GCSE (9-1) Mathematics

2018 Post-16: Making a Start Guide
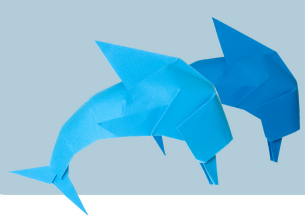
Contents

Introduction

This short guide has been designed to help you to get your post-16 Foundation tier GCSE Mathematics classes up and running this September. The guide contains useful information about our GCSE (9-1) Mathematics assessment along with details of recent refinements to our assessments. This guide also provides details of, and links to, free Pearson resources and services designed to support your preparation and delivery of GCSE (9-1) Mathematics.

The last section of the guide includes details of some practical maths activities and exercises you may wish to use in your first few lessons to help address some of the problem areas and topics that post-16 learners find challenging.

Brief review of assessment criteria

The following table shows the distribution of marks for each of the specification topic areas by tier:

Foundation tier weighting	Assessment topic area	Higher tier weighting
25%	Number	15%
20%	Algebra	30%
25%	Ratio, proportion and rates of change	20%
15%	Geometry and measures	20%
15%	Probability & Statistics	15%

Remember that the GCSE Mathematics assessment now has more weighting in the Ratio and proportion area than was the case in the previous GCSE, so there are now more questions on this area and they can be more demanding. There is also more algebra included in Foundation tier than was the case in the previous scheme.
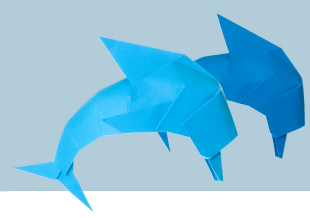
The assessment objectives and their weightings

AO1 is about using and **applying standard techniques**, similar to the current AO1

50% foundation

40% higher

AO2 has a different focus. It's about **reasoning, interpreting and communicating** mathematically

25% foundation

30% higher

AO3 is about solving problems with a much greater focus on **solving non-routine problems** in mathematical and non-mathematical contexts.

25% foundation

30% higher

In 2015 there is less AO1 at Higher and roughly the same at Foundation compared to 2010.

Quality of Written Communication (QWC) is also now included as part of AO2.

Another important change to remember from the previous GCSE is the inclusion of assessment objective 2 (AO2) which requires candidates to support their answers by showing legible working out and reasoning when required. Candidates will not gain full marks in many of the questions if they do not do this, even if they give the correct answer.

The problem solving aspect, assessment objective 3 (AO3), now forms a greater part of the assessment in both tiers and hence requires extra emphasis during teaching and learning.

Information on grade boundaries can be found on the Mathematics Emporium in the GCSE Mathematics 11 MA1 linear drawer 'Grade boundaries'.

Full details and copies of our specification can be found in the Mathematics Emporium and on the website. Further information can also be found in our Getting Started Guide.
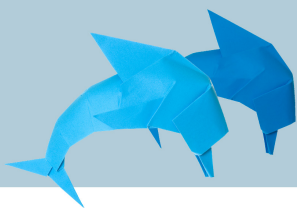
Recent refinements to assessment

Following the first assessment of the GCSE (9-1) in June 2017 and after external consultation and internal review procedures the following refinements have been made to GCSE (9-1) Mathematics assessment papers:

> The early questions on the Foundation tier papers are accessible to all students and will be mainly one mark questions.
>
> The common questions which appear on both Higher tier and Foundation tier papers are all accessible to students targeting grades 4 and 5.
>
> Appropriate language and contexts are used in all questions so that we are testing mathematical ability only.
>
> Each series of exams will assess as many topics and skills as possible, including those that are new to the curriculum.
>
> The layout of the papers is reviewed continuously to ensure diagrams are large enough and students have enough working space around them.

The above changes, which were first implemented in the summer 2018 series, apply to both Higher and Foundation tiers. We continuously strive to improve the quality and accessibility of our GCSE Mathematics assessments and would value any constructive feedback from teachers or candidates to further improve our assessment process at mathsemporium@pearson.com.

