Dawood Public School
Course Outline 2016-17
Mathematics
Class X

Books:


Introduction

This syllabus provides a comprehensive set of progressive learning objectives for mathematics. The objectives detail what the learner should know or what they should be able to do in each year of education. The learning objectives provide a structure for teaching and learning and a reference against which learners’ ability and understanding can be checked.

This syllabus designed to promote continuity, coherence and progression within the study of Mathematics. The syllabus builds on the knowledge, understanding and skills developed within the Key Stage of Study for Mathematics.

This syllabus has been designed to meet the requirements of the GCSE regulations.

In studying a course based on this specification, students should be encouraged to make appropriate use of Information and Communications Technology (ICT), for example, spreadsheets and databases.

It has been designed to be as free as possible from ethnic, gender, religious, political or other forms of bias.

Cambridge O level Mathematics (Syllabus D) Syllabus Code 4024

Assessment:

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.

<table>
<thead>
<tr>
<th>Paper 1</th>
<th>2 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper 1 has approximately 25 short answer questions.</td>
<td></td>
</tr>
<tr>
<td>Candidates should show all working in the spaces provided on the question paper. Omission of essential working will result in loss of marks.</td>
<td></td>
</tr>
<tr>
<td>No calculators are allowed for this paper. 80 marks weighted at 50% of the total</td>
<td></td>
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<tr>
<td>80 marks</td>
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<tr>
<td>This paper will be weighted at 50% of the total qualification.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Paper 2</th>
<th>2 hours 30 minutes</th>
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</thead>
<tbody>
<tr>
<td>Paper 2 has approximately 11 structured questions.</td>
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<tr>
<td>Candidates should answer all questions.</td>
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<tr>
<td>Electronic calculators may be used and candidates should have access to a calculator for this paper.</td>
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</tr>
<tr>
<td>Candidates should show all working in the spaces provided on the question paper. Essential working must be shown for full marks to be awarded.</td>
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<tr>
<td>100 marks</td>
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<tr>
<td>This paper will be weighted at 50% of the total qualification.</td>
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</tbody>
</table>
Assessment at a Glance

Calculating aids:

<table>
<thead>
<tr>
<th>Paper 1 – the use of all calculating aids is prohibited.</th>
</tr>
</thead>
</table>

| 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 penalised, 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 centimetre 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.

Students will be expected to be familiar with the solidus notation for the expression of compound units, e.g. 5 cm/s for 5 centimetres per second, 13.6 g/cm\(^3\) for 13.6 grams per cubic centimetre.

Mathematical Instruments

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

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 everyday 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;
- recognise 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 generalise 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;
- organise, 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;
- recognise 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;

Monthly Syllabus

<table>
<thead>
<tr>
<th>MONTH</th>
<th>CHAPTERS</th>
<th>DURATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUGUST</td>
<td>● Angle Properties of Circles</td>
<td>2 Weeks</td>
</tr>
<tr>
<td></td>
<td>● Graphical Solution of Functions</td>
<td>1 Week</td>
</tr>
<tr>
<td>SEPTEMBER</td>
<td>● Graphical Solution of Functions</td>
<td>1 Week</td>
</tr>
<tr>
<td></td>
<td>● More on Probability</td>
<td>2 Weeks</td>
</tr>
<tr>
<td></td>
<td>● Linear Inequalities</td>
<td>1 Week</td>
</tr>
<tr>
<td>OCTOBER</td>
<td>● Graphs applied to Kinematics</td>
<td>2 Weeks</td>
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<tr>
<td></td>
<td>● Revision exercises Book 4</td>
<td>2 Weeks</td>
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<tr>
<td>NOVEMBER</td>
<td>● REVISION FOR MID TERM</td>
<td></td>
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<tr>
<td></td>
<td>● MID TERM EXAMS</td>
<td></td>
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<tr>
<td>JANUARY</td>
<td>● Trigonometric Ratios and Further Trigonometry</td>
<td>3 Weeks</td>
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<td></td>
<td>● Cumulative Frequency Curve</td>
<td>1 Weeks</td>
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<tr>
<td>FEBRUARY</td>
<td>● Past Papers</td>
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<tr>
<td>MARCH</td>
<td>● Revision Exercises Book 4</td>
<td></td>
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<td></td>
<td>● Revision</td>
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<td></td>
<td>● Mock Exams</td>
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</table>

Syllabus Content:

AUGUST

- Angle Properties of Circles
  Book 3, Chap No.13
- Graphical Solution of Functions
<table>
<thead>
<tr>
<th>Month</th>
<th>Theme or Topic</th>
<th>Subject Content</th>
<th>Notes/Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>August</td>
<td>● Angle Properties of Circle Book 3, Chap No.13</td>
<td><strong>Students should be able to:</strong>&lt;br&gt;• calculate unknown angles and give simple explanations using the following geometrical properties:&lt;br&gt;(a) angles on a straight line;&lt;br&gt;(b) angles at a point;&lt;br&gt;(c) vertically opposite angles;&lt;br&gt;(d) angles formed by parallel lines;&lt;br&gt;(e) angle properties of triangles and quadrilaterals;&lt;br&gt;(f) angle properties of polygons including angle sum;&lt;br&gt;(g) angle in a semi-circle;&lt;br&gt;(h) angle between tangent and radius of a circle;&lt;br&gt;(i) angle at the centre of a circle is twice the angle at the circumference;&lt;br&gt;• use the following symmetry properties of circles:&lt;br&gt;(a) equal chords are equidistant from the centre;&lt;br&gt;(b) the perpendicular bisector of a chord passes through the centre;&lt;br&gt;(c) tangents from an external point are equal in length.&lt;br&gt;• demonstrate familiarity with cartesian coordinates in two dimensions;&lt;br&gt;• interpret and use graphs in practical situations including travel graphs and conversion graphs;&lt;br&gt;• draw graphs from given data;&lt;br&gt;• construct tables of values and draw graphs for functions of the form $y = ax^n$ where $n = -2, -1, 0, 1, 2, 3$, and simple sums of not more than three of these and for functions of the form $y = ko^x$ where $a$ is a positive integer;&lt;br&gt;• interpret graphs of linear, quadratic, reciprocal and exponential functions;&lt;br&gt;• find the gradient of a straight line graph;&lt;br&gt;• solve equations approximately by graphical methods;&lt;br&gt;• estimate gradients of curves by drawing tangents.</td>
<td>Candidates will be expected to use the correct geometrical terminology when giving reasons for answers.</td>
</tr>
</tbody>
</table>
Learning Resources:

Specimen paper:
2018 Specimen Paper 1 Q 25a

Past papers:
Jun 13 Paper 11 Q 5, 14a, 14b
Jun 13 Paper 12 Q 12a
Nov 13 Paper 12 Q 22a
Nov 13 Paper 22 Q 4a, 4bii
Jun 14 Paper 12 Q 8
Nov 14 Paper 11 Q 9
Nov 14 Paper 22 Q 5a, 5b


Past papers:
Jun 13 Paper 11 Q 10b
Jun 14 Paper 22 Q 2a
Nov 14 Paper 11 Q 12
Nov 14 Paper 21 Q 3a, 3b
Nov 14 Paper 22 Q 8a
Jun 15 Paper 12 Q 15
Jun 15 Paper 22 Q 7b
Nov 15 Paper 21 Q 8b, 8c

SEPTEMBER

- Graphical Solution of Functions
- More on Probability
  Book 4, Chap No. 6
  Pg No. (207-247)
- Linear Inequalities
  Book 3 Chap No. 3 Pg No. (53-70)
  Addendum, Book 4
<table>
<thead>
<tr>
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<th>Notes/Examples</th>
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</thead>
<tbody>
<tr>
<td>SEPTEMBER</td>
<td>●Graphical Solution of Functions</td>
<td>Students should be able to:</td>
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<tr>
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<td></td>
<td>$y = ka^x$ where $a$ is a positive integer;</td>
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<tr>
<td></td>
<td></td>
<td>interpret graphs of linear, quadratic, reciprocal and exponential functions;</td>
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<td>find the gradient of a straight line graph;</td>
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<td>solve equations approximately by graphical methods;</td>
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<td></td>
<td>estimate gradients of curves by drawing tangents.</td>
<td>-</td>
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<tr>
<td></td>
<td>● More On Probability Book 4, ChapNo.6</td>
<td>-</td>
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<td>Pg No. (207-247)</td>
<td>• calculate the probability of a single event as either a fraction or a decimal (not a ratio);</td>
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<td>• 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.)</td>
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<td></td>
<td>● Linear Inequalities Book 3 Chap No.3</td>
<td>-</td>
<td>-</td>
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<td></td>
<td>Pg No. (53-70) Addendum, Book 4</td>
<td>• solve simple linear equations in one unknown;</td>
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<td></td>
<td></td>
<td>• solve simple linear inequalities.</td>
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<td>• order quantities by magnitude and demonstrate familiarity with the symbols $\leq$, $\geq$, $\leq$, $\geq$.</td>
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<td>• forming inequalities when shading is done</td>
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<tr>
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<td>• leaving the region shaded or unshaded when inequalities are given</td>
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<td>Probabilities should not be given as ratios.</td>
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<td>Problems could be set involving extracting information from tables or graphs.</td>
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<td>e.g. $P$ (blue) = 0.8, find $P$ (not blue)</td>
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<td>e.g. use results of experiments with a spinner to estimate the probability of a given outcome</td>
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<td></td>
<td></td>
<td>e.g. use probability to estimate from a population</td>
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<tr>
<td></td>
<td></td>
<td>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.</td>
<td>-</td>
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<tr>
<td></td>
<td></td>
<td>Linear programming problems are not included.</td>
<td>-</td>
</tr>
</tbody>
</table>

