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2021-22

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Dear friends and colleagues

What a year it has been for us all.

We have all been tested to the limits of our ingenuity to find the best ways to support the students we all serve, and through this, the positives have shone through. In talking to teachers every day, it is evident that the use of technology through remote learning has evidently had a positive impact on learning again back in the classroom. This will hopefully improve the success of any additional provision where it is needed beyond the classroom this year. PG Online have been able to assist many schools through the past 12 months with our digital resources and I am confident that these will continue to aid those teachers and students for many more years to come.

Our new ClearRevise™ series launched in the summer of 2020. Work started in early last year with significant research involving students and teachers from a variety of schools, and research into the science of learning beyond our own teaching experiences. The guides provide a more accessible and approachable revision experience, with examination style questions, model answers and specification transparency at their heart. The series has been exceptionally well received, winning the ERA Education Books of the Year Award in the first year of conception, and has a bright future for expansion in 2021 with our new Maths Practice guide.

PG Online continues to grow, helping more schools and more departments every year. Thank you for your reciprocal support and I hope that we can continue to support you even more in the future.

Best wishes for 2021.

Rob Heathcote
Director

EdTech Impact Teachers' Choice 2021

Education Books of the Year 2021
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Company of the Year Finalist
2019, 2018, 2017
Service and Support Finalist 2019
Secondary Content Finalist 2016, 2019

Company of the Year Finalist
2020, 2019, 2018
Supplier of the Year Winner 2017

Presence Learning Award Winner 2019
Reimagine Education K12 Finalist 2019

Digital Publisher of the Year 2018, 2016

Category winner 2019
5* Winner 2018

UK SME Company of the Year 2018 Finalist

Education Publisher of the Year 2018

Cover picture:
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PG ONLINE

Contents

£360
Lifetime licence

Save time and improve grades

See page 7 for more details.

A 'pick and mix' approach

We have given a lot of thought to the best strategy to help both experienced Mathematics teachers and teachers unfamiliar with the subject to deliver the new GCSE specifications, without having to spend too much time planning or developing an entirely new set of resources. Teachers have discovered enormous value in our teaching material.

We decided that a 'pick and mix' approach that allows teachers to select units on topics where they feel they could do with some help, and do not tie the school in to paying an annual licence, was the best solution. We started to recruit proven teachers, experienced published authors and educational researchers to create units. Each unit has been carefully edited and typeset to give the great end results you can see in the **free** sample material.

Series authors: Nick Asker, Amanda Ayres, Ross Bishop, Nicola Cologne-Brookes, Belle Cottingham, Heather Davis, Sophie Goldie, Ray Huntley, Rob King, Elaine Lambert, Andy Lutwyche, Alan Naden, Deborah McCarthy, Dr Naomi Norman, Barry Pomfret, and Karl Warsi.

All the material in the units is fully editable – you can customise it to your own teaching style, the department timetable and your students' needs.

Did you know...

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Fergal Moane
Assistant Headteacher
Sandringham School

"I'd just like to express my thanks for the material and support. If I had needed to have made my own resources, the results wouldn't have been as good.

Paul Sloane
Head of Department
Lady Manners School

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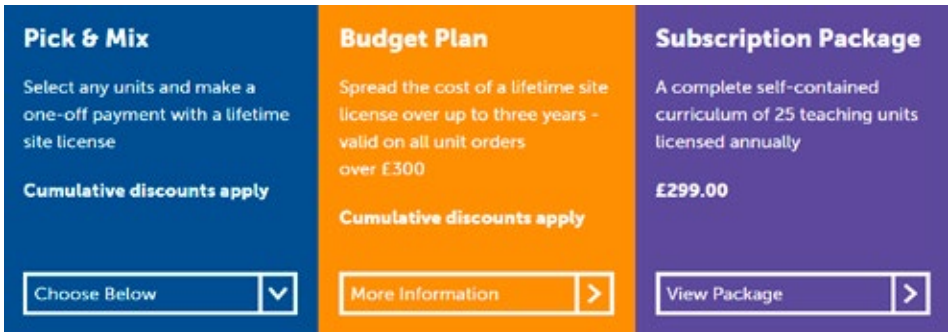

Each editable teaching unit comprises:

- An overview of the unit specifying the new attainment targets covered in the unit, learning outcomes and suggested resources
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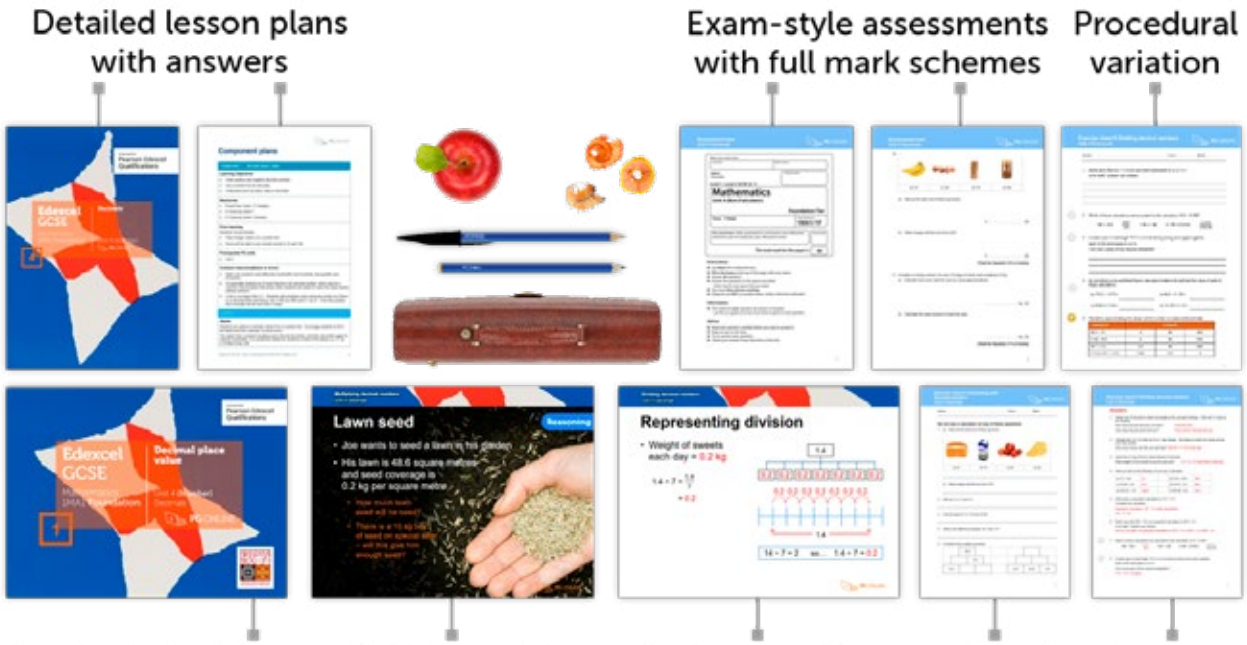

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Andrew Clarke. Head of Subject
Holbrook Academy

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Find out more at: **www.pgonline.co.uk/landing/mastery.**

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PG Online are committed to providing outstanding teaching materials which are a blend of the best teaching pedagogies from around the world. In recognition of this, PG Online have developed a standards marque to indicate that materials bearing this icon have been rigorously checked and developed with Mastery concepts in mind. These teaching principles, including those of representation and variation theory have been applied throughout our material to help enable students to develop a deeper understanding and a more applied knowledge of mathematics.

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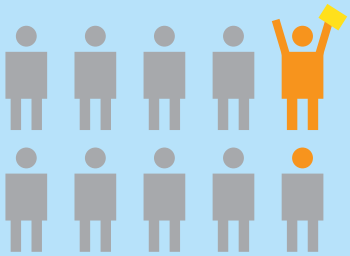
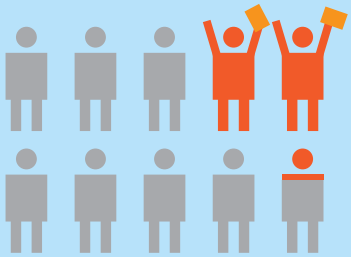


12% of students **improved** their **GCSE grade** in schools using PG Online GCSE Teaching Units



23% of students **improved** their **A Level grade** in schools using PG Online A Level Teaching Units

Based on independent statistical analysis of grade performance in the June 2018 GCSE and A Level Computer Science examination series within England and Wales. Sample taken across 59,599 Computer Science students in 2,166 schools.

Following an additional survey of over 300 teachers in December 2018, teachers using PG Online materials saved an average of 3.2 hours per week.

