



MATHS

HELPING MATHS TEACHERS AND TRAINERS

THE EDUCATION AND TRAINING FOUNDATION OFFERS PRACTITIONERS A RANGE OF RESOURCES, COURSES AND RESEARCH TO HELP WITH MATHS TEACHING. TO WATCH A VIDEO OF HOW THE ETF WAS ABLE TO HELP LIAM ALDERTON, OF EAST COAST COLLEGE, GREAT YARMOUTH, DEVELOP DIGITAL APPROACHES TO TEACHING BOTH MATHS AND ENGLISH. SCAN THE QR CODE (RIGHT) OR SEARCH FOR MATHS AND ENGLISH SUPPORT AT WWW.ET-FOUNDATION.CO.UK



ETF SUPPORT FOR MATHS TEACHING

Support and courses are available from the Education and Training Foundation to help with effective teaching of maths for teachers of GCSE, Functional Skills, apprenticeships and study programmes.

- Self-evaluation tools enable you to identify areas for updating against the GCSE maths pathway and, separately, Functional Skills.
- A range of maths modules is available from Foundation Online Learning.
- The maths exhibition site on the Excellence Gateway also provides a portal to a range of tools, resources and case studies.
- Teachers and trainers can contact their regional specialist maths lead for more advice, guidance and support.
- Practitioners are also invited to join the ETF's Professional Exchange Networks (PENs) to explore regional challenges and reflect on effective practice in the sector.
- Education and training providers can engage with the ETF's dedicated team of specialists to receive a maths strategic support visit to identify high-level areas of need.

Contact details:

For the self-assessment tools and links to courses, visit the ETF's website and select the options under the 'Supporting you' tab at the top of the page. Or visit www.foundationonline.org.uk

To discuss a strategic visit, please contact the ETF's head of Maths and English, Imke Djouadj, at: imke.djouadj@etfoundation.co.uk

TEN TOP TIPS

There are no simple solutions to improving maths provision and outcomes. However, there is a growing body of expertise that suggests some critical success factors for providers.

- 1 Have a clear vision of what is required to develop a whole organisational approach to maths.
- 2 Actively promote the links between the maths skills on learners' main programme of study and discrete maths lessons to help them see the relevance of maths.
- 3 Ensure that effective teaching, learning and assessment underpins the Self-Assessment Report (SAR) and Quality Improvement Plan (QIP).
- 4 Address underpinning causes, not symptoms. For instance, if attendance is an issue, consider what might be the underlying cause and focus on this.
- 5 Ensure the maths strategy, and associated policy, meet the individual maths needs of learners.
- 6 Train observers of maths and vocational lessons to recognise and give feedback on the effective development of maths.
- 7 Ensure that specialist maths teachers have dedicated meetings with vocational teams to plan and contextualise the curriculum.
- 8 Develop a training needs analysis to inform a Continuing Professional Development (CPD) programme.
- 9 Ensure learners' starting points are accurately assessed and recorded by all tutors involved in programme delivery using effective Assessment for Learning (AfL) strategies.
- 10 Use innovative approaches, including learning technologies, to engage learners with maths.

MATHS BODIES

The National Centre for Excellence in the Teaching of Mathematics
www.ncetm.org.uk
National Numeracy
www.nationalnumeracy.org.uk
National Association for Numeracy and Mathematics in Colleges
www.nanamic.org.uk
Maths Hubs
www.mathshubs.org.uk

FUNCTIONAL SKILLS MATHS

The government is reforming maths Functional Skills in partnership with Ofqual and the ETF. Find out more about the ETF's dedicated support for FS on the ETF Online Booking site.

The ETF undertook research in support of the FS reforms. To read the reports and the government's response, scan the QR code (left) or visit www.et-foundation.co.uk



EMBEDDING TECHNOLOGY

The Education and Training Foundation has published a report that explores the barriers and enablers to embedding learning technology in the delivery of teaching, learning and assessment in further education colleges.



To access the report, scan the QR code (left) or access it on the ETF website under the 'Research' tab.

SET DISCOUNTS

SET members are eligible for an exclusive 15 per cent discount on most Maths courses (and many others) run by the Education and Training Foundation.

For information on all member benefits visit the SET website and click on 'Membership'.
<https://set.et-foundation.co.uk>

BAR MODELLING

This is a maths mastery technique popular in places like Singapore. It relies on taking learners on the journey from physical objects to abstract maths concepts.

You can begin with concrete modelling.



Then move to pictorial representations of those objects.



And finally to a mathematical representation.

6

4

TOP TRUMPS

Based on the popular card games, this maths game encourages learners to compare data and explore mathematical ideas such as larger and smaller numbers on themed cards. You can also ask learners to create the data, which encourages the use of wider mathematical skills.

The beauty of the game is that they can be themed around any learning. For instance, in catering you might compare the diameters of pots, the length of knives, the cost per kilo of different ingredients and the cooking times of different products.

SIX MATHS MASTERY FACTS

- Each maths topic is studied in depth.
- It is about more than learning a set of mathematical rules.
- There is no streaming in class by ability group.
- Learners who grasp the topics more quickly are challenged with more complex problems in the same topic.
- Learners who need more time are supported to develop their understanding of the topic
- The teacher does not move to the next stage or topic until all learners demonstrate that they fully understand the topic.

MATHS JARGON-BUSTER

Algorithm = a step-by-step procedure that can be used to answer a calculation.

Coefficients = the numbers in front of the letters in an expression e.g. in the expression $6x + 3y$, the coefficients for x and y are 6 and 3 respectively.

Coordinate = a pair of numbers that give the location or position of a point (often on a graph), determined by the point's distance from the x and y axes.

Fermi question = a question which requires making assumptions and estimates to arrive at an answer that may seem difficult or impossible to answer precisely, e.g. how many hours will you spend asleep during your lifetime?

Fibonacci numbers = a sequence of numbers formed by adding the last two numbers to get the next in the series: 0, 1, 1, 2, 3, 5, 8, etc.

Hypotenuse = the longest side of a right-angled triangle, opposite the right angle.

Integers = whole numbers, both positive (natural numbers) and negative, including zero.

Matrix = a rectangular array of numbers, which can be added, subtracted and multiplied, and used to represent linear transformations and vectors, solve equations, etc.

Natural numbers = the set of positive integers (regular whole numbers), sometimes including zero.

Perfect number = a number that is the sum of its divisors (excluding the number itself), e.g. $28 = 1 + 2 + 4 + 7 + 14$

Prime numbers = integers greater than 1 which are only divisible by themselves and 1.

Pythagoras' theorem = the square of the hypotenuse of a right angled triangle is equal to the sum of the squares of the other two sides ($a^2 + b^2 = c^2$).

Quadratic = A quadratic expression is anything with x^2 as its highest power e.g. x^2 or $x^2 + 2x + 3$

Sequence = an ordered set of numbers whose terms are usually determined