

Dawood Public School
Cambridge O Level Additional Mathematics (4037)
Course Outline 2019-2020

Grade IX

Syllabus Book

Ho Soo Thong et. Al, 2002; *New Additional Mathematics (Revised 2002)*, Singapore, Paramount Publisher.

Syllabus Aims

The course should enable students to:

1. Consolidate and extend their elementary mathematical skills, and use these in the context of more advanced techniques.
2. Further develop their knowledge of mathematical concepts and principles, and use this Knowledge for problem solving.
3. Appreciate the inter connectedness of mathematical knowledge.
4. Acquire a suitable foundation in mathematics for further study in the subject or in mathematics related subjects.
5. Devise mathematical arguments and use present them precisely and logically.
6. Integrate information technology to enhance the mathematical experience.
7. Develop the confidence to apply their mathematical skills and knowledge in appropriate situations.
8. Develop creativity and perseverance in the approach to problem solving.
9. Derive enjoyment and satisfaction from engaging in mathematical pursuits, and gain an appreciation of beauty, power and usefulness of mathematics.
10. Provide foundation for AS Level/Higher study.

Assessment Objectives

The assessment objectives (AOs) are:

AO1 Demonstrate knowledge and understanding of mathematical techniques

Candidates should be able to:

- recall and use mathematical manipulative techniques
- interpret and use mathematical data, symbols and terminology
- comprehend numerical, algebraic and spatial concepts and relationships.

AO2 Apply mathematical techniques

Candidates should be able to:

- recognize the appropriate mathematical procedure for a given situation
- formulate problems into mathematical terms and select and apply appropriate techniques.

Detailed Syllabus

- Knowledge of the content of Cambridge O Level Mathematics (or an equivalent syllabus) is assumed.
- Cambridge O Level material which is not included in the subject content will not be tested directly but it may be required in response to questions on other topics.
- Proofs of results will not be required unless specifically mentioned in the syllabus.
- Candidates will be expected to be familiar with the scientific notation for the expression of compound units.

Examination Structure

Mid-Year Examination	2 hours	75 marks
Final Examination	2 hours	80 marks

- Paper will consist of approximately 10-12 questions of various lengths. There will be no choice of question in the paper.
- Candidates must show all necessary working; no marks will be given to unsupported answers from a calculator.

Structure of Assessments

- Miscellaneous Exercises at the end of each chapter in syllabus book will be given as assignment.
- Test will be taken after completion of chapter.

Electronic Calculators

The use of silent scientific electronic calculators is expected in O level Additional Mathematics (4037). Calculators with any of the following facilities are prohibited, unless specifically stated otherwise in the syllabus.

- Graphic display
- Data banks
- Dictionaries
- Language translators
- Retrieval or manipulation of text or formulae
- QWERTY keyboards
- Built-in symbolic algebraic manipulations
- Symbolic differentiation or integration
- Capability of remote communication with other machines.

MONTHLY COURSE DISTRIBUTION

MONTHS	CHAPTERS	DURATION
AUGUST	• Simultaneous equations	2 weeks
	• Indices, Surds and Logarithms	1 week
SEPTEMBER	• Indices, Surds and Logarithms (contd.)	4 weeks
OCTOBER	• Quadratic Functions	4 weeks
NOVEMBER	Revision for Mid-Year Examination	
DECEMBER	Mid-Year Examination	
JANUARY	• Factors of Polynomials	2.5 weeks
	• Straight Line Graphs	1.5 weeks
FEBRUARY	• Arithmetic and Geometric Progressions	4 weeks
MARCH	• Functions	4 weeks
APRIL	Revision for Final Examination	
MAY	Final Examination	

First Term
August - October

Syllabus Content	Learning Objectives
Simultaneous Equations Pages 30-35	<ul style="list-style-type: none"> • Solve simultaneous equations in two unknowns with at least one linear equation.
Indices, Surds and Logarithms Pages 36-57	<ul style="list-style-type: none"> • Perform simple operations with indices and with surds, including rationalizing the denominator. • Know and use the laws of logarithms (including change of base of logarithms). • Solve equations of the form $a^x = b$.
Quadratic Functions Pages 61-80	<ul style="list-style-type: none"> • Find the maximum or minimum value of the quadratic function: $f : x \mapsto ax^2 + bx + c$ by any method; • Use the maximum or minimum value of $f(x)$ to sketch the graph or determine the range for a given domain. • Know the conditions for $f(x) = 0$ to have: <ul style="list-style-type: none"> ➤ two real roots ➤ two equal roots ➤ no real roots and the related conditions for a given line to: <ul style="list-style-type: none"> ➤ intersect a given curve ➤ be a tangent to a given curve ➤ not intersect a given curve • Solve quadratic equations for real roots and find the solution set for quadratic inequalities.
<p><u>Useful Websites</u></p> <ul style="list-style-type: none"> • www.geogebraTube.org/student/m7323 • www.mathsisfun.com/surds.html • http://rechneronline.de/function-graphs • www.autograph-math.com • http://rechneronline.de/function-graphs 	

