Year 11 Mathematics: Course Overview

Schemes of Work Overview
Structure
There are two separate schemes of work laid out in the following units, one for students following the Core Curriculum and one for students following the Extended Curriculum.

Core Curriculum Scheme of Work: Units 5, 6, 8, 9

Extended Curriculum Scheme of Work: Units 5, 6, 8, 9

All the material in the Core Curriculum is covered within the Extended scheme. The order of topic coverage is similar in the two schemes, so that it should be possible to deliver both in parallel if required (for example where a single class contains Core and Extended students).

Recommended Prior Knowledge
It is recommended that candidates have followed the curriculum framework for Cambridge Checkpoint Mathematics http://www.cie.org.uk/CIE/WebSite/qualificationsandawardshub/ciespecialisms/specialism/specialism.jsp?oid=2276 or followed courses which cover the material contained in the UK National Curriculum for Mathematics at Key Stage 3 http://www.nc.uk.net/webdav/servlet/XRM?Page/@id=6004&Subject/@id=22.

1. Extended plan

Term 1

<table>
<thead>
<tr>
<th>Suggested number of weeks</th>
<th>Topic</th>
<th>Objectives (directly from IGCSE syllabus)</th>
<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 weeks</td>
<td>1. Algebra 2</td>
<td>Express direct and inverse variation in algebraic terms and use this form of expression to find unknown quantities; increase and decrease a quantity by a given ratio. Construct and transform more complicated formulae and equations. Manipulate directed numbers; use brackets and extract common factors. Use and interpret positive, negative and zero Indices Use and interpret fractional indices, e.g. solve</td>
<td>Extended Mathematics for Cambridge IGCSE by David Rayner Chapter 5</td>
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</table>
32. Solve simple linear inequalities.

Represent inequalities graphically and use this representation in the solution of simple linear programming problems (the conventions of using broken lines for strict inequalities and shading unwanted regions will be expected).

| 4 weeks | 3. Sets, vectors and functions | Use language, notation and Venn diagrams to describe sets and represent relationships between sets as follows:
Definition of sets, e.g.
\[ A = \{x : x \text{ is a natural number}\} \]
\[ B = \{(x,y) : y = mx + c\} \]
\[ C = \{x : a \leq x \leq b\} \]
\[ D = \{a, b, c, \ldots\} \]

Notation
Number of elements in set \( A \) \( n(A) \)
"...is an element of..." \( \in \)
"...is not an element of..." \( \notin \)
Complement of set \( A \) \( A' \)
The empty set \( \emptyset \)

Chapter 8 | Resources |
Universal set
A is a subset of $B \ A \subseteq B$
A is a proper subset of $B \ A \subset B$
A is not a subset of $B \ A \nsubseteq B$
A is not a proper subset of $B \ A \nsubset B$

Union of $A$ and $B \ A \cup B$
Intersection of $A$ and $B \ A \cap B$

Use function notation, e.g. $f(x) = 3x - 5$,
f: $x \mapsto 3x - 5$ to describe simple functions, and
the notation $f^{-1}(x)$ to describe their inverses; form
composite functions as defined by $g(f(x)) = g(f(x))$

Calculate the magnitude of a vector $\begin{pmatrix} x \\ y \end{pmatrix}$ as
$\sqrt{x^2 + y^2}$.

(Vectors will be printed as $\vec{AB}$ or $\vec{a}$ and their
magnitudes denoted by modulus signs, e.g. $|\vec{AB}|$
or $|\vec{a}|$. In their answers to questions candidates are
expected to indicate $\vec{a}$ in some definite way, e.g. by
an arrow or by underlining, thus $\vec{AB}$ or $\vec{a}$)

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.