The changes implemented in the Foundation tier are designed to increase the confidence of candidates at the beginning of the assessments through the inclusion of up to eight short, straightforward, one-mark questions. The later problem solving questions in the papers are now designed to allow grade 4 candidates to score some of the available marks, even if candidates cannot complete the full answers.

Each set of papers assesses as much of the curriculum as is possible, giving candidates the opportunity to demonstrate their skills in a wide range of topics.

The language used in assessment questions is checked by non-maths language experts to ensure that only mathematical ability is being tested. All diagrams included in papers are designed to be clear, of a suitable size and to have space around them so that candidates can annotate them as part of the answer process.
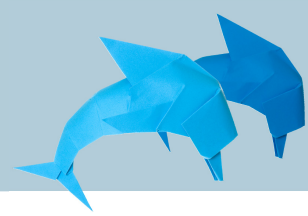
Initial/diagnostic assessment and baseline tests

Initial assessment and diagnostic testing are important tools to help develop schemes of work and individual learning plans for learners studying GCSE Mathematics. If you do not have your own assessments or are looking for resources or guidance, there are some free Pearson resources and Department for Education case studies on effective practice:

- Pearson baseline tests
- Diagnostic questions
- Effective practice in the delivery and teaching of English and mathematics to 16-18 year olds

Extra features recently introduced into ResultsPlus have been specifically designed for post-16 centres. These features allow you to retrieve and carry out analysis of individual students' performance in their previous exam attempt. This data is very useful when planning teaching and learning and is discussed further on page 7.

November resit

The opportunity for post-16 learners to re-sit GCSE Mathematics in November is still available as it was in the previous scheme. The early exam date only allows for 10 weeks or less of revision and so it is recommended that the November opportunity is reserved for those who narrowly missed their target grade or who have specific special considerations.

Although there is no official guidance on which learners the November window may be appropriate for, feedback from colleges suggests that a common benchmark is total marks 5% or less away from the target grade boundary (usually grade 4). Some colleges operate much stricter criteria of 5 marks out of 240 away from the target grade.

Higher tier students who scored a grade 3 should consider carefully whether it is a good idea to take the Higher tier papers again or to do Foundation tier instead. The crossover questions in the Mathematics Emporium (in the 'Practice papers and questions' cabinet) are a good tool to use. If potential Higher tier students can't answer most of these questions at initial assessment they may well struggle to achieve a grade 4 in the re-sit.
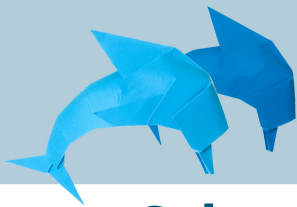
Schemes of work – Interactive scheme of work

Editable schemes of work for one or two years, suitable for use in the post-16 sector, are available on the Mathematics Emporium (in the 'Schemes of work' cabinet).

A free interactive scheme of work is also available.

The interactive scheme of work is totally flexible so you can tailor it to the way you want to teach the GCSE (9-1) Mathematics qualification, i.e. as a 1-year GCSE post-16 resit course or even as a 2-year, 3-year or 5-year curriculum.

To access the interactive scheme of work just complete the ActiveLearn registration form available here. The interactive scheme of work is available for free.

Further information including an explanation of how to use the interactive scheme of work is available in part 3 of our GCSE (9-1) Mathematics resits webinar.

Examiners' reports

Examiners' reports and Chief Examiner feedback summaries are very useful for identifying general issues and weaknesses that were apparent in previous exam series.

