

# Table of Contents

<b>Overview of Functions 11</b> .....	<b>v</b>
Structure of the Teacher's Resource .....	vi
Program Philosophy .....	viii
Approaches to Teaching Mathematics .....	viii
Instructional Practice .....	ix
Literacy .....	x
Problem Solving .....	x
Mathematical Processes .....	xi
Technology .....	xii
Assessment .....	xiii
Reaching All Students .....	xv
Curriculum Correlation .....	xviii
<b>Chapter 1 Functions</b> .....	<b>1</b>
<b>Prerequisite Skills</b> .....	<b>4</b>
1.1 Functions, Domain, and Range .....	4
1.2 Functions and Function Notation .....	8
1.3 Maximum or Minimum of a Quadratic Function .....	11
<b>Use Technology</b> Use a TI-Nspire™ CAS Graphing Calculator to Find Maximum or Minimum and the Zeros of a Quadratic Function .....	14
1.4 Skills You Need: Working With Radicals ....	14
<b>Use Technology</b> Use a TI-Nspire™ CAS Graphing Calculator to Explore Operations With Radicals .....	16
1.5 Solve Quadratic Equations .....	17
1.6 Determine a Quadratic Equation Given its Roots .....	20
1.7 Solve Linear-Quadratic Systems .....	24
<b>Chapter 1 Review</b> .....	<b>29</b>
<b>Chapter Problem Wrap-Up</b> .....	<b>30</b>
<b>Chapter 1 Practice Test</b> .....	<b>32</b>
<b>Task: Laser Beams</b> .....	<b>33</b>
<b>Chapter 2 Transformations of Functions</b> ..	<b>37</b>
<b>Prerequisite Skills</b> .....	<b>40</b>
2.1 Functions and Equivalent Algebraic Expressions .....	40
<b>Use Technology</b> Graph Functions Using a TI-Nspire™ CAS Calculator .....	42
2.2 Skills You Need: Operations With Rational Expressions .....	43
2.3 Horizontal and Vertical Translations of Functions .....	46
2.4 Reflections of Functions .....	49
2.5 Stretches of Functions .....	53
<b>Use Technology</b> Use <i>The Geometer's Sketchpad</i> ® to Explore Transformations .....	57
2.6 Combinations of Transformations .....	57
2.7 Inverse of a Function .....	61
<b>Chapter 2 Review</b> .....	<b>65</b>
<b>Chapter Problem Wrap-Up</b> .....	<b>66</b>
<b>Chapter 2 Practice Test</b> .....	<b>67</b>
<b>Task: Functions in Design</b> .....	<b>68</b>
<b>Chapter 3 Exponential Functions</b> .....	<b>71</b>
<b>Prerequisite Skills</b> .....	<b>75</b>
3.1 The Nature of Exponential Growth .....	76
<b>Use Technology</b> Use Lists and Trace Features on a TI-Nspire™ CAS Graphing Calculator ....	80
3.2 Exponential Decay: Connecting to Negative Exponents .....	80
3.3 Rational Exponents .....	84
3.4 Properties of Exponential Functions .....	88
3.5 Transformations of Exponential Functions ...	91
3.6 Making Connections: Tools and Strategies for Applying Exponential Models .....	94
<b>Chapter 3 Review</b> .....	<b>96</b>
<b>Chapter Problem Wrap-Up</b> .....	<b>97</b>
<b>Chapter 3 Practice Test</b> .....	<b>98</b>
<b>Chapters 1 to 3 Review</b> .....	<b>99</b>
<b>Task: Radioactive Isotopes</b> .....	<b>99</b>
<b>Chapter 4 Trigonometry</b> .....	<b>103</b>
<b>Prerequisite Skills</b> .....	<b>106</b>
4.1 Special Angles .....	107
4.2 Co-terminal and Related Angles .....	112
<b>Use Technology</b> Use a Computer Algebra System to Find Exact Trigonometric Ratios and Angles ..	116
4.3 Reciprocal Trigonometric Ratios .....	117
4.4 Problems in Two Dimensions .....	119
<b>Use Technology</b> Use Geometry Software to Test for the Ambiguous Case .....	122
4.5 Problems in Three Dimensions .....	122
4.6 Trigonometric Identities .....	124
<b>Chapter 4 Review</b> .....	<b>128</b>
<b>Chapter Problem Wrap-Up</b> .....	<b>129</b>
<b>Chapter 4 Practice Test</b> .....	<b>131</b>
<b>Task: Pyramids and Angles of Elevation</b> .....	<b>132</b>
<b>Chapter 5 Trigonometric Functions</b> .....	<b>135</b>
<b>Prerequisite Skills</b> .....	<b>139</b>
5.1 Modelling Periodic Behaviour .....	140
5.2 The Sine Function and the Cosine Function ..	144
<b>Use Technology</b> Dynamically Unwrap the Unit Circle .....	149

