

Maths at Work

A guide for employers offering work experience as part of 16 to 19 Study Programmes (including Traineeships)

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About this guide

This guide is for employers offering work experience placements to young people aged 16 to 19 who are following Study Programmes. It may also be useful for employers offering other forms of work experience, and for developing the mathematical skills of members of staff.

The aim of the guide is to provide practical suggestions about how you might help to strengthen young people's mathematical skills during the time they spend with you, as they move from learning in a classroom to applying their skills in the workplace. We understand that you may not have much time to spare for this and so we have developed this guide to offer you some suggestions that do not require much effort, but can have a big impact.

There is also a section that explains what kinds of maths the young people may have studied before they join you, or will be working on while they are with you.

This guide is not intended as a general guide to work experience but you can find some links to such guides in the section on further sources of information.

Why does maths matter for everyone involved?

Giving young people the chance to use their mathematical skills in the workplace not only improves their prospects, but can also help you and your business to gain more from the time they spend with you.

It helps the young person to build confidence and competence. This may help them to achieve better results in maths and other qualifications, which can open doors to career paths that would not otherwise be accessible. Seeing the usefulness of maths can also be very motivating.

Enhancing the young person's employability skills in this way also helps your business to gain more from the work experience placement. Mathematical proficiency avoids errors, saving time and money, and in many situations enhancing customer service. Being able to think logically, perform calculations accurately, and apply maths to solving problems may also result in the young person requiring less supervision during the placement. On a larger scale, you will be enriching the pool of talent available for you to recruit from. You may also find that the involvement of your employees helps to develop their own confidence and mathematical skills.

What are Study Programmes and Traineeships?

All students aged 16 to 19, whether following academic or vocational studies or a mixture, are now expected to follow a Study Programme tailored to where they are in their education

and to their career aspirations.

Key features of Study Programmes include:

- Students spend most of their time taking one or more substantial qualifications (the size of an A level or larger), undertaking a Traineeship or doing extended work experience.
- Students who have not achieved grade C GCSE English and Mathematics or better are expected to continue to work towards that goal.
- Students are involved in an activity that does not lead to a qualification. This often involves work experience, and for those students following vocational pathways work experience is an integral part of their Study Programmes.

Traineeships for 16-19 year olds are a strand of 16-19 Study Programmes for young people who are not yet ready to enter the job market but want to move into an apprenticeship or other employment. Traineeships last a maximum of six months and mainly involve work preparation training, a high quality external work placement, and working towards grade C GCSE Mathematics and English or better for those who have not yet achieved it.

A further kind of Study Programme, the Supported Internships Programme, helps young people with a complex mix of needs into work by giving them extra support including on-the-job training, backed by expert 'job coaches'.

What sort of maths?

It can be helpful for you to know which maths qualifications the young person has achieved and which they are working on now so that you know which duties are appropriate for them to carry out and which applications of maths may be within their grasp.

The young people who join you for work experience who do not have grade C GCSE Mathematics or better will be taking various maths qualifications as stepping stones on their journey towards it. These might include QCF qualifications, Functional Skills and Free Standing Maths Qualifications (FSMQs). The table in Annex 1 provides a summary of the key features of these maths qualifications, together with GCSE and I-GCSE.

Some of these qualifications can be taken at different levels, ranging from Entry 1 through to Level 3. Further information about these levels is provided in the table in Annex 2, which also offers examples of the maths being used at each level. It is not definitive, but aims to provide you with an idea of what to expect from the young people who are working at each level. Further information about qualification levels is available on the [Ofqual website](#).

Young people who already have grade C GCSE Mathematics or better are also likely to enhance their employability by practising maths in the workplace. Some will be working towards a higher level in maths, such as AS or A level Mathematics or Mathematics for Engineering. Others will have chosen not to continue to study maths; in which case it may be many months or even years since they last used maths and they may have forgotten some of it. There may also be some aspects that they were not confident with or did not cover.

How can mathematical skills be strengthened?

There are many ways in which you may be able to help the young people you work with to improve their mathematical skills. This section provides some suggestions.

Arranging a placement

Meetings with Study Programme providers, i.e. schools, colleges and independent training organisations, present the ideal opportunity to find out about the young person and discuss how you may be able to help them. If you do not have the opportunity to meet with the provider then you could discuss these points with the young person when they join you.