November

Revision for Mid-Year Examination

December

Mid-Year Examination

Final Term
January - March

Syllabus Content	Learning Objectives
Factors of polynomials Pages 83-95	<ul style="list-style-type: none"> • Know and use the remainder and factor theorems. • Find factors of polynomials. • Solve cubic equations.
Straight line graphs Pages 144-171 176-192	<ul style="list-style-type: none"> • Interpret the equation of a straight line graph in the form $y = mx + c$ • Transform given relationships, including $y = ax^n$ and $y = Ab^x$, to straight line form and hence determine unknown constants by calculating the gradient or intercept of the transformed graph. • Solve questions involving mid-point and length of a line. • Know and use the condition for two lines to be parallel or perpendicular, including finding the equation of perpendicular bisectors.
Arithmetic and Geometric Progressions (Hand out)	<ul style="list-style-type: none"> • Recognise an arithmetic progression. • Recognise a geometric progression. • Use the formula for the nth term and the sum of the first n terms to solve problems involving an arithmetic progression. • Use the formula for the nth term and the sum of the first n terms to solve problems involving a geometric progression. • Use the condition for the convergence of a geometric progression. • Use the formula for the sum to infinity of a convergent geometric progression.
Functions Pages 196-229	<ul style="list-style-type: none"> • Understand the following terms <ul style="list-style-type: none"> ➤ function ➤ domain ➤ range (image set) ➤ one-one function ➤ inverse function ➤ composition of functions • Use the notation $f(x) = \sin x$, $f: x \mapsto \lg x$, $(x > 0)$, $f^{-1}(x)$ and $f^2(x)$ [$=f(f(x))$]. • Understand the relationship between $y = f(x)$ and $y = f(x)$, where $f(x)$ may be linear, quadratic or trigonometric. • Explain in words why a given function is a function or why it does not have an inverse. • Find the inverse of a one-one function and form composite functions. Use sketch graphs to show the relationship between a function and its inverse.
Useful Websites <ul style="list-style-type: none"> • www.mathwarehouse.com/algebra/polynomial/polynomial-equation. • www.purplemath.com/modules/synthdiv.htm • www.tes.co.uk/teaching-resource/Equations-of-straight-lines-6148248/ • http://mmlsoft.com/index.php/products/tarsia • www.purplemath.com/modules/slopyint.htm • http://education.ti.com/en/us/home • www.tes.co.uk/teaching-resource/Equations-of-straight-lines-6148248/ • www.bbc.co.uk/education/asguru/maths • www.mathsisfun.com/sets/function.html • www.khanacademy.org/math/algebra/algebra-functions/v/function-inverses-example-3 • www.khanacademy.org/math/algebra/algebra-functions/v/function-inverses-example-2 	

April

Revision for Final Examination

May

Final Examination

ADDITIONAL SYLLABUS SUPPORT

Command words

This glossary should help candidates understand what is expected when responding to questions in the assessment.

The number of marks allocated for any part of a question is a guide to the depth required for the answer.

Command Word	What it means
Calculate	work out from given facts, figures or information, generally using a calculator
Describe	state the points of a topic/give characteristics and main features
Determine	establish with certainty
Explain	set out purposes or reasons make the relationships between things evident provide why and/or how and support with relevant evidence
Give	produce an answer from a given source or recall/memory
Plot	mark point(s) on a graph
Show (that)	provide structured evidence that leads to a given result
Sketch	make a simple freehand drawing showing the key features
State	express in clear terms
Verify	confirm a given statement/result is true
Work out	calculate from given facts, figures or information with or without the use of a calculator
Write	give an answer in a specific form
Write down	give an answer without significant working

Reference Booklist for O Level Additional Mathematics 4037

Backhouse, J K and Houldsworth S P T Essential Pure Mathematics: A First Course
(Longman, 1991) 0582066581

Backhouse, J K and Houldsworth S P T Pure Mathematics: A First Course
(Longman, 1985) 0582353866

Bostock L and Chandler S Mathematics: Core Maths for Advanced Level
(Nelson Thornes, 2000) 0748755098

Bostock L and Chandler S Mathematics: Pure Mathematics 1
(Nelson Thornes, 1978) 0859500926

Emanuel, R Pure Mathematics 1
(Longman, 2001) 0582405505

Harwood Clarke, L Additional Pure Mathematics
(Heinemann, 1980) 0435511874

Talbert, J F Additional Maths Pure and Applied
(Longman, 1995) 0582265118