Some of the main issues and weaknesses identified in the GCSE (9-1) Mathematics Foundation tier exams to date are as follows:

- Lack of or illegible working out to support answers
- Apparent lack of required equipment such as protractors, rulers and calculators
- Limited performance in multi-stage problem solving questions
- Not knowing required formulae
- Metric conversions
- Error intervals
- Arithmetic
- Algebraic manipulation including forming equations, factorising and solving
- RTFQ – Read the full question
- Checking answers are sensible
- Compound and simple interest, percentages, ratio
- Understanding of the terms expression, equation, identity, etc.
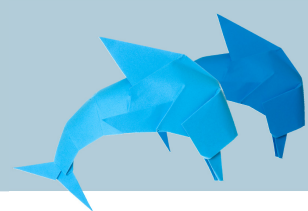
Some suggested ideas and resources to address some of these weakness areas are included later in this pack. Details on pages 11–13.

Full examiners' reports are available on the website and the Mathematics Emporium.

# Using ResultsPlus to help plan teaching and learning

ResultsPlus is a free-to-use service that provides data and data analysis tools for tutors. It enables you to access and analyse learner performance in previous Pearson Edexcel GCSE Mathematics exams. ResultsPlus also provides a mock analysis service which can be used alongside the annual Pearson mock papers to provide analysis of learner and group performance in mock exams.

A new feature now available in ResultsPlus allows you to download and carry out analysis of your incoming learners' performance in their previous Pearson exam attempt (which will usually have been at school). This data is very useful when planning teaching and learning.

ResultsPlus can analyse your learners' and your groups' previous exam performance and enables you at a glance to identify their strongest and weakest skills as well as their performance in each individual question. It enables you to compare them with Pearson national averages including by target grade. The gradometer enables you to see at a glance how far each learner was from the grade boundaries.

To access ResultsPlus use your Edexcel Online user name and password supplied by your exams officer.

On the ResultsPlus home page a full user guide is available by clicking on the link as indicated below:
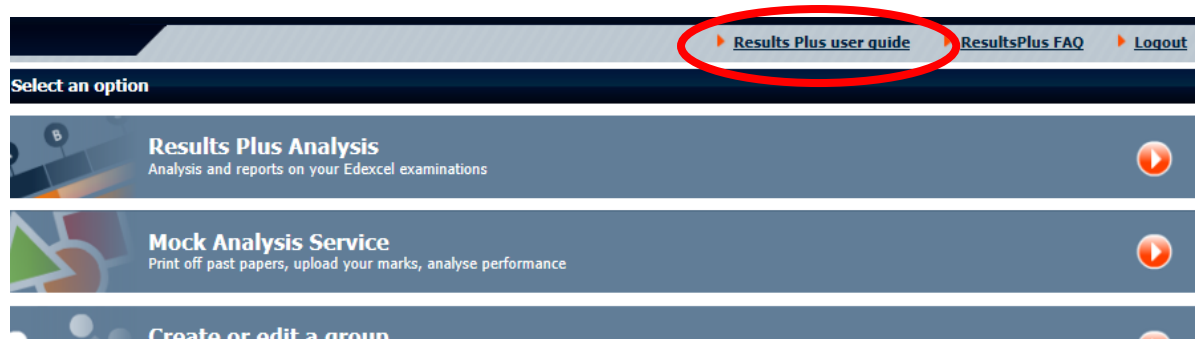
A pre-recorded GCSE (9-1) Mathematics resits training event that explains how to retrieve incoming learner data and how to use ResultsPlus to analyse the data is available on the ResultsPlus area of the website.

examWizard

examWizard is a free exam preparation tool containing a bank of past Edexcel exam questions, mark schemes and examiners' reports. It enables you to access past papers and create mock papers, homework or practice tests in minutes. Build your own tests and exercises by selecting the specification content areas and/or assessment objectives you want learners to practise.

To use this service you will require your Edexcel Online user name and password (available from your exams officer).

Further information and explanation on how to use examWizard is available in part 4 of a pre-recorded GCSE (9-1) Mathematics resits webinar.

Problem solving

Problem solving is proving difficult for many learners and so they often require extra practice and support to master the skills required. There are problem solving practice questions on the Mathematics Emporium and website, available in graded sets for Foundation tier and Higher tier learners.

