

Mathematics Department

Long-term sequencing Year 12 Core Pure 1

HALF TERM 1:

STUDENTS MUST KNOW:

Chapter 1: Complex numbers

- understand and use the terms 'real part' and 'imaginary part'.
- be able to add, subtract and multiply complex numbers in the form $x + iy$ with x and y real;
- understand and use the complex conjugate of a complex number;
- be able to divide two complex numbers by using the complex conjugate of the denominator;
- know that non-real roots of polynomial equations with real coefficients occur in conjugate pairs;
- be able to solve cubic or quartic equations with real coefficients.

Chapter 2: Argand diagram

- be able to use and interpret Argand diagrams.
- be able to convert between the Cartesian form and the modulus-argument form of a complex number;
- be able to multiply and divide complex numbers in modulus-argument form.
- be able to construct and interpret simple loci in the Argand diagram such as $|z - a| > r$ and $\arg(z - a) = \theta$.

Chapter 3: Series

- be able to use sigma notation;
- understand and use formulae for the sums of integers, squares and cubes;
- be able to use known formulae to sum more complex series.

HOW THIS WILL BE ASSESSED:

Recall and Retrieval tasks

End of unit assessments

HALF TERM 2:

STUDENTS MUST KNOW:

Chapter 4: Roots of polynomials

- understand and use the relationship between roots and coefficients of polynomial equations up to quartic equations.
- be able to form a polynomial equation whose roots are a linear transformation of the roots of a given polynomial equation (of at least cubic degree).

Chapter 6: Matrices

- be able to add and subtract matrices of the same dimension; be able to multiply a matrix by a scalar;
- be able to multiply conformable matrices.
- be able to calculate determinants of 2×2 and 3×3 matrices; be able to calculate the inverse of non-singular 2×2 and 3×3 matrices.
- be able to use matrices and their inverses to solve linear simultaneous equations, including three linear simultaneous equations in three variables;
- interpret simultaneous equations geometrically.

Chapter 7: Linear transformation

- be able to use matrices to represent 2D rotations, reflections, enlargements and translations;
- understand and use zero and identity matrices;
- be able to use matrix products to represent combinations of transformations;
- be able to use matrices to represent linear transformations in three dimensions;
- be able to use inverse matrices to reverse the effect of a linear transformation;
- be able to use the determinant of a matrix to determine the area scale factor of a transformation;
- be able to find invariant points and lines for a linear transformation.

Chapter 8: Proof by induction

- be able to obtain a proof for the summation of a series, using induction;
- be able to use proof by induction to prove that an expression is divisible by a certain integer;
- be able to use mathematical induction to prove general statements involving matrix multiplication.

Chapter 9: Vectors

- know how to find the vector equation of a line in both two and three dimensions;
- understand and use the Cartesian forms of an equation of a straight line in three dimensions;
- understand and use the vector and Cartesian forms of the equation of a plane; find the scalar product of two vectors;
- be able to check whether vectors are perpendicular by using the scalar product;
- be able to use the scalar product to express the equation of a plane; calculate the angle between two lines, two planes; between a line and a plane.
- be able to find the points of intersection of lines and planes which meet;
- be able to calculate the perpendicular distance between two lines ;from a point to a line or to a plane.

HOW THIS WILL BE ASSESSED:

Recall and Retrieval tasks

End of unit assessments

HALF TERM 3:

STUDENTS MUST KNOW:

Chapter 5: Volumes of revolutions

- be able to derive formulae for and calculate volumes of revolution about both the x and y-axes.

Revision

HOW THIS WILL BE ASSESSED:

Recall and Retrieval tasks

End of unit assessments

HALF TERM 4:

STUDENTS MUST KNOW:

- Revision

HOW THIS WILL BE ASSESSED:

Recall and Retrieval tasks

HALF TERM 5:

STUDENTS MUST KNOW:

- Revision

Start Year 13 content CP2

Chapter 1: Complex numbers

- be able to multiply and divide complex numbers in modulus-argument and exponential form;
- know and use cosine and sine in terms of the exponential form.
- understand, remember and be able to use de Moivre's theorem: $z^n = r^n e^{in\theta} = r^n (\sin n\theta + i \cos n\theta)$;
- be able to derive multiple angle formulae/expressions e.g. $\cos 3\theta$ in terms of powers of $\cos \theta$, and $\sin^3 \theta$ in terms of multiple angles of $\sin \theta$;
- be able to apply de Moivre's theorem to sum a geometric series.
- know how to solve completely equations of the form $z^n - a - ib = 0$, giving special attention to cases where $a = 1, b = 0$.

HOW THIS WILL BE ASSESSED:

Recall and Retrieval tasks

End of unit assessments.

HALF TERM 6:

STUDENTS MUST KNOW:

- Revision and Review

HOW THIS WILL BE ASSESSED:

Recall and Retrieval tasks