

# DAWOOD PUBLIC SCHOOL

Course out line 2011-2012

Subject Maths

Class - XI

## Book:

*Seng, T.et al, 2006, New Syllabus Mathematics 1(5<sup>th</sup> Edition), Singapore; Oxford University Press*

*Seng, T.et al, 2006, New Syllabus Mathematics 2(6<sup>th</sup> Edition), Singapore; Oxford University Press*

*Seng, T.et al, 2006, New Syllabus Mathematics 3(6<sup>th</sup> Edition), Singapore; Oxford University Press*

*Seng, T.et al, 2006, New Syllabus Mathematics 4(6<sup>th</sup> Edition), Singapore; Oxford University Press*

*Addendum*

## Cambridge O Level Mathematics (Syllabus D)

Syllabus code 4024

All candidates take two papers.

Each paper may contain questions on any part of the syllabus and questions will not necessarily be restricted to a single topic.

### Paper 1

2 hours

Paper 1 has approximately 25 short answer questions.

Candidates should show all working in the spaces provided on the question paper. Omission of essential working will result in loss of marks.

**No calculators are allowed for this paper.**

80 marks weighted at 50% of the total

### Paper 2

2 hours 30 minutes

Paper 2 has structured questions across two sections.

**Section A (52 marks):** approximately six questions. Candidates should answer all questions.

**Section B (48 marks):** five questions. Candidates should answer four.

**Electronic calculators may be used.**

Candidates should show all working in the spaces provided on the question paper. Omission of essential working will result in loss of marks.

100 marks weighted at 50% of the total

## Assessment at a Glance

Calculating aids:

**Paper 1** – the use of all calculating aids is prohibited.

**Paper 2** – all candidates should have a **silent** electronic calculator. A scientific calculator with trigonometric functions is strongly recommended.

Unless stated otherwise within an individual question, three figure accuracy will be required. This means that four figure accuracy should be shown throughout the working, including cases where answers are used in subsequent parts of the question. Premature approximation will be penalized, where appropriate.

In Paper 2, candidates with suitable calculators are encouraged to use the value of  $\pi$  from their calculators.

The value of  $\pi$  will be given as 3.142 to 3 decimal places for use by other candidates. This value will be given on the front page of the question paper only.

## Units

SI units will be used in questions involving mass and measures: the use of the centimeter will continue. Both the 12-hour clock and the 24-hour clock may be used for quoting times of the day. In the 24-hour clock, for example, 3.15 a.m. will be denoted by 03 15; 3.15 p.m. by 15 15, noon by 12 00 and midnight by 24 00.

Candidates will be expected to be familiar with the solidus notation for the expression of compound units, e.g. 5 cm/s for 5 centimeters per second, 13.6 g/cm<sup>3</sup> for 13.6 grams per cubic centimeter.

## Syllabus Aims and Assessment:

The syllabus demands understanding of basic mathematical concepts and their applications, together with an ability to show this by clear expression and careful reasoning.

In the examination, importance will be attached to skills in algebraic manipulation and to numerical accuracy in calculations.

### Aims

The course should enable students to:

- Develop their mathematical knowledge and oral, written and practical skills in a manner which encourages confidence;
- Read mathematics, and write and talk about the subject in a variety of ways;
- Develop a feel for number, carry out calculations and understand the significance of the results obtained;
- Apply mathematics in every day situations and develop an understanding of the part which mathematics plays in the world around them;
- Solve problems, present the solutions clearly, check and interpret the results;
- Develop an understanding of mathematical principles;
- Recognize when and how a situation may be represented mathematically, identify and interpret relevant factors and, where necessary, select an appropriate mathematical method to solve problems;
- Use mathematics as a means of communication with emphasis on the use of clear expression;
- Develop the abilities to reason logically, to classify, to generalize and to prove;

### Assessment objectives:

The examination tests the ability of candidates to:

- Recall, apply and interpret mathematical knowledge in the context of everyday situations;
- Set out mathematical work, including the solution of problems, in a logical and clear form using appropriate symbols and terminology;
- Organize, interpret and present information accurately in written, tabular, graphical and diagrammatic forms;
- Perform calculations by suitable methods;
- Use an electronic calculator;
- Understand systems of measurement in everyday use and make use of them in the solution of problems;
- Estimate, approximate and work to degrees of accuracy appropriate to the context;
- Use mathematical and other instruments to measure and to draw to an acceptable degree of accuracy;
- Recognize patterns and structures in a variety of situations and form generalisations;
- interpret, transform and make appropriate use of mathematical statements expressed in words or symbols;
- Interpret, use and present information in written, graphical, diagrammatic and tabular forms;
- Apply and interpret Mathematics in a variety of situations, including daily life;
- Formulate problems into mathematical terms, select, apply and communicate appropriate techniques of solution and interpret the solutions in terms of the problems.