Sets of Gold, Silver and Bronze questions are available. These pose the same questions but provide varying levels of scaffolding allowing differentiation within groups depending on problem solving ability. The Gold versions are the questions as presented in the assessments while the Bronze versions have the most scaffolding.
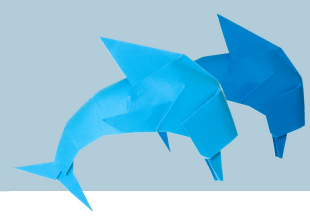
Other useful resources

Listed below is a selection of some of the many resources available on the website and Mathematics Emporium:

- Free downloadable and printable Top 10 toughest areas booklets compiled using ResultsPlus data from the 2017 GCSE (9-1) Mathematics exams.

- Three sets of mock exam papers and mark schemes.

- Seven sets of practice papers and mark schemes to help learners practice.

- A series of themed practice papers is available on the Mathematics Emporium.

- An A4 version of the formulae poster for learners to include in their folders.

- Exemplar answers with examiner comments are available with examiner comments for all examinations to date.

- Recorded webinar on the 2017 GCSE (9-1) Mathematics summer papers.

Forthcoming events

Check the website training section (search 'Training from Pearson') for our forthcoming training events including those available online.

Our regular free events include:

- GCSE (9-1) Mathematics summer feedback events on the summer exam series

- Recorded live webinar GCSE (9-1) Mathematics summer exams review

- Post-16 network meetings in the Autumn and Summer terms at various venues across England, providing the opportunity for updating and to share best practice.

Please visit the training section of the website to book your place on any of our free events.
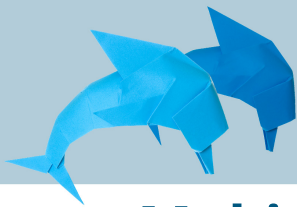
Making a Start resources

This section provides information about a number of free downloadable active resources and group activities that you may want to use in the first few teaching sessions of the year. These resources have been designed to cover selected topics contained in the first section of the 1 year scheme of work and/or that have been highlighted as problem areas in examiners' reports. These resources provide opportunities for learners to work together to overcome recognised common weaknesses in post-16 resit classes.

All the resources can be downloaded from the following zip folder.

Fractions – Hexagons puzzle

Fractions are a real problem for many post-16 learners and learner often attempt to answer fractions questions by using percentages or decimals, even in non-calculator exams. This exercise could be used at the beginning of a fractions session to be followed by other exercises or teaching.

Print off the sheets **single-sided** and then cut out the individual hexagons (the layout should allow the use of either a guillotine or scissors).

Learners arrange the cards around the four fractions to form flower shapes. This activity can be done individually or in groups.

Other similar exercises could be developed for equivalent fractions, percentages and decimals.

Multiplication – Lattice method

Multiplication – Lattice method – Further practice

The lattice method is a great way of doing multiplication and can be quickly learned and easily remembered by most learners. This exercise also presents an opportunity to use estimation to locate the decimal point correctly.

Print off the pages and give individually to learners. There is a further practice worksheet available if required.

Once learners have mastered this technique, take the opportunity to do algebraic multiplication using grids (resource provided) in the same or the following lesson.
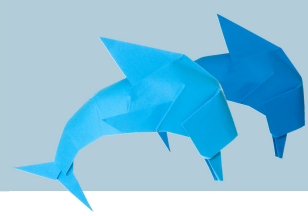
Included below are links to free videos that you may want to use before using the exercise sheet.

[Lattice multiplication – Mr Bletcher](#)

[lattice multiplication – TheAnimatedClassroom](#)

[Lattice multiplication – Khan Academy](#)

Algebra – Multiplication grids

Once learners have mastered the lattice multiplication technique for numbers they can then use these grids to do algebraic multiplication and expand quadratic double bracket expressions effectively. This is an ideal opportunity to introduce algebra early in the scheme, relating it to numbers and using a similar grid type method. In post-16 resit classes algebra is an area that presents confidence issues for many learners. Using exam-style questions after successfully completing the exercise should help with this, particularly if the questions are done as a group activity.

