

## Activity 4

### Teacher checklist

#### Pure Mathematics 1

	R/A/G
Quadratics	
Using the discriminant	
Solving inequalities	
Solving simultaneous equations with one linear equation	
Functions	
Determine the range of a function	
Composite functions	
Inverse functions	
Coordinate geometry	
Finding equation of straight line	
Using parallel and perpendicular lines	
Graphical interpretation of algebraic expressions	
Circular measure	
Radian measurement	
Arc length and sector area of a circle	
Trigonometry	
Sketching trigonometric functions	
Using simple trigonometric identities	
Solving simple trigonometric equations in a specified interval	
Vectors	
Unit vectors, displacement vectors and position vectors	
Magnitude of a vector	
Use of scalar product to determine angles between two directions	
Series	
Expansion of the $(a + b)^n$ , $n$ a positive integer	
Arithmetic progressions, including sum of the first $n$ terms	
Geometric progressions, including sum of the first $n$ terms and the sum to infinity for convergent geometric progressions	
Differentiation	
Differentiation of simple functions	
Use of the Chain Rule	
Applying differentiation to geometric and practical situations	
Locating and identifying stationary points, including sketching graphs	
Integration	
Integration of simple functions	
Solving problems involving the evaluation of the constant of integration	
Evaluation of definite integrals	
Use of integration to calculate the area of a region and the volume of revolution	

**Pure Mathematics 3**

	R/A/G
<b>Algebra</b>	
Calculating and using the modulus to solve equations and inequalities	
Division of a polynomial by another polynomial	
Use of the factor theorem	
Use of the remainder theorem	
Finding partial fractions	
Use of the binomial expansion where $n$ is a rational number and $ x  < 1$	
<b>Logarithmic and exponential functions</b>	
Use of the laws of logarithms	
Properties of $e^x$ and $\ln x$	
Solving equations and equalities in the form $a^x = b$	
Using logarithms to transform relationships into linear form to solve problems	
<b>Trigonometry</b>	
Use of secant, cosecant and cotangent	
Using trigonometric identities and formulae to simplify expressions or in the course of solving equations	
<b>Differentiation</b>	
Differentiation of $e^x$ , $\ln x$ , $\sin x$ , $\cos x$ and $\tan x$	
Differentiation of products and quotients	
First derivative of functions defined parametrically or implicitly	
<b>Integration</b>	
Integration of more complex functions, including trigonometric	
Use of trigonometric identities within integration	
Use of partial fractions within integration	
Integration by parts	
Use of substitution within integration	
Use of trapezium rule to estimate definite integrals, interpreting the result	
<b>Numerical solution of equations</b>	
Location of a root	
Understand and use an iterative formula	
<b>Vectors</b>	
Determination of the geometrical relationship between two lines	
Find angle between two lines and any point of intersection	
Vector equation of a plane	
Use of equations of lines and planes to solve geometrical problems	
<b>Differential equations</b>	
Formulate differential equations	
Solve differential equations and interpret the solution as a model	
<b>Complex numbers</b>	
Relationship between complex numbers	
Manipulation of complex numbers expressed in Cartesian form	
Use of Argand diagram, including illustrating simple equations or inequalities and geometrical effects of complex number operations	
Manipulation of complex numbers expressed in polar form	

**Mechanics 1**

	R/A/G
Forces and equilibrium	
Identifying forces	
Calculating components	
Use of the properties of equilibrium	
Use of the model of smooth contact	
Limiting friction and limiting equilibrium	
Use of Newton's third law	
Kinematics of motion in a straight line	
Use of scalar and vector properties as appropriate	
Sketching and use of displacement-time and velocity-time graphs	
Use of differentiation and integration with respect to time to solve problems (limited to Pure 1 content)	
Use of formulae for motion with constant acceleration in a straight line	
Newton's laws of motion	
Apply Newton's law of motion in linear situations	
Relationship between mass and weight	
Solving simple problems modelled as motion of a particle vertically or on an inclined plane with constant acceleration	
Solving simple problems which may be modelled as the motion of two particles connected by a light inextensible string	
Energy, work and power	
Calculating the work done by a constant force when its point of application undergoes displacement	
Understanding and using the concepts of gravitational potential energy and kinetic energy	
Applying the principle of conservation of energy	

**Statistics 1**

	R/A/G
<b>Representation of Data</b>	
Construct and use stem-and-leaf diagrams, box-and-whisker plots, histograms and cumulative frequency graphs	
Use different measures of central tendency and variation to compare sets of data	
Use cumulative frequency graphs	
Calculate mean and standard deviation of a set of data or from coded data	
<b>Permutations and combinations</b>	
Solve simple problems involving selections	
Solve problems about arrangements of objects in a line, including those involving restrictions or repetitions	
<b>Probability</b>	
Evaluate simple cases by enumeration or by using permutations or combinations	
Use addition and multiplication of probabilities	
Determining exclusive or independent events	
Calculate and use conditional probabilities	
Discrete random variables	
Construct a probability distribution table	
Calculate $E(X)$ and $Var(X)$	
Apply the formulae for probabilities for the binomial distribution	
Expectation and variance of the binomial distribution	
<b>The normal distribution</b>	
Understand the conditions for the normal distribution	
Solve problems involving the normal distribution, including the use of normal distribution tables	
Identify the conditions where the normal distribution can be used as an approximations to the binomial distribution in order to solve problems	