- Which maths qualifications has the young person achieved and which is he or she currently working towards? Are there any particular areas that he or she aims to improve?
- If you agree objectives for the placement, consider including some about developing mathematical skills.
- Do you, or the provider, expect the young person to carry out a project or complete a work-book during the work experience placement? If so, how can it involve maths?

If you are concerned that these suggestions could be a burden, remember that the young people and the providers should be taking the lead on involving maths. Providers should be able to support you and if you have any worries then it is best to discuss them with the provider as early as possible.

Once you know more about the young person and everyone's expectations have been clarified, you can start to think about how you can help with maths side of things.

How to go about it

The table below offers some simple suggestions for supporting and encouraging your young people to build up their mathematical skills.

Remember that being functional with maths is not just about doing calculations, but involves using maths to help carry out everyday tasks and solve everyday problems. For instance it may involve:

- Modelling a situation
- Using an appropriate mathematical method to solve a problem
- Identifying patterns
- Using data
- Interpreting results and using them to make recommendations.

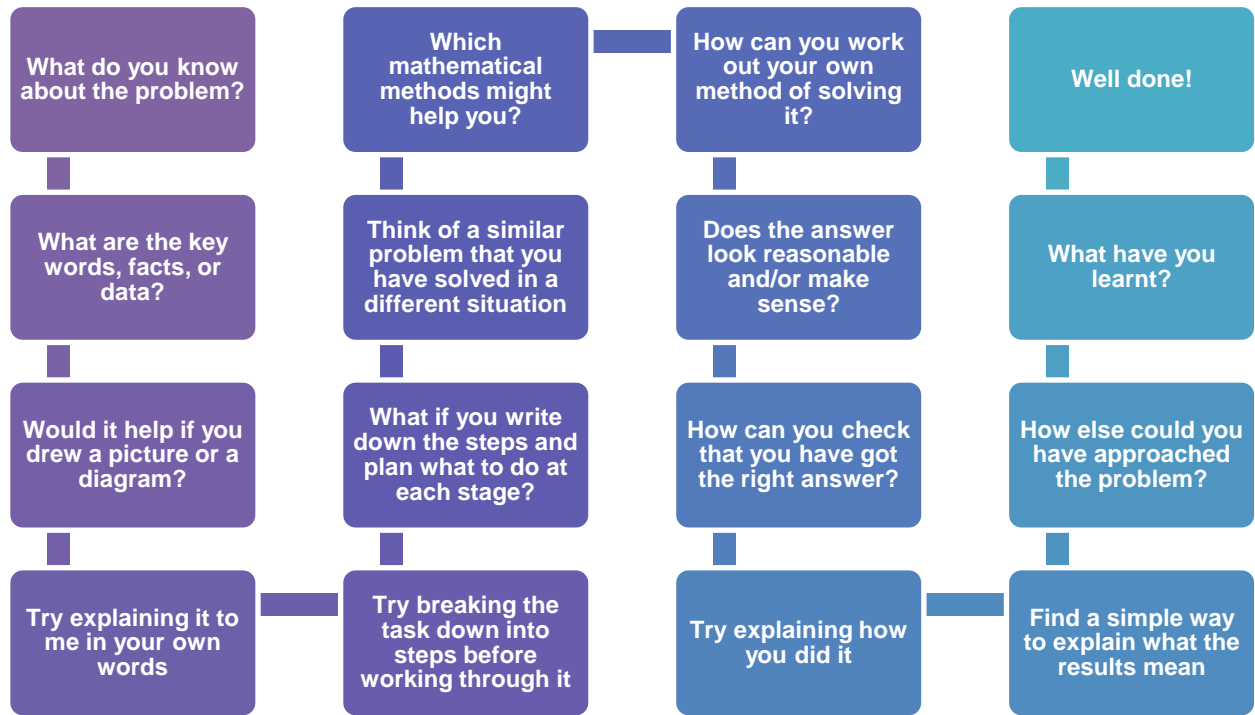
If you bear this in mind, you may find that there are more ways that you use maths than you thought. If you are not sure, ask your provider to help.

