## Contents

Pearson Mathematics writing and development team ..... iii
Series features ..... viii
Using Pearson Mathematics ..... X
Chapter 1 Financial mathematics ..... 2
Recall 1 ..... 4
Exploration Task: Get rich quick? ..... 4
1.1 Percentages review ..... 5
Problem solving: Age-old dilemmas ..... 13
1.2 Buying and selling ..... 14
Problem solving: Patrick's prized painting ..... 21
Gamespace: ShopBay ..... 22
1.3 Earning an income ..... 24
Problem solving: Careless Carly ..... 30
Investigation: Working out the roster ..... 31
1.4 Tax and other pay deductions ..... 33
Game: Master of the market ..... 39
Maths 4 Real: A fair wage ..... 40
Half-time 1 ..... 42
1.5 Simple interest ..... 43
Exploration Spreadsheet: Using iteration to investigate savings plans ..... 50
1.6 Payment methods ..... 52
1.7 The cost of resources ..... 59
1.8 Communication costs ..... 67
Puzzle: Sudoku ..... 73
Challenge 1 ..... 74
Chapter review 1 ..... 75
Numeracy practice 1 ..... 79
Chapter 2 Pythagoras' theorem ..... 80
Recall 2 ..... 82
Exploration Task: Pythagorean triples ..... 82
2.1 Pythagoras' theorem and right-angled triangles ..... 83
Problem solving: Olives and pots ..... 89
2.2 Finding the length of the hypotenuse ..... 90
Game: Perfect square root bingo ..... 99
2.3 Finding the length of a shorter side ..... 100
Puzzle: Roots but no plants ..... 104
Half-time 2 ..... 105
Maths 4 Real: Pythagoras and plasma screens ..... 106
Investigation: Estimating with Pythagoras ..... 108
2.4 Applications of Pythagoras' theorem ..... 109
Puzzle: Pythagoras and the missing fig ..... 114
2.5 Pythagorean triples ..... 115
Problem solving: How old was Pythagoras? ..... 119
Gamespace: The Pythagoreans ..... 120
Challenge 2 ..... 122
Chapter review 2 ..... 123
Numeracy practice 2 ..... 126
Mixed review A ..... 127
Chapter 3 Algebra ..... 130
Recall 3 ..... 132
Exploration Task: How many different areas of the same rectangle? ..... 132
3.1 Introducing index laws using variables ..... 133
Problem solving: Square cubes ..... 141
Maths 4 Real: The digital world comes in byte-sized bits ..... 142
3.2 More index laws and index properties ..... 144
Puzzle: What is a'googolplex'? ..... 155
3.3 Scientific notation and significant figures ..... 156
Problem solving: Stairway to the Moon ..... 165
Gamespace: Super powers ..... 166
3.4 Rearranging formulas ..... 168
Puzzle: In the prime of his life ..... 172
Half-time 3 ..... 173
3.5 Expanding the brackets ..... 174
Problem solving: Divisibility dilemma? ..... 181
3.6 Expanding special products ..... 182
Problem solving: Oranges and apples ..... 185
3.7 Factorising using common factors ..... 186
Game: Matching expressions ..... 189
Investigation: Mr Gershwin's piano ..... 190
3.8 Factorising by grouping in pairs ..... 192
Puzzle: Trouble in variable paradise ..... 197
Challenge 3 ..... 198
Chapter review 3 ..... 199
Numeracy practice 3 ..... 201
Exploration STEM: Help find the best loan! ..... 202
Exploration STEM: Grow your own Pythagoras tree ..... 202
Exploration STEM: How healthy is your garden? ..... 203
Exploration Coding: The bubble sort ..... 203
Chapter 4 Measurement ..... 204
Recall 4 ..... 206
Exploration Task: Seeing double ..... 206
4.1 Perimeter ..... 207
4.2 Area ..... 215
Maths 4 Real: Veterinary maths ..... 224
Half-time 4 ..... 226
4.3 Surface area ..... 227
Problem solving: Icosahedron ..... 234
4.4 Volume and capacity ..... 235
Problem solving: Gold, set, match ..... 241
Exploration CAS: The properties of cylinders ..... 242
Gamespace: Origami sports shirt ..... 244
Investigation: The humble milk carton ..... 246
Challenge 4 ..... 247
Chapter review 4 ..... 248
Numeracy practice 4 ..... 252
Mixed review B ..... 253
Chapter 5 Linear relationships ..... 256
Recall 5 ..... 258
Exploration Task: Straight lines ..... 258
5.1 Solving linear equations ..... 259
Problem solving: Burning down ..... 267
Gamespace: A day out ..... 268
5.2 Solving problems using linear equations ..... 270
Problem solving: Fractions in fractions in fractions ..... 272
5.3 Coordinate geometry ..... 273
Puzzle: Hitori ..... 277
5.4 Plotting linear graphs ..... 278
Problem solving: How many edges? ..... 285
Half-time 5 ..... 286
5.5 Gradient ..... 287
Problem solving: Lost in the desert ..... 296
Exploration CAS: Linear relationships ..... 297