### Monthly Syllabus

AUGUST	<ul style="list-style-type: none"><li>• Sets</li><li>• Application of Sets to Problems</li><li>• Matrices</li><li>• Probability</li></ul>
SEPTEMBER	<ul style="list-style-type: none"><li>• Probability</li><li>• Vectors</li><li>• Graphs Applied to Kinematics</li><li>• Loci and Construction</li></ul>
OCTOBER	<ul style="list-style-type: none"><li>• Loci and Construction</li><li>• Frequency Distribution</li><li>• Linear Inequalities Graphs</li><li>• Cumulative Frequency Distribution</li></ul>
NOVEMBER	<ul style="list-style-type: none"><li>• Cumulative Frequency Distribution</li><li>• REVISION</li></ul>
DECEMBER	<ul style="list-style-type: none"><li>• <b>MID TERM EXAMS</b></li></ul>

JANUARY	<ul style="list-style-type: none"> <li>● Geometrical Transformation</li> <li>● Further Geometrical Transformation</li> <li>● Arithmetical Problems</li> <li>● Revision Exercises</li> <li>● Past Papers</li> </ul>
FEBRUARY	<ul style="list-style-type: none"> <li>● Past Papers</li> </ul>
MARCH	<ul style="list-style-type: none"> <li>● Past Papers</li> <li>● Mock Exams</li> </ul>

### Syllabus Content

Theme or Topic	Subject Content
<ul style="list-style-type: none"> <li>● Sets</li> <li>● Application of Sets to Problems</li> </ul> Addendum, Chap No.1,2	<p><i>Students should be able to:</i></p> <ul style="list-style-type: none"> <li>• use set language and set notation, and Venn diagrams, to describe sets and represent relationships between sets as follows:</li> </ul> <p>Definition of sets, e.g.  <math>A = \{x : x \text{ is a natural number}\}</math>  <math>B = \{(x, y) : y = mx + c\}</math>  <math>C = \{x : a \leq x \leq b\}</math>  <math>D = \{a, b, c, \dots\}</math></p> <p>Notation:            Union of <math>A</math> and <math>B</math> <span style="float: right;"><math>A \cup B</math></span>            Intersection of <math>A</math> and <math>B</math> <span style="float: right;"><math>A \cap B</math></span>            Number of elements in set <math>A</math> <span style="float: right;"><math>n(A)</math></span>            "... is an element of ... " <span style="float: right;"><math>\in</math></span>            Complement of set <math>A</math> <span style="float: right;"><math>A'</math></span>            The empty set <span style="float: right;"><math>\emptyset</math></span>            Universal set <span style="float: right;"><math>\epsilon</math></span>  <math>A</math> is a subset of <math>B</math> <span style="float: right;"><math>A \subseteq B</math></span>  <math>A</math> is a proper subset of <math>B</math> <span style="float: right;"><math>A \subset B</math></span>  <math>A</math> is not a subset of <math>B</math> <span style="float: right;"><math>A \not\subseteq B</math></span>  <math>A</math> is not a proper subset of <math>B</math> <span style="float: right;"><math>A \not\subset B</math></span></p>
<ul style="list-style-type: none"> <li>● Matrices</li> </ul> Addendum, Chap No.3	<ul style="list-style-type: none"> <li>• display information in the form of a matrix of any order;</li> <li>• solve problems involving the calculation of the sum and product (where appropriate) of two matrices, and interpret the results;</li> <li>• calculate the product of a scalar quantity and a matrix;</li> <li>• use the algebra of <math>2 \times 2</math> matrices including the zero and identity <math>2 \times 2</math> matrices;</li> <li>• calculate the determinant and inverse of a non-singular matrix. (<math>A^{-1}</math> denotes the inverse of <math>A</math>.)</li> </ul>
<ul style="list-style-type: none"> <li>● Probability</li> </ul> Book 4, Chap No.6	<ul style="list-style-type: none"> <li>• calculate the probability of a single event as either a fraction or a decimal (not a ratio);</li> <li>• calculate the probability of simple combined events using possibility diagrams and tree diagrams where appropriate. (In possibility diagrams outcomes will be represented by points on a grid and in tree diagrams outcomes will be written at the end of branches and probabilities by the side of the branches.)</li> </ul>
<ul style="list-style-type: none"> <li>● Vectors</li> </ul> Book 4, Chap No.3	<ul style="list-style-type: none"> <li>• describe a translation by using a vector represented by <math>AB</math> or <math>\mathbf{a}</math>;</li> <li>• add vectors and multiply a vector by a scalar;</li> <li>• calculate the magnitude of a vector as <math>\sqrt{x^2 + y^2}</math>.</li> </ul> <p>(Vectors will be printed as <math>AB</math> or <math>\mathbf{a}</math> and their magnitudes denoted by modulus signs, e.g. <math> AB </math> or <math> \mathbf{a} </math>. In all their answers to questions candidates are expected to indicate <math>\mathbf{a}</math> in some definite way, e.g. by an arrow or by underlining, thus <math>\underline{AB}</math> or <math>\mathbf{a}</math>);</p> <ul style="list-style-type: none"> <li>• represent vectors by directed line segments; use the sum and difference of two vectors to express given vectors in terms of two coplanar vectors; use position vectors.</li> </ul>
<ul style="list-style-type: none"> <li>● Frequency Distribution</li> </ul> Book 3, Chap No.13 Pg No.(281-300)	<ul style="list-style-type: none"> <li>• use frequency density to construct and read histograms with equal and unequal intervals;</li> <li>• calculate the mean, median and mode for individual data and</li> </ul>

