



Course Outline

Year 12 AS Level Pure Math1&2

Today, Tomorrow, Together.

Overview

The Math Syllabus at GEMS Wesgreen International Secondary School aims to support students to develop their ability to calculate fluently, to reason and solve problems through application of knowledge and transferable skills. Throughout the year we recover and extend objectives as the focus is on securing an understanding in the subject by developing a greater depth.

Learning Outcomes

The aims of all subjects state what a teacher may expect to teach and what a student may expect to experience and learn. These aims suggest how the student may be changed by the learning experience.

The aims of the Math Syllabus are to encourage and enable students to:

- become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- reason mathematically by following a line of enquiry, conjecturing relationships and generalizations, and developing an argument, justification or proof using mathematical language
- can solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

Unit Overviews

Term 1

Unit 1 - P1 Ch 1 Algebraic expressions

Approximate length: 4 hours

Specific Edexcel Objectives Covered:

- multiply and divide integer powers.
- expand a single term over brackets and collect like terms.
- expand the product of two or three expressions.
- factorise linear, quadratic and simple cubic expressions.
- know and use the laws of indices
- simplify and use the rules of surds.
- rationalise denominators.

Unit 2 – P1 Chapter 2 Quadratic functions

Approximate length: 4 hours

Specific Edexcel Objectives Covered:

- solve a quadratic equation by factorization, the quadratic and use of the formula and completing the square
- Read and use the $f(x)$ notation when working with functions
- Sketch the graph and find the turning point of a quadratic function
- Find an interpret the discriminant of a quadratic expression

Unit 3 – P1 Chapter 3 Equations and Inequalities

Approximate length: 9 hours

Specific Edexcel Objectives Covered:

- to solve linear simultaneous equations using elimination and substitution
- to solve simultaneous equations where one equation is linear and the other quadratic
- interpret algebraic solutions of equations graphically
- solve linear inequalities
- solve quadratic inequalities
- interpret inequalities graphically
- represent linear and quadratic inequalities graphically

Unit 4 –P1 Chapter 4 Graphs and Transformations

Approximate length: 10 hours

Specific Edexcel Objectives Covered:

- sketch cubic graphs
- sketch reciprocal graphs of the form $y = a / x$ and $y = a / x^2$
- use intersection points of graphs to solve equations
- translate graphs
- stretch graphs
- transform graphs of unfamiliar functions

Unit 5 –P1 Chapter 5 Straight Line Graphs

Approximate length: 9 hours

Specific Edexcel Objectives Covered:

- calculate the gradient of a line joining a pair of points
- understand the link between the equation of a line and its gradient and intercept
- find the equation of a line given(i) the gradient and one point on the line or (ii) two points on the line
- and use the rules for parallel and perpendicular gradients
- find the point of intersection for a pair of straight lines
- solve length and area problems on coordinate grids

Unit 6 -P1 Chapter 6 Trigonometric Ratios

Approximate length: 6 hours

Specific Edexcel Objectives Covered:

- use the cosine rule to find a missing side or angle
- use the sign rule to find the missing side or angle
- find the area of a triangle using an appropriate formula
- solve problems involving triangles
- sketch the graphs of the sine cosine and tangent functions
- sketch simple transformations of these graphs

Unit 7 -P1 Chapter 7 Radians

Approximate length: 6 hours

Specific Edexcel Objectives Covered:

- convert between radians and degrees, and know exact values of angles measured in radians
- find an arc length using radians
- find areas of sectors and segments using radians

Unit 8 -P1 Chapter 8 Differentiation

Approximate length: 11 hours

Specific Edexcel Objectives Covered:

- find the derivative $f'(x)$ or dy/dx of a simple function
- use the derivative to solve problems involving gradients tangents and normals
- find the 2nd derivative $f''(x)$ or d^2y/dx^2 of a simple function

Unit 9 -P1 Chapter 9 Integration

Approximate length: 6 hours

Specific Edexcel Objectives Covered:

- find y given dy/dx for x
- integrate polynomials
- find $f(x)$ given $f'(x)$ and a point on the curve

Unit 1 - P2 Chapter 1 Algebraic Methods

Approximate length: 8 hours

Specific Edexcel Objectives Covered:

- Divide a polynomial by a linear expression
- Use the factor theorem to factorize a cubic expression
- Construct mathematical proofs using algebra
- Use proof by exhaustion and disproof by counterexample
- Use the remainder theorem to find the remainder when a polynomial $f(x)$ is divided by $ax - b$

Term 2

**Unit 2 – P2 Chapter 2 Coordinate Geometry in the xy plane
hours****Approximate length: 7**Specific Edexcel Objectives Covered:

- Find the midpoint of a line segment
- Find the equation of the perpendicular bisector of a line segment
- Know how to find the equation of a circle
- Solve geometric problems involving straight lines and circles
- Use circle properties to solve problems on coordinate grids
- Find the angle of a semicircle and solve other problems involving circles and triangles

Unit 3 – P2 Chapter 3 Exponentials and Logarithms**Approximate length: 5 hours**Specific Edexcel Objectives Covered:

- Sketch the graph of the form Y equal to a power X - Transformations of these graphs
- Recognize the relationship between exponents and logarithms
- Recall and apply the laws of logarithm
- Solve the equations of the form a power X is equal to B
- Change the base of a logarithm

Unit 4 – P2 Chapter 4 The Binomial Expansion**Approximate length: 5 hours**Specific Edexcel Objectives Covered:

- Use pascal's triangle to identify binomial coefficients and use them to expand simple binomial expression
- Use combinations and factorial notation use the binomial expansion to expand brackets
- Use individual coefficients in binomial expansion
- Find individual coefficients in binomial expansion
- Make approximations using binomial expansion

Unit 5 – P2 Chapter 5 Sequences and Series**Approximate length: 4 hours**Specific Edexcel Objectives Covered:

- Find the N th term of arithmetic sequence
- Use formula for some of the first N terms of arithmetic series
- Find the N th term of geometric sequence
- Prove and use the formula for the sum of a finite geometric series
- Prove and use the formula for the sum to Infinity of a convergent geometric series
- Use the Sigma notation to describe series

Unit 6 – P2 Chapter 6 Trigonometric Identities and Equations Approximate length: 10 hours

Specific Edexcel Objectives Covered:

- Calculate the sine cosine tangent of any angle
- Know the exact trigonometric ratio of 30 degrees 45 degrees 60 degrees
- Know and use the relationships of $\tan \theta$ $\sin \theta$ $\cos \theta$
- Solve Simple trigonometric equations of the form $\sin \theta = k$ $\cos \theta = k$ $\tan \theta = k$
- Solve More complicated trigonometric equations of the form $\sin n\theta = k$ And equivalent equations involving \cos and \tan
- Solved trigonometric equations that produces quadratics

Unit 7 – P2 Chapter 7 Differentiation

Approximate length: 5 hours

Specific Edexcel Objectives Covered:

- Identify increasing and decreasing functions
- Find the stationary points of a function and determine their nature
- Sketch the gradient of a function
- Model real life situations with differentiation

Unit 8 – P2 Chapter 8 Integration

Approximate length: 7 hours

Specific Edexcel Objectives Covered:

- Evaluate the definite integral
- Find the area bounded by a curve and the X axis
- Find the area bounded by two curves
- Find the area bounded by curves and straight lines
- Use the Trapezium rule to approximate the area under a curve

Assessment

Formative:

Throughout the units, the children will complete graded work, quizzes and problem- solving activities which allows the teacher to assess the students' attainment and inform their planning.

For each unit the students complete written quizzes, online quizzes as well as Chapter- wise tests (Topic Tests). Quizzes are taken based on 1-chapter assessment, where Tests are combined as per the requirement i.e. 2 to 3 chapters/topics - sections. This allows us to see progress across the units and align our planning.

Summative:

At the end of each term we complete internal and standardized tests. This allows us to measure the students' progress throughout the term and year. End of term 1 and term 2 they have Edexcel format exam for P1 and P2 respectively. This is practice / preparation for their final Edexcel examinations. In the one year course, students appear for their final Edexcel examination for Syllabus - Pearson Edexcel International Advanced Subsidiary in Mathematics (XMA01)

Hyperlink to the Edexcel IAL syllabus:

<https://qualifications.pearson.com/content/dam/pdf/International%20Advanced%20Level/Mathematics/2018/Specification-and-Sample-Assessment/international-a-level-maths-spec.pdf>