Division and multiplication – Practice sheet

Using the lattice method for multiplication works well for most learners but division is a common weakness area. Some learners prefer to do chunking, so included below are links to free videos showing the bus stop and chunking methods of division.

[Bus shelter division – Mr Bletcher](#)

[Bus shelter division – Tutors United](#)

[Chunking – Simon Deakin](#)

Measure conversion – Card sort

Converting units of measure is a real issue for many learners and this area is consistently outlined as a weakness in examiners' reports. This exercise is designed to get learners thinking and converting as a group activity.

Print off **double-sided with each pair of pages on different coloured card**. Cut along the table lines leaving the central section of each table as one piece.

Give learners the straight conversion table to sort first. It would be a good idea for them also to fill in the correct conversions in a blank table for reference and to aid recall.

Once the basic conversions have been sorted, one or all of the other three tables could be done immediately or used in subsequent sessions. The middle card in each set is double-sided so can show multiply or divide depending which way up it lands on the desk when used - learners usually find the dividing more difficult.
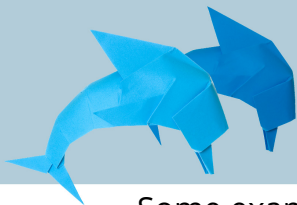
Some exam-style questions could be used after completing the exercise to further practise and embed learning.

Basic algebra – Card sort

Algebra remains a stumbling block for many post-16 Foundation tier students and the fear it instils into many of them is a barrier to mastering even basic principles. Using group activities helps them develop confidence and so learn. This exercise could be linked in with the Algebra multiplication grids provided above.

Print off the cards on pages 1 and 2 **single-sided** and cut them out along the table lines. Have the learners match the pairs of cards as a group exercise. This card set creates an opportunity to learn, revise and practise the basic rules of algebra. Page 3 lists some mathematical rules and can be given out with the card sort activity if required.

The $x^5 - x^3$ card is included to highlight a common misconception: learners usually match it to the x^2 card. When they have completed the exercise and made this error ask them to check their cards as one pair is wrong; it usually takes them quite a while to find the error so gives others a chance to catch up.

You could follow this exercise with more practice exercises in groups or on an individual basis. Some learners will be more competent than others so it is a good idea to have some further more challenging exercises and exam style questions available.

Powers and roots – Using a calculator

Many post-16 learners do not bring calculators to learning sessions or even to examinations (as is evident from examiners' comments). This exercise can be used during one of the first few sessions of the year to get learners to bring and use their calculators. Advance notice will probably be required!

This exercise is intended to get learners using the power and root keys on their calculators and includes questions that are designed to get them to think more deeply about the maths involved. The exercise could be done in groups or individually and then results and answers to questions shared with the whole group afterwards.

Exam-style questions could be done on completion of the exercise for more practice.
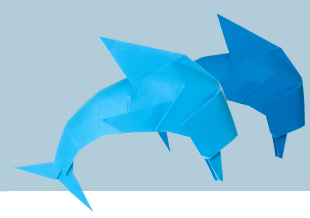
Factors and indices – Matching cards

This exercise links numbers, factors, roots, indices and algebra so could be used in an early session to introduce or link these topic areas.

Print off **single-sided** and cut up the cards on the table lines **except the first section with blue text which should remain as a full strip.**

This resource is best used as a group activity without calculators. Learners should arrange the cards in the correct column under the blue strip. Reasoning – rather than calculations – can be used to sort the difficult-looking large number square roots and other expressions. For example, for √4096: 4096 ends in a 6 which is related to 4^2 (16) and is larger than 60^2 so can only be 64 in this exercise. Calculators could be used to good effect for checking answers once the sort is completed.

Further individual or group exercises could follow to reinforce learning.