

# Contents

## 1 Real Numbers 15

### Themes

Properties of real numbers; whole numbers, natural numbers, integers, fractions, rational numbers, square roots, irrational numbers

### Vocabulary

Definitions of types of numbers; properties of real numbers, derivatives  
Common procedures followed by mathematicians: factoring, using reciprocals/  
division, collecting like items, using average, converting to decimal or fractional  
notation

### Writing

Paragraph structure, cohesion and coherence

### Note-taking

Identifying main points in a lecture: “Imaginary and complex numbers” contents

## 2 Algebraic Expressions, Equations and Functions 31

### Themes

Algebraic expressions, equations and functions

### Discussion

Skimming and scanning, identifying main points

### Vocabulary

Using a variety of words to describe arithmetic processes; translating “text” to algebra;  
reading functions and equations

### Note-taking

Linear style abbreviations and symbols

### Style

Introducing formality by comparing two excerpts

## 3 Exponents and Exponential Functions 53

### Themes

Exponents and exponential functions; exponential decay and growth; geometric  
progressions and scientific notation

### **Academic vocabulary**

Definitions;

Writing the product as a monomial in a standard form

Numbers of Science: Conversions from Metric system to English

Metric prefixes for powers of 10

Comparing objects of widely different sizes: orders of magnitude

### **Academic writing and style**

Introduction to paraphrasing;

Expressing cause and effect as a paraphrasing tool

## **4 Introduction to Reasoning and Proof**

**77**

### **Themes**

The language of proofs regarding segments; inductive and deductive reasoning, theorems, logic tables, axioms, methods of proof

### **Discussion**

Useful phrases

### **Vocabulary**

Definitions of Logic Theory terms

### **Writing**

The language and symbols of proofs

### **Note-taking**

Writing

Mathematical proofs by induction, identifying the base, hypothesis and conclusion

## **5 Introduction to Probability**

**97**

### **Themes**

Introduction to probability, random events, random variables and their categorisations, density and distribution functions, notation and axiomatic definition of probability

### **Vocabulary**

Definitions of probability related terms; collocations; notation in probability, adverbial phrases

### **Academic style**

Introduction to academic caution; modal verbs and the lack of tentative language in Mathematics

### **Note-taking**

Peer-reviewing notes on probability webinar

## 6 Introduction to Statistics

115

### Themes

Data, sample population, numerical descriptors, rational equations and functions; descriptive and inferential statistics, statistical significance; standard deviation, coefficient of variation, mean, median; graphs

### Vocabulary

Statistics: Definitions  
Word formation and use-in-context

### Language

The use of gerund and infinitive in Mathematics

### Presentation/Writing

Reporting graphs and charts

### Writing

Writing a report following a chart or graph  
Plagiarism, citations and references; why and how we use them

## 7 Geometry connections

135

### Themes

Introduction to Geometry; lines, points, planes and angles, parallel and perpendicular lines

### Discussion

Expressing agreement, disagreement or acknowledgement

### Academic vocabulary

Use in context, definitions of popular mathematical terms  
Geometric shapes: 2D and 3D definitions  
Giving examples

### Academic writing

Summary guidelines and practice

### Note-taking

Identifying the moves in a lecture; using reference verbs

## 8 Properties of Triangles

159

### Themes

Triangles; main and secondary elements of a triangle, types of triangles by lengths of sides, classification according to internal angles, the Pythagorean Theorem, the concepts of congruence and similarity

### **Vocabulary**

Definitions; use-in-context: types of triangles  
Writing a two-column proof  
Making comparisons

### **Writing**

Passive voice

### **Presentation**

Opening/closing phrases and transitions

## **9 Introduction to Trigonometry**

**175**

### **Themes**

Right triangle Trigonometry, ratios, sine, cosine, tangent, trigonometric identities, function graphs

### **Academic vocabulary**

The language of theorems, axioms and proofs

### **Note-taking practice**

The unit circle

### **Academic presentation skills**

Signposting language that engages your audience enhances the impact of your speech

## **10 The Geometry of the Circle**

**197**

### **Themes**

Properties of circles; chords, tangents, secants, equations and graphs of circles

### **Vocabulary**

Use-in-context; definitions  
Geometry tools

### **Note-taking**

Equations and graphs of circles

### **Writing**

How to write an argumentative essay on "Pure vs. Applied Mathematics"  
Using evaluative language to unfavour someone's view

## 11 Polygons and Quadrilaterals 225

### Themes

Polygons and quadrilaterals; parallelograms, rhombi, rectangles, squares, kites and trapezoids

Ratios, proportions and similarity applied to polygons and quadrilaterals, proportionality with parallel lines, dilations and fractions

### Vocabulary

Definitions; use-in-context; adjective suffixes

### Academic language focus

Subject verb agreement; quantifiers

### Academic style

Avoiding wordiness and repetition

### Academic presentation skills

From text to slides

Using visuals to enhance the impact of your presentation

### Note-taking

Tessellations

## 12 The Geometry of Three Dimensions 251

### Themes

Introduction to the geometry of three dimensions, points and lines in space, coordinate systems, polyhedra and solids of revolution

### Academic vocabulary

Definitions: use in context

### Academic style

Formality and complexity;

Comparing texts written for different audiences

### Introduction to critical reading

Common pitfalls when writing a scientific paper

**Appendix** 273

**Glossary** 287

**Evaluation criteria** 323

**Transcripts** 331

**Bibliography** 349