Suggestion	Example
<p>Think about how, when and where you and your colleagues use maths every day. You may be so used to this that you do not even realise it.</p>	<p>A hair dresser making an appointment for a hair colouring uses maths to work out when it can be fitted in, what time to book it for and what time it is likely to end.</p>
<p>Point out examples of ways in which maths is used to the young person. This is best done when you introduce them to a work-related task.</p>	<p>When estimating the quantity of architrave needed to frame 10 doors, a carpenter might explain that it is not as simple as adding up the required lengths and dividing by the length the wood is supplied in. In order to minimise joins and avoid waste, account needs to be taken of where each length of wood will be cut. Getting this right can save money and result in a better job.</p>
<p>If you can, start with something the young person is more likely to be familiar with before moving on to situations that may be new to them.</p>	<p>When about to explain how to carry out a stock take, a retail manager might start by talking about checking the contents of your cupboards and fridge at home before you go shopping.</p>
<p>Encourage them to identify fresh examples themselves.</p>	<p>A young person spending their work experience in a hotel reception could be asked to try to note down every day one new example of how maths is used in the hotel. These could then be reviewed at the end of the placement.</p>
<p>Encourage them to practise their skills in new situations.</p>	<p>If they have three £1 coins for lunch, what can they afford to buy in the canteen, and how much change should they expect.</p>
<p>If possible, give the young person the same level of responsibility as other employees. This ensures that he or she develops skills in context.</p>	<p>You could get them to check that the quantities of the goods delivered to a warehouse correspond to those recorded on the delivery docket.</p>
<p>Help the young person to see aspects of other employees' jobs that involve maths.</p>	<p>A childcare manager could explain how he or she uses ratios to calculate how many nursery staff are needed to supervise a group of two-year-old children.</p>

Suggestion	Example
<p>Help them to see ways in which maths is used throughout your industry.</p>	<p>NHS hospital performance measures are monitored and compared between hospitals. Average waiting time is based on the median length of time that patients waited from being referred by their GP to being admitted to hospital to begin their treatment.</p>
<p>Encourage your staff to demonstrate a positive attitude to maths. This is very important as they can have a significant influence.</p>	<p>When introducing the young person to an office administrator, you might mention how good the administrator is at using mental maths to quickly estimate how long a task will take.</p>
<p>There may be several ways to approach a problem and several methods of working out a result. Where possible, try to support the young person to tackle it in his or her own way, since new methods sometimes confuse.</p>	<p>When multiplying two two-digit numbers, the young person may use a grid method rather than long multiplication.</p>
<p>Get the young people to use the technology you use, such as tills, computers and hand-held terminals, but where possible also ensure that they understand and practise the maths done by the technology so they can see how the technology works and manage without it if it fails or is not to hand.</p>	<p>A charity fundraiser has set up a spreadsheet for colleagues to use to calculate the conversion rate of an email marketing campaign into donations. It is important that other fundraisers at the charity understand the maths used in the conversion calculation, so that they can check the results.</p>
<p>Talk about the maths qualifications needed for the career they aspire to.</p>	<p>A finance manager might explain that applicants for the accountancy apprenticeship scheme that the Company runs are required to have at least a grade B in GCSE Mathematics.</p>

Useful questions

The diagram below provides some examples of questions and prompts that you could use with a young person who is trying to understand a maths problem.



Making the most of review meetings

The normal review meetings that you have with the provider and the young person offer an opportunity to discuss progress and issues relating to maths as well as general matters. If you feel you need any support then it is best to raise this with the provider as early as possible.

What about our own staff and their maths?

Some members of your staff may not feel sufficiently confident in maths to help the young person. This does not have to be a problem if you involve the member of staff, their colleagues or workmates, the young person or the provider. You could even ask the provider about how to help your staff with their own maths. You can also contact Mathematics in Education and Industry for further suggestions.

Further sources of information

Other sources of advice and guidance that could help you include:

- **Not Just Making Tea: Reinventing work experience**
This guide to work experience for employers produced by the UK Commission for Employment and Skills aims to make offering work experience as easy as possible and includes a wealth of case studies.
- **Making work experience work: top tips for employers**
This booklet from the Chartered Institute of Personnel and Development (CIPD) includes practical advice for employers on the benefits of work experience.

