

Extended

1. Number

Syllabus content	What do you know?	R	A	G	Comments
Types of numbers	Identify and use: - natural numbers - integers (positive, zero and negative) - prime numbers - square numbers - cube numbers - common factors (eg HCF – highest common factor of two numbers) - common multiples (eg LCM – lowest common multiple of two numbers) - rational and irrational numbers - reciprocals	☐	☐	☐	Surds HCF and LCM Rationalise the denominator 
Sets	Understand and use set language, notation and Venn diagrams	☐	☐	☐	
	Definition of sets: $A = \{x: x \text{ is a natural number}\}$ $B = \{(x, y): y = mx + c\}$ $C = \{x: a \leq x \leq b\}$ $D = \{a, b, c, \dots\}$	☐	☐	☐	
	Notation: - Number of elements in set A "... is an element of ..." "... is not an element of ..." - Complement of set A - The empty set - Universal set - A is a subset of B - A is not a subset of B - Union of A and B - Intersection of A and B	☐	☐	☐	

Syllabus content		What do you know?	R	A	G	Comments
Powers and roots	Calculate with the following:	- squares - square roots - cubes - cube roots - other powers and roots of numbers	☐	☐	☐	
Fractions, decimals and percentages	Use the language and notation of the following in appropriate contexts:	- proper fractions - improper fractions - mixed numbers - decimals - percentages	☐	☐	☐	
	Recognise equivalence and convert between these forms		☐	☐	☐	
Ordering	Order quantities by magnitude and demonstrate familiarity with the symbols $=$, $\neq$, $>$, $<$, $\geq$ and $\leq$		☐	☐	☐	
The four operations	Use the four operations for calculations with:	- integers - fractions - decimals - correct ordering of operations (BIDMAS) and use of brackets	☐	☐	☐	 Operations with fractions and converting recurring decimals to fractions.
Indices I	Understand and use indices (positive, zero and negative integers)		☐	☐	☐	
	Understand and use the rules of indices for:	- multiplication of indices, e.g. $2^{-3} \times 2^4$ - division of indices, e.g. $2^3 \div 2^4$ - index numbers raised to an index, e.g. $(2^3)^2$	☐	☐	☐	
Standard Form	Use the standard form $A \times 10^n$ where n is a positive or negative integer and $1 \leq A < 10$		☐	☐	☐	Standard Form 
	Convert numbers into and out of standard form		☐	☐	☐	
	Calculate with values in standard form		☐	☐	☐	

Syllabus content		What do you know?	R	A	G	Comments
Estimation	Round values to a specified degree of accuracy of:		☐	☐	☐	
	- significant figures - decimal places		☐	☐	☐	
	Make estimates for calculations involving numbers, quantities and measurements		☐	☐	☐	
Limits of accuracy	Round answers to a reasonable degree of accuracy in the context of a given problem		☐	☐	☐	
	Give upper and lower bounds for data rounded to a specified accuracy		☐	☐	☐	
	Find upper and lower bounds of the results of calculations which have used data rounded to a specified accuracy		☐	☐	☐	
Ratio and proportion	Understand and use ratio and proportion to:		☐	☐	☐	
	- give ratios in their simplest form - divide a quantity in a given ratio - use proportional reasoning and ratios in context, e.g. map scales, determine best value		☐	☐	☐	
			☐	☐	☐	
Rates	Use common measures of rate, e.g. hourly rates of pay, exchange rates between currencies		☐	☐	☐	
	Apply other measures of rate, e.g. pressure, density		☐	☐	☐	
	Solve problems involving average speed, including recall of speed/distance/time formula		☐	☐	☐	
Percentages	Calculate a percentage of a quantity		☐	☐	☐	
	Express one quantity as a percentage of another		☐	☐	☐	
	Calculate percentage increase or decrease		☐	☐	☐	
	Calculate with simple and compound interest, including recall of formulas		☐	☐	☐	
	Calculate using reverse percentages		☐	☐	☐	

