Topic: 1 Algebraic Manipulation

Learning Outcomes and Scaffolding

11.1.1 Take out common factors
- Single numerical factor: $4x + 8$
- Numerical and algebraic factor: $3x - 9x^3$
- Linear factor: $(x - 1)(3x - 2) + (x - 1)(x + 9)$

11.1.2 Expand the product of two simple linear expressions
- Emphasize the distributive property: $(a + b)(c + d) = a(c + d) + b(c + d)$

11.1.3 Understand the concept of a quadratic expression and be able to factorise such expressions (limited to $x^2 + bx + c$)
- Ensure all combinations of negatives are examined

Topic: 2 Linear Equations

Learning Outcomes and Scaffolding

11.2.1 Solve linear equations, with fractional coefficients, in one unknown in which the unknown appears on either side or both sides of the equation
- $\frac{4x+5}{2} = 3$
- $\frac{x-2}{3} - \frac{x+1}{5} = 1$
- $\frac{1}{3}x - 2 = \frac{3}{5}(1 - 2x)$

11.2.2 solve quadratic equations by factorisation (limited to $x^2 + bx + c$)

11.2.3 Calculate the exact solution of two simultaneous equations in two unknowns
- Solve simple problems where only one equation needs to be changed
- Solve problems where both equations need to be changed
- Solve problems in context

Topic: 3 Statistical Measures

Learning Outcomes and Scaffolding

11.3.1 Calculate an estimate for the mean for grouped data
- Also look at finding the total of the frequency and the distinction between this and the mean

11.3.2 Identify the modal class for grouped data

Topic: 4 Expressions and Formulae

Learning Outcomes and Scaffolding

11.4.1 Use formulae from mathematics and other real-life contexts expressed initially in words or diagrammatic form and convert to letters and symbols

11.4.2 Derive a formula or expression

11.4.3 Change the subject of a formula where the subject appears once

- Make r the subject of $A = \pi r^2$
- Make t the subject of $v = u + at$

Topic: 5 Graphs

Learning Outcomes and Scaffolding

11.5.1 Interpret information presented in a range of linear and non-linear graphs

- Financial graphs – possibly currencies or stock markets
- Speed/time graphs
- Distance/time graphs

11.5.2 Determine the coordinates of the midpoint of a line segment, given the coordinates of the two end points

- Also ask for an end point given the start and the mid-point

11.5.3 Draw and interpret straight line conversion graphs

- Look at currency conversion graphs

11.5.4 Find the gradient of a straight line

- Gradient is the distance travelled in the y-direction after going 1 unit in the x-direction
- Gradient = (increase in y) ÷ (increase in x)

11.5.5 Recognise that equations of the form y = mx + c are straight line graphs with gradient m and intercept on the y-axis at the point (0, c)

- Write down the gradient and coordinates of the y-intercept of $y = 3x + 5$
- Write down the equation of the straight line with gradient 6 that passes through the point $(0, 2)$

Topic: 6 Probability

Learning Outcomes and Scaffolding

11.6.1 Use the addition rule of probability for mutually exclusive events

- Use the 'OR' rule to find probabilities different events

11.6.2 Understand and use the term expected frequency

Topic: 7 Polygons

Learning Outcomes and Scaffolding

11.7.1 Know the term 'regular polygon' and calculate interior and exterior angles of regular polygons
- Identify regular and irregular polygons
- Identify the exterior and interior angles of a polygon
- Find the exterior angle of a polygon using the formula

11.7.2 Know and use the angle sum of polygons
- For a polygon with n sides, the sum of the interior angles is $(2n-4)$ right angles

11.7.3 Know congruence as meaning the same shape and size

11.7.4 Know that two or more polygons with the same shape and size are said to be congruent to each other

Topic: 8 Set Language and Set Notation

Learning Outcomes and Scaffolding

11.8.1 Understand the definition of a set

11.8.2 Use the set notation $\cup, \cap, \in$ & $\notin$
- Also included is the universal set ξ
- And the empty set $\emptyset$

11.8.3 Understand the concept of the Universal Set and the Empty Set and the symbols for these sets

11.8.4 Understand and use the complement of a set
- Use the notation A'

11.8.5 Use Venn diagrams to represent sets

Topic: 9 Standard Form

Learning Outcomes and Scaffolding

11.9.1 Calculate with and interpret numbers in the form $a \times 10^n$ where n is an integer and $1 \leq a < 10$

Topic: 10 Inequalities

Learning Outcomes and Scaffolding

11.10.1 Understand and use the symbols $>, <, \geq$ and $\leq$
- π Write inequalities using the notation from context

11.10.2 Understand and use the convention for open and closed intervals on a number line
- π Express inequalities on a number line for intervals

11.10.3 Solve simple linear inequalities in one variable and represent the solution set on a number line
- π Solve linear inequalities in one variable expressing the solution on a number line or as a list of integers
- π Solve an enclosed interval: $-4 < 2x + 2 < 20$

11.10.4 Represent simple linear inequalities on rectangular cartesian graphs
- π Plot single lines and identify which direction the inequality lies

11.10.5 Identify regions on rectangular cartesian graphs defined by simple linear inequalities
- π Identify regions formed by the axes, one diagonal line and one horizontal/vertical line

Topic: 11 Measures

Learning Outcomes and Scaffolding

11.11.1 Understand and use the relationship between average speed, distance and time
- π Apply the formula both with numbers and algebraically
- π Solve problems with changes to units. I.e. time given in minutes but speed in km/h

11.11.1 Use compound measure such as speed, density and pressure
- π Know the formulae for speed, density and pressure and what they mean in context
- π Identify the formulae from the units of the calculation

Topic: 12 Trigonometry and Pythagoras' Theorem

Learning Outcomes and Scaffolding

11.12.1 Know, understand and use sine, cosine and tangent of acute angles to determine lengths and angles of a right-angled triangle

11.12.2 Apply trigonometrical methods to solve problems in two dimensions
- π Solve problems in context involving both Pythagoras' Theorem and Trigonometry

Topic: 13 Graphs

Learning Outcomes and Scaffolding

11.13.1 Recognise, generate points and plot graphs of linear and quadratic functions

- π Know the common features of a linear graph, y-intercept and gradient and be able to use these on the grid
- π Use the calculator to create a table of values for drawing the graph
- π Know that a quadratic graph is symmetrical and use it to help you find the coordinates

Topic: 14 Circle Properties

Learning Outcomes and Scaffolding

11.14.1 Understand chord and tangent properties of circles

Topic: 15 Similarity

Learning Outcomes and Scaffolding

11.15.1 Understand and use the geometrical properties that similar figures have corresponding lengths in the same ratio but corresponding angles remain unchanged

- π Know the mathematical definition of the word 'similar'
- π Identify the scale factor between similar shapes and use to calculate missing sides

11.15.2 Use and interpret maps and scale drawings

- π Use a ratio to describe the scale of a drawing
- π Calculate lengths from maps and scale drawings
- π Calculate lengths which involve different units

Topic: 16 3D Shapes and Volume

Learning Outcomes and Scaffolding

11.16.1 Convert between units of volume within the metric system

- π Convert between mm^3, cm^3, m^3 & km^3

Topic: 17 Degree of Accuracy

Learning Outcomes and Scaffolding

11.17.1 Identify upper and lower bounds where values are given to a degree of accuracy

11.17.2 Use estimation to evaluate approximations to numerical calculations

- π By rounding to 1 significant figure