## Contents

	Welcome to Mathematics:	
	A complete introduction!	xi
	Introduction	xiii
	The contract of the contract o	1
1	Number 1.1 Introduction – place value	0
	1.2 Arithmetic – the four operations	
	1.3 Order of operations	
	1.4 Problems which use arithmetic	
	1.5 Special numbers	
	1.6 Multiples, factors and primes	
2	A loo	15
2		10
	2.1 Introduction 2.2 Angles	
	2.3 Measuring and drawing angles	
	2.4 Using angle facts	
	2.5 Parallel lines	
	2.6 Bearings	
3	Fractions	27
•	3.1 Introduction	
	3.2 What is a fraction?	
	3.3 Which fraction is bigger?	
	3.4 Simplifying fractions	
	3.5 Improper fractions	
	3.6 Adding and subtracting fractions	
	3.7 Multiplication of fractions	
	3.8 Fractions of quantities	
	3.9 Division of fractions	
	3.10 A number as a fraction of another number	
4	Two-dimensional shapes	39
	4.1 Introduction	
	4.2 Triangles	
	4.3 Constructing triangles	
	4.4 Quadrilaterals	
	4.5 Polygons 4.6 Interior and exterior angles	
	176	
	4.7 Symmetries of regular polygons 4.8 Congruent shapes	
	4.9 Tessellations	

5	Decimals 5.1 Introduction 5.2 Place value 5.3 Converting decimals to fractions 5.4 Converting fractions to decimals 1 5.5 Addition and subtraction 5.6 Multiplication of decimals 5.7 Division of decimals 5.8 Converting fractions to decimals 2	55
6	Statistics 1 6.1 Introduction 6.2 Collection of data 6.3 Pictograms 6.4 Bar charts 6.5 Pie charts 6.6 Line graphs 6.7 Scatter graphs 6.8 Discrete and continuous data 6.9 Grouping data	71
7	Directed numbers 7.1 Introduction 7.2 Ordering directed numbers 7.3 Addition and subtraction 7.4 Multiplication and division 7.5 Using a calculator	91
8	Graphs 1 8.1 Coordinates 8.2 Straight-line graphs 8.3 Lines parallel to the axes	99
9	Measurement 9.1 The metric system 9.2 Imperial units 9.3 Converting between metric and imperial units 9.4 Choosing suitable units	111
10	Perimeter and area  10.1 Perimeter  10.2 Area  10.3 Area of a rectangle  10.4 Area of a parallelogram  10.5 Area of a triangle  10.6 Area of a trapezium	119

11	Algebraic expressions  11.1 Introduction – what is algebra?  11.2 Writing expressions  11.3 Simplifying expressions  11.4 Evaluating expressions	
	11.5 Squaring 11.6 Brackets 11.7 Factorizing expressions 11.8 Indices 11.9 Laws of indices	
12	Approximation  12.1 Introduction  12.2 Rounding whole numbers  12.3 Rounding with decimals  12.4 Significant figures  12.5 Estimates  12.6 Rounding in practical problems	
13	Equations 1  13.1 Introduction  13.2 Finding missing numbers  13.3 Solving linear equations  13.4 Equations with brackets  13.5 Solving problems using equations  13.6 Solving inequalities	163
14	Percentages  14.1 Introduction  14.2 Percentages, decimals, fractions  14.3 Percentages of quantities  14.4 Increasing and decreasing quantities  14.5 One quantity as a percentage of another quantity  14.6 Percentage increases  14.7 Using multipliers	
15	Formulae 15.1 What is a formula? 15.2 Evaluating terms other than the subject 15.3 Changing the subject of a formula	189
16	Circles 16.1 Introduction 16.2 Circumference of a circle 16.3 Area of a circle 16.4 Two properties of circles	197

17	Probability 17.1 Introduction 17.2 Relative frequency 17.3 Probability of a single event 17.4 Two events 17.5 Tree diagrams 17.6 Expected frequency	209
18	Three-dimensional shapes 18.1 Introduction 18.2 Nets and surface area 18.3 Volume of a cuboid 18.4 Volume of a prism 18.5 Weight of a prism	225
19	Ratio and proportion  19.1 What is a ratio?  19.2 Scales  19.3 Using ratio  19.4 Direct proportion  19.5 Inverse proportion	239
20	Pythagoras' theorem and trigonometry 20.1 Pythagoras' theorem 20.2 Using Pythagoras' theorem 20.3 Proof of Pythagoras' theorem 20.4 Pythagoras' theorem problems 20.5 Trigonometry 20.6 The tangent ratio 20.7 Values of the tangent 20.8 Using tangents 20.9 Sine and cosine	251
21	Indices and standard form  21.1 Indices  21.2 Laws of indices  21.3 Prime factors  21.4 Highest common factor  21.5 Lowest common multiple  21.6 Standard form – large numbers  21.7 Standard form – small numbers  21.8 Standard form calculations	
22	Statistics 2 22.1 Averages 22.2 The mode 22.3 The median 22.4 The mean 22.5 The range 22.6 Frequency tables 22.7 Grouped frequency tables	

viii

23	Graphs 2 23.1 Equations of straight lines 23.2 Drawing straight-line graphs 23.3 The gradient of a straight line 23.4 Curved graphs	295
24	Equations 2  24.1 Simultaneous equations  24.2 Algebraic methods  24.3 Quadratic expressions  24.4 Factorizing quadratic expressions  24.5 Quadratic equations  24.6 Solution by factorizing  24.7 Cubic equations	309
	Answers	327
	Taking it further	361
	Index	365