Lifetime site licence with free updates

The worksheets are well written with some interesting questions too, which fit well with the new GCSE course.

Tamsin Woolford. Mathematics teacher
Clayesmore School

Edexcel Maths 1MA1 (9-1) Foundation

The new Edexcel GCSE (9-1) 1MA1 Foundation series comprises 25 editable teaching units covering each Lesson of the specification.

Unit 4: Decimals is FREE.

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Unit 4: Decimals – FREE

This unit builds on the work completed in Unit 1 with integers, by extending into decimal values. Initially place value is explored and decimal numbers compared and ordered. The four mathematical operations are considered in the context of decimals and consolidated through intelligent practice. The impact of multiplying and dividing by powers of 10 is explored and place value is used to solve reasoning problems. Techniques with rounding numbers, significant figures and decimal places are developed and the use of approximations to support problems is considered. Contextualised problems help develop a range of written methods to multiply and divide decimal numbers.

Lesson 1 Decimal place value
Lesson 2 Calculating with decimal numbers
Lesson 3 Rounding and decimal places
Lesson 4 Significant figures
Lesson 5 Multiplying decimal numbers
Lesson 6 Dividing decimal numbers
Unit assessment

Unit 1: Integers

This unit covers the building blocks of number, dealing with integer values. With a focus on clarity of explanations and developing mastery, the unit aims to ensure that students are fluent with these critical basics. Integers, both positive and negative, and place value are explored and these concepts are developed and used within reasoning problems. The use of the four mathematical operations are considered and consolidated through intelligent practice. Contextualised problems help develop a range of written methods to multiply and divide numbers and to find a remainder. The relationship between operations is explored and used to solve problems. The hierarchy of operations is also discussed with conventional notation used to support this work.

FREE LESSON
Lesson 1 Place value
Lesson 2 Negative integers
Lesson 3 Calculating with negative integers
Lesson 4 Multiplication
Lesson 5 Division
Lesson 6 Priority of operations
Unit assessment

Download a **FREE** topic with every unit at **www.pgonline.co.uk**

> **I would like to compliment you and the team on your resources. By far the most useful in the market and have saved me countless hours.**
>
> Fergal Moane. Assistant Headteacher, Sandringham School

Unit 2: Primes, factors and multiples

This unit focuses on the properties of number. The unit begins with an investigation leading to square numbers. Roots and negative roots are then explored. The work on index numbers continues; recognising and recalling the squares and cubes, square and cube roots of key integers. The laws of indices are developed in the context of number and used to simplify index numbers. With a strong emphasis on the use of imagery and pictorial representations to encourage mastery, this unit develops understanding of factors and multiples of numbers, prime numbers and expressing a number as a product of its prime factors. It explores how to find the highest common factor and the lowest common multiple of a set of numbers and applies this knowledge to solving problems in context.

	Lesson 1	Square numbers
FREE LESSON	Lesson 2	Index notation
	Lesson 3	Laws of indices
	Lesson 4	Prime numbers
	Lesson 5	Factors
	Lesson 6	Multiples and LCM
	Lesson 7	Factors and HCF
	Unit assessment	

Unit 3: Algebraic expressions

This unit returns to the basics of algebra to ensure fluency in the bedrock of algebraic techniques. Algebraic notation is considered in the representation of an unknown by a letter, the four operations in algebra and index numbers. Algebraic expressions are introduced and used to represent information given in a context. The substitution of numbers into algebraic expressions is dealt with, including into known and given scientific formula. Algebraic expressions are manipulated and simplified by collecting like terms, cancelling terms, multiplying and dividing terms, expanding brackets and factorising. Algebraic terms involving indices and surds are met and manipulated using the laws of indices. The unit ensures students understand key terminology relating to algebra such as expression, equation and formulae, and continues to deal with the formation and solving of simple equations.

	Lesson 1	Algebraic notation
FREE LESSON	Lesson 2	Expressions as functions
	Lesson 3	Simplifying algebraic expressions
	Lesson 4	Simple equations
	Lesson 5	Simple formula
	Lesson 6	Brackets and common factors
	Lesson 7	Powers and roots
	Unit assessment	

Unit 5: Measures

This unit deals with measures used in mathematics, including scales, 2D representations, perimeter, area and volume. At the start of the unit estimation is considered in context, with rounding and sensible degrees of accuracy revisited (from Unit 4) and the use of inequalities to express error bounds for rounded and truncated numbers is developed. With elegant graphics to support the learning, students learn about scale drawings and bearings, using reasoning to solve contextualised problems. Plans and elevations are met, focusing on the skills needed to draw and interpret 2D representations of 3D objects. The unit then moves on to shapes; finding the perimeter, area and volume of shapes such as triangles, trapezium, parallelogram, cuboids, prisms and composites of these shapes. Standard formulae for area and volume are introduced and used, and these skills are applied through graded questions, reasoning and problem-solving tasks.

	Lesson 1	Estimation
	Lesson 2	Scale diagrams
	Lesson 3	Bearings
	Lesson 4	Plans and elevations
	Lesson 5	Perimeter
FREE LESSON	Lesson 6	Area of simple shapes
	Lesson 7	Volume of simple shapes
	Unit assessment	

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The worksheet relating to each part of the unit are excellent for consolidation.

Fiona Peers, Head of Mathematics
Akeley Wood School

Unit 6: Fractions

This fourth number unit in the foundation series is dedicated to considering all key aspects of fractions. The unit begins by looking at equivalent fractions, simplifying fractions and being able to compare and order fractions. Associated terminology is introduced and used. There is a strong emphasis on the use of images to represent fractions and their equivalents in order to support mastery of this key area of mathematics. The unit continues to look at mixed fractions and students develop skills to convert between mixed and improper fractions. Skills in applying the four operations with fractions are developed, including finding the reciprocal of a fraction to support further work on dividing fractions. Graded questions are tackled in context.

	Lesson 1	Equivalent fractions
	Lesson 2	Proper and improper fractions
	Lesson 3	Add and subtract fractions
	Lesson 4	Mixed numbers
FREE LESSON	Lesson 5	Multiply fractions
	Lesson 6	Divide fractions
	Unit assessment	

Unit 7: Straight line graphs

This unit considers the properties and uses of straight line graphs. With an emphasis on developing mastery, the unit begins by revisiting coordinates; reading and plotting values and finding the mid-point between two points. Equations of horizontal and vertical lines are explored and developed. Linear graphs are constructed from tables and an understanding of the form $y = mx + c$ is developed and used to solve problems. The gradient and y-intercept of a straight line graph are explored, and skills developed so that students can plot a straight line without a table of values, from the gradient and y-intercept. Using context, the unit continues to develop skills in finding the equation of a line between two given points and a line with a given gradient, passing through a single given point. Reasoning problems are presented to support the development of students' ability to apply their knowledge.

	Lesson 1	Working with coordinates
FREE LESSON	Lesson 2	Equations of lines
	Lesson 3	Plotting graphs 1
	Lesson 4	Plotting graphs 2
	Lesson 5	Gradients of straight lines
	Lesson 6	Equation of a straight line 1
	Lesson 7	Equation of a straight line 2
	Unit assessment	

Unit 8: Fractions, decimals and percentages

This unit focuses on the properties and applications of fractions, decimals and percentages. Decimals and fractions are considered first with an emphasis on developing mastery on these dual concepts. From here, percentages are introduced; expressing an amount as a percentage, converting between fractions, decimals and percentages, and comparing two quantities using percentages. In context, percentages are interpreted as operators, percentages of amounts are found and reasoning tasks involving percentages are posed. Fluency with percentages grows as the unit moves onto consider percentage increase and decrease; using a decimal multiplier to represent the percentage change and to work in reverse. Problems in context involving percentage change are posed and solved.

FREE LESSON	Lesson 1	Decimals to fractions
	Lesson 2	Fractions to decimals
	Lesson 3	Percentages 1
	Lesson 4	Percentages 2
	Lesson 5	Problems involving percentages
	Lesson 6	Percentage increase
	Lesson 7	Percentage decrease
	Unit assessment	

PG Online resources are very well planned and easy to use.

Gillian Broadhead. ACTL Creative and Technical Studies
Ridgewood High School

The stretch and challenge provided for was outstanding.