Syllabus content	What do you know?	R	A	G	Comments
Using a calculator	Use a calculator efficiently	☐	☐	☐	
	Enter values appropriately on a calculator, e.g. 2 hours 30 minutes	☐	☐	☐	
	Interpret the calculator display appropriately, e.g. in money 4.8 means \$4.80	☐	☐	☐	
Time	Calculate with time: seconds (s), minutes (min), hours (h), days, weeks, months, years, including the relationship between units	☐	☐	☐	
	Calculate times in terms of the 24-hour and 12-hour clock	☐	☐	☐	
	Read • clocks • timetables	☐	☐	☐	
Money	Calculate with money	☐	☐	☐	
	Convert from one currency to another	☐	☐	☐	
Exponential growth and decay	Use exponential growth and decay, e.g. depreciation, population change	☐	☐	☐	
Surds	Understand and use surds, including simplifying expressions	☐	☐	☐	 Surds HCF and LCM Rationalise the denominator
	Rationalise the denominator	☐	☐	☐	

2. Algebra and graphs

Syllabus content	What do you know?	R	A	G	Comments
Introduction to algebra	Use letters to represent generalised numbers	☐	☐	☐	
	Substitute numbers into expressions and formulas	☐	☐	☐	

Algebra basics

Syllabus content	What do you know?	R	A	G	Comments
Algebraic manipulation	Simplify expressions by collecting like terms	☐	☐	☐	Factorisation Complete the Square Algebraic Fractions 
	Expand products of algebraic expressions: - with a single bracket, e.g. $3x(2x - 4y)$ - with a pair of brackets, e.g. $(3x + y)(x - 4y)$ - with more than two brackets, e.g. $(x - 2)(x + 3)(2x + 1)$	☐	☐	☐	
	Factorise by extracting common factors	☐	☐	☐	
	Factorise expressions of the form: $ax + bx + kay + kby$ $a^2x^2 - b^2y^2$ $a^2 + 2ab + b^2$ $ax^2 + bx + c$ $ax^3 + bx^2 + cx$	☐	☐	☐	
	Complete the square for expressions in the form $ax^2 + bx + c$	☐	☐	☐	
Algebraic fractions	Manipulate algebraic fractions such as: $\frac{x}{3} + \frac{x-4}{2}$ $\frac{2x}{3} + \frac{3(x-5)}{2}$ $\frac{3a}{3} \times \frac{9a}{10}$ $\frac{3a}{3} \div \frac{9a}{10}$ $\frac{1}{x-2} \div \frac{x+1}{x-3}$ Factorise and simplify rational expressions such as $\frac{x^2 - 2x}{x^2 - 5x + 6}$	☐	☐	☐	

Syllabus content	What do you know?	R	A	G	Comments
Indices II	Understand and use indices: - positive, zero, negative - fractional	☐	☐	☐	Indices 
	Understand and use the rules of indices, e.g. to simplify: $3x^{-4} \times \frac{2}{3}x^{\frac{1}{2}}$ $\frac{2}{5}x^{\frac{1}{2}} \div 2x^{-2}$ $\left(\frac{2x^5}{3}\right)^3$	☐	☐	☐	
Equations	Construct expressions, equations and formulas	☐	☐	☐	Factorisation Complete the Square Algebraic Fractions 
	Solve linear equations in one unknown	☐	☐	☐	
	Solve fractional equations with: - numerical denominators - linear algebraic denominators	☐	☐	☐	
	Solve simultaneous linear equations in two unknowns	☐	☐	☐	Simultaneous equations 
	Solve quadratic equations by: - factorisation - completing the square - use of the quadratic formula	☐	☐	☐	
	Change the subject of formulas	☐	☐	☐	

Rearranging formulae



Syllabus content	What do you know?	R	A	G	Comments
Inequalities	Represent and interpret inequalities, including on a number line	☐	☐	☐	Inequalities and regions in a plane 
	Construct, solve and interpret linear inequalities	☐	☐	☐	
	Represent and interpret linear inequalities in two variables graphically	☐	☐	☐	
	List inequalities that define a given region	☐	☐	☐	
Sequences	Continue a given number sequence or pattern	☐	☐	☐	
	Recognise patterns in sequences, including the term-to-term rule	☐	☐	☐	
	Recognise relationships between different sequences - linear sequences - quadratic sequences - cubic sequences - exponential sequences - simple combinations of these - Find and use the nth term of sequences	☐	☐	☐	
Proportion	Express direct proportion in algebraic terms	☐	☐	☐	
	Express inverse proportion in algebraic terms	☐	☐	☐	
	Use algebraic expressions of direct and indirect proportion to find unknown quantities	☐	☐	☐	

