

GCSE Edexcel Mathematics Higher Level



Student Book

The Complete 9-1 Course for Edexcel

Includes Free Online Edition

Contents

Introduction		Section 5 — Percentages	
About this Book	i	1. Percentages	59
		2. Percentages, Fractions and Decimals	62
Section 1 — Arithmetic, Multiples ar	nd	3. Percentage Increase and Decrease	65
Factors		4. Compound Percentage Change	70
1. Calculations	2	Review Exercise	73
Multiples and Factors	7	Exam-Style Questions	74
3. Prime Numbers and Prime Factors	9		
4. LCM and HCF	12	Section 6 — Expressions	
Review Exercise	16	1. Simplifying Expressions	75
Exam-Style Questions	17	2. Expanding Brackets	77
		3. Factorising — Common Factors	80
Section 2 — Approximations		4. Factorising — Quadratics	82
	1.0	5. Algebraic Fractions	85
1. Rounding	18	Review Exercise	89
2. Upper and Lower Bounds Review Exercise	21	Exam-Style Questions	90
Exam-Style Questions	25		
Exam-style Questions	26	Section 7 — Powers and Roots	
Section 3 — Fractions		1. Squares, Cubes and Roots	91
1. Equivalent Fractions	27	2. Indices and Index Laws	92
2. Mixed Numbers	29	3. Standard Form	96
3. Ordering Fractions	30	4. Surds	99
4. Adding and Subtracting Fractions	31	Review Exercise	104
5. Multiplying and Dividing by Fractions	33	Exam-Style Questions	105
6. Fractions and Decimals	36		
Review Exercise	40	Section 8 — Formulas	
Exam-Style Questions	41	1. Writing Formulas	106
		2. Substituting into a Formula	107
Section 4 — Ratio and Proportion	•	3. Rearranging Formulas	109
1. Ratios	42	Review Exercise	111
2. Using Ratios	46	Exam-Style Questions	112
3. Dividing in a Given Ratio	50		
4. Proportion	53	Section 9 — Equations	
Review Exercise	57	1. Solving Equations	113
Exam-Style Questions	58	2. Forming Equations from Word Problems	116
		3. Identities	118
		4. Proof	119
		5. Iterative Methods	121

Review Exercise

Exam-Style Questions

125

126

Section 10 — Direct and Inverse		Section 16 — Other Types of Graph	
Proportion		1. Quadratic Graphs	194
1. Direct Proportion	127	2. Cubic Graphs	198
2. Inverse Proportion	130	3. Reciprocal and Exponential Graphs	200
Review Exercise	133	4. Circle Graphs	203
Exam-Style Questions	134	5. Trigonometric Graphs	204
		6. Transforming Graphs	206
Section 11 — Quadratic Equations		Review Exercise	210
1. Solving Quadratic Equations by Factorising	135	Exam-Style Questions	212
2. Completing the Square	137		
3. The Quadratic Formula	140	Section 17 — Using Graphs	
Review Exercise	142	1. Interpreting Real-Life Graphs	214
Exam-Style Questions	143	2. Drawing Real-Life Graphs	217
		3. Solving Simultaneous Equations	210
Section 12 — Simultaneous Equations	S	Graphically	219
1. Simultaneous Linear Equations	144	4. Solving Quadratics Graphically5. Gradients of Curves	221
2. Simultaneous Linear and		Review Exercise	223
Quadratic Equations	147	Exam-Style Questions	225
Review Exercise	149	Exam-style Questions	226
Exam-Style Questions	150	Section 18 — Functions	
Section 13 — Inequalities		1. Evaluating Functions	228
1. Solving Inequalities	151	2. Composite Functions	230
2. Quadratic Inequalities	154	3. Inverse Functions	232
3. Graphing Inequalities	156	Review Exercise	234
Review Exercise	159	Exam-Style Questions	235
Exam-Style Questions	160	Sear age.	
	100	Section 19 — Sets	
Section 14 — Sequences		1. Sets	236
1. Term to Term Rules	161	2. Venn Diagrams	238
2. Using the <i>n</i> th Term	167	3. Unions and Intersections	241
3. Finding the <i>n</i> th Term	170	4. Complement of a Set	244
Review Exercise	175	Review Exercise	246
Exam-Style Questions	176	Exam-Style Questions	247
Section 15 — Straight-Line Graphs	•	Section 20 — Angles and 2D Shapes	
Straight-Line Graphs	177	1. Angles on Lines and Around Points	248
2. Gradients	180	2. Parallel Lines	250
3. Equations of Straight-Line Graphs	182	3. Triangles	252
4. Parallel and Perpendicular Lines	185	4. Quadrilaterals	254
5. Line Segments	188	5. Polygons	257
Review Exercise	191	6. Symmetry	261
Exam-Style Questions	193	Review Exercise	262
		Exam-Style Questions	264

