Year 10 and 11 Intermediate Course Outline for school website

Students on the intermediate course will study blocks 1 to 6 across the 2 year course. Students who are likely to take a higher paper in final entry will aim to finish all six blocks around Christmas of year 11, and then top up with some higher units.

The blocks will vary in length depending on the difficulty of the topics, and so cannot be allocated into terms.

Intermediate Block 1 – Angles Objectives

Block I1 Angles Objectives
Recall and use properties of angles at a point, angles on a straight line, perpendicular lines, opposite angles at a vertex
Recognise or draw acute, obtuse, reflex and right angles.
Use parallel lines, alternate angles and corresponding angles.
Understand the consequent properties of parallelograms and proof that the angle sum of a triangle is 180^o
Understand a proof that the exterior angle of a triangle is equal to the sum of its opposite interior angles
Use angle properties of equilateral, isosceles and right angles triangles.
Understand congruence
Explain why the angle sum of a quadrilateral is 360^0
Solve and justify solutions to multistep angle problems

Intermediate Block 1 – Fractions

Block I1 Fractions Objectives
Calculate a given fraction of a quantity – expressing the answer as a fraction if needed.
Express a given number as a fraction of another
Add and subtract fractions by writing them with a common denominator (including mixed numbers)
Multiply fractions (including mixed numbers)
Divide fractions (including mixed numbers)
Calculate exactly with fractions

Intermediate Block 1 – Formulae and Expressions and Rearranging Formulae

Block I1 Formulae and Expressions and Rearranging Formulae Objectives
Simplify expressions by collecting like terms, in order to show that expressions are equivalent
Expand single brackets
Factorise expressions into single brackets
Use(**substitute** in positive and negative numbers) and generate formulae in context
Know what an **expression** is. Know the vocabulary '**terms**' '**formula**' **inequality**' '**factor**'
Use algebra to support and construct arguments
Change the subject of a formula (may appear more than once)

Intermediate Block 1 – Ratio

Block I1 Ratio Objectives
Understand and use ratios including in contexts such as maps, scale diagrams and scale factors
Divide a quantity in a given ratio
Identify and work with fractions in ratio problems

Intermediate Block 1 – Proportion

Block I1 Proportion Objectives
Solve problems involving direct (y/x = k) proportion using algebraic and graphical approaches
Solve problems involving inverse (indirect) proportion (xy = k) using algebraic and graphical approaches
Interpret equations that describe direct and inverse proportion
Recognise and interpret graphs that illustrate direct and inverse proportion

Intermediate Block 2 – Calculate with decimals

Block I2 Calculate with Decimals Objectives
Multiply with decimals with up to 2 decimal places
Divide with decimals with up to 2 decimal places
Solve problems with decimals involving multiplication and division by decimals with up to 2 decimal places

Intermediate Block 2 – Accuracy, Estimating and checking

Block I2 Accuracy, estimating and checking
Approximate by rounding to an appropriate number of decimal places
Approximate by rounding to an appropriate number of significant figures
Use inequality notation to specify error intervals due to truncation or rounding
Apply and interpret limits of accuracy
Estimate answers using appropriate techniques and check solutions

Intermediate Block 2 – Transformations

Block I2 Transformations
Rotate shapes around a centre. Recognise and describe rotations
Reflect shapes in a mirror line (which may be given as an equation). Recognise and describe reflections
Enlarge shapes from a given centre by a positive scale factor, including fractional. Recognise and describe enlargements.
Carry out combinations of transformations
Recognise when the object and image are congruent or similar and use the language correctly.

Intermediate Block 2 – Powers and primes

Block I2 Powers and Primes	1st check	2nd check
Use positive integer powers and associated real roots. Recognise powers of 2,3,4,5		
Calculate with roots and integer indices		
Find reciprocals and use in calculations, applying BIDMAS		
Calculate with and interpret standard form		
Use and understand the terms highest common factor and lowest common multiple and prime number		
Express a number as a product of primes		
Calculate HCF and LCM		

Intermediate Block 2 – Equations and inequalities

Block I2 Equations and inequalities
Solve one step equations using inverse operations
Solve two step equations using inverse operations
Solve equations with unknown on both sides
Solve equations involving brackets
Form equations to solve a problem
Form inequalities in one variable
Solve inequalities in one variable, giving solution as an inequality or on a number line

Intermediate Block 2 – Percentages

Block I2 Percentages
Convert between %, fractions and decimals
Use % to compare amounts
Find a % of an amount
Increase or decrease an amount by a percentage using a multiplier
Work back to an original amount
Solve problems involving simple and compound interest.

Intermediate Block 3 – 2D Shapes

Block I3 2D shapes
Recall the essential properties and definitions of special types of triangle and quadrilateral
Classify quadrilaterals by their geometrical properties
Draw **tessellations** of simple shapes
Calculate area of a rectangle and parallelogram
Calculate the area of any triangle
Calculate the area of a trapezium
Calculate the area of a **composite** shape

Use basic congruence criteria for triangles (SSS, SAS, ASA, RHS)
Find corresponding lengths in similar shapes
Use angle facts, congruence etc to give simple proofs

Intermediate Block 3 – Pythagoras

Block I3 2D Pythagoras Objectives
Recognise the relationship between the sides of a right angled triangle
Recall and use pythagoras' theorem to find a missing side of a right angled triangle
Apply Pythagoras' Theorem to solve problems (for example finding the length of the diagonal of a rectangle)

Intermediate Block 3 – Right angled Trigonometry

Block I3 Right Angled Trigonometry Objectives
Understand the connection between angles and lengths of side in right angled triangles
Know the rules for sin, cos and tan
Use sin, cos and tan to find unknown lengths in right angled triangles
Use sin, cos and tan to find unknown angles in right angled triangles
Know the exact values for sin and cos for 30,45,60,90 and tan 30,45,60
Use trigonometry to solve problems in context.

