Checkpoint Maths Scheme of Work

Year 2

Unit 5:   Algebra

Key Learning Outcomes
Pupils should be able to:
- simplify or transform linear expressions by collecting like terms; multiply a single term over a bracket
- substitute integers into simple formulae; construct and solve linear equations
- construct and solve linear inequalities
- plot the graphs of linear functions in the form $y = mx + c$; find the gradient
- find position-to-term rules for sequences of numbers.

Links
The Checkpoint curriculum references are given in the Learning outcomes column.
IGCSE Syllabus Topics 1, 17, 18, 19, 20, 21, 24.
Chapter references in *Checkpoint Maths 11-14 (Book 2) by Ric Pimental and Terry Wall* are given in the Resources column.

Vocabulary
The vocabulary listed for Unit 2 is assumed in addition to the words listed below.

Cubic, difference pattern, directly proportional, general term, gradient (m), greater than (>), less than (<), position-to-term rule, quadratic, trial and improvement, *y*-intercept (c).

	Learning Outcomes	Suggested Teaching Activities	Resources
An1	Simplify or transform linear expressions by collecting like terms. Factorise simple expressions; transform simple formulae. Evaluate formulae, including quadratic and cubic expressions.	Revise the meaning of the terms expression, equation and formula. Find out which formulae are being used in other subjects and discuss how these are used (e.g. Pressure = force per unit area, Population density = population per unit area). Devise formulae for the perimeter, area and volume of different shapes, first using words, and then letters. Transform these formulae so that lengths can be found given areas etc.	*Checkpoint Maths 11-14 (Book 2) Chapter 12* *Checkpoint Maths 11-14 (Book 2) Chapter 17*
An2	Construct and solve linear equations.	Set up some simple equations from real life situations. Find different methods of solving the equations, such as trial and improvement, cover up or recognition, number machines or flow diagrams, balancing both sides. Progress to general rules that can be applied to more complicated equations, encouraging correct setting out of the solution every time. Give plenty of practice at this point.	http://illuminations.nctm.org/lessonplans/6-8/bridges/index.html *Checkpoint Maths 11-14 (Book 2) Chapter 7*
An3	Understand and use inequality signs. Represent the solution set on a number line.	Collect practical examples such as the number of students in the classroom has to be less than or equal to the number of chairs, or that the number of people allowed in a lift is less than or equal to a given number.	Go to www.learn.co.uk and follow links through lessons? Maths? keystage3? Algebra *Checkpoint Maths 11-14 (Book 2) Chapter 11*
Ag1	Construct tables of values and plot graphs of linear functions, where y is given explicitly in terms of x; recognise that equations of the form $y = mx + c$ correspond to straight line graphs. Find the gradient of a straight-line graph.	As a whole class activity solve problems like, 'think of a number, multiply by 2, add 3 and write down the answer'. Construct tables of the input number and the answer. Plot a graph of 'answer' against 'input number'. Investigate the properties of the resulting lines and use the lines to predict the answer from other input numbers (and vice-	*Checkpoint Maths 11-14 (Book 2) Chapter 21*

	Learning Outcomes	Suggested Teaching Activities	Resources
	Rearrange linear equations into the form $y = mx + c$ and know the significance of the numbers m and c.	versa). Progress to using letters. Show that the points on the line are the only ones to satisfy the equation, including decimal values. Define gradient as a measure of the steepness of a sloping line. Draw line segments on squared paper and find their gradients by counting squares. Progress to linear graphs with equal scales on each axis and find their gradients and y-intercepts. Investigate the connection with the equation for each graph.	
Ag2	Draw and interpret the graphs of linear functions arising from practical situations. Recognise when two quantities are directly proportional.	Plot the results from simple experiments such as stretching a spring and measuring length against mass, or burning a candle and measuring length against time. Compare graphs of the forms $y=mx$ and $y=mx+c$ to understand direct proportion.	Some ideas at: http://www.nottingham.ac.uk/education/shell/graphs.htm
Ag5	Recognise and continue number patterns; find term-to-term and position-to-term rules.	Devise number patterns from sequences of geometrical shapes. Obtain the rules and check by continuing the patterns for further terms in the sequence.	See Matchstick sequencing at: http://www.bgfl.org/bgfl/index.cfm?s=1&m=220&p=136,view_resource&id=102