Syllabus content		What do you know?	R	A	G	Comments
Graphs in practical situations	Use and interpret graphs in practical situations including:		☐	☐	☐	
	- travel graphs - conversion graphs					
	Draw graphs from given data		☐	☐	☐	
	Apply the idea of rate of change to simple kinematics involving:		☐	☐	☐	
	- distance–time graphs - speed–time graphs - acceleration and deceleration					
	Calculate distance travelled as area under a speed–time graph		☐	☐	☐	
Graphs of functions	Construct tables of values, and draw, recognise and interpret graphs for functions of the following forms:		☐	☐	☐	
	ax^n (includes sums of no more than three of these) where $n = -2, -1, -\frac{1}{2}, 0, \frac{1}{2}, 1, 2, 3$ and a is a rational number $ab^x + c$ where a and c are rational numbers and b is a positive integer					
	Solve associated equations graphically, including finding and interpreting roots by graphical methods		☐	☐	☐	
	Draw and interpret graphs representing exponential growth and decay problems		☐	☐	☐	
Sketching curves	Recognise, sketch and interpret graphs of the following functions:		☐	☐	☐	 Curved graphs Quadratic (parabola) and finding gradients by differentiation.
	- linear - quadratic - cubic - reciprocal - exponential (knowledge of turning points, roots, symmetry, vertical and horizontal asymptotes is required)					

Syllabus content	What do you know?	R	A	G	Comments
Differentiation	Estimate gradients of curves by drawing tangents	☐	☐	☐	
	Use the derivatives of functions of the form ax^n , where a is a rational constant and n is a positive integer or zero, and simple sums of not more than three of these	☐	☐	☐	
	Apply differentiation to gradients and stationary points (turning points)	☐	☐	☐	
	Discriminate between maxima and minima by any method	☐	☐	☐	
Functions	Understand functions, domain and range and use function notation	☐	☐	☐	
	Understand and find inverse functions $f^{-1}(x)$	☐	☐	☐	
	Form composite functions as defined by $gf(x) = g(f(x))$	☐	☐	☐	

3. Coordinate geometry

Syllabus content	What do you know?	R	A	G	Comments
Coordinates	Use and interpret Cartesian coordinates in two dimensions	☐	☐	☐	Linear Functions (Straight lines) 
Drawing linear graphs	Draw straight-line graphs for linear equations	☐	☐	☐	
Gradient of linear graphs	Find the gradient of a straight line	☐	☐	☐	
	Calculate the gradient of a straight line from the coordinates of two points on it	☐	☐	☐	
Length and midpoint	Calculate the length of a line segment	☐	☐	☐	
	Find the coordinates of the midpoint of a line segment	☐	☐	☐	
Equations of linear graphs	Interpret and obtain the equation of a straight-line graph	☐	☐	☐	

Syllabus content	What do you know?	R	A	G	Comments
Parallel lines	Find the gradient and equation of a straight line parallel to a given line	☐	☐	☐	
Perpendicular lines	Find the gradient and equation of a straight line perpendicular to a given line	☐	☐	☐	

4. Geometry

Syllabus content	What do you know?	R	A	G	Comments
Geometrical terms	Use and interpret the following geometrical terms: • point • vertex • line • plane • parallel • perpendicular • perpendicular bisector • bearing • right angle • acute, obtuse and reflex angles • interior and exterior angles • similar • congruent • scale factor	☐	☐	☐	
	Use and interpret the vocabulary of: • triangles • special quadrilaterals • polygons • nets • solids	☐	☐	☐	
	Use and interpret the vocabulary of a circle	☐	☐	☐	

