

Fast Track 3

Mathematics Workbook

W. Geldof

Written for able Year 11 students aiming to achieve
Level 1 standards with Merit or Excellence

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2nd Edition



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AS 1.1 - Numeric Reasoning Internally Assessed - 4 credits

Basic Arithmetic	5
Primes and Powers	6
Problems with Special Numbers	7
Decimals	8
Significant Figures	9
Standard Form	10
Calculator Skills	11
Problems with Decimal Numbers	12
Number Systems	13
Fractions, Decimals & Percentages	14
Ratio	15
Fraction Arithmetic 1	16
Fraction Arithmetic 2	17
Working with Percentages 1	18
Working with Percentages 2	19
Use a Ratio Table	20
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Achievement Standard 1.1 - Skills Test	23

AS 1.2 - Algebraic Methods Externally Assessed - 4 credits

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Simplifying Expressions 3	27
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Solving Equations 2	31
Solving Equations 3	32
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Simultaneous Equations 2	37
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Factorising Quadratics 2	41
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Quadratic Equations 2	43
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AS 1.3 - Tables, Equations and Graphs Externally Assessed - 4 credits

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Plotting Lines 2	48
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Gradients and Intercepts 2	50
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Quadratic Patterns	55
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Solving Problems 2	65
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Composite Shapes	77
Complex Shapes	78
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Composite Solids	81
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Modelling	84
Measurement Medley	85
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AS 1.6 - Geometric Reasoning Externally Assessed - 4 credits

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Writing Expressions	91
Bearings from North	92
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Angles in Circles 2	94
Angles in Circles 3	95
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Prove It	98
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Similar Shapes 2	100
Recognising Similar Triangles	101
The Rule of Pythagoras	102
Using Pythagoras' Rule	103
Pythagoras in Context	104
Right Angle Trigonometry	105
The Ratio Triangle	106
Length of a Side	107
Size of an Angle	108
2D Modelling	109
Maps and Bearings	110
Achievement Standard 1.6 - Skills Test	115 & 116

* Pages 99-110 cover work for both AS 1.6 and 1.7.

AS 1.7 - Right-Angled Triangles Internally Assessed - 3 credits

Similar Shapes 1	99
Similar Shapes 2	100
Recognising Similar Triangles	101
The Rule of Pythagoras	102
Using Pythagoras' Rule	103
Pythagoras in Context	104
Right Angle Trigonometry	105
The Ratio Triangle	106
Length of a Side	107
Length of an Angle	108
2D Modelling	109
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* Pages 99-110 cover work for both AS 1.7 and 1.6.

AS 1.10 - Investigating Multivariate Data Internally Assessed - 4 credits

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Investigative Questions	120
Sampling	121
Sources of Variation	122
Recording and Sorting Data	123
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Sample Statistics - Spread	125
The Shape of a Distribution	126
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Statistical Inference 2	130
Case Study 1	131
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Achievement Standard 1.10 - Investigation	135

* Pages 118-123 cover work required for both AS 1.10 and 1.11.

AS 1.11 - Investigating Bivariate Data Internally Assessed - 3 credits

The Statistical Enquiry Cycle	*118
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Sampling	121
Sources of Variation	122
Recording and Sorting Data	123
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* Pages 118-123 cover work required for both AS 1.10 and 1.11.

AS 1.12 - Chance and Data Externally Assessed - 4 credits

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Interpreting Data 2	149
Interpreting Data 3	150
Interpreting Data 4	151
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A Choice of Standards

This mathematics workbook *'Fast Track 3'* prepares students to pass NCEA Level 1 Achievement Standards with merit or excellence. The work is drawn from levels 5 and 6 of the New Zealand Mathematics and Statistics curriculum.

There are 13 Achievement Standards in NCEA Level 1 Mathematics. It is expected that a full-time Level 1 student will study between 5 and 7 of these standards (about 20 - 24 credits). The selection should cover the three strands of the curriculum : Number and Algebra, Geometry and Measurement, Statistics. Most schools will make this selection based on the ability and interests of their students.

Since no Level 1 student is expected to do all 13 standards, it would be a waste of money and paper to ask students to purchase a workbook containing enough material to adequately revise all 13 standards. Therefore, after consultation with Heads of Maths departments, I have selected the nine most popular Achievement Standards that make up courses for able Level 1 maths students.

'Fast Track 3' provides work for the following Achievement Standards :

Achievement Standard 1.1	Apply numeric reasoning in solving problems
Achievement Standard 1.2	Apply algebraic reasoning in solving problems
Achievement Standard 1.3	Investigate relationships between tables, equations or graphs
Achievement Standard 1.5	Apply measurement in solving problems
Achievement Standard 1.6	Apply geometric reasoning in solving problems
Achievement Standard 1.7	Apply right-angled triangles in solving measurement problems
Achievement Standard 1.10	Investigate a given multivariate data set using the statistical enquiry cycle
Achievement Standard 1.11	Investigate bivariate numerical data using the statistical enquiry cycle
Achievement Standard 1.12	Demonstrate understanding of chance and data

In our survey the most popular set of standards for able students was :
AS 1.1, AS 1.2, AS 1.3,
AS 1.6, AS 1.10, AS 1.12,
giving a total of 24 credits
and 4 external tests.

[An abbreviated version of the full Achievement Standards can be found on pages A15 - A18 at the back of this book]

Some of these standards cover the same parts of the curriculum. For instance AS 1.6 and AS 1.7 both include trigonometry. Also both AS 1.10, AS 1.11 are based on the statistical enquiry cycle. You will find that the same pages on trigonometry are done whether you are aiming to sit AS 1.6 or AS 1.7. Similarly the pages on the statistical enquiry cycle must be done whether you are aiming for AS 1.10 or AS 1.11. See the contents page for details.

Whenever possible students should practise their mental strategies in arithmetic. Developing algebraic skills is important, you will find applications in measurement, geometric reasoning, trigonometry and any other science subject you are studying.

It is expected that students use technology (calculator, graphic calculator, spreadsheet) throughout the year. This book includes some basic instructions for the Casio fx9750 graphic calculator and Excel spreadsheet. However, these explanations are brief and more detailed information can be found in the graphic calculator's instruction booklet and in Excel's help menu. Please note that Achievement Standard 1.2 does NOT ALLOW the use of electronic technology when assessing this standard.

Spreadsheet Data Available on Sigma's Website

In this workbook you will be asked to investigate tables of data. You could choose to enter the data into a spreadsheet yourself or you could save time by downloading the complete data set from Sigma's website. To download these spreadsheets you require a computer with internet access and the microsoft spreadsheet program Excel. Download instructions :

- 1] Go to Sigma's website at www.sigmapublications.co.nz and click on *'Secondary Maths Books'* in the side panel menu.
- 2] Click on the cover picture of *'Fast Track 3'* at the bottom of the page.
- 3] At the bottom of the book page for *'Fast Track 3'* you will find a list of the downloadable spreadsheets.
- 4] To download the data, click on the spreadsheet you require.

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