**Learning Resources:**

Suitable work on probability in section 5.3 onwards:  
[www.cimt.plymouth.ac.uk/projects/mepres/algcse/bka5.pdf](http://www.cimt.plymouth.ac.uk/projects/mepres/algcse/bka5.pdf)
Developing an Exam Question: Probability, a resource from the UK Department for Education’s Standards Unit, involves learners in using and analysing past examination questions as they review key ideas about probability:

www.nationalstemcentre.org.uk/elibrary/resource/2057/developing-an-exam-question-probability-s7

Specimen paper:
2018 Specimen Paper 2 Q 2e

Past papers:
- Jun 13 Paper 21 Q 4a
- Jun 13 Paper 22 Q 10a
- Nov 13 Paper 11 Q 20
- Nov 13 Paper 12 Q 21
- Jun 14 Paper 11 Q 24
- Jun 14 Paper 12 Q 21
- Jun 14 Paper 22 Q 4
- Nov 14 Paper 12 Q 21
- Nov 14 Paper 22 Q 3
- Jun 15 Paper 11 Q 25
- Jun 15 Paper 21 Q 10a
- Jun 15 Paper 22 Q 11a
- Nov 15 Paper 11 Q 7
- Nov 15 Paper 12 Q 23

Work on inequalities. The graphical approach is covered in section 16.1:


Maths is Fun has work on graphing inequalities:

www.mathsisfun.com/algebra/graphing-linear-inequalities.html

Specimen paper:
2018 Specimen Paper 1 Q 12

Past papers:
- Jun 13 Paper 12 Q 5
- Nov 13 Paper 11 Q 17
- Nov 13 Paper 12 Q 15
- Jun 14 Paper 12 Q 15
- Nov 14 Paper 12 Q 23
- Jun 15 Paper 11 Q 21
- Jun 15 Paper 12 Q 11
- Nov 15 Paper 12 Q 18
- Nov 15 Paper 21 Q 5c
### OCTOBER

- Graphs applied to Kinematics
  - Book 3, Chap No.9
  - Pg No.(186-205)
- Revision exercises Book 4

<table>
<thead>
<tr>
<th>Month</th>
<th>Theme or Topic</th>
<th>Subject Content</th>
<th>Notes/Examples</th>
</tr>
</thead>
</table>
| OCTOBER | ● Graphs Applied to Kinematics  
           - Book 3, Chap No.9  
           - Pg No.(186-205)  
           ● Revision exercises Book 4 | Students should be able to:  
  • apply the idea of rate of change to easy kinematics involving distance-time and speed-time graphs, acceleration and retardation;  
  • calculate distance travelled as area under a linear speed-time graph. | |

**Learning Resources:**

**Specimen paper:**
2018 Specimen Paper 1 Q 26

**Past papers:**
- Jun 13 Paper 11 Q 13
- Jun 13 Paper 12 Q 22
- Nov 13 Paper 11 Q 23
- Nov 13 Paper 12 Q 25
- Jun 14 Paper 11 Q 18
- Jun 14 Paper 12 Q 20
- Nov 14 Paper 12 Q 22
- Jun 15 Paper 22 Q 2
- Nov 15 Paper 11 Q 20
- Nov 15 Paper 12 Q 25

**NOVEMBER**

**REVISION FOR MID TERM EXAMS**

**DECEMBER**

**MID TERM EXAMS**
### JANUARY

- **Trigonometric Ratios and Further Trigonometry**  
  Book 3, Chap No.11  
  Pg No.(297-330)