Syllabus content		What do you know?	R	A	G	Comments
Geometrical constructions	Measure and draw lines and angles					
	Construct a triangle, given the lengths of all sides, using a ruler and pair of compasses only					
	Draw, use and interpret nets					
Scale drawings	Draw and interpret scale drawings					
	Use and interpret three-figure bearings					
Similarity	Calculate lengths of similar shapes					Similar Shapes 
	Use the relationships between lengths and areas of similar shapes and lengths, surface areas and volumes of similar solids					
	Solve problems and give simple explanations involving similarity					
Symmetry	Recognise line symmetry and order of rotational symmetry in two dimensions					
	Recognise symmetry properties of prisms, cylinders, pyramids and cones					
Angles	Calculate unknown angles and give simple explanations using the following geometrical properties: • sum of angles at a point = 360° • sum of angles at a point on a straight line = 180° • vertically opposite angles are equal • angle sum of a triangle = 180° • angle sum of a quadrilateral = 360°					
	Know and use angle properties of regular and irregular polygons <i>(you are expected to use the correct geometrical terminology when giving reasons for answers)</i>					

Syllabus content	What do you know?	R	A	G	Comments
Circle theorems I	Calculate unknown angles and give explanations using the following geometrical properties of circles: • angle in a semicircle = 90° • angle between tangent and radius = 90° • angle at the centre is twice the angle at the circumference • angles in the same segment are equal • opposite angles of a cyclic quadrilateral sum to 180° (supplementary) • alternate segment theorem <i>(you are expected to use these geometrical properties when giving reasons for answers)</i>	☐	☐	☐	
Circle theorems II	Use the following symmetry properties of circles: • equal chords are equidistant from the centre • the perpendicular bisector of a chord passes through the centre • tangents from an external point are equal in length <i>(you are expected to use these geometrical properties when giving reasons for answers)</i>	☐	☐	☐	

5. Mensuration

Syllabus content	What do you know?	R	A	G	Comments
Units of measure	Use metric units of: • mass • length • area • volume • capacity in practical situations	☐	☐	☐	
	Convert quantities into larger or smaller units	☐	☐	☐	

Syllabus content	What do you know?	R	A	G	Comments
Area and perimeter	Carry out calculations involving the perimeter and area of a: - rectangle - triangle - parallelogram - trapezium				
Circles, arcs and sectors	Carry out calculations involving the circumference and area of a circle				
	Carry out calculations involving arc length and sector area as fractions of the circumference and area of a circle				
Surface area and volume	Carry out calculations and solve problems involving the surface area and volume of a: - cuboid - prism - cylinder - sphere - pyramid - cone				
Compound shapes and parts of shapes	Carry out calculations and solve problems involving perimeters and areas of: - compound shapes - parts of shapes				
	Carry out calculations and solve problems involving surface areas and volumes of: - compound solids - parts of solids				

6. Trigonometry

Syllabus content	What do you know?	R	A	G	Comments
Pythagoras' theorem	Know and use Pythagoras' theorem	☐	☐	☐	
Right-angled triangles	Know and use the sine, cosine and tangent ratios for acute angles in calculations involving sides and angles of a right-angled triangle	☐	☐	☐	 Trig ratios Sine rule Cosine rule
	Solve problems in two dimensions using Pythagoras' theorem and trigonometry	☐	☐	☐	
	Know that the perpendicular distance from a point to a line is the shortest distance to the line	☐	☐	☐	
	Carry out calculations involving angles of elevation and depression	☐	☐	☐	
Exact trigonometric values	Know the exact values of: $\sin x$ for $x = 0^\circ, 30^\circ, 45^\circ, 60^\circ$ and 90° $\cos x$ for $x = 0^\circ, 30^\circ, 45^\circ, 60^\circ$ and 90° $\tan x$ for $x = 0^\circ, 30^\circ, 45^\circ$ and 60°	☐	☐	☐	
Trigonometric functions	Recognise, sketch and interpret the following graphs for $0^\circ \leq x \leq 360^\circ$: $y = \sin x$ $y = \cos x$ $y = \tan x$	☐	☐	☐	
	Solve trigonometric equations involving $\sin x$, $\cos x$ or $\tan x$, for $0^\circ \leq x \leq 360^\circ$	☐	☐	☐	
Non-right-angled triangles	Use the sine rule in calculations involving lengths and angles for any triangle	☐	☐	☐	
	Use the cosine rule in calculations involving lengths and angles for any triangle	☐	☐	☐	
	Use the formula area of triangle = $\frac{1}{2}ab \sin C$	☐	☐	☐	
Pythagoras' theorem and trigonometry in 3D	Carry out calculations and solve problems in three dimensions using Pythagoras' theorem and trigonometry, including calculating the angle between a line and a plane	☐	☐	☐	