Section 21 — Circle Geometry		Section 26 — Vectors	
1. Circle Theorems 1	266	1. Vectors and Scalars	339
2. Circle Theorems 2	269	2. Vector Geometry	344
3. Circle Theorems 3	272	Review Exercise	347
Review Exercise	274	Exam-Style Questions	348
Exam-Style Questions	275	and the state of t	
		Section 27 — Perimeter and Area	
Section 22 — Units, Measuring		1. Triangles and Quadrilaterals	349
and Estimating		2. Circles and Sectors	353
1. Metric Units — Length, Mass and Volume	276	Review Exercise	356
2. Metric Units — Area and Volume	278	Exam-Style Questions	357
3. Metric and Imperial Units	280		
4. Estimating in Real Life	282	Section 28 — 3D Shapes	
Review Exercise	283	1. Plans, Elevations and Isometric Drawings	358
Exam-Style Questions	284	2. Volume	362
A CONTRACTOR OF THE PARTY OF TH		3. Nets and Surface Area	365
Section 23 — Compound Measures		4. Spheres, Cones and Pyramids	368
1. Compound Measures	285	5. Rates of Flow	372
Distance-Time Graphs	290	6. Symmetry of 3D Shapes	373
3. Velocity-Time Graphs	293	Review Exercise	374
Review Exercise	297	Exam-Style Questions	376
Exam-Style Questions	298	Ziam style Questions	
DES.		Section 29 — Transformations	
Section 24 — Constructions		1. Reflections	377
1. Scale Drawings	299	2. Rotations	380
2. Bearings	302	3. Translations	383
3. Constructions	305	4. Enlargements	385
4. Loci	313	5. Combinations of Transformations	390
Review Exercise	316	Review Exercise	392
Exam-Style Questions	317	Exam-Style Questions	393
Section 25 — Pythagoras and		Section 30 — Congruence and	
Trigonometry		Similarity	
1. Pythagoras' Theorem	318	1. Congruence and Similarity	394
2. Pythagoras' Theorem in 3D	321	2. Areas and Volumes of Similar Shapes	399
3. Trigonometry — Sin, Cos and Tan	323	Review Exercise	403
4. The Sine and Cosine Rules	328	Exam-Style Questions	404
5. Trigonometry in 3D	333		
Review Exercise	335		

337

Exam-Style Questions

Section 31 — Collecting Data	
1. Using Different Types of Data	405
2. Data Collection	407
3. Sampling and Bias	410
Review Exercise	414
Exam-Style Questions	415

Section 32 — Averages and Ranges	
1. Averages and Ranges	416
2. Averages for Grouped Data	422
Review Exercise	424
Exam-Style Questions	425

Section 33 — Displaying Data	
1. Tables and Charts	426
2. Stem and Leaf Diagrams	431
3. Frequency Polygons	433
4. Histograms	434
5. Cumulative Frequency Diagrams	437
6. Time Series	440
7. Scatter Graphs	442
8. Appropriate Representation of Data	446
Review Exercise	447

Section 34 — Probability	
1. Calculating Probabilities	451
2. Listing Outcomes	454
3. Probability from Experiments	457
Review Exercise	461
Exam-Style Questions	462

Section 35 — Probability for Combin	ned
1. The AND Rule for Independent Events	463
2. The OR Rule	465
3. Using the AND/OR Rules	468
4. Tree Diagrams	470
5. Conditional Probability	472
Review Exercise	475
Exam-Style Questions	476
Mixed Exam-Style Questions	477
Answers	483
Glossary	596
Index	602

Published by CGP

Editors:

Sammy El-Bahrawy, Shaun Harrogate, Samuel Mann, Tom Miles, Rosa Roberts, Caley Simpson, Dawn Wright

Contributors:

Katharine Brown, Eva Cowlishaw, Alastair Duncombe, Paul Garrett, Stephen Green, Philip Hale, Phil Harvey, Judy Hornigold, Claire Jackson, Mark Moody, Charlotte O'Brien, Rosemary Rogers, Manpreet Sambi, Neil Saunders, Jan Walker, Kieran Wardell, Jeanette Whiteman

Cover design by emc design ltd.

Exam-Style Questions

With thanks to Janet Dickinson, Allan Graham, Rosie Hanson, Samantha Krbacevic, Simon Little, Glenn Rogers, David Ryan and Ruth Wilbourne for the proofreading. With thanks to Ana Pungartnik for the copyright research.

Printed by Elanders Ltd, Newcastle upon Tyne. Clipart from Corel®

Text, design, layout and original illustrations © Coordination Group Publications Ltd. (CGP) 2018 All rights reserved.

Photocopying more than 5% of this book is not permitted, even if you have a CLA licence. Extra copies are available from CGP with next day delivery • 0800 1712 712 • www.cgpbooks.co.uk