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Annex 1: Stepping stones towards GCSE Mathematics

Name	Description	Levels
QCF qualifications	A range of small units, for example in handling data, designed to fill gaps in mathematical skills in order to prepare learners for studying for one of the more substantial maths qualifications listed below.	Entry 1, Entry 2, Entry 3, Level 1 and Level 2
Functional Skills	Designed to equip learners with the practical problem solving skills required in everyday life, education and the workplace.	Entry 1, Entry 2, Entry 3, Level 1 and Level 2
FSMQ (Free Standing Mathematics Qualifications)	Designed to support the study of a range of other subjects. They are available on several topics.	Level 1, Level 2, and Level 3
GCSE (General Certificate of Secondary Education)	GCSE involves studying mathematical methods with some practical applications. It is often used as a benchmark to judge students' ability to move into further study and careers. There are different examinations for the Higher tier (grades A*-D) and the Foundation tier (grades C-G).	Grade D-G: Level 1 Grade A*-C: Level 2
I-GCSE (International General Certificate of Secondary Education)	A qualification equivalent to GCSE available internationally and also used by a number of UK schools and colleges.	Grade D-G: Level 1 Grade A*-C: Level 2

Annex 2: Maths qualification levels

Level	Examples of content	Example question
Entry 1	Count orally up to 10; read, write and order numbers; add and subtract single-digit numbers; simple features of shapes; describe the position of objects (e.g. using 'on' or 'above'); compare objects (e.g. using 'before' or 'after'); sort and classify objects.	"Chris has 3 invoices and Ajita has 7 invoices. Who has the most invoices?"
Entry 2	Count orally up to 100 and beyond; select odd and even numbers from a list; add and subtract two-digit numbers; multiply and divide whole numbers; find and make simple patterns; a sense of angles as turns; compare objects by length; collect and record data in charts.	"24 people need to be seated at tables. Up to 6 people can sit at each table. How many tables are needed?"
Entry 3	Count orally up to 1000; know hundreds, tens and units; simple fractions; multiplication tables for 2, 3, 4, 5 and 10; use mental maths to add and subtract numbers up to two digits; basic use of a calculator; divide whole numbers up to 100 by single-digit numbers; use mathematical terms to describe shapes; give directions (e.g. 'forward then turn right'); simple units of measure; use of simple measuring instruments (e.g. scales); estimate length and time; extract data from tables; draw and interpret bar charts.	"The Castle car park contains 135 spaces, and the Riverside car park contains 67 spaces. How many spaces are there in total?"
Level 1	Negative numbers; equivalent common fractions, decimals and percentages; add and subtract decimals up to two decimal places; simple ratios; simple formulae expressed in words for one- or two-step operations; problems involving calculation with money, time, length, weight, capacity and temperature; convert units of measure; work out areas and perimeters; models and shapes; extract and interpret information from tables, diagrams, charts and graphs; collect and record discrete data; organise and represent information in different ways; find mean and range; use data to assess the likelihood of an outcome.	Compare 3 mobile phone tariffs and decide which option is best for the person's needs.

Level	Examples of content	Example question
Level 2	<p>The nature and content of maths qualifications at this level are more distinct.</p> <p>Functional Skills Level 2 Mathematics:</p> <p>Calculations with numbers of any size to a given number of decimal places; ratio, proportion and scale; 2-D representations of 3-D objects; area, perimeter and volume of common shapes; use and convert metric and imperial measures; collect and represent discrete and continuous data; use and interpret statistical measures, tables and diagrams, for discrete and continuous data; statistical methods; use probability to assess the likelihood of an outcome.</p> <p>GCSE Mathematics grades A*-C:</p> <p>The content of Functional Skills level 2 Mathematics, with additional mathematical methods, including algebra (e.g. simultaneous and quadratic equations); compound interest; trigonometry; Pythagoras Theorem; probability tree diagrams. Higher tier examinations include content that is not examined for Foundation tier.</p> <p>The BBC Bitesize website provides a helpful overview of the content of GCSE Mathematics. It also indicates which topics are included in the Foundation tier and which are included in the Higher tier.</p>	<p>Use mean, median, mode and range to compare two queuing systems for a health centre and interpret the results.</p> <p>“A ship sails for 15 km on a bearing of 220°. How far south and how far west is it from the point at which it started?”</p>

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