

Maths

Mathematics: working hard together, achieving together, making every lesson count

The Mathematics Department will provide students with exciting, relevant and challenging Mathematics, delivered by dedicated staff.

Students will understand the underlying principles of the mathematics they learn, making links and developing reasoning skills and logical thinking.

They will progress towards being independent mathematicians who can identify correct and incorrect work for themselves.

Students will have their confidence encouraged and their complacency challenged in order to maximise potential.

Autumn		Spring		Summer	
Similarity Congruence Vectors	Completing the square to sketch curves Iteration Set Theory	Applied Handling Data Applied Number Applied Shape & Space Applied Algebra	Personalised exam Preparation: Knowledge and Understanding Enhancement	Personalised exam Preparation: Knowledge and Understanding Enhancement	Exams

Students will receive one piece of homework per week that will be marked and returned to the student at the next available opportunity. The piece of work will be designed to last between 1 hour and 1 and a half hours. Unless otherwise stated by the teacher, students should complete homework in their book and show all working out. Homework could take a variety of formats including:

- Worksheet
- Research Project
- Mymaths
- Revision
- Exam Practice

Unit	Duration (lessons)	Learning Objectives/Outcomes
Similarity	8	<ul style="list-style-type: none"> • Understand the effect of enlargement for perimeter, area and volume of shapes and solids • Understand that enlargement does not have the same effect on area and volume • Use simple examples of the relationship between enlargement and areas and volumes of simple shapes and solids • Use the effect of enlargement on areas and volumes of shapes and solids • Know the relationships between linear, area and volume scale factors of mathematically similar shapes and solids
Congruence & Similarity	4	<ul style="list-style-type: none"> • Recognise that all corresponding angles in similar figures are equal in size when the lengths of sides are not • Understand and use SSS, SAS, ASA and RHS conditions to prove the congruence of triangles using formal arguments, and to verify standard ruler and a pair of compasses constructions • Understand similarity of triangles and of other plane figures, and use this to make geometric inferences • Complete a formal geometric proof of similarity of two given triangles
Vectors & Vector Geometry	8	<ul style="list-style-type: none"> • Understand and use vector notation • Calculate, and represent graphically, the sum of two vectors, the difference of two vectors and a scalar multiple of a vector • Calculate the resultant of two vectors • Solve geometrical problems in 2-D using vector methods • Apply vector methods for simple geometrical proofs

Plotting Complex Functions Transforming $y = f(x)$ Incl. Exponential Growth & Decay	8	<ul style="list-style-type: none"> • Plot graphs of simple cubic functions, the reciprocal function $y = 1/x$ with $x \neq 0$, the exponential function $y = kx$ for integer values of x and simple positive values of k, the circular functions $y = \sin x$ and $y = \cos x$, within the range -360° to $+360^\circ$ • Recognise the characteristic shapes of all these functions • Draw and plot a range of mathematical functions • Interpret and analyse a range of mathematical functions and be able to draw them, recognising that they were of the correct shape • Apply to the graph of $y = f(x)$ the transformations $y = f(x) + a$, $y = f(ax)$, $y = f(x + a)$, $y = af(x)$ for linear, quadratic, sine and cosine functions $f(x)$ • Select and apply the transformations of reflection, rotation, enlargement and translation of functions expressed algebraically • Interpret and analyse transformations of functions and write the functions • Algebraically • Recognise the characteristics of an exponential curve • Know and understand the principles of compound interest • Understand that powers are the variable in an exponential formula • Be able to draw a graph of $y = abx$ • Be able to use co-ordinates on a graph to determine a formula and hence solve further problems
Completing the square to sketch curves	4	<ul style="list-style-type: none"> • Know that all equations in this form are transformations of the curve $y = x^2$ • Identify minimum/maximum from an equation by comp the sq. • Determine an equation from a sketch (work backwards)
Tangents to a curve at a given point	4	<ul style="list-style-type: none"> • Use a trial and error method to find the gradient (eqn) of a tangent to a point on a given curve • Determine the gradient of a tangent to the curve $y = x^2$ using Newton's method of choosing a point very close to the given point • Investigate the process and look into differentiation

Iteration	4	<ul style="list-style-type: none"> • Use a flow diagram to generate a sequence of numbers where U_2 is found by using U_1 and so on... • Know when a sequence converges or diverges • Generate a sequence from a given iteration formula
Set Theory	4	<ul style="list-style-type: none"> • Understand sets defined in algebraic terms • Understand and use subsets • Understand and use the complement of a set • Use Venn diagrams to represent sets and the number of elements in sets • Use the notation $n(A)$ for the number of elements in set A • Use sets in practical situations
Applied Handling Data	4	<ul style="list-style-type: none"> • Data Representation • Contextualised work - Recap and application of work
Applied Number	4	<ul style="list-style-type: none"> • Number Topics • Contextualised work - Recap and application of work
Applied Shape & Space	4	<ul style="list-style-type: none"> • Shape & Space Topics • Contextualised work - Recap and application of work
Applied Algebra	4	<ul style="list-style-type: none"> • Algebra Topics • Contextualised work - Recap and application of work
Exam Preparation	4	<ul style="list-style-type: none"> • Personalised exam preparation
Knowledge & Understanding Enhancement	44	<ul style="list-style-type: none"> • Revision