

Preparation for Sixth Form and other courses

When entering a new educational phase or environment, students thrive best if they have:

- Reliable recall of knowledge and methods learned previously
- Fluidity in handling algebra, and other rearrangements and conversions
- A high degree of connectivity of mathematical ideas so that they can use analogy

From a teaching perspective, classes make more progress if there is:

- An extensive common knowledge base, and preferably common methodology

Entry into Sixth Form courses, particularly those involving mathematics, has always posed a difficulty in this respect because i) students cease to reinforce memory of what they have learned once they have taken their GCSEs, and ii) most Sixth Forms are a merger of students from a variety of GCSE settings.

One way of tackling these issues is to set incoming students some revision questions, so that they begin from a common position. A subsidiary, but frequently useful, outcome of using such bridging material is that some students who would struggle part-way through the A level course may be dissuaded from starting the course, and transfer to a different subject which will be a greater success for them. This is especially helpful for maths teachers, who have an extra issue because students can opt for just A level maths, or they can take both maths and further maths A levels: setting bridging work may identify students who have done very well at GCSE, but will still find further maths courses a challenge.

For teachers who wish to direct students to Using Essential GCSE Mathematics for refreshing maths between GCSE and A level courses, or as preparation for entering the UK system post-GCSE, we suggest below some questions that would provide a useful background.

The first three sections of questions are suggestions to cover general revision of some selected topics for: 1) important basic skills, 2) augmenting basic skills for students doing STEM subjects at A level (or the equivalent), but not including A level maths, 3) material preparatory for studying A level maths (with or without further maths). For mathematicians the choices have been made to concentrate on developing algebraic competency, and the STEM questions relate to skills for handling experimental data.

Students will have time limitations, so in each case we indicate questions from a few selected chapters to give a good starting point for each category of study. If teachers require students, in particular STEM students, to look at more than one group of questions, then guidance will be required to avoid creating a large workload. Hence, we have not suggested using whole chapters for bridging work, but if teachers prefer to use chapters, the on-line chapter-by-chapter question boards can be used in the usual way.

Teachers may well want to choose material from other chapters instead to broaden the revision experience, so in section 4 we suggest some other questions which we have found useful. These questions include both other topics, and more synoptic applications of basic principles.

In section 5 we have listed some more challenging questions which could be used for testing understanding or raising the level of challenge for students who are considering A level further maths.

Please note that these lists are not exhaustive: they are intended to provide a basic resource which teachers can adapt for their current students.

Suggested questions for study:

Section 1 Basic skills for students who are:

- joining or rejoining the UK system post-GCSE
- users of maths in non-STEM subjects at A level or the equivalent
- preparing to start STEM A levels, but without studying A level maths
- wanting to check their skill level before studying A level maths or further maths

Chapter 4 Fractions (questions 4, 5, 10)

Chapter 6 Percentages (8, 9, 11)

Chapter 7 Ratio (6, 8, 11)

Chapter 11 Units (1, 5, 10)

Chapter 12 Writing and Using Algebra (2, 7, 11, 12)

Chapter 17 Re-arranging and Changing the Subject (3, 4, 7, 9)

Chapter 24 Graphs and Co-ordinate Geometry of Straight Lines (5, 8, 12, 14)

Chapter 54 Sampling and Representations of Data (2, 4, 6, 9)

Section 2 Supporting STEM questions suitable for:

- augmenting basic skills for STEM students not studying A level maths

Chapter 10 Standard Form (questions 5, 10, 13)

Chapter 23 Solving Linear Equations (4, 5, 7, 12)

Chapter 34 Proportionality (3, 5, 11)

Chapter 36 Real-World Graphs and Kinematics (1, 3, 5)

Chapter 38 Pythagoras' Theorem (3, 5, 7)

Chapter 55 Summary Statistics (3, 5, 6)

Chapter 57 Correlation (2, 3, 4)

Section 3 Pre-A level maths topics suitable for:

- students intending to study A level maths (with or without further maths)

Chapter 16 Factorising II: Quadratic Expressions (questions 1, 5, 11)

Chapter 20 Functions (6, 9, 13)

Chapter 21 Surds and Rationalising a Denominator (3, 7, 8, 10)

Chapter 24 Graphs and Co-ordinate Geometry of Straight Lines (15, 17, 19)

Chapter 27 Graphs of Quadratic Functions (4, 6, 8)

Chapter 38 Pythagoras' Theorem (8, 10, 12)

Chapter 41 Trigonometry (2, 3, 7, 9, 10)

Section 4 Useful general questions suitable for:

- increasing the number of topics that are revised
- increasing the connectivity of ideas

Chapter 4 Fractions (question 15)

Chapter 6 Percentages (16, 19)

Chapter 8 Rounding, Limits of Accuracy and Bounds (7)

Chapter 10 Standard Form (16)

Chapter 13 Indices and Taking Roots (1, 5, 9)

Chapter 14 Expanding (4, 7, 10)

Chapter 15 Factorising I: Common Factors (7, 8)

Chapter 25 Simultaneous Equations 1 – Two Linear Equations (9)

Chapter 31 Inequalities (5, 9)

Chapter 34 Proportionality (10)

Chapter 36 Real-World Graphs and Kinematics (11, 12)

Chapter 40 Symmetry and Similarity (9)

Chapter 42 Circles and Circle Theorems (6)

Chapter 43 Perimeter and Area (10)

Chapter 44 Surface Area and Volume (4)

Chapter 51 Probability Laws and Outcomes (4, 5)

Chapter 42 Tree Diagrams and Venn Diagrams (1)

Chapter 55 Summary Statistics (7)

Chapter 56 Grouped Data and Diagrams (1)

Section 5 Additional questions for:

- testing higher level skills
- raising the level of challenge

Chapter 6 Percentages (question 20)

Chapter 11 Units (12)

Chapter 12 Writing and Using Algebra (16)

Chapter 14 Expanding (11, 13)

Chapter 16 Factorising II: Quadratic Expressions (12, 13)

Chapter 20 Functions (16)

Chapter 21 Surds and Rationalising a Denominator (13)

Chapter 22 Algebraic Fractions (3, 9)

Chapter 23 Solving Linear Equations (13, 14)

Chapter 26 Solving Quadratic Equations 1 – By Factorising (9)

Chapter 28 Solving Quadratic equations 2 – The Quadratic Formula (6)

Chapter 29 Solving Quadratic Equations 3 – Completing the Square (8)

Chapter 30 Simultaneous Equations 2 – Where One is Quadratic (9)

Chapter 33 Graphs of Standard Functions (10)

Chapter 34 Proportionality (12, 13)

Chapter 36 Real-World Graphs and Kinematics (10, 13)

Chapter 39 Angles and Shapes (10)

Chapter 51 Probability Laws and Outcomes (8)

Chapter 52 Tree Diagrams and Venn Diagrams (10)