whole unit may be inaccurate by up to one half in either direction;	More measures
g. convert between area measures (including square centimetres and square metres), and volume measures (including cubic centimetres and cubic metres);	Measures
h. understand and use compound measures (including speed and density).	More measures
Perimeter, area (including circles), and volume	
Candidates should be able to:	

a. find areas of rectangles, recalling the formula, understanding the connection to counting squares;	Area
b. recall and use the formulae for the area of a parallelogram and a triangle;	Area
c. work out the surface area of simple shapes using the area formulae for triangles and rectangles;	Area
d. calculate perimeters and areas of shapes made from triangles and rectangles;	Area; Triangles and quadrilaterals
e. find circumferences of circles and areas enclosed by circles, recalling relevant formulae;	Circles; Circle calculations
f. find volumes of cuboids, recalling the formula and understanding the connection to counting cubes;	Cubes and cuboids
g. calculate volumes of right prisms and of shapes made from cubes and cuboids;	Cubes and cuboids
h. use π in exact calculations.	Circles; Circle calculations
i. calculate volumes of objects made from cubes, cuboids, pyramids, prisms and spheres;	3-D shapes; Cubes and cuboids
j. calculate the lengths of arcs and the areas of sectors of circles.	Circles; Circle calculations
Use 2D representations of 3D shapes	
Candidates should be able to:	
a. explore the geometry of cuboids (including cubes) and objects made from cuboids;	Cubes and cuboids
b. use 2D representations of 3D objects; analyse 3D objects through 2D projections (including plan and elevation) and cross-sections;	Cubes and cuboids; 3-D shapes
c. draw nets of 3D objects;	3-D shapes
d. solve problems involving the surface area and volume of prisms;	3-D shapes
e. construct nets of cubes, regular tetrahedra, square-based pyramids and other 3D shapes from given information.	Cubes and cuboids; 3-D shapes
f. solve problems involving surface areas and volumes of prisms, pyramids, cylinders, cones and spheres;	3-D shapes
g. solve problems involving more complex shapes and solids, including segments of circles and frustums of cones	Circles; Circle calculations; 3-D shapes

Enlargement	
Candidates should be able to:	
a. identify the scale factor of an enlargement as the ratio of the lengths of any two corresponding line segments and apply this to triangles;	Enlargement
b. understand that enlargement preserves angle but not length;	Enlargement
c. understand the implications of enlargement for perimeter;	Enlargement
d. understand the implications of enlargement for area and volume.	Enlargement
e. understand and use the effect of enlargement on areas and volumes of shapes and solids.	Enlargement
Trigonometry in 2D and 3D and Pythagoras' theorem in 3D	
Candidates should be able to:	
a. use trigonometrical relationships in 3D contexts, including finding the angles between a line and a plane (but not the angle between two planes or between two skew lines);	Applying trigonometry
b. use the sine and cosine rules to solve 2D and 3D problems;	Trigonometry; Applying trigonometry; Further trigonometry; Trigonometry graphs and rules
c. calculate the area of a triangle using ½absinC;	Trigonometry graphs and rules
d. use Pythagoras' theorem in 3D contexts.	Applying pythagoras
Probability	
Candidates should be able to:	
a. use the vocabulary of probability to interpret results involving uncertainty and prediction;	Probability
b. understand and use the probability scale;	Probability
c. understand and use estimates or measures of probability from theoretical models (including equally-likely outcomes), or from relative frequency;	Experimental probability
d. list all outcomes for single events, and for two successive events, in a systematic way;	Combined probability
e. identify different mutually-exclusive outcomes;	Combined probability
f. know that the sum of the probabilities of all the possible mutually exclusive outcomes is 1;	Combined probability

g. understand that if they repeat an experiment, they may (and usually will) get different outcomes, and that increasing sample size generally leads to better estimates of probability;	Experimental probability
h. compare experimental data to theoretical probabilities.	Experimental probability
i. know when to add or multiply probabilities:	Combined probability
i. if A and B are mutually exclusive, then the probability of A or B occurring is P(A) + P(B);	Combined probability
ii. if A and B are independent events, the probability of A and B occurring is P(A) x P(B);	Combined probability
j. use tree diagrams to represent outcomes of compound events, recognising when events are independent.	Tree diagrams