Tim Baguley. Head of Mathematics
Queen Elizabeth's School

Unit 9: Probability

This unit focuses on developing mastery in the basic and developing concepts of probability. The probability scale is explored; assigning values using fraction, decimals, percentages and words to describe the likelihood of an event. Students are encouraged to be systematic when listing outcomes of single or combined events and to use appropriate forms to display outcomes such as two-way tables. Procedural variation in questioning is used to good effect to underpin the learning. Probability experiments are explored practically with relative frequencies calculated and compared to theoretical probabilities. Theoretical probabilities are found from models and used to solve problems. The unit is rounded off by a consideration of mutually exclusive events and associated calculations including adding simple probabilities and finding the probability of successive events.

	Lesson 1	Measuring probability
FREE LESSON	Lesson 2	Listing systematically
	Lesson 3	Theoretical probability
	Lesson 4	Experimental data
	Lesson 5	Probability experiments
	Lesson 6	Mutually exclusive events
	Lesson 7	Combined events
	Unit assessment	

Unit 10: Ratio

With a strong emphasis on using techniques from bar modelling to develop mastery, this unit focuses on developing skills with ratio. Starting from the basics, the concept of ratio, its notation and the connection with fractions is developed. Simplifying ratio, dividing in a given ratio and solving ratio problems in context are explored using procedural variation to support learning. Direct proportion is linked to ratio and students recognise, represent and use direct proportion to solve graded questions. Ratio as a linear function is presented graphically, and students interpret the gradient and use reasoning to solve questions in context. The unit closes with a Lesson on scale factors and maps where the fluency of the earlier ratio work supports this application of ratio in a real-life context.

FREE LESSON	Lesson 1	Ratio notation
	Lesson 2	Dividing a quantity in a given ratio
	Lesson 3	Ratio and proportion
	Lesson 4	Solving problems with ratio
	Lesson 5	Ratio as a linear function
	Lesson 6	Map scales
	Unit assessment	

Unit 11: Shapes and transformations

This unit focuses on the properties of angles and shapes. Beautifully illustrated to support learning and with a balance of clarity and challenge, this unit provides a valuable resource for the development of understanding within this area of mathematics. Angle properties in lines and shapes are explored, developed and used to solve problems. Names and properties of 2D shapes are met and classification is explored. The values of interior and exterior angles of polygons are considered and skills developed and applied to reasoning challenges. All four transformations of shapes are considered both singly and as combinations. The work on enlargements is then developed into considering similarity of shapes and their properties, considering initially integer scale factors. This work is then further developed to encompass fractional scale factors and finding and using centres of enlargement.

FREE LESSON	Lesson 1	Angle properties of lines
	Lesson 2	Angle properties of shapes
	Lesson 3	Translations and rotations
	Lesson 4	Transformations and reflections
	Lesson 5	Enlargements and similarity
	Lesson 6	Further enlargements
	Unit assessment	

We decided that (rather than going on courses) it would be far more beneficial to buy in resources for the same price or less. We have looked into (several resources) which would fulfil the curriculum...
We have decided to go with PG Online as this offered the best resources for the cheapest price.

Richard Bunn. Curriculum Leader, Our Lady & St Chad Catholic Sports College Wolverhampton

Unit 12: Sequences

This unit considers sequences and inequalities; developing the fundamentals of the maths behind sequences and extending into more complex sequences. Starting with the concept of sequences, the unit considers linear sequences; recognising, describing and finding the n^{th} term. Triangular number sequences, the Fibonacci sequence and other known sequences are explored whilst arithmetic and geometric sequences are identified and distinguished. Quadratic sequences are introduced and their n^{th} term is used to generate a sequence. Relevance to real-life context is used to enhance learning and to facilitate the application of skills developed with sequences. The unit closes by considering inequalities; solving linear inequalities using a number line and algebraic techniques, and applying this knowledge to tackle reasoning problems.

FREE LESSON
- Lesson 1 Introducing sequences
- Lesson 2 Linear sequences and n^{th} term
- Lesson 3 Special sequences
- Lesson 4 Geometric progressions
- Lesson 5 Quadratic sequences
- Lesson 6 Inequalities interpretation
- Lesson 7 Solving linear inequalities
- Unit assessment

Unit 13: Proportion

Proportion now represents a more significant aspect of the reformed GCSE specification and this unit is an excellent resource to support and deepen the learning in this important area of mathematics. With much of the learning contextualised, this unit develops students' understanding of proportion in the context of currency conversions, best buy problems and conversion between a range of units, including metric and imperial units. It uses graphical representations of proportion to develop understanding and encourage mastery, and uses ratio to convert between measures. The unit closes by considering a range of contextualised reasoning problems to deepen understanding.

- Lesson 1 Conversion of currency

FREE LESSON
- Lesson 2 Best buy problems
- Lesson 3 Standard units
- Lesson 4 Units of time
- Lesson 5 Metric and imperial conversions
- Lesson 6 Direct proportion problems
- Unit assessment

Unit 14: Data

This unit tackles the basics of handling data; clearly illustrated and with an emphasis on clarity and deepening understanding, this unit provides an excellent basis for work on statistics, which is continued in Unit 21. The unit starts by considering types of data, methods of collection and display. Continuous data is met, grouped using appropriate notation and used to construct statistical diagrams. Mean, mode, median and range are found and interpreted from data and estimated from grouped data. Consideration is given to which type of measure is more useful in different circumstances. Stem and leaf diagrams are explored and used. The unit ends by considering how to compare populations; using a range of statistical charts, graphs, diagrams and measures.

FREE LESSON
- Lesson 1 Categorical and discrete data
- Lesson 2 Data, charts and graphs
- Lesson 3 Continuous data
- Lesson 4 Mean, mode, median and range
- Lesson 5 Estimating averages
- Lesson 6 Statistical diagrams and tables
- Lesson 7 Comparing populations
- Unit assessment

Lifetime site licence with free updates

Thank you so much for making something that seemed daunting, so manageable and teachable.

Catriona O'Connor. Design and Technology
Redruth School

Unit 15: Properties of shapes

This unit continues the work from Unit 11 on the properties of angles and shapes. The unit starts by considering the names and properties of quadrilaterals and the classification of each by property. Tessellations of shapes are explored, and the interior angles of polygons are considered in this context. Geometrical reasoning problems are considered, and students are supported in the development of a solution and encouraged to use appropriate language. Circle area and circumference are met and applied. The unit ends by considering the properties of 3D shapes including their nets, symmetries and associated geometric terms.

FREE LESSON

- Lesson 1 Quadrilaterals
- Lesson 2 Tessellations
- Lesson 3 Solving geometrical problems
- Lesson 4 Circumference
- Lesson 5 Circle areas
- Lesson 6 3D shapes
- Lesson 7 Planes of symmetry and nets
- Unit assessment

Unit 16: Applications of number

This unit starts with two Lessons focusing on the application of mathematics to household financial matters including the calculation of VAT, profit and loss, tax and simple interest. Rates are explored in the context of pay along with the calculation of income tax. Compound measures including speed and density are explored and used, tackling the conversion between these compound units. Standard form is used to express numbers. Converting between both forms and calculations with numbers in standard form are considered in a real-life context. The use of a calculator is supported.

FREE LESSON

- Lesson 1 Dealing with money
- Lesson 2 Financial mathematics
- Lesson 3 Speed
- Lesson 4 Compound measures
- Lesson 5 Standard form
- Lesson 6 Calculating with standard form
- Unit assessment

Unit 17: Further graphs

This unit continues the earlier work on graphs to develop into a wider range of graphs including quadratic, cubic, reciprocal and real-life graphs. Graphs of real-life situations are explored; drawing these, interpreting the line in context and solving associated reasoning problems. Quadratic graphs are explored; plotting from values, identifying roots, intercepts and turning points, and interpreting quadratic graphs of real-life problems. Simple cubic and reciprocal graphs are recognised, sketched and interpreted. The unit closes by developing skills to solve simultaneous linear equations graphically, developing the learning from within a context.

FREE LESSON

- Lesson 1 Real life graphs
- Lesson 2 Quadratic functions
- Lesson 3 Quadratic graphs
- Lesson 4 Reciprocal graphs
- Lesson 5 Cubic graphs
- Lesson 6 Solving simultaneous equations graphically
- Unit assessment

We just wanted to say a massive thank you to you and your team for the units we purchased. They have made such a difference to the staff. The teacher now has more time for revision sessions during the busy exam period, has a proper break during the day and the students are more engaged with their learning.