7. Transformations and vectors

Syllabus content	What do you know?	R	A	G	Comments
Transformations	Recognise, describe and draw the following transformations: • Reflection of a shape in a straight line • Rotation of a shape about a centre through multiples of 90° • Enlargement of a shape from a centre by a scale factor • Translation of a shape by a vector $\begin{pmatrix} x \\ y \end{pmatrix}$	☐	☐	☐	
Vectors in two dimensions	Describe a translation using a vector represented by $\begin{pmatrix} x \\ y \end{pmatrix}$, $\overrightarrow{AB}$ or $\mathbf{a}$	☐	☐	☐	
	Add and subtract vectors	☐	☐	☐	
	Multiply a vector by a scalar	☐	☐	☐	
Magnitude of a vector	Calculate the magnitude of a vector $\begin{pmatrix} x \\ y \end{pmatrix}$ as $\sqrt{x^2 + y^2}$	☐	☐	☐	
Vector geometry	Represent vectors by directed line segments	☐	☐	☐	
	Use position vectors	☐	☐	☐	
	Use the sum and difference of two or more vectors to express given vectors in terms of two coplanar vectors	☐	☐	☐	
	Use vectors to reason and to solve geometric problems	☐	☐	☐	

8. Probability

Syllabus content	What do you know?	R	A	G	Comments
Introduction to probability	Understand and use the probability scale from 0 to 1	☐	☐	☐	
	Understand and use probability notation	☐	☐	☐	
	Calculate the probability of a single event	☐	☐	☐	
	Understand that the probability of an event not occurring = $1 -$ the probability of the event occurring	☐	☐	☐	
Relative and expected frequencies	Understand relative frequency as an estimate of probability	☐	☐	☐	
	Calculate expected frequencies	☐	☐	☐	
Probability of combined events	Calculate the probability of combined events using, where appropriate: - sample space diagrams - Venn diagrams - tree diagrams	☐	☐	☐	
Conditional probability	Calculate conditional probability using Venn diagrams, tree diagrams and tables	☐	☐	☐	

9. Statistics

Syllabus content	What do you know?	R	A	G	Comments
Classifying statistical data	Classify and tabulate statistical data	☐	☐	☐	
Interpreting statistical data	Read, interpret and draw inferences from tables and statistical diagrams	☐	☐	☐	
	Compare sets of data using tables, graphs and statistical measures	☐	☐	☐	
	Appreciate restrictions on drawing conclusions from given data	☐	☐	☐	

Syllabus content	What do you know?	R	A	G	Comments
Averages and measures of spread	Calculate the: - mean - median - mode - quartiles - range - interquartile range for individual data and distinguish between the purposes for which these are used	☐	☐	☐	
	Calculate an estimate of the mean for: - grouped discrete data - grouped continuous data	☐	☐	☐	
	Identify the modal class from a grouped frequency distribution	☐	☐	☐	
Statistical charts and diagrams	Draw and interpret: - bar charts - pie charts - pictograms - stem-and-leaf diagrams - simple frequency distributions	☐	☐	☐	
Scatter diagrams	Draw and interpret scatter diagrams	☐	☐	☐	
	Understand what is meant by positive, negative and zero correlation	☐	☐	☐	
	Draw by eye, interpret and use a straight line of best fit	☐	☐	☐	
Cumulative frequency diagrams	Draw and interpret cumulative frequency tables and diagrams	☐	☐	☐	
	Estimate and interpret the median, percentiles, quartiles and interquartile range from cumulative frequency diagrams	☐	☐	☐	
Histograms	Draw and interpret histograms	☐	☐	☐	
	Calculate with frequency density	☐	☐	☐	