Intermediate Block 3 – Sequences

Block I3 Sequences Objectives
Recognise and use sequences of triangular, square and cube numbers.
Recognise and use simple arithmetic progressions (same difference between one term and next)
Recognise and use Fibonacci style sequences (sum two terms to get next one)
Recognise and use quadratic sequences
Recognise and use simple GPs (same multiplier between one term and next)
Deduce expressions to calculate the nth term of a linear sequence

Intermediate Block 4 – Data

Block I4 Data Objectives
Calculate an estimate for the mean from grouped data
Comment on and compare data sets using measures of central tendency (mean, median and mode)and spread (range or inter quartile range)
Consider outliers for discrete, continuous and grouped data

Intermediate Block 4 – Scatter Graphs and Displaying Data

Block I4 Scatter Graphs and Displaying Data Objectives
Draw a scatter graph from given data
Interpret a scatter graph (for discrete or continuous variables) and describe it as having positive, negative or no correlation

Know when and how to draw a line of best fit.
Use the line of best fit (where appropriate) to make predictions
Interpolate and extrapolate apparent trends, and know the dangers of doing so

Intermediate Block 4 – Circles

Block I4 Circles Objectives
Know the definition of a circle
Know the terms centre, radius, chord, diameter, circumference, tangent, arc, sector, segment
Understand that the tangent at any point non a circle is perpendicular to the radius at that point.
Calculate arc lengths of circles, and angles of sectors
Calculate perimeters of composite shapes involving circles
Calculate areas of sectors of circles, and angles of sectors
Calculate areas of composite shapes

Intermediate Block 4 –Compound Rates

Block I4 Compound Rates Objectives
Understand and use rates and compound measures for speed, distance and time
Understand and use rates for compound measures for mass, density and volume
Relate the compound units to the formula for calculating it.eg. m/h
Interpret information from travel graphs.

Intermediate Block 5 – Charts and Tables

Block I5 Charts and Tables Objectives	1st check	2nd check
Use a 2 way table to extract information		
Construct a 2 way table to store information and solve a problem		
Use of timetables to solve problems		

Intermediate Block 5 – Probability

Block I5 Probability Objectives
Solve probability problems involving events with equally likely outcomes
Use relative frequency (experimental probability) to estimate the probability of an event.
Understand the bigger the sample size the closer the relative frequency is to the actual probability of an event.
Know and use the fact that all the probability of all possible events must sum to 1.
Organise and list possible outcomes systematically using tables, grids and venn diagrams
Calculate the probability of independent and dependent events, including using tree diagrams

Intermediate Block 5 – Straight Lines

Block I5 Straight Lines Objectives
Given an equation plot a straight line.
Work out gradients of straight lines and in a given context explain what the gradient means. Eg. Speed.

Recognise the intercept of straight lines and explain what it means in a given context. For example, a fixed cost.
Know that y = mx +c represents a straight line with gradient m and intercept (0,c)
Use the form y=mx+c to identify parallel lines
Find the equation of a line through two given points
Find the equation of a line through one point given the gradient of the line.

Intermediate Block 5 – Curves

Block I5 Curves Objectives
Plot,recognise , sketch and interpret graphs of quadratics functions (eg. Y = $2x^2$)
Plot, recognise , sketch and interpret graphs of cubic functions (eg. Y = $2x^3$)
Plot, recognise , sketch and interpret graphs of reciprocal function (Y = 1/x)
Find the roots (where y=0), intercepts (where x=0)and turning points of quadratic functions graphically
Deduce the roots (where y = 0) of quadratics algebraically (may wait for next unit)
Use graphs to approximate solutions to real life problems

Intermediate Block 5 – Quadratics

Block I5 Quadratics Objectives
Expand double brackets
Expand double brackets, including those involving surds
Factorise quadratics into double brackets
Solve quadratics of the form $x^2+bx+c=0$ by factorising

Intermediate Block 6 – 3D Shapes, Surface Area and Volume

Block I6 3D Shapes, Surface Area and Volume Objectives
Name 3D shapes, including cube, cuboid, cylinder, types of prism, types of pyramid, cone and sphere
Construct and interpret plans and elevations of shapes
Be able to identify the net of a solid
Work out the number of vertices, faces, surfaces, edges in a solid
Solve problems involving volume of prisms, including a cylinder
Solve problems involving surface of prisms, including a cylinder
Calculate the volume of spheres, pyramids, cones and composite solids
Calculate the surface area of spheres, pyramids, cones and composite solids
Compare lengths, areas and volumes using ratio notation

Intermediate Block 6 – Loci and Constructions

Block I6 Loci and Constructions Objectives
Apply loci to spatial problems involving shapes and paths
Use a straight edge and compasses to produce standard constructions including • Mid point of a line segment
• Perpendicular bisector of a line segment
• Perpendicular from a point to a line
• Construct 60^0 and 30^0 angles

• Bisect an angle

Intermediate Block 6 – Simultaneous equations

Block I6 Simultaneous Equations Objectives
Derive and solve a linear equation from a 'real' situation
Derive two linear simultaneous equations from a 'real ' situation
Solve the pair of simultaneous equations graphically
Solve the pair of simultaneous equations algebraically

Intermediate Block 6 – Vectors

Block I6 Vectors Objectives
Represent vectors in both column and diagram form
Add and subtract vectors
Multiply a vector by a scalar