

Dawood Public School
Cambridge O Level Additional Mathematics 4037
Course Outline 2020-21
Grade XI

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

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

- Content for PAPER 1 and PAPER 2 will not be dissected.
- 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 | <ul style="list-style-type: none">Rates of change | 1.5 week |
| | <ul style="list-style-type: none">Applications of Differentiation | 1.5 week |
| SEPTEMBER | <ul style="list-style-type: none">Differentiation of Trigonometric Functions | 1 week |
| | <ul style="list-style-type: none">Differentiation of e and ln functions | 1 week |
| | <ul style="list-style-type: none">Integration | 2 weeks |
| OCTOBER | <ul style="list-style-type: none">Application of Integration | 1.5 weeks |
| | <ul style="list-style-type: none">Kinematics | 2 weeks |
| NOVEMBER | <ul style="list-style-type: none">Vectors in 2 dimensions | 2 weeks |
| | Revision for Mid-Year Examination | |
| DECEMBER | Mid-Year Examination | |
| JANUARY | Past Papers | |
| FEBRUARY | Past Papers | |
| MARCH | Mock Examinations | |

| Syllabus Content | Learning Objectives |
|--|---|
| Rates of Change Pages 355-370 | <ul style="list-style-type: none">• Apply differentiation to connected rates of change and small increments. |
| Differentiation Pages 373-420 | <ul style="list-style-type: none">• Understand the idea of a derived function.• Use the notations $f'(x)$, $f''(x)$, $\frac{dy}{dx}$, $\frac{d^2y}{dx^2}$• Use the derivatives of the standard functions x^n (for any rational n), $\sin x$, $\cos x$, $\tan x$, e^x, $\ln x$, together with constant multiples, sums and composite functions of these.• Differentiate products and quotients of functions.• Apply differentiation to the following:<ul style="list-style-type: none">➤ gradients➤ tangents➤ normal➤ stationary points➤ connected rates of change➤ small increments and approximations➤ practical maxima and minima problems• Discriminate between maxima and minima by any method. |
| Integration Pages 428-448 | <ul style="list-style-type: none">• Understand integration as the reverse process of differentiation.• Integrate sums of terms in powers of x excluding $\frac{1}{x}$;• Integrate functions of the form $(ax + b)^n$ (excluding $n = -1$), $e^{ax} + b$, $\sin(ax + b)$, $\cos(ax + b)$ |
| Application of Integration Pages 451-468 | <ul style="list-style-type: none">• Evaluate definite integrals and apply integration to the evaluation of plane areas. |
| Kinematics Pages 471-502 | <ul style="list-style-type: none">• Apply differentiation and integration to kinematics problems that involve displacement, velocity and acceleration of a particle moving in a straight line with variable or constant acceleration, and the use of x-t and v-t graphs. |
| Vectors in 2 dimensions Pages 508-531 | <ul style="list-style-type: none">• Use vectors in any form, e.g. $\begin{pmatrix} a \\ b \end{pmatrix}$, \overrightarrow{AB}, p, $ai - bj$;• Know and use position vectors and unit vectors.• Find the magnitude of a vector, add and subtract vectors and multiply vectors by scalars.• Compose and resolve velocities. |
| Useful Websites <ul style="list-style-type: none">• www.s-cool.co.uk/a-level/maths/differentiation/• www.autograph-math.com/• www.mathsisfun.com/calculus/derivatives-rules.ht• www.khanacademy.org/math/calculus | |

- www.s-cool.co.uk/a-level/maths/integration/
- www.autograph-math.com/
- <http://rechneronline.de/function-graphs/>
- www.khanacademy.org/math/calculus
- www.geogebra.org/cms/en/
- www.tes.co.uk/teaching-resource/Vectors-multiple-choice-6161352/
- www.khanacademy.org/science/physics/v/introduction-to-vectors-and-scalars

Worksheets

- www.kutasoftware.com/freeica.html

November

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| Revision for Mid-Year Examination |
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December

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|----------------------|
| Mid-Year Examination |
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Final Term
January – Feb/March

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| Past Papers for Practice |
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March

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| Mock Examination |
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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