Joanne Vance. Assistant Headteacher
Hollis Academy

Unit 18: Geometry

This unit builds on earlier geometry units to consider constructions with straight line and compass which are then used to solve loci problems. Questions have an emphasis on developing reasoning skills. Congruency of shapes is explored and congruence criteria for triangles are developed and associated problems solved. Similarity is explored, and its understanding developed so that students can solve problems in missing lengths and angles with an emphasis on reasoning. The relationship between the side lengths of right angled triangles is explored. Pythagoras' theorem is used to find missing sides and to solve more complex reasoning problems set in real-life contexts. The unit closes by developing understanding of how to pose a simple proof set in a geometric context; using symmetry and side and angle properties developed so far.

FREE LESSON

- Lesson 1 Constructions
- Lesson 2 Loci
- Lesson 3 Congruence
- Lesson 4 Similarity
- Lesson 5 Pythagoras' Theorem
- Lesson 6 Geometric proofs

Unit assessment

Unit 19: Equations and identities

This unit builds on the earlier algebra units, starting with a well-paced recap of necessary prior knowledge. Solving linear equations including those with variables on both sides, brackets and more complicated expressions are tackled. Students move on by expanding double brackets and factorising quadratic expressions, with an emphasis on a mastery approach and application of skills through reasoning problems. Identities; understanding what they are and using them is considered next. Mathematical reasoning is used to show equivalence of expressions and 'show that' questions are developed with concepts being strongly supported through mathematical representations. Algebraic problems are posed from geometric context and reasoning skills are developed to support the solving of such problems.

- Lesson 1 Knowledge check
- Lesson 2 Harder linear equations

FREE LESSON

- Lesson 3 Product of two binomials
- Lesson 4 Factorising quadratics
- Lesson 5 Identities
- Lesson 6 Proving identities
- Lesson 7 Solving algebraic problems

Unit assessment

Unit 20: Trigonometry

This geometry unit focuses fully on developing mastery of this important area of mathematics. At the start of the unit, students consider similar shapes and the impact of similarity on the ratio of side lengths. With carefully chosen illustrations to illuminate the learning, the unit introduces the trigonometric ratios and develops these into the more formal methods of use when finding missing sides or angles in right-angled triangles. The trigonometric ratios for special triangles are devised and applied, and the angles of elevation and depression met and used in context to solve trigonometry problems and reasoning challenges.

- Lesson 1 Ratio in similar shapes
- Lesson 2 Trigonometric ratios
- Lesson 3 Using trigonometric ratios

FREE LESSON

- Lesson 4 Trigonometry in context
- Lesson 5 Special angles
- Lesson 6 Trigonometry problems

Unit assessment

Download a **FREE** topic with every unit at **www.pgonline.co.uk**

This is such a steep learning curve, but PG Online materials have been great and really support me and my students.

Mrs Julia Vale. Assistant Head Teacher
Court Moor School

Unit 21: Statistics

This statistics unit builds on Unit 14: Data - and begins with a well-paced revision of the prior knowledge required for this unit. Types of data, including primary and secondary data, are considered and the collection of these explored. Sampling of data is examined along with understanding bias and how to avoid it to produce representative samples from a population. Times series are studied next; constructing tables for data and producing and interpreting appropriate graphs of this data. The unit is completed by a thorough consideration of scatter graphs in a real-life context; interpreting the line of best fit and using it to predict values where appropriate, understanding correlation and its relationship to causation.

	Lesson 1	Knowledge check
	Lesson 2	Types of data
FREE LESSON	Lesson 3	Sampling
	Lesson 4	Time series
	Lesson 5	Scatter graphs
	Lesson 6	Correlation
	Unit assessment	

Unit 22: Probability diagrams

This unit builds on the earlier probability in Unit 9 to develop understanding of the use of diagrams, charts and tables in solving probability problems. The unit begins with a consideration of the impact of sample size on the relative frequency obtained. Graphs are used to support understanding. Tree diagrams are used to represent the outcome of dependent and independent events and to calculate the probabilities of these outcomes. Venn diagrams are also introduced to represent outcomes and to support the calculation of probabilities from real-life contexts and with an emphasis on developing reasoning skills. Two-way tables are then considered and the unit closes by exploring probability problems linked with other areas of mathematics such as algebra and data handing.

	Lesson 1	Sample size
FREE LESSON	Lesson 2	Tree diagrams
	Lesson 3	Venn diagrams
	Lesson 4	Using tables and diagrams
	Lesson 5	Dependent events
	Lesson 6	Solving probability problems
	Unit assessment	

Unit 23: Mensuration

This unit on mensuration begins with an introduction to vectors, their key properties and uses. With an emphasis on developing mastery, students learn how to carry out simple arithmetic processes with vectors and understand the geometric interpretations of these. Circle facts from Unit 15 are built on, developing skills for calculations involving arcs and sectors of circles, dealing with composite circle shapes and solving problems in relation to these. The unit moves on to look at 3D shapes, specially finding the surface area and volume of 3D shapes. Formulae are developed and presented and students' skills in applying these formulae to find missing values are supported. Contextualised problems including the use of reasoning skills are developed.

	Lesson 1	Vectors
	Lesson 2	Parallel vectors
FREE LESSON	Lesson 3	Arcs and sectors
	Lesson 4	Composite circle shapes
	Lesson 5	Surface area
	Lesson 6	Volume of complex shapes
	Unit assessment	

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"Your resources are perfect for the new curriculum, just the way I would have done it, if there were 48 hours in a day.

Christine Mrozek. Teacher
St Michaels Catholic Grammar School

Unit 24: Applications of ratio

This unit builds on earlier Units 10 and 13, developing further the mastery of this area of mathematics through the use of context and reasoning skills. Density and pressure are explored and calculated following a recap of prior learning of fractions, decimal and percentages. Ratios of the lengths, areas and volumes of similar shapes are explored and used to solve problems in context, with units being converted as appropriate. Velocity time graphs are drawn and their gradients and the area under the graph are interpreted in context. Directly and inversely proportional relationships are recognised and interpreted and, where appropriate, represented algebraically. Compound interest is explored and students set up, solve and interpret real-life problems. The unit closes by considering growth and decay problems in context; setting up and solving problems through repeated calculations (rather than using a formula) and interpreting the solutions.

FREE LESSON

- Lesson 1 Fractions, decimals and percentages
- Lesson 2 Density and pressure
- Lesson 3 Comparisons using ratio notation
- Lesson 4 Interpreting gradients
- Lesson 5 Direct and inverse proportion
- Lesson 6 Compound interest
- Lesson 7 Growth and decay problems
- Unit assessment

Unit 25: Further equations

This final unit of the series develops the algebraic strand by considering a wide range of more complex equations and solving them. Solving linear equations is revisited, followed by solving quadratic equations by factorising. Simultaneous equations are derived from questions in context and solved algebraically, both by substitution and elimination. A wide range of types of problems are presented and reasoning skills are developed through the setting up and solving of these problems; including solving a range of types of equations and of inequalities. At the close of the unit, degrees of accuracy are explored along with the impact of accuracy levels on calculations.

FREE LESSON

- Lesson 1 Linear equations
- Lesson 2 Simultaneous equations 1
- Lesson 3 Simultaneous equations 2
- Lesson 4 Solving quadratic equations
- Lesson 5 Working with formulae
- Lesson 6 Limits of accuracy
- Unit assessment

The PG Resource Marque

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I honestly never realised how good your resources are.

Stuart Hall. Lead Practitioner
Castleview School

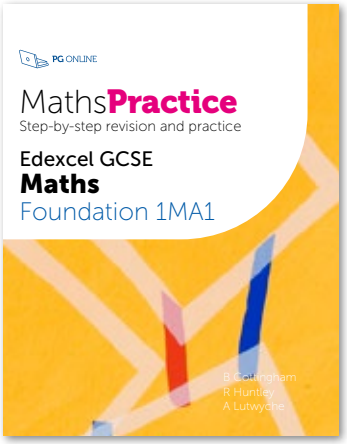
Edexcel GCSE (9-1) Maths Practice book
Foundation

ISBN: 978-1-910523-16-2 320 pages £15 Publication: July 2021
B Cottingham, R Huntley & A Lutwyche

This Edexcel GCSE Foundation Student book provides a fresh new approach to traditional textbooks. It is comprehensive in its coverage of the full Edexcel GCSE Maths Foundation specification, but this student book is a resource which can be used either to complement the teaching and learning materials produced by PG Online for this specification or as a stand-alone student book. For the classroom or revision, it comprises 25 sections, each focusing on aspects from one of the strands of the specification. Each section is further divided into six or seven chapters; one chapter representing the learning from approximately one lesson.

SEE INSIDE

Each chapter provides concise explanations supported by worked examples, concluding with a set of graduated questions to apply the learning. To support the Mastery approach, appropriate use of procedural variation and representations is made, with examination-style questions.



