



## Mathematical Thinking Course Outline

### FET Phase

The AIMSSEC Mathematical Thinking residential course (FET phase) concentrates on grades 10 and 11, with specific reference to the following areas:

- Patterns, functions and algebra
- Geometry
- Trigonometry
- Probability and statistics
- Planning for learning
- Information technology skills (for either beginners or advanced users)

The course content is related to the CAPS (Curriculum Assessment Policy Statement) and is introduced with accompanying pedagogical approaches. The content areas are broken down as follows:

#### Patterns, functions and algebra (7 lessons)

- **Sequences and Series:** both linear and quadratic
- **Algebraic expressions:** multiplication, factorisation and simplification; using laws of exponents
- **Algebraic equations:** solving and rearranging; manipulating systems of equations; inequalities
- **Functions and graphs:** working with a variety of graphs and transformations; gradients

#### Geometry (6 lessons)

- **Euclidean geometry:** properties of special quadrilaterals; the geometry of triangles; circle geometry and circle theorems
- **Analytical geometry:** use of the Cartesian grid; distance between points; midpoints of line segments, gradients of lines, conditions for lines to be perpendicular or parallel, the equation of a line and the inclination of a line

#### Trigonometry (4 lessons)

- **Trigonometric functions:** definitions in right-angled triangles, definitions for obtuse and reflex angles; derivation of the functions' values for key angles
- **Trigonometric equations:** solving equations for acute angles, solving problems in two dimensions; deriving and using identities and knowing when an identity is undefined
- **Graphs of trigonometric functions:** sketching; transformations; investigating the period and amplitude
- **Derivations of related formulae:** the reduction formula; the sine, cosine and area rules; solving two-dimensional problems

#### Probability and statistics (4 lessons)

- **Probability:** language of probability and probability scale; introduction to probability through practical experiment; data recorded on tree diagrams, 2-way tables and Venn diagrams; relative frequency; deriving theoretical probabilities from expected results; multiplication rule for independent events
- **Statistics:** data-handling cycle – asking and answering questions using statistical techniques; data collection; using summary measures, including measures of central tendency and dispersion for grouped and ungrouped data, and graphs, to analyse data and draw conclusions; the appropriate use of various graphs and charts

### Planning for learning (3 lessons)

As educators, we tend to concentrate on *planning for teaching* to ensure curriculum coverage. These sessions will help educators to shift from *planning for teaching* to *planning for learning*; it explains how this practice can enhance their effectiveness in the classroom to address issues of inclusion, differentiation and progression. Educators are expected to engage with relevant learning resources that they can use with learners in their schools.

### Information technology skills (4 lessons)

Beginner level	Advanced level
<ul style="list-style-type: none"><li>• <b>General computer skills:</b> logging on to a computer; opening and using programs; saving and renaming software files;</li><li>• <b>Internet skills:</b> online research and communication; use of specialist websites such as the Aiming High Teachers' Network and Moodle;</li><li>• <b>Specialist software:</b> the use of mathematical software, programs and resources appropriate to the teachers and their learners, such as Microsoft Word and Microsoft Excel.</li></ul>	<ul style="list-style-type: none"><li>• <b>Internet skills:</b> online research and communication; use of specialist websites such as the Aiming High Teachers' Network and Moodle;</li><li>• <b>Specialist software:</b> the use of mathematical software, programs and resources appropriate to the teachers and their learners, such as Microsoft Excel and GeoGebra.</li></ul>

In addition to the above mentioned content areas, AIMSSEC provides plenary sessions on a variety of mathematical topics and cross-cutting issues related to the teaching and learning of mathematics.

To complete the course successfully, educators are expected to write a test on the work covered during the course and to submit two assignments. These assignments are based on *planning for learning* and the use of learner-centred activities in the classroom.

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