<table>
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<tr>
<th>4 weeks</th>
<th>4. Matrices and transformations</th>
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</table>
| Display information in the form of a matrix of
any order; calculate the sum and product (where
appropriate) of two matrices; calculate the product
of a matrix and a scalar quantity; use the algebra of
$2 \times 2$ matrices including the zero and identity $2 \times 2$
matrices; calculate the determinant and inverse $A^{-1}$
of a non-singular matrix $A$

Use the following transformations of the plane:
reflection (M); rotation (R); translation (T);
enlargement (E); shear (H); stretch (S) and their
combinations (if $M(a) = b$ and $R(b) = c$ the notation
$RM(a) = c$ will be used; invariants under these
transformations may be assumed.)
Identify and give precise descriptions of
transformations connecting given figures; describe
transformations using co-ordinates and matrices
(singular matrices are excluded). | Extended Mathematics for
Cambridge IGCSE by
David Rayner
Chapter 9 |
Assessment

The students will be assessed based on unit tests, mental tests, Quizzes, interim exams, and final exams. Notebook organization, participation, and behavior will be considered too in class.

2. Core plan

Term 1

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<td>4 weeks</td>
<td>1. Shape and space</td>
<td>Use and interpret the geometrical terms: point, line, parallel, bearing, right angle, acute, obtuse and reflex angles, perpendicular, similarity, congruence; use and interpret vocabulary of triangles, quadrilaterals, circles, polygons and simple solid figures including nets. Use the following loci and the method of intersecting loci for sets of points in two dimensions: (a) which are at a given distance from a given point (b) which are at a given distance from a given straight line (c) which are equidistant from two given points (d) which are equidistant from two given intersecting straight lines. Carry out calculations involving the perimeter and area of a rectangle and triangle, the circumference and area of a circle, the area of a parallelogram and a trapezium, the volume of a cuboid, prism and cylinder and the surface area of a cuboid and a cylinder. Interpret and use three-figure bearings measured clockwise from the North (i.e. 000°–360°); apply Pythagoras’ theorem and the sine, cosine and tangent ratios for acute angles to the calculation of a side or of an angle of a right-angled triangle (angles will be quoted in, and answers required in, degrees and decimals to one decimal place).</td>
<td>Extended Mathematics for Cambridge IGCSE by David Rayner Chapter 5</td>
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Describe a translation by using a vector represented by e.g. $\begin{pmatrix} x \\ y \end{pmatrix}$, $\overrightarrow{AB}$ or $a$; add and subtract vectors; multiply a vector by a scalar.

Reflect simple plane figures in horizontal or vertical lines; rotate simple plane figures about the origin, vertices or midpoints of edges of the figures, through multiples of 90°; construct given translations and enlargements of simple plane figures; recognise and describe reflections, rotations, translations and enlargements.

4 weeks  
Algebra 2  
Chapter 6

Continue a given number sequence; recognise patterns in sequences and relationships between different sequences, generalise to simple algebraic statements (including expressions for the $n$th term) relating to such sequences.

Demonstrate familiarity with Cartesian co-ordinates in two dimensions, interpret and use graphs in practical situations including travel graphs and conversion graphs, draw graphs from given data.

Use letters to express generalised numbers and express basic arithmetic processes algebraically, substitute numbers for words and letters in formulae; transform simple formulae; construct simple expressions and set up simple equations.

Manipulate directed numbers; use brackets and extract common factors.

Solve simple linear equations in one unknown; solve simultaneous linear equations in two unknowns.

**Term 2**

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<td>4 weeks</td>
<td>3. Probability</td>
<td>Calculate the probability of a single event as either a fraction or a decimal (not a ratio); understand and</td>
<td>Chapter 8</td>
</tr>
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<td>Time</td>
<td>Topic</td>
<td>Details</td>
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<td>4 weeks</td>
<td>4. Shape and space</td>
<td>Use and interpret the geometrical terms: point, line, parallel, bearing, right angle, acute, obtuse and reflex angles, perpendicular, similarity, congruence; use and interpret vocabulary of triangles, quadrilaterals, circles, polygons and simple solid figures including nets. Interpret and use three-figure bearings measured clockwise from the North (i.e. 000°–360°); apply Pythagoras’ theorem and the sine, cosine and tangent ratios for acute angles to the calculation of a side or of an angle of a right-angled triangle (angles will be quoted in, and answers required in, degrees and decimals to one decimal place).</td>
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**Assessment**

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