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This standalone unit focuses on the critically important area of mathematics – problem solving. The ability to solve problems has always been at the heart of mathematics, and in recent years, an increased emphasis has been placed on problem solving and reasoning skills through assessment materials.

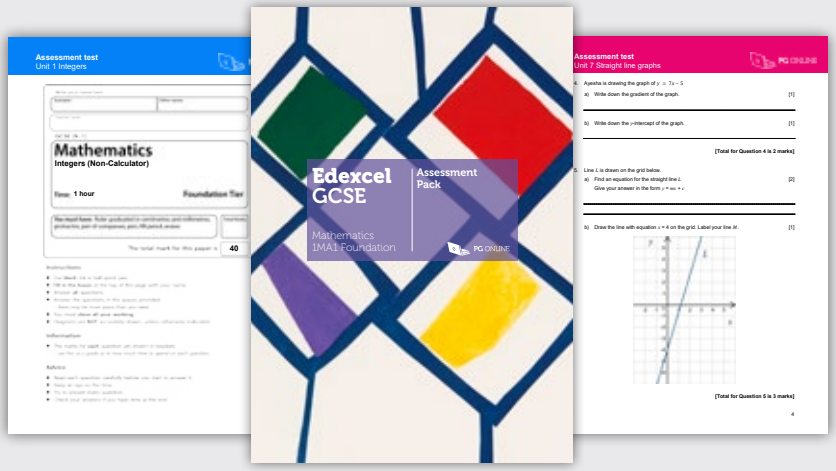
This unit considers a range of strategies and techniques which can be used when faced with a problem to solve. The strategies include making a list, making a table, looking for patterns, drawing a picture and making use of a bar model. Further strategies consider how to make use of x for the unknown and consider situations when this strategy would be useful. The importance of a logical approach is emphasised and exemplified.

FREE LESSON

Lesson 1	Using lists and tables
Lesson 2	Using pictures
Lesson 3	Using bar models
Lesson 4	Using x for the unknown
Lesson 5	Choosing a strategy

Edexcel Foundation Assessments Pack

This photocopiable pack contains each of the 25 papers from the downloadable Unit series. Every paper is written in an examination style, for each of the topics in the Foundation specification. They will help support students make a successful transition between Foundation and Higher, or provide ample practice for those on the Foundation tier to achieve the best in Maths that they can. The pack will be helpful for higher achieving students if they are working through Foundation materials in earlier years.



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Many thanks for providing excellent detailed resources which will help my team endlessly!

Julia George. Head of Design and Technology
Thurston Community College

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Unit 4: Decimals is FREE.

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Unit 4: Decimals – FREE

This FREE unit builds on the work completed in Unit 1 with integers, by extending into decimal values. Initially place value is explored and decimal numbers compared and ordered. The four mathematical operations are considered in the context of decimals and consolidated through intelligent practice. The impact of multiplying and dividing by powers of 10 is explored and place value is used to solve reasoning problems. Techniques with rounding numbers, significant figures and decimal places are developed and the use of approximations to support problems is considered. The work on approximations continues by developing the use of inequalities to express error intervals for rounded and truncated numbers. Contextualised problems help develop a range of written methods to multiply and divide decimal numbers.

Lesson 1 Decimal place value
Lesson 2 Calculating with decimal numbers
Lesson 3 Rounding and decimal places
Lesson 4 Significant figures
Lesson 5 Error intervals
Lesson 6 Multiplying decimal numbers
Lesson 7 Dividing decimal numbers
Unit assessment

Unit 1: Integers

This unit covers the building blocks of number; dealing with integer values. With a focus on the clarity of explanations and developing mastery, the unit aims to ensure that students are fluent with these critical basics. Integers, both positive and negative, and place value are explored and these concepts developed and used within reasoning problems. The use of the four mathematical operations are considered and consolidated through intelligent practice. Contextualised problems help develop a range of written methods to multiply and divide numbers and to find a remainder. The relationship between operations is explored and used to solve problems. The hierarchy of operations is discussed with conventional notation used to support this work.

Lesson 1 Place value
Lesson 2 Negative integers
Lesson 3 Calculating with negative integers
FREE LESSON Lesson 4 Multiplication
Lesson 5 Division
Lesson 6 Priority of operations
Unit assessment

Download a **FREE** topic with every unit at **www.pgonline.co.uk**

I would like to compliment you and the team on your resources. By far the most useful in the market and have saved me countless hours.

Fergal Moane. Assistant Headteacher, Sandringham School

Unit 2: Primes, factors and multiples

This unit focuses on the properties of number. The unit begins with an investigation leading to square numbers. Roots are explored. The work on index numbers continues; recognising and recalling the squares and cubes, and the square and cube roots of key integers. The laws of indices are developed in the context of number and used to simplify index numbers. With a strong emphasis on the use of imagery and pictorial representations to encourage mastery, this unit develops understanding of factors and multiples of numbers, prime numbers, expressing a number as a product of its prime factors and working out the root of a number when expressed in this form. It explores how to find the highest common factor and the lowest common multiple of a set of numbers and applies this knowledge to solving problems in context.

	Lesson 1	Square numbers
FREE LESSON	Lesson 2	Index notation
	Lesson 3	Laws of indices
	Lesson 4	Prime numbers
	Lesson 5	Factors
	Lesson 6	Multiples and LCM
	Lesson 7	Factors and HCF
	Unit assessment	

Unit 3: Algebraic expressions

This unit returns to the basics of algebra to ensure fluency in the bedrock of algebraic techniques. Algebraic notation is considered; the representation of an unknown by a letter, the four operations in algebra and index numbers. Algebraic expressions are introduced and used to represent information given in a context. The substitution of numbers into algebraic expressions is dealt with, including into known and given scientific formula. Algebraic expressions are manipulated and simplified by collecting like terms, cancelling terms, multiplying and dividing terms, expanding brackets and factorising. Algebraic terms involving indices and surds are met and manipulated using the laws of indices. The unit ensures students understand key terminology relating to algebra such as expression, equation and formulae, and continues to deal with the formation and solving of simple equations. Rearranging of simple formulae is considered including changing the subject of a formula involving indices.

	Lesson 1	Algebraic notation
FREE LESSON	Lesson 2	Expressions as functions
	Lesson 3	Algebraic expressions
	Lesson 4	Simple equations
	Lesson 5	Simple formula
	Lesson 6	Brackets and common factors
	Lesson 7	Powers and roots
	Unit assessment	

Unit 5: Measures

This unit deals with measures used in mathematics, including scales, 2D representations, perimeter, area and volume. At the start of the unit, estimation is considered in context, with sensible degrees of accuracy discussed and the use of approximations to estimate the value of a calculation explored. With elegant graphics to support the learning, students discover scale drawings and bearings, using reasoning to solve contextualised problems. Plans and elevations are met, focusing on the skills needed to draw and interpret 2D representations of 3D objects, including the use of isometric drawings. The unit then moves on to shapes; finding the perimeter, area and volume of shapes such as triangles, trapezium, parallelogram, cuboids, prisms and composites of these shapes. Standard formulae for area and volume are introduced and used, and these skills are applied through graded questions with reasoning and problem-solving.

	Lesson 1	Estimation
	Lesson 2	Scale diagrams
	Lesson 3	Bearings
	Lesson 4	Plans and elevations
	Lesson 5	Perimeter
FREE LESSON	Lesson 6	Area of simple shapes
	Lesson 7	Volume of simple shapes
	Unit assessment	

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The worksheet relating to each part of the unit are excellent for consolidation.

Fiona Peers, Head of Mathematics
Akeley Wood School

Unit 6: Fractions

This fourth number unit in the foundation series is dedicated to considering all key aspects of fractions. The unit begins by looking at equivalent fractions, simplifying fractions and being able to compare and order fractions. Associated terminology is introduced and used. There is a strong emphasis on the use of images to represent fractions and their equivalents in order to support mastery of this key area of mathematics. The unit continues to look at mixed fractions and students develop skills to convert between mixed and improper fractions. Skills in applying the four operations with fractions are developed. Graded questions are tackled in context.