5.3 Investigate Transformations of Sine and Cosine Functions . . . . .	149
5.4 Graphing and Modelling with $y = \text{asin}[k(x - d)] + c$ and $y = \text{acos}[k(x - d)] + c$ . . . . .	155
5.5 Data Collecting and Modelling . . . . .	157
5.6 Use Sinusoidal Functions to Model Periodic Phenomena Not Involving Angles. . . . .	161
<b>Use Technology</b> Create a Scatter Plot and a Function Using a TI-Nspire™ CAS Graphing Calculator. . . . .	163
<b>Chapter 5 Review</b> . . . . .	163
<b>Chapter Problem Wrap-Up</b> . . . . .	164
<b>Chapter 5 Practice Test</b> . . . . .	166
<b>Chapters 4 and 5 Review</b> . . . . .	167
<b>Task: Modelling a Rotating Object</b> . . . . .	167
<b>Chapter 6 Discrete Functions</b> . . . . .	<b>171</b>
<b>Prerequisite Skills</b> . . . . .	174
6.1 Sequences as Discrete Functions. . . . .	175
<b>Use Technology</b> Use a TI-Nspire™ CAS Graphing Calculator to Write Terms in a Sequence . . . . .	178
6.2 Recursive Procedures . . . . .	179
6.3 Pascal's Triangle and Expanding Binomial Powers. . . . .	183
6.4 Arithmetic Sequences . . . . .	185
6.5 Geometric Sequences . . . . .	188
6.6 Arithmetic Series . . . . .	192
6.7 Geometric Series . . . . .	194
<b>Chapter 6 Review</b> . . . . .	198
<b>Chapter Problem Wrap-Up</b> . . . . .	199
<b>Chapter 6 Practice Test</b> . . . . .	200
<b>Task: Mathematics in Media Studies</b> . . . . .	201
<b>Chapter 7 Financial Applications of Sequences and Series</b> . . . . .	<b>205</b>
<b>Prerequisite Skills</b> . . . . .	208
7.1 Simple Interest . . . . .	209
7.2 Compound Interest . . . . .	211
7.3 Present Value . . . . .	216
7.4 Annuities . . . . .	220
7.5 Present Value of an Annuity. . . . .	222
<b>Chapter 7 Review</b> . . . . .	227
<b>Chapter Problem Wrap-Up</b> . . . . .	228
<b>Chapter 7 Practice Test</b> . . . . .	229
<b>Chapters 6 and 7 Review</b> . . . . .	230
<b>Task: Loans and Annuities Due</b> . . . . .	230
<b>Course Review</b> . . . . .	232

## Blackline Masters

### (Available on *Functions 11: Teacher's Resource CD-ROM*)

This package has generic masters and generic assessment masters, along with chapter-specific worksheets, assessment tools, and technology masters.

Blackline masters are provided in WORD and PDF format for the Prerequisite Skill pages, each numbered sections of the text, and the Chapter Review. A Chapter Test is provided for each chapter. Answers are included for all these extra questions.

The BLM package also includes rubrics for selected Achievement Check questions, Chapter Problem Wrap-Ups, and the Tasks.

### Generic Masters

- BLM G-1 Grid Paper
- BLM G-2 Placemat
- BLM G-3 Four Quadrant Grids

### Generic Assessment Masters

- BLM A-1 Problem Solving
- BLM A-2 Reasoning and Proving
- BLM A-3 Reflecting
- BLM A-4 Selecting Tools and Computational Strategies
- BLM A-5 Connecting
- BLM A-6 Representing
- BLM A-7 Communicating
- BLM A-8 Learning Skills Descriptors
- BLM A-9 Study Skills for Success in Math

### Generic Technology Masters

- BLM T-1 Microsoft® *Excel*
- BLM T-2 *The Geometer's Sketchpad*® 4
- BLM T-3 *Fathom*™