Dawood Public School
Course Outline 2017-18
Additional Mathematics (4037)
Class XI (S and C)

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.

Assessment Objectives

The examination will test the ability of candidates to:
1. recall and use manipulative technique;
2. interpret and use mathematical data, symbols and terminology;
3. comprehend numerical, algebraic and spatial concepts and relationships;
4. recognize the appropriate mathematical procedure for a given situation;
5. formulate problems into mathematical terms and select and apply appropriate techniques of solution.

Examination Structure

There will be two papers, each of 2 hours and each carries 80 marks.
Content for PAPER 1 and PAPER 2 will not be dissected.
Each paper will consist of approximately 10-12 questions of various lengths. There will be no choice of question in each paper.

Electronic Calculators

The use of silent 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
- QWETRY keyboards
- Built–in symbolic algebraic manipulations
- Symbolic differentiation or integration
- Capability of remote communication with other machines.

Mathematical Instruments

Apart from the usual mathematical instruments, candidates may use flexi curves in this examination.

Detailed Syllabus

Knowledge of the content of Ordinary level Syllabus D is assumed. Ordinary level material which is nor repeated in the syllabus below will not be tested directly but it may be required in response to questions on other topics.

Proof of results will not be required unless specifically mentioned in the syllabus.

Syllabus Book

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

Syllabus Contents	Pg no.	Month	Curriculum Objectives	Useful Websites	Assessment
1. Differentiation	373 - 420	AUG	−understand the idea of a derived function; −use the notations $f'(x)$, $f''(x)$, $\dfrac{dy}{dx}$, $\dfrac{d^2y}{dx^2}$; −use the derivatives of the standard functions x^n (for any rational n), sin x, cos x, tan x, e^x, lnx, together with constant multiples, sums and composite functions of these; −differentiate products and quotients of functions; −apply differentiation to gradients, tangents and normals, stationary points, connected rates of change, small increments and approximations and practical maxima and minima	www.autograph-math.com/ www.mathsisfun.com/calculus/derivatives-rules.html www.s-cool.co.uk/a-level/maths/differentiation/ www.khanacademy.org/math/calculus Worksheets: http://www.kutasoftware.com/freeica.html	• Test will be taken.

			problems; −discriminate between maxima and minima by any method;		
2. Integration	428 - 448	SEP	−understand integration as the reverse process of differentiation; −integrate sums of terms in powers of x excluding $\dfrac{1}{x}$; −integrate functions of the form (ax + b)^n (excluding n = −1), e^{ax} + b, sin (ax + b), cos (ax + b);	www.s-cool.co.uk/a-level/maths/integration/ www.khanacademy.org/math/calculus Worksheets: www.kutasoftware.com/freeica.html	• Test will be taken.

Syllabus contents	Pg no.	Month	Curriculum objectives	Useful Websites	Assessment
3. Application of integration	451-468	SEP	−evaluate definite integrals and apply integration to the evaluation of plane areas;	www.autograph-math.com/ http://rechneronline.de/function-graphs/	• Test will be taken.
4. Kinematics	471-502	SEP	−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.	www.khanacademy.org/math/calculus	• Test will be taken.
5. Vectors in 2 dimensions	508-531	OCT	−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;	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	• Test will be taken.

6. Relative velocity	535-556	OCT/ NOV	−compose and resolve velocities; −use relative velocity including solving problems on interception (but not closest approach).	www.mathwarehouse.com/vectors/ www.mathsisfun.com/algebra/vectors.html	• Assignment will be given.

Syllabus contents	Pg no.	Month	Curriculum objectives	Useful Websites	Assessment
7. Set language and notation	1-26	DEC	−use set language and notation, and Venn diagrams to describe sets and represent relationships between sets as follows: A = {x : x is a natural number} B = {(x, y): y = mx + c} C = {x: a≤ x ≤b} D = {a, b, c, … } −understand and use the following notation: Union of A and B A ∪ B Intersection of A and B A ∩B Number of elements in set A n(A) ". . . is an element of . . . " ∈ ". . . is not an element of . . ." ∉ Complement of set A A' The empty set Ø Universal set ℰ A is a subset of B A ⊆ B A is a proper	www.purplemath.com/modules/venn diag4.htm www.math-aids.com/Venn_Diagram	As knowledge of this topic is assumed from Ordinary level Syllabus D course so it will not be taught again in the class. • Assignment will be given. In order to test the knowledge.

			subset of B A ⊂ B A is not a subset of B A ⊄ B A is not a proper subset of B A ⊄ B		
		DEC			• Midterm Examination.
Past papers & Revision		JAN/ FEB			• Assignments will be given.
		MAR			• Mock Examination.