	Lesson 1	Equivalent fractions
	Lesson 2	Proper and improper fractions
	Lesson 3	Adding and subtracting fractions
	Lesson 4	Mixed numbers
FREE LESSON	Lesson 5	Multiplying fractions
	Lesson 6	Dividing fractions
	Unit assessment	

Unit 7: Straight line graphs

This unit considers the properties and uses of straight line graphs. With an emphasis on developing mastery, the unit begins by revisiting coordinates; reading and plotting values and finding the mid-point between two points. Equations of horizontal and vertical lines are explored and developed. Linear graphs are constructed from tables and an understanding of the form y = mx + c is developed and used to solve problems. The gradient and y-intercept of a straight line graph are explored, and skills developed so that students can plot a straight line without a table of values, from the gradient and y-intercept. Using context, the unit continues to develop skills in finding the equation of a line between two given points and a line with a given gradient that passes through a single given point. Reasoning problems are presented to support the development of students' ability to apply their knowledge.

	Lesson 1	Working with coordinates
FREE LESSON	Lesson 2	Equations of lines
	Lesson 3	Plotting graphs 1
	Lesson 4	Plotting graphs 2
	Lesson 5	Gradients of straight lines
	Lesson 6	Equation of a straight line 1
	Lesson 7	Equation of a straight line 2
	Unit assessment	

Unit 8: Fractions, decimals and percentages

This unit focuses on the properties and applications of fractions, decimals and percentages. Decimal and fractions are considered first with an emphasis on developing a mastery of these dual concepts. From here, percentages are introduced; expressing an amount as a percentage, converting between fractions, decimals and percentages and comparing two quantities using percentages. In context, percentages are interpreted as operators, percentages of amounts are found and reasoning tasks involving percentages are posed. Fluency with percentages grows as the unit moves on to consider percentage increase and decrease; using a decimal multiplier to represent the percentage change and to work in reverse. Problems in context involving percentage change are posed and solved.

FREE LESSON	Lesson 1	Decimals to fractions
	Lesson 2	Fractions to decimals
	Lesson 3	Percentages 1
	Lesson 4	Percentages 2
	Lesson 5	Problems involving percentages
	Lesson 6	Percentage increase
	Lesson 7	Percentage decrease
	Unit assessment	

PG Online resources are very well planned and easy to use.

Gillian Broadhead. ACTL Creative and Technical Studies
Ridgewood High School

The stretch and challenge provided for was outstanding.

Tim Baguley. Head of Mathematics
Queen Elizabeth's School

Unit 9: Probability

This unit focuses on developing mastery in the basic and developing concepts of probability. The probability scale is explored; assigning values using fractions, decimals and percentages to the likelihood of an event. Students are encouraged to be systematic when listing outcomes of single or combined events and to use appropriate forms to display outcomes such as two-way tables. Procedural variation in questioning is used to good effect to underpin the learning. Probability experiments are explored practically with relative frequencies calculated and compared to theoretical probabilities. Theoretical probabilities are found from models and used to solve problems. The unit is rounded off by a consideration of mutually exclusive events and associated calculations including adding simple probabilities and finding the probability of successive events.

FREE LESSON
Lesson 1 Measuring probability
Lesson 2 Listing systematically
Lesson 3 Theoretical probability
Lesson 4 Experimental data
Lesson 5 Probability experiments
Lesson 6 Mutually exclusive events
Lesson 7 Combined events
Unit assessment

Unit 10: Ratio

With a strong emphasis on using techniques from bar modelling to develop mastery, this unit focuses on developing skills with ratio. Starting from the basics, the concept of ratio, its notation and the connection to fractions is developed. Simplifying ratio, dividing in a given ratio and solving ratio problems in context are explored and procedural variation is used to support this learning. Direct proportion is linked to ratio and students recognise, represent and use direct proportion to solve graded questions. Ratio as a linear function is presented graphically, and students interpret the gradient and use reasoning to solve questions in context. The unit closes with a lesson on scale factors and maps where the fluency of the earlier ratio work supports this application of ratio in a real-life context.

FREE LESSON
Lesson 1 Ratio notation
Lesson 2 Dividing a quantity in a given ratio
Lesson 3 Ratio and proportion
Lesson 4 Solving problems with ratio
Lesson 5 Ratio as a linear function
Lesson 6 Map scales
Unit assessment

Unit 11: Shapes and transformations

This unit focuses on the properties of angles and shapes. Beautifully illustrated to support learning and with a balance of clarity and challenge, this unit provides a valuable resource for the development of understanding within this area of mathematics. Angle properties in lines and shapes are explored, developed and used to solve problems. Names and properties of 2D shapes are met and classification is explored. The values of interior and exterior angles of polygons are considered and skills developed and applied to reasoning challenges. All four transformations of shapes are considered both singly and as combinations. The work on enlargements is then developed into considering similarity of shapes and their properties, initially considering integer scale factors. This work is then further developed to encompass fractional scale factors and finding and using centres of enlargement.

FREE LESSON
Lesson 1 Angle properties of lines
Lesson 2 Angle properties of shapes
Lesson 3 Translations and rotations
Lesson 4 Transformations and reflections
Lesson 5 Enlargements and similarity
Lesson 6 Further enlargements
Unit assessment

**We decided that (rather than going on courses) it would be far more beneficial to buy in resources for the same price or less. We have looked into (several resources) which would fulfil the curriculum...
We have decided to go with PG Online as this offered the best resources for the cheapest price.**

Richard Bunn. Curriculum Leader, Our Lady & St Chad Catholic Sports College Wolverhampton

Unit 12: Sequences

This unit considers sequences and inequalities; developing the fundamentals of the maths behind sequences and extending into more complex sequences. With graphics which enhance learning and a focus on developing mastery, this unit provides an excellent platform to learn about this area of mathematics. Starting with the concept of sequences, the unit considers linear sequences; recognising, describing and finding the n^{th} term. Triangular number sequences, Fibonacci sequence and other known sequences are explored whilst arithmetic and geometric sequences are identified and distinguished. Quadratic sequences are met and their n^{th} term is used to generate a sequence. Relevance to real-life context is used to enhance learning and facilitate the application of skills developed with sequences. The unit closes by considering inequalities; solving linear inequalities using a number line and algebraic techniques and applying this knowledge to tackle reasoning problems.

FREE LESSON
- Lesson 1 Introducing sequences
- Lesson 2 Linear sequences and n^{th} term
- Lesson 3 Special sequences
- Lesson 4 Geometric progressions
- Lesson 5 Quadratic sequences
- Lesson 6 Inequalities
- Lesson 7 Solving linear inequalities
- Unit assessment

Unit 13: Proportion

Proportion now represents a more significant aspect of the reformed GCSE specification and this unit is an excellent resource to support and deepen the learning in this important area of mathematics. With much of the learning contextualised, this unit develops students' understanding of proportion in the context of currency conversions, best buy problems and conversion between a range of units, including metric and imperial units. It uses graphical representations of proportion to develop understanding and encourage mastery and uses ratio to convert between measures. The unit closes by considering a range of contextualised reasoning problems to deepen understanding.

- Lesson 1 Conversion of currency

FREE LESSON
- Lesson 2 Best buy problems
- Lesson 3 Standard units
- Lesson 4 Units of time
- Lesson 5 Metric and imperial conversions
- Lesson 6 Direct proportion problems
- Unit assessment

Unit 14: Data

This unit tackles the basics of handling data; well-illustrated and with an emphasis on clarity and deepening understanding, this unit provides an excellent basis for work on statistics, which is continued in Unit 21. The unit starts by considering types of data, methods of collection and display. Continuous data is met, grouped using appropriate notation and used to construct statistical diagrams. Mean, mode, median and range are found and interpreted from data and estimated from grouped data. Consideration is given to which type of measure is more useful in different circumstances. The unit ends by considering how to compare populations using a range of statistical charts, graphs, diagrams and measures.

FREE LESSON
- Lesson 1 Categorical and discrete data
- Lesson 2 Data, charts and graphs
- Lesson 3 Continuous data
- Lesson 4 Mean, mode, median and range
- Lesson 5 Estimating averages
- Lesson 6 Statistical diagrams and tables
- Lesson 7 Comparing populations
- Unit assessment

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Thank you so much for making something that seemed daunting, so manageable and teachable.

Catriona O'Connor. Design and Technology
Redruth School

Unit 15: Properties of shapes

This unit continues the work from Unit 11 on the properties of angles and shapes. The unit starts by considering quadrilaterals; their names and properties and the classification of each by property. Rotational and reflective symmetry of shapes are explored, and the interior angles of polygons are considered in this context. Geometrical reasoning problems are considered, and students are supported in the development of a solution and encouraged to use appropriate language. Circle area and circumference are met and applied. The unit ends by considering the properties of 3D shapes, the difference between prisms and pyramids and work on the shape of nets of 3D shapes.