<ul style="list-style-type: none"> <li>● Graphs Applied to Kinematics Book 3, Chap No.9 Pg No.(186-205)</li> <li>● Loci and Construction Book 4, Chap No.2</li> </ul>	<p>distinguish between the purposes for which they are used;</p> <ul style="list-style-type: none"> <li>• apply the idea of rate of change to easy kinematics involving distance-time and speed-time graphs, acceleration and retardation;</li> <li>• calculate distance travelled as area under a linear speed-time graph.</li> <li>• use the following loci and the method of intersecting loci: <ul style="list-style-type: none"> <li>(a) sets of points in two or three dimensions <ul style="list-style-type: none"> <li>(i) which are at a given distance from a given point,</li> <li>(ii) which are at a given distance from a given straight line,</li> <li>(iii) which are equidistant from two given points;</li> </ul> </li> <li>(b) sets of points in two dimensions which are equidistant from two given intersecting straight lines.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>● Cumulative Frequency Distribution Book 4, Chap No.5 Pg No.(155-198)</li> <li>● Linear Inequalities Addendum, Chap No.3 Pg No.(42-55)</li> <li>● Indices and Standard Form Book 3, Chap No.2 Pg No.(18-41)</li> </ul>	<ul style="list-style-type: none"> <li>• calculate the mean, median and mode for individual data and distinguish between the purposes for which they are used;</li> <li>• construct and use cumulative frequency diagrams; estimate the median, percentiles, quartiles and interquartile range;</li> <li>• calculate the mean for grouped data; identify the modal class from a grouped frequency distribution.</li> <li>• solve simple linear equations in one unknown;</li> <li>• solve simple linear inequalities.</li> <li>• order quantities by magnitude and demonstrate familiarity with the symbols <math>=, \neq, &gt;, &lt;, \leq, \geq</math>.</li> <li>• use and interpret positive, negative, zero and fractional indices.</li> <li>• use the standard form <math>A \times 10^n</math> where <math>n</math> is a positive or negative integer, and <math>1 \leq A &lt; 10</math>.</li> </ul>
<ul style="list-style-type: none"> <li>● Geometrical Transformation</li> <li>● Further Geometrical Transformation Book 4, Chap No.4,5</li> <li>● Arithmetical Problems Book 2, Chap No.1 Pg No.(1-17)</li> </ul>	<ul style="list-style-type: none"> <li>• use the following transformations of the plane: reflection (M), rotation (R), translation (T), enlargement (E), shear (H), stretching (S) and their combinations (If <math>M(a) = b</math> and <math>R(b) = c</math> the notation <math>RM(a) = c</math> will be used; invariants under these transformations may be assumed.);</li> <li>• identify and give precise descriptions of transformations connecting given figures; describe transformations using coordinates and matrices. (Singular matrices are excluded.)</li> <li>• demonstrate an understanding of the elementary ideas and notation of ratio, direct and inverse proportion and common measures of rate;</li> <li>• divide a quantity in a given ratio;</li> <li>• use scales in practical situations, calculate average speed;</li> <li>• express one quantity as a percentage of another, calculate percentage increase or decrease;</li> <li>• carry out calculations involving reverse percentages, e.g. finding the cost price given the selling price and the percentage profit.</li> <li>• calculate times in terms of the 12-hour and 24-hour clock;</li> <li>• read clocks, dials and timetables.</li> <li>• solve problems involving money and convert from one currency to another.</li> <li>• use given data to solve problems on personal and household finance involving earnings, simple interest, discount, profit and loss;</li> <li>• extract data from tables and charts.</li> </ul>

### Assessment and Home Work

Students will be assessed by taking test of each and every chapter. Home Work shall be given on a daily basis.

## Mathematical Notations:

The list which follows summarizes the notation used

### Set Notation

$\in$	is an element of
$\notin$	is not an element of
$\{x_1, x_2, \dots\}$	the set with elements $x_1, x_2, \dots$
$\{x: \dots\}$	the set of all $x$ such that...
$n(A)$	the number of elements in set $A$
$\emptyset$	the empty set
$\mathbb{E}$	universal set
$A'$	the complement of the set $A$
$\mathbb{N}$	the set of positive integers, $\{1, 2, 3, \dots\}$
$\mathbb{Z}$	the set of integers $\{0, \pm 1, \pm 2, \pm 3, \dots\}$
$\mathbb{Z}^+$	the set of positive integers $\{1, 2, 3, \dots\}$
$\mathbb{Q}$	the set of rational numbers
$\mathbb{Q}^+$	the set of positive rational numbers, $\{x \in \mathbb{Q} : x > 0\}$
$\mathbb{R}$	the set of real numbers
$\mathbb{R}^+$	the set of positive real numbers $\{x \in \mathbb{R} : x > 0\}$
$\subseteq$	is a subset of
$\subset$	is a proper subset of
$\not\subseteq$	is not a subset of
$\not\subset$	is not a proper subset of
$\cup$	Union
$\cap$	Intersection
$[a, b]$	the closed interval $\{x \in \mathbb{R} : a \leq x \leq b\}$
$(a, b)$	the interval $\{x \in \mathbb{R} : a < x < b\}$

### Mathematical Symbols

$=$	is equal to
$\neq$	is not equal to
$\equiv$	is identical to or is congruent to
$\approx$	is approximately equal to
$<; \ll$	is less than, is much less than
$<$	is less than or equal to
$>; \gg$	is greater than, is much greater than
$>$	is greater than or equal to
$\infty$	infinity

### Operations

$a + b$	$a$ plus $b$
$a - b$	$a$ minus $b$
$a \times b, ab, a.b$	$a$ multiplied by $b$
$a \div b, \frac{a}{b}, a/b$	$a$ divided by $b$

### 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 $B$
$f: x \rightarrow a$	$y$ the function $f$ maps the element $x$ to the element $y$
$f^{-1}$	the inverse of the function $f$
$\sin, \cos, \tan,$ $\operatorname{cosec}, \sec, \cot \}$	the circular functions
$\sin^{-1}, \cos^{-1}, \tan^{-1},$ $\operatorname{cosec}^{-1}, \sec^{-1}, \cot^{-1} \}$	the inverse circular relations

### Matrices

$\mathbf{M}$	a matrix $\mathbf{M}$
$\mathbf{M}^{-1}$	the inverse of the square matrix $\mathbf{M}$
$\det \mathbf{M}$	the determinant of the square matrix $\mathbf{M}$

## Vectors

$\mathbf{a}$	the vector $\mathbf{a}$
$AB$	the vector represented in magnitude and direction by the directed line segment $AB$
$ \mathbf{a} $	the magnitude of $\mathbf{a}$
$ AB $	the magnitude of $AB$

## Probability and Statistics

$A, B, C$ etc.	events
$A \cup B$	union of events $A$ and $B$
$A \cap B$	intersection of the events $A$ and $B$
$P(A)$	probability of the event $A$
$A'$	complement of the event $A$ , the event 'not $A$ '
$P(A B)$	probability of the event $A$ given the event $B$
$X, Y, R$ , etc.	random variables
$x, y, r$ , etc.	values of the random variables $X, Y, R$ , etc.
$x_1, x_2, \dots$	observations
$f_1, f_2, \dots$	frequencies with which the observations $x_1, x_2, \dots$ occur

## Resource List

New Mathematics Syllabus D work book 1,2,3,4;  
GCE O Level past papers

Bostock, L, S Chandler, A Shepherd, E Smith ST(P) Mathematics Books 1A to 5A  
(Stanley Thornes)  
Book 1A Book 2A Book 3A Book 4A Book 5A  
Book 1B Book 2B Book 3B Book 4 B Book 5B

Buck well, Geoff Mastering Mathematics (Macmillan Education Ltd) 0 333 62049 6  
Collins, J, Warren, T and C J Cox Steps in Understanding Mathematics (John Murray)  
Book 1, 2,3,4,5

National Mathematics Project (NMP) Mathematics for Secondary Schools Red Track Books 1 to 5 (Longman  
Singapore Publishers Pte Ltd)  
Book 1, 2, 3, 4, 5

Cox, C J and D Bell Understanding Mathematics Books 1–5 (John Murray)  
Book 1, 2, 3, 4, 5

MSM Mathematics Group MSM Mathematics Books 1, 2, 3Y, 4Y, 5Y (Nelson) Murray, Les Progress in Mathematics  
Books 1E to 5E (Stanley Thornes)  
Book 1E, 2E, 3E, 4E,5E

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