

Geometry Proof and Systems of Equations

1.1 Applying algebraic skills to matrices and systems of equations	VG	OT	NS
Understand terms: matrix, element, row, column, order, identity matrix, inverse, determinant, singular, non-singular and transpose.			
Add, subtract, multiply and equate matrices.			
Know properties: $A+B=B+A$ but $A \times B \neq B \times A$ $(AB)C=A(BC)$ $A(B+C)=AB+AC$ $(A')'=A$ $(A+B)'=A'+B'$ $(AB)'=B'A'$ $AB^{-1}=B^{-1}A^{-1}$ $\text{Det}(AB)=\text{det}A\text{det}B$			
Calculate the determinant of 2×2 and a 3×3 matrices.			
Find the inverse of a 2×2 and a 3×3 matrix, where these exist.			
Apply the inverse matrix to the solution of a system of equations.			
Use 2×2 matrices to represent geometrical transformations in the (x, y) plane.			
Use a matrix to organise a system of equations.			
Perform elementary row operations.			
Reduce a matrix to an upper triangular form.			
Solve a 3×3 system of equations using Gaussian Elimination on an augmented matrix.			
Find the solution to a system of linear equations given as $Ax=b$ where there is a unique solution, <i>no solution and an infinite family of solutions.</i>			
<i>Identify an ill-conditioned matrix.</i>			
Assessment mark			P/F

1.2 Applying algebraic and geometric skills to vectors	VG	OT	NS
Calculate scalar and vector products in three dimensions.			
Know that $\mathbf{a} \times \mathbf{b} = -\mathbf{b} \times \mathbf{a}$.			
Know the equation of a line in vector, parametric and symmetric forms.			
Know the equation of a plane in vector, parametric and Cartesian forms.			
Find equations of lines and planes.			
<i>Find the angle between two lines, between two planes and between a line and a plane.</i>			
<i>Find the intersection of two lines, a line and a plane and two or three planes.</i>			
Assessment mark			P/F

1.3 Applying geometric skills to complex numbers	VG	OT	NS
Evaluate the modulus and argument of a complex number.			
Convert between polar and Cartesian form of a complex number.			
<i>Use De Moivre's theorem to expand powers of complex numbers.</i>			
<i>Apply De Moivre's theorem to multiple angle formulae.</i>			
<i>Use De Moivre's theorem to find the nth roots of unity.</i>			
<i>Find the locus of a point in the complex plane.</i>			
Assessment mark			P/F

1.4 Applying Algebraic skills to number theory	VG	OT	NS
Know the division algorithm.			
Use the Euclidian Algorithm to find the greatest common divisor of two positive integers.			
<i>Express the gcd as a linear combination of two integers.</i>			
<i>Use the division algorithm to write integers in bases other than 10.</i>			
Assessment mark			P/F

1.5 Applying algebraic skills and geometric skills to methods of proof	VG	OT	NS
Recognise the need for proof in mathematics.			
Understand the terms implies (\Rightarrow), is implied by (\Leftarrow) and equivalence (\Leftrightarrow).			
Directly prove simple results.			
Disprove a conjecture by providing a counter example.			
Prove a result using the contrapositive.			
<i>Know and use the fundamental theorem of arithmetic.</i>			
Use proof by contradiction.			
Assessment mark			P/F