FREE LESSON

- Lesson 1 Quadrilaterals
- Lesson 2 Symmetry
- Lesson 3 Solving geometrical problems
- Lesson 4 Circumference
- Lesson 5 Circle areas
- Lesson 6 3D shapes
- Lesson 7 Nets of 3D shapes
- Unit assessment

Unit 16: Applications of number

The unit starts with two lessons focusing on the application of mathematics to household financial matters including the calculation of VAT, profit and loss, tax and simple interest. Rates are explored in the context of rates of pay along with the calculation of income tax. Compound measures including speed and density are explored, calculated and applied before conversion between compound units is tackled. Standard form is used to express numbers; converting between both forms, and calculations with numbers in standard form are considered in a real-life context. The use of a calculator is supported.

- Lesson 1 Dealing with money

FREE LESSON

- Lesson 2 Financial mathematics
- Lesson 3 Speed
- Lesson 4 Compound measures
- Lesson 5 Standard form
- Lesson 6 Calculating with standard form
- Unit assessment

Unit 17: Further graphs

This unit continues the earlier work on graphs to develop into a wider range; quadratic, cubic, reciprocal and real-life graphs. Graphs of real-life situations are explored; drawing these, interpreting the line in context and solving associated reasoning problems. Quadratic graphs are met; plotting from values, identifying roots, intercepts and turning points and interpreting quadratic graphs of real-life problems. Simple cubic and reciprocal graphs are recognised, sketched and interpreted. The unit closes by developing skills to solve simultaneous linear equations graphically, developing the learning from within a context.

FREE LESSON

- Lesson 1 Real life graphs
- Lesson 2 Quadratic functions
- Lesson 3 Quadratic graphs
- Lesson 4 Reciprocal graphs
- Lesson 5 Cubic graphs
- Lesson 6 Solving simultaneous equations graphically
- Unit assessment

We just wanted to say a massive thank you to you and your team for the units we purchased. They have made such a difference to the staff. The teacher now has more time for revision sessions during the busy exam period, has a proper break during the day and the students are more engaged with their learning.

Joanne Vance. Assistant Headteacher
Hollis Academy

Unit 18: Geometry

This unit builds on earlier geometry units, initially to consider constructions with straight line and compass, which are then used to solve loci problems, with an emphasis on developing problem solving skills. Congruency of shapes is explored and congruence criteria for triangles are developed and associated problems solved. Similarity is explored, and its understanding developed so that students can solve problems in missing lengths and angles through reasoning. The relationship between the side lengths of right angled triangles is explored and Pythagoras' Theorem reached and used to find missing sides and solve more complex reasoning problems set in a real-life context. The unit closes by developing understanding of how to pose a simple proof set in a geometric context; using symmetry, and the side and angle properties developed so far.

FREE LESSON
- Lesson 1 Constructions
- Lesson 2 Loci
- Lesson 3 Congruence
- Lesson 4 Similarity
- Lesson 5 Pythagoras' Theorem
- Lesson 6 Geometric proofs

Unit assessment

Unit 19: Equations and identities

This unit builds on the earlier algebra units, starting with a well-paced recap of the necessary prior knowledge. Solving linear equations including those with variables on both sides, brackets and more complicated expressions are tackled. Students move on to expanding double brackets and factorising quadratic expressions, with an emphasis on a mastery approach and the application of skills through reasoning problems. Identities; understanding what they are and using them is considered next. Mathematical reasoning is used to show equivalence of expressions and 'show that' questions are developed with concepts being strongly supported through mathematical representations. Algebraic problems are posed from geometric contexts and reasoning skills are developed to support the solving of such problems.

- Lesson 1 Knowledge check
- Lesson 2 Harder linear equations

FREE LESSON
- Lesson 3 Product of two binomials
- Lesson 4 Factorising quadratics
- Lesson 5 Identities
- Lesson 6 Proving identities
- Lesson 7 Solving algebraic problems

Unit assessment

Unit 20: Trigonometry

This geometry unit fully focuses on developing mastery of this important area of mathematics. At the start of the unit, students consider similar shapes and the impact of similarity on the ratio of side lengths. With carefully chosen illustrations to illuminate the learning, the unit continues on to introduce the trigonometric ratios and develop these into the more formal methods of use when finding missing sides or angles in right angle triangles. The trigonometric ratios for special triangles are devised and used. The unit concludes by considering how to set up and solve trigonometry problems in context.

- Lesson 1 Ratio in similar shapes
- Lesson 2 Trigonometric ratios
- Lesson 3 Using trigonometric ratios

FREE LESSON
- Lesson 4 Trigonometry in context
- Lesson 5 Special angles
- Lesson 6 Trigonometry problems

Unit assessment

Download a **FREE** topic with every unit at **www.pgonline.co.uk**

This is such a steep learning curve, but PG Online materials have been great and really support me and my students.

Mrs Julia Vale. Assistant Head Teacher
Court Moor School

Unit 21: Statistics

This Statistics unit builds on Unit 14: Data, and begins with a well-paced revision of the prior knowledge required for this unit. Types of data, including primary and secondary data, are considered and the collection of these explored. Sampling of data is examined along with understanding bias and how to avoid it to produce representative samples from a population. Times series are studied next; constructing tables for data and producing and interpreting appropriate graphs of this data. The unit is completed by a thorough consideration of scatter graphs in a real-life context; interpreting the line of best fit and using it to predict values where appropriate, understanding correlation and its relationship to causation.

	Lesson 1	Knowledge check
	Lesson 2	Types of data
FREE LESSON	Lesson 3	Sampling
	Lesson 4	Time series
	Lesson 5	Scatter graphs
	Lesson 6	Correlation
	Unit assessment	

Unit 22: Probability diagrams

This unit builds on the earlier Unit 9: Probability, to develop understanding of the use of diagrams, charts and tables in solving probability problems. The unit begins with a consideration of the impact of sample size on the relative frequency obtained. Graphs are used to support understanding. Tree diagrams are used to represent the outcome of dependent and independent events and to calculate the probabilities of these outcomes. Venn diagrams are introduced to represent outcomes and to support the calculation of probabilities from real-life context and with an emphasis on developing reasoning skills. Two-way tables are also considered, and the unit closes by exploring probability problems linked with other areas of mathematics such as algebra and data handing.

	Lesson 1	Sample size
FREE LESSON	Lesson 2	Tree diagrams
	Lesson 3	Venn diagrams
	Lesson 4	Dependent events
	Lesson 5	Independent events
	Lesson 6	Solving probability problems
	Unit assessment	

Unit 23: Mensuration

This unit on mensuration begins with an introduction to vectors, their key properties and uses. With an emphasis on developing mastery, students learn how to carry out simple arithmetic processes with vectors and understand the geometric interpretations of these. Circle facts from Unit 15 are built on, developing skills for calculations involving arcs and sectors of circles, and dealing with composite circle shapes and solving problems in relation to these. The unit moves on to look at 3D shapes; specially finding the surface area and volume of 3D shapes. Formulae are developed and presented and students' skills in applying these formulae to find missing values are supported. Contextualised problems including the use of reasoning skills are developed.

	Lesson 1	Vectors
	Lesson 2	Working with vectors
FREE LESSON	Lesson 3	Arcs and sectors
	Lesson 4	Composite circle shapes
	Lesson 5	Surface area
	Lesson 6	Volume of complex shapes
	Unit assessment	

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Your resources are perfect for the new curriculum, just the way I would have done it, if there were 48 hours in a day.

Christine Mrozek. Teacher
St Michaels Catholic Grammar School

Unit 24: Applications of ratio

This unit builds on earlier areas further developing the mastery of this important area of mathematics through excellent use of context and reasoning skills. Density and pressure are explored and calculated. Ratios of the lengths, areas and volumes of similar shapes are explored and used to solve problems in context, with units being converted as appropriate. Velocity time graphs are drawn and their gradients and the area under the graph are interpreted in context. Direct and inverse proportion relationships are recognised and interpreted, and where appropriate represented algebraically. Compound interest is explored and students set up, solve and interpret real-life problems. The unit concludes by considering growth and decay problems in context; setting up and solving problems through repeated calculations (rather than using a formula) and interpreting the solutions.

Lesson 1 Fractions, decimals and percentages
Lesson 2 Density and pressure
Lesson 3 Comparisons using ratio notation
Lesson 4 Interpreting gradients
Lesson 5 Direct and inverse proportion
Lesson 6 Compound interest
Lesson 7 Growth and decay problems
Unit assessment

Unit 25: Further equations

This final unit of the series develops the algebraic strand to learning by considering a wide range of more complex equations and solving them. Solving linear equations is recapped, followed by solving quadratic equations by factorising. Simultaneous equations are derived from questions in context and solved algebraically both by substitution and elimination. A wide range of types of problems are presented and reasoning skills are developed through the setting up and solving of these problems; including solving a range of types of equations. At the end of the unit, degrees of accuracy are explored along with the impact of accuracy levels on calculations.

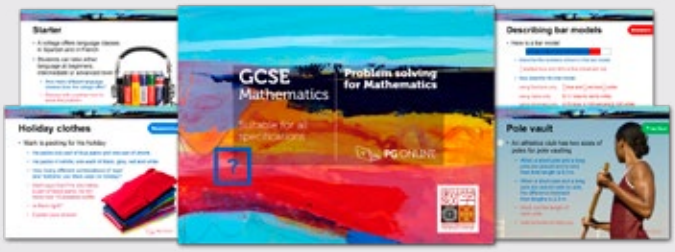
FREE LESSON Lesson 1 Linear equations
Lesson 2 Simultaneous equations 1
Lesson 3 Simultaneous equations 2
Lesson 4 Solving quadratic equations
Lesson 5 Working with formulae
Lesson 6 Limits of accuracy
Unit assessment

Approaches to Problem solving

Suitable for ALL examination boards

This standalone unit focuses on the critically important area of mathematics – problem solving. The ability to solve problems has always been at the heart of mathematics, and in recent years, an increased emphasis has been placed on problem solving and reasoning skills through assessment materials.

This unit considers a range of strategies and techniques which can be used when faced with a problem to solve. The strategies include making a list, making a table, looking for patterns, drawing a picture and making use of a bar model. Further strategies consider how to make use of x for the unknown and consider situations when this strategy would be useful. The importance of a logical approach is emphasised and exemplified.



FREE LESSON Lesson 1 Using lists and tables
Lesson 2 Using pictures
Lesson 3 Using bar models
Lesson 4 Using x for the unknown
Lesson 5 Choosing a strategy

Download a **FREE** topic with every unit at **www.pgonline.co.uk**

This is such a steep learning curve, but PG Online materials have been great and really support me and my students.

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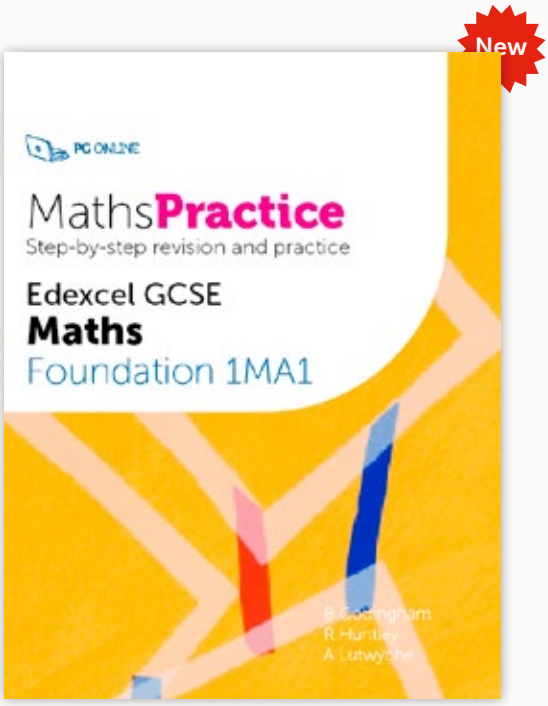

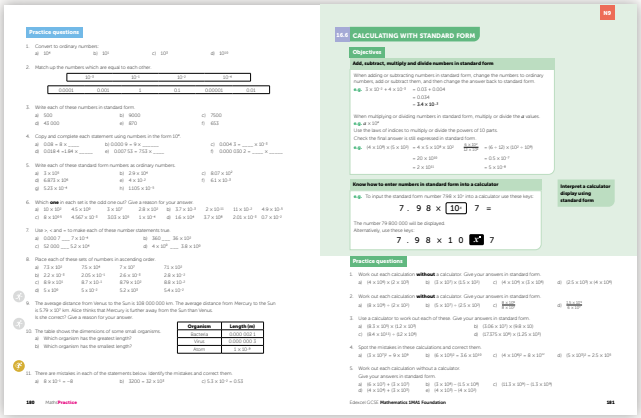

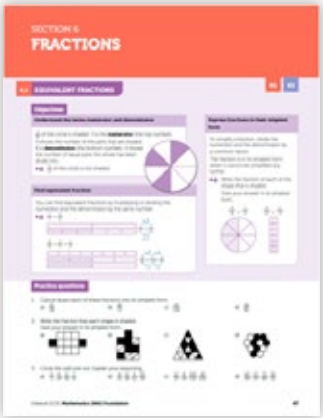

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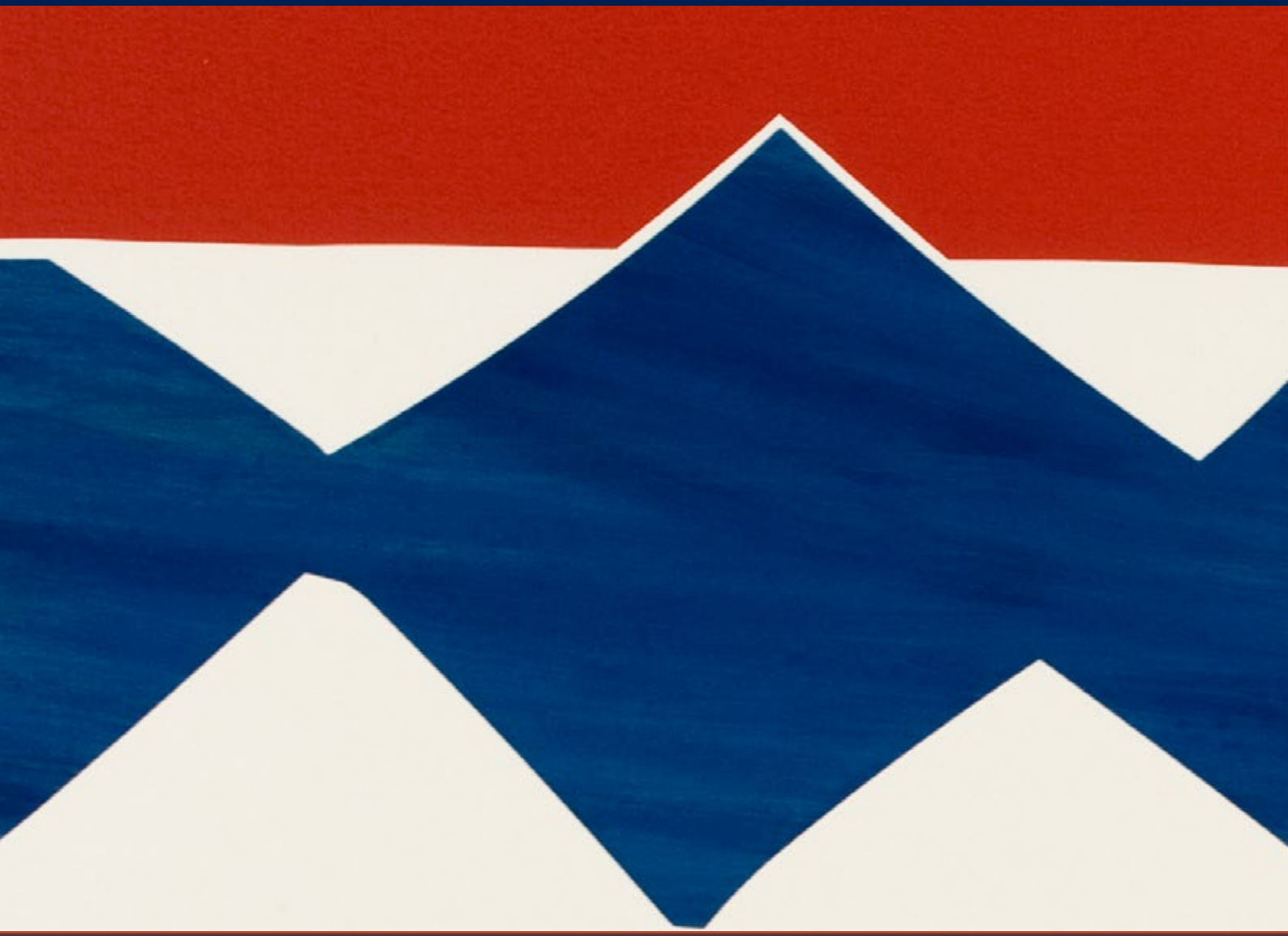

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