5.6 Sketching linear graphs using the gradient and $y$-intercept ..... 300
Game: Equation battleships ..... 311
Maths 4 Real: Engineering and linear relationships ..... 312
5.7 Sketching linear graphs using intercepts ..... 314
5.8 Vertical and horizontal graphs ..... 318
Problem solving: Area of a rectangle ..... 321
Investigation: A fun park dilemma ..... 322
Challenge 5 ..... 324
Chapter review 5 ..... 325
Numeracy practice 5 ..... 329
Chapter 6 Geometric reasoning ..... 330
Recall 6 ..... 332
Exploration Task: What makes two triangles similar to each other? ..... 332
6.1 Angle review ..... 333
Game: Space invaders ..... 339
Gamespace: Space race home ..... 340
6.2 Triangles and congruency ..... 342
Puzzle: Hexagon jigsaw ..... 349
6.3 Special quadrilaterals and their properties ..... 350
Puzzle: Matchstick quadrilaterals ..... 360
Investigation: Exterior angle sum of polygons ..... 361
Half-time 6 ..... 362
6.4 Enlarging and reducing ..... 364
Puzzle: What a star! ..... 370
Exploration CAS: Enlarging or reducing a figure ..... 371
6.5 Similarity and similar triangles ..... 374
Puzzle: How many triangles? ..... 381
6.6 Solving problems using similar triangles ..... 382
Problem solving: Curiously crossed ..... 387
Investigation: Measuring shadows to find heights ..... 388
Maths 4 Real: Aspect ratio ..... 390
6.7 Solids and nets ..... 392
Puzzle: Matching cubes ..... 398
Challenge 6 ..... 399
Chapter review 6 ..... 400
Numeracy practice 6 ..... 404
Mixed review C ..... 406
Exploration STEM: What colours do you see? ..... 409
Exploration STEM: How many fish in the sea? ..... 409
Exploration Coding: What might I earn? ..... 409
Chapter 7 Trigonometry ..... 410
Recall 7 ..... 412
Exploration Task: What's so special about right-angled triangles? ..... 412
7.1 Introduction to trigonometry ..... 413
Puzzle: Matchstick madness ..... 417
7.2 Trigonometric ratios ..... 418
7.3 Using trigonometry to find side lengths ..... 425
Half-time 7 ..... 431
7.4 Using trigonometry to find angles ..... 432
Puzzle: Sudoku ..... 437
Investigation: Kicking goals in rugby ..... 438
Gamespace: Adventure on Sohcahtoa Island ..... 440
7.5 Applications of trigonometry ..... 442
Problem solving: Finding the height of a tree ..... 449
Maths 4 Real: Air traffic controller ..... 450
Challenge 7 ..... 452
Chapter review 7 ..... 453
Numeracy practice 7 ..... 457
Chapter 8 Statistics and probability ..... 458
Recall 8 ..... 460
Exploration Task: From data to information ..... 460
8.1 Investigating data ..... 461
Puzzle: Equation squares ..... 467
8.2 Interpreting data ..... 468
Puzzle: Code breaking ..... 472
8.3 Statistics from grouped data ..... 473
Puzzle: Complete the pattern ..... 483
Investigation: Reading matters! ..... 484
Gamespace: Rating the ratings ..... 486
8.4 Comparing data sets ..... 488
Maths 4 Real: Counting the country ..... 496
Half-time 8 ..... 498
8.5 Understanding probability ..... 499
Exploration Spreadsheet: How many heads? ..... 507
Investigation: Game simulator ..... 508
8.6 Probability events ..... 510
Game: Bigger is better ..... 516
8.7 Representing probability ..... 517
Problem solving: Birthday cards ..... 523
Challenge 8 ..... 524
Chapter review 8 ..... 525
Numeracy practice 8 ..... 531
Chapter 9 Non-linear relationships and proportion ..... 532
Recall 9 ..... 534
Exploration Task: The range of non-linear relationships ..... 534
9.1 Quadratic relationships ..... 535
Puzzle: Hitori ..... 552
9.2 Solving quadratic equations ..... 553
Problem solving: Stopping distances ..... 560
9.3 Sketching parabolas using transformations ..... 561
Problem solving: Let's go camping ..... 576
Investigation: A parabolic nomogram ..... 577
Gamespace: Quadratic maze ..... 578
Half-time 9 ..... 580
9.4 Circle relationships ..... 581
Problem solving: Circles within circles ..... 588
Exploration CAS: Investigating non-linear equations ..... 589
Ext 9.5 Exponentials and hyperbolas ..... 593
Problem solving: How many triangles? ..... 601
Maths 4 Real: The space race ..... 602
9.6 Direct proportion ..... 604
Problem solving: Relationships between variables ..... 612
(Ext) 9.7 Inverse proportion ..... 613
Problem solving: The mass of Earth ..... 619
Challenge 9 ..... 620
Chapter review 9 ..... 621
Numeracy practice 9 ..... 625
Mixed review D ..... 626
Answers ..... 628
Glossary and index ..... 704

