

## Checkpoint Maths Scheme of Work

### Year 3

### Unit 8: Algebra

#### Key Learning Outcomes

Pupils should be able to:

- manipulate simple algebraic expressions; expand and simplify the product of two linear expressions
- solve a pair of simultaneous equations; solve simple quadratic equations by factorisation
- construct and solve linear inequalities
- use the index laws for multiplication and division of positive integer powers
- draw and interpret quadratic and cubic functions; find the gradient of a straight line

#### Links

The Checkpoint curriculum references are given in the Learning outcomes column.

IGCSE Syllabus Topics 18, 21, 23, 24.

Chapter references in *Checkpoint Maths 11-14 (Book 3)* by Ric Pimental and Terry Wall are given in the Resources column.

#### Vocabulary

The vocabulary listed for Units 2 and 5 is assumed in addition to the words listed below.

Algebraic fraction, cubic function, factorise, inequality, quadratic equation, quadratic function, simultaneous equation.

Learning Outcomes		Suggested Teaching Activities	Resources
An1 An4	<p>Simplify, factorise or transform algebraic expressions; add simple algebraic fractions (<math>x/2 + x/5</math>).</p> <p>Expand the product of two simple linear expressions and simplify the corresponding quadratic expression.</p>	<p>Revise the meanings of the words term, expression, numerator and denominator.</p> <p>Revise addition of fractions.</p> <p>Demonstrate that 'the sign belongs to the term that follows it' and that if this rule is obeyed expressions may be written in different orders before simplification. Find a convenient order of work when expanding pairs of brackets.</p>	
An2 Ag4	<p>Solve a simple pair of simultaneous equations algebraically or graphically.</p> <p>Solve simple quadratic equations by factorisation.</p>	<p>Revise drawing graphs. Show that there are many 'solutions' to equations in two variables. Emphasise that all the points satisfying a given equation lie on the line and nowhere else.</p> <p>Show that if two lines are not parallel then it is possible to find a point that satisfies them both at once (where the lines cross). Start by solving pairs of linear simultaneous equations graphically to find in each case the only point that satisfies them both at once. Find ways of solving these algebraically and check that the results agree with the graphical ones.</p> <p>Draw graphs of simple quadratic equations and introduce the word 'root' as meaning those values of <math>x</math> that make <math>y</math> equal to zero. Move on to factorising the quadratic equations already used. Treat the factorisation as a puzzle that involves trial and error. Show that the only way two things can be multiplied to give zero is if one of them is zero. Hence solve these equations algebraically.</p>	<p>Ideas for simultaneous and quadratic equations at: <a href="http://math-equation.net">http://math-equation.net</a></p> <p>Also at <a href="http://www.learn.co.uk">www.learn.co.uk</a> (follow links through lessons? Maths? keystone3? algebra)</p> <p><i>Checkpoint Maths 11-14 (Book 3) Chapter 7</i></p> <p><i>Checkpoint Maths 11-14 (Book 3) Chapter 12</i></p> <p><i>Checkpoint Maths 11-14 (Book 3) Chapter 17</i></p> <p>For extension work see: <i>Checkpoint Maths 11-14 (Book 3) Chapter 22</i></p>
An3	<p>Construct and solve simple linear inequalities in one variable.</p> <p>Represent the solution set on a number</p>	<p>Use graded examples and solve in an identical way to linear equations, pointing out that multiply or dividing both sides by a negative number reverses the inequality sign.</p>	<p>Go to <a href="http://www.learn.co.uk">www.learn.co.uk</a> and follow links through lessons? Maths? keystone3? Algebra</p> <p><i>Checkpoint Maths 11-14 (Book 3) Chapter 16</i></p>

Learning Outcomes		Suggested Teaching Activities	Resources
	line.		
An5	Use positive index notation for integer powers; apply the index laws for multiplication and division to simple expressions.	<p>Revise integer notation as a shorthand form of multiplication.</p> <p>Devise and state rules for multiplying and dividing numbers in index form. Progress to slightly more complicated algebraic forms.</p>	<i>Checkpoint Maths 11-14 (Book 3) Chapter 1</i>
Ag1	Draw and interpret the graphs of simple quadratic and cubic functions.	Draw graphs of simple quadratic equations and also cubic equations. Discuss the general shapes of the graphs and predict the shape expected from each equation. Learn to recognise when a point may have been plotted incorrectly.	<p><a href="http://www.mathsnet.net/nns/index.html">www.mathsnet.net/nns/index.html</a></p> <p>Use this site to aid discussion of shapes:  <a href="http://xanadu.math.utah.edu/java/CubicGraph.html">http://xanadu.math.utah.edu/java/CubicGraph.html</a></p>