



Course Outline

Year 13 A Level Pure Math 3 & 4

Inspiring excellence, empowering global minds

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 - P3 Ch 1 Algebraic Methods

Approximate length: 4 hours

Specific Edexcel Objectives Covered:

- Multiply Algebraic Fractions
- Divide Algebraic Fractions
- Add and Subtract Algebraic Fractions
- Covert and improper fraction into partial fraction form

Unit 2 – P3 Chapter 2 Functions and Graphs

Approximate length: 4 hours

Specific Edexcel Objectives Covered:

- Understand Modulus function
- Mappings and Functions
- Domain and Range
- Composite functions
- Inverse functions graphically and algebraically
- Graphs of modulus functions
- Combined transformations
- Transformation of Modulus functions

Unit 3 – P3 Chapter 3 Trigonometric Functions

Approximate length: 9 hours

Specific Edexcel Objectives Covered:

- Definitions of secant, cosecant and cotangent
- Graphs of secant, cosecant and cotangents
- Simplify trigonometric expressions.
- Prove simple trigonometric identities.
- Solve equations with secant, cosecant and cotangent.
- Prove other trigonometric identities.
- Inverse functions and domain and range.

Unit 4 P3 Chapter 4 Trigonometric Addition Formula: 10 hours

Specific Edexcel Objectives Covered:

- Apply addition formula.
- Apply the double angle formula.
- Solve trigonometric equations using the double angle and the addition formula.
- Write expressions in the forms of $a \cos \theta \pm b \sin \theta$ $R \cos(\theta \pm \alpha)$ or $R \sin(\theta \pm \alpha)$
- Prove trigonometric identities

Unit 5 -P3 Chapter 5 Exponential and Logarithms**Approximate length: 9 hours**Specific Edexcel Objectives Covered:

- Sketch the graphs of $y = a^x$, $y = e^x$, $y = e^{ax+b} + c$,
- Transformation of the exponential graphs.
- Differentiate e
- The natural logarithm function.
- Apply logarithms to estimate values in non-linear models.
- Interpret models and exponential functions.

Unit 6 -P3 Chapter 6 Differentiation**Approximate length: 6 hours**

- Specific Edexcel Objectives Covered
- Differentiate trigonometric functions.
- Differentiate exponential and logarithmic functions.
- Apply the Chain, product and quotient rule.

Unit 7 -P3 Chapter 7 Integration**Approximate length: 6 hours**Specific Edexcel Objectives Covered:

- Integrate normal functions.
- Integrate trigonometric functions.
- Integrate exponential functions.
- Apply reverse chain rule to integrate composite functions.
- Integrate complex functions using reverse chain rule.

Unit 8 -P3 Chapter 8 Numerical Methods**Approximate length: 11 hours**Specific Edexcel Objectives Covered:

- Identify the existence of a root by considering sign change
- Use iteration to find the approximation of the function.

Term 2

Unit 1 - P4 Chapter 1 Proof Approximate length: 7 hours

Specific Edexcel Objectives Covered:

- Proof by contradiction to prove true statements.

Unit 2 - P4 Chapter 2 Partial Fractions Approximate length: 5 hours

Specific Edexcel Objectives Covered:

- Partial fractions with linear denominators
- Partial fractions with repeated roots.
- Improper fractions to partial fractions.

Unit 3 - P4 Chapter 3 Coordinate geometry in the (x,y) plane Approximate length: 5 hours

Specific Edexcel Objectives Covered:

- Parametric Equation into Cartesian form by the process of substitution.
- Parametric equation into Cartesian form by using trigonometric identities.
- Sketching parametric curves.
- Solving geometrical problems using parametric equation.

Unit 4 - P4 Chapter 4 Binomial Expansion Approximate length: 4 hours

Specific Edexcel Objectives Covered:

- Understand the binomial expansion of $(1 + ax)^n$ for any rational constant and determine the range for which the expansion is valid.
- Understand the binomial expansion of $(a + bx)^n$ for any rational constant and determine the range for which the expansion is valid.
- Expand fractional expressions by applying partial fractions.

Unit 5 - P4 Chapter 5 Differentiation Approximate length: 10 hoursSpecific Edexcel Objectives Covered:

- differentiate parametric equations.
- differentiate implicit equations.
- find the rates of change and construct differential equations.

Unit 6 - P4 Chapter 6 Integration Approximate length: 5 hoursSpecific Edexcel Objectives Covered:

- Find the area under the curve in a parametric form.
- Find the volume of revolution when the curve is rotated around the X axis.
- Integrate functions by substitution.
- Integrate functions by parts and using partial fractions.
- Solve simple differential equations.

Unit 7 - P4 Chapter 7 Vectors Approximate length: 7 hoursSpecific Edexcel Objectives Covered:

- Vectors in two dimensions.
- Column vectors in arithmetic operation on vectors.
- Calculate the magnitude and direction of a vector.
- Use 3 dimensional vectors.
- Solve geometrical problems by using vectors.
- Understand 3D Cartesian coordinates.
- Understand and use the vector form of equation of a straight line in three dimensions.

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 P3 and P4 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>