Mathematical Notation

The list which follows summarizes the notation used in the CIE's Mathematics examinations

1. **Miscellaneous Symbols**

$=$	is equal to
$\neq$	is not equal to
$\equiv$	is identical to or is congruent to
$\approx$	is approximately equal to
$\cong$	is isomorphic to
$\propto$	is proportional to
$<$	is less than
$>$	is greater than
$\leq$	is less than or equals to
$\geq$	is greater than or equals to
∞	infinity

2. **Operations**

$a + b$	a plus b
$a - b$	a minus b
$a \times b$, ab, $a.b$	a multiplied by b
$a \div b$, a/b	a divided by b
$a : b$	the ratio of a to b
$\sqrt{a}$	the positive square root of the realnumber a
$\lvert a \rvert$	the modulus of the real number a
$n!$	n factorial for $n \in N$ ($0! = 1$)
$\binom{n}{r}$	the binomial coefficient $\dfrac{n!}{r!(n-r)!}$, for n, r $\in \square$, $0 \leq r \leq n$

3. **Functions**

f	function f
$f(x)$	the value of the function f at x
$f : A \to B$	f is a function under which each element of set A has an image in set B
$f : x \mapsto y$	the function f maps the element x to the element y
f^{-1}	the inverse of the function f
$g \circ f$, gf	the composite function of f and g which isdefined by $(g \circ f)(x)$ or $gf(x) = g(f(x))$
$\lim_{x \to a} f(x)$	the limit of f(x) as x tends to a
Δx; δx	tan increment of x
$\dfrac{dy}{dx}$	the derivative of y with respect to x

$$\frac{d^n y}{dx^n}$$ the nth derivative of y with respect to x

f ´(x), f ´´(x), …, f$^{(n)}$(x)   the first, second, …, nth derivatives of f(x) with respect to x

$$\int y\,dx$$ indefinite integral of y with respect to x

$$\int_a^b y\,dx$$ the definite integral of y with respect to x for values of x

between a and b

$$\frac{\partial y}{\partial x}$$ the partial derivative of y with respect to x

4. Exponential and Logarithmic Functions

e	base of natural logarithms
e^x,	exp x exponential function of x
log$_a$ x	logarithm to the base a of x
ln x	natural logarithm of x
lg x	logarithm of x to base 10

5. Matrices

M	a matrix M
M^{-1}	the inverse of the square matrix M
M^T	the transpose of the matrix M
det M	the determinant of the square matrix M

6. Vectors

a	the vector **a**
$\overrightarrow{AB}$	the vector represented in magnitude and direction by the directed linesegment AB
â	a unit vector in the direction of the vector a
i, j, k	unit vectors in the directions of the cartesian coordinate axes
| a |	the magnitude of a
| AB |	the magnitude of AB

7. Set Notation

$\mathbb{N}$	the set of positive integers, {1, 2, 3, …}
$\mathbb{Z}$	the set of integers {0, ±1, ±2, ±3, …}
$\mathbb{Z}^+$	the set of positive integers {1, 2, 3, …}
$\mathbb{Z}_n$	the set of integers modulo n, {0, 1, 2, …, $n-1$}
$\mathbb{Q}$	the set of rational numbers
$\mathbb{Q}^+$	the set of positive rational numbers, $\{x \in \mathbb{Q}: x > 0\}$
$\mathbb{Q}_0^+$	the set of positive rational numbers and zero, $\{x \in \mathbb{Q}: x \geqslant 0\}$
$\mathbb{R}$	the set of real numbers
$\mathbb{R}^+$	the set of positive real numbers $\{x \in \mathbb{R}: x > 0\}$

Reference Booklist

O level Additional Mathematics 4037

Suggested Books

- 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