

**Dawood public school**  
**Course Outline 2017-18**  
**Additional Mathematics (4037)**  
**Class X (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 one paper, of 2 hours and 30 minutes and of 100 marks, in each of midterm and Final term Examinations.

Paper will consist of approximately 10-12 questions of various lengths. There will be no choice of question in the 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
- QWERTY 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 not 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. Trigonometry	237/277	Aug/Sep	<p>–know the six trigonometric functions of angles of any magnitude (sine, cosine, tangent, secant, cosecant, cotangent) ;</p> <p>–understand amplitude and periodicity and the relationship between graphs of e.g. <math>\sin x</math> and <math>\sin 2x</math>;</p> <p>–draw and use the graphs of <math>y = a \sin(bx) + c</math>, <math>y = a \cos(bx) + c</math>, <math>y = a \tan(bx) + c</math>, where <math>a, b</math> are positive integers and <math>c</math> is an integer;</p> <p>- use the relationships  <math>\frac{\sin A}{\cos A} = \tan A</math>  ,</p>	<p><a href="http://www.geogebraTube.org/student/m3342">www.geogebraTube.org/student/m3342</a></p> <p><a href="http://www.khanacademy.org/math/trigonometry/basic-trigonometry/basic-trig-ratios/v/example--the-six-trig-ratios">www.khanacademy.org/math/trigonometry/basic-trigonometry/basic-trig-ratios/v/example--the-six-trig-ratios</a></p> <p><a href="http://www.mathstat.strath.ac.uk/basicmaths/321_trigratiosforanglesofanysizeorsign.html">www.mathstat.strath.ac.uk/basicmaths/321_trigratiosforanglesofanysizeorsign.html</a></p> <p><a href="http://www.haesemathematics.com.au/samples/ibmyp5plus-2_18.pdf">www.haesemathematics.com.au/samples/ibmyp5plus-2_18.pdf</a></p>	<ul style="list-style-type: none"> <li>• Test will be taken.</li> </ul>

			$\frac{\cos A}{\sin A} = \cot A$ , $\sin^2 A + \cos^2 A = 1$ ,  $\sec^2 A = 1 + \tan^2 A$ , $\operatorname{cosec}^2 A = 1 + \cot^2 A$ , and solve simple trigonometric equations involving the six trigonometric functions and the above relationships (not including general solution of trigonometric equations)  -prove simple trigonometric identities.	
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Syllabus contents	Pg no.	Month	Curriculum Objectives	Useful Websites	Assessment
2. Circular measure	280-292	Sep/Oct	<p>–solve problems involving the arc length and sector area of a circle, including knowledge and use of radian measure.</p>	<p><a href="http://www.slideshare.net/roszelan/add-mathf4-circular-measure-83">www.slideshare.net/roszelan/add-mathf4-circular-measure-83</a></p> <p><a href="http://www.printableworksheets.rokkada.com/?dq=CircularMeasure">www.printableworksheets.rokkada.com/?dq=CircularMeasure</a></p>	<ul style="list-style-type: none"> <li>• Test will be taken.</li> </ul>
3. Permutations and combinations	296-311	Oct	<p>–recognize and distinguish between a permutation case and a combination case;</p> <p>–know and use the notation <math>n!</math>, (with <math>0! = 1</math>), and the expressions for permutations and combinations of <math>n</math> items taken <math>r</math> at a time;</p> <p>–answer simple problems on arrangement and selection (cases with repetition of objects, or with</p>	<p><a href="http://betterexplained.com/articles/easy-permutations-and-combinations/">http://betterexplained.com/articles/easy-permutations-and-combinations/</a></p> <p><a href="http://khanacademy.org/math/probability/probability-and-combinatorics-topic/">http://khanacademy.org/math/probability/probability-and-combinatorics-topic/</a></p> <p><a href="http://mrnewbatt.wikispaces.com/file/view/MDM4U+U1L4+worksheet.pdf">http://mrnewbatt.wikispaces.com/file/view/MDM4U+U1L4+worksheet.pdf</a></p>	<ul style="list-style-type: none"> <li>• Test will be taken.</li> <li>• Assignment will be given.</li> </ul>

			objects arranged in a circle or involving both permutations and combinations, are excluded		
4. Binomial expansions	314-324	Nov	<p>–use the Binomial Theorem for expansion of <math>(a + b)^n</math> for positive integral <math>n</math>;</p> <p>–use the general term</p> $\binom{n}{r} a^{n-r} b^r,$ $0 < r \leq n$ <p>(knowledge of the greatest term and properties of the coefficients is not required).</p>	<p><a href="http://www.purplemath.com/modules/binomial.htm">www.purplemath.com/modules/binomial.htm</a></p> <p><a href="http://www.khanacademy.org/math/trigonometry/polynomial_and-rational/binomial-theorem">www.khanacademy.org/math/trigonometry/polynomial_and-rational/binomial-theorem</a></p>	<ul style="list-style-type: none"> <li>• Assignment will be given.</li> </ul>

Syllabus Contents	Pg no.	Month	Curriculum Objectives	Useful Websites	Assessment
		Dec			<ul style="list-style-type: none"> <li>Midterm Examinations</li> </ul>
5. Differentiation and its techniques	330 - 353	Jan	<p>–understand the idea of a derived function; use the notations <math>f'(x), \frac{dy}{dx}</math>.</p> <p>–differentiate products and quotients of functions;</p> <p>–apply differentiation to gradients, tangents and normals.</p>	<p><a href="http://www.mathsisfun.com/calculus/derivatives-rules.html">www.mathsisfun.com/calculus/derivatives-rules.html</a></p> <p><a href="http://www.s-cool.co.uk/a-level/maths/differentiation/revise-it/the-product-rule-and-the-quotient-rule">www.s-cool.co.uk/a-level/maths/differentiation/revise-it/the-product-rule-and-the-quotient-rule</a></p> <p><a href="http://www.khanacademy.org/math/calculus">www.khanacademy.org/math/calculus</a></p>	<ul style="list-style-type: none"> <li>Assignment will be given.</li> </ul>
6. Rates of change	355 - 370	Feb	–apply differentiation to connected rates of change and small increments.	<a href="http://www.s-cool.co.uk/a-level/maths/differentiation/">www.s-cool.co.uk/a-level/maths/differentiation/</a>	<ul style="list-style-type: none"> <li>Assignment will be given.</li> </ul>
		Mar			<ul style="list-style-type: none"> <li>Final Examinations</li> </ul>

## 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
$\infty$	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 real number a
$ a $	the modulus of the real number a
$n!$	n factorial for $n \in \mathbb{N}$ ( $0! = 1$ )
$\binom{n}{r}$	the binomial coefficient $\frac{n!}{r!(n-r)!}$ , for $n, r \in \mathbb{N}, 0 \leq r \leq n$

### 3. Functions

$f$	function f
$f(x)$	the value of the function f at x
$f : A \rightarrow B$	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 is defined by $(g \circ f)(x)$ or $gf(x) = g(f(x))$
$\frac{dy}{dx}$	the 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 $M$

#### 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