- **Cumulative Frequency Curve**  
  Book 4, Chap No.1

<table>
<thead>
<tr>
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<th>Theme or Topic</th>
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</thead>
</table>
| JANUARY | ● Further Trigonometry and Three Dimensional Problems  
Book 3, Chap No.11  
Pg No.(297-330) | Students should be able to:  
- solve trigonometrical problems in two dimensions including those involving angles of elevation and depression and bearings;  
- extend sine and cosine functions to angles between 90° and 180°; solve problems using the sine and cosine rules for any triangle and the formula $\frac{1}{2}ab\sin C$ for the area of a triangle;  
- solve simple trigonometrical problems in three dimensions. (Calculations of the angle between two planes or of the angle between a straight line and plane will not be required.)  
- interpret and use three-figure bearings measured clockwise from the north (i.e. 000°–360°).  
- Finding values from graphs (raw values, percentages, fractions, etc)  
- Finding Median, range, upper quartile, lower quartile, interquartile range and percentiles.  
- Plotting cumulative frequency curve and finding unknowns from it which includes (Median, range, upper quartile, lower quartile, interquartile range, percentiles, etc) | Measured clockwise from the north, i.e. 000°–360°.  
E.g. Find the bearing of A from B if the bearing of B from A is 125°  
Angles will be quoted in, and answers required in, degrees and decimals of a degree to one decimal place.  
Calculations of the angle between two planes or of the angle between a straight line and plane will not be required. |
Learning Resources:

Trigonometry in non-right-angled triangles is covered in 4.8 to 4.9: www.cimt.plymouth.ac.uk/projects/mepres/allgcse/bka4.pdf

2018 Specimen Paper 2 Q 4a

Past papers:
Jun 13 Paper 11 Q 8b
Jun 13 Paper 21 Q 6a
Nov 13 Paper 21 Q 6
Nov 14 Paper 21 Q 8b
Nov 14 Paper 22 Q 4b
Jun 15 Paper 21 Q 2, 5

Specimen paper:
2018 Specimen Paper 2 Q 8b, 10

Past papers:
Jun 13 Paper 11 Q 8
Jun 13 Paper 21 Q 11
Jun 13 Paper 22 Q 6, 12b
Nov 13 Paper 12 Q 26
Nov 13 Paper 21 Q 12
Nov 13 Paper 22 Q 10
Jun 14 Paper 21 Q 9
Jun 14 Paper 22 Q 5
Nov 14 Paper 21 Q 5
Jun 15 Paper 11 Q 13
Jun 15 Paper 21 Q 7
Jun 15 Paper 22 Q 5
Nov 15 Paper 21 Q 11
Nov 15 Paper 22 Q 7

Cambridge O Level Mathematics: Volume 2 has notes and practice questions on pages 356–366

Online:
Work on cumulative frequency at section 9.5: www.cimt.plymouth.ac.uk/projects/mepres/allgcse/bkb9.pdf

BBC Bitesize has work on cumulative frequency: www.bbc.co.uk/schools/gcsebitesize/maths/statistics

Mathematics teacher K Pitchford describes an unusual (but effective) method for teaching quartiles: http://mathssandpit.co.uk/blog/?p=1145

Olympic weights – a handling data rich task from mathematics teacher Adam Briggs that involves cumulative frequency and also box and whisker diagrams: www.ncetm.org.uk/public/files/411886/Olympic+Weights+-+A+Handling+Data+Rich+Task.doc

Other:
Learners own data from previous statistics work could be used.

4024 past examination papers:
Jun 12 Paper 12 Q9
Jun 12 Paper 22 Q5
Jun 13 Paper 11 Q18
Jun 13 Paper 12 Q21
Nov 13 Paper 12 Q14
Nov 13 Paper 21 Q4
FEBRUARY

- Past Papers

MARCH

- Revision Exercises Book 4
- Revision
- Mock Exams

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 summarises the notation used

Mathematical Symbols

- is equal to
- is not equal to
- is identical to or is congruent to
- is approximately equal to
- is less than, is much less than
- is less than or equal to
- is greater than, is much greater than
- is greater than or equal to
- infinity

Operations

- $a + b$  
  $a$ plus $b$
- $a - b$  
  $a$ minus $b$
- $a \times b, ab, a.b$  
  $a$ multiplied by $b$
- $a \div b, a/b$  
  $a$ 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,
cosec, sec, cot }  
the circular functions

sin$^{-1}$, cos$^{-1}$, tan$^{-1}$,
cosec$^{-1}$, sec$^{-1}$, cot$^{-1}$ }  
the inverse circular relations
Resource List

Books:


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,4B
Book 1B  Book 2B  Book 3B  Book 5A,5B

Buckwell, Geoff Mastering Mathematics (Macmillan Education Ltd) 0 333 62049 6

Book 1
Book 2
Book 3
Book 4

Book 1
Book 2
Book 3
Book 4

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

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
Book 2E
Book 3E
Book 4E
Book 5E

Website:

www.nrich.com
www.hoddereducation.com
www.collinseducation.com
www.pearsonschoolsandfcolleges.co.uk
www.hoddereducation.com
www.lettsandlonsdale.com
www.counton.org
www.math.com
www.maths-help.co.uk
www.mathsnet.net