

Contents

Introduction

v

Acknowledgements

vii

Unit 1

Chapter 1: Reviewing number concepts

- 1.1 Different types of numbers
- 1.2 Multiples and factors
- 1.3 Prime numbers
- 1.4 Powers and roots
- 1.5 Working with directed numbers
- 1.6 Order of operations
- 1.7 Rounding numbers

Chapter 2: Making sense of algebra

- 2.1 Using letters to represent unknown values
- 2.2 Substitution
- 2.3 Simplifying expressions
- 2.4 Working with brackets
- 2.5 Indices

Unit 2

Chapter 5: Fractions and standard form

- 5.1 Equivalent fractions
- 5.2 Operations on fractions
- 5.3 Percentages
- 5.4 Standard form
- 5.5 Your calculator and standard form
- 5.6 Estimation

Chapter 6: Equations and rearranging formulae

- 6.1 Further expansions of brackets
- 6.2 Solving linear equations
- 6.3 Factorising algebraic expressions
- 6.4 Rearrangement of a formula

Unit 3

Chapter 9: Sequences and sets

- 9.1 Sequences
- 9.2 Rational and irrational numbers
- 9.3 Sets

Chapter 10: Straight lines and quadratic equations

- 10.1 Straight lines
- 10.2 Quadratic (and other) expressions

Chapter 11: Pythagoras' theorem and similar shapes

- 11.1 Pythagoras' theorem
- 11.2 Understanding similar triangles

Examination practice: structured questions for Units 1–3

Chapter 3: Lines, angles and shapes

- 3.1 Lines and angles
- 3.2 Triangles
- 3.3 Quadrilaterals
- 3.4 Polygons
- 3.5 Circles
- 3.6 Construction

Chapter 4: Collecting, organising and displaying data

- 4.1 Collecting and classifying data
- 4.2 Organising data
- 4.3 Using charts to display data

Chapter 7: Perimeter, area and volume

- 7.1 Perimeter and area in two dimensions
- 7.2 Three-dimensional objects
- 7.3 Surface areas and volumes of solids

Chapter 8: Introduction to probability

- 8.1 Basic probability
- 8.2 Theoretical probability
- 8.3 The probability that an event does not happen
- 8.4 Possibility diagrams
- 8.5 Combining independent and mutually exclusive events

11.3 Understanding similar shapes

11.4 Understanding congruence

Chapter 12: Averages and measures of spread

- 12.1 Different types of average
- 12.2 Making comparisons using averages and ranges
- 12.3 Calculating averages and ranges for frequency data
- 12.4 Calculating averages and ranges for grouped continuous data
- 12.5 Percentiles and quartiles
- 12.6 Box-and-whisker plots

Unit 4**Chapter 13: Understanding measurement**

13.1 Understanding units	281
13.2 Time	285
13.3 Upper and lower bounds	289
13.4 Conversion graphs	294
13.5 More money	297

Chapter 14: Further solving of equations and inequalities

14.1 Simultaneous linear equations	303
14.2 Linear inequalities	310
14.3 Regions in a plane	314
14.4 Linear programming	319
14.5 Completing the square	321
14.6 Quadratic formula	322
14.7 Factorising quadratics where the coefficient of x^2 is not 1	324
14.8 Algebraic fractions	326

Chapter 15: Scale drawings, bearings and trigonometry

	335
15.1 Scale drawings	336
15.2 Bearings	339
15.3 Understanding the tangent, cosine and sine ratios	340
15.4 Solving problems using trigonometry	355
15.5 Sines, cosines and tangents of angles more than 90°	360
15.6 The sine and cosine rules	364
15.7 Area of a triangle	372
15.8 Trigonometry in three dimensions	375

Chapter 16: Scatter diagrams and correlation

	383
16.1 Introduction to bivariate data	384

Unit 5**Chapter 17: Managing money**

	394
17.1 Earning money	395
17.2 Borrowing and investing money	401
17.3 Buying and selling	409

Chapter 18: Curved graphs

	415
18.1 Drawing quadratic graphs (the parabola)	416
18.2 Drawing reciprocal graphs (the hyperbola)	424
18.3 Using graphs to solve quadratic equations	428
18.4 Using graphs to solve simultaneous linear and non-linear equations	429
18.5 Other non-linear graphs	431
18.6 Finding the gradient of a curve	441
18.7 Derived functions	443

Chapter 19: Symmetry

	459
19.1 Symmetry in two dimensions	461
19.2 Symmetry in three dimensions	464
19.3 Symmetry properties of circles	467
19.4 Angle relationships in circles	470

Chapter 20: Histograms and frequency distribution diagrams

	483
20.1 Histograms	485
20.2 Cumulative frequency	492

Unit 6**Chapter 21: Ratio, rate and proportion**

	506
21.1 Working with ratio	507
21.2 Ratio and scale	512
21.3 Rates	515
21.4 Kinematic graphs	517
21.5 Proportion	525
21.6 Direct and inverse proportion in algebraic terms	528
21.7 Increasing and decreasing amounts by a given ratio	532

Chapter 22: More equations, formulae and functions

	536
22.1 Setting up equations to solve problems	537
22.2 Using and transforming formulae	543
22.3 Functions and function notation	546

Chapter 23: Vectors and transformations

	556
23.1 Simple plane transformations	557
23.2 Vectors	570
23.3 Further transformations	582

Chapter 24: Probability using tree diagrams and Venn diagrams

	595
24.1 Using tree diagrams to show outcomes	597
24.2 Calculating probability from tree diagrams	598
24.3 Calculating probability from Venn diagrams	600
24.4 Conditional probability	604

Examination practice: structured questions for Units 4–6	611
--	-----

Answers	617
---------	-----

Glossary	688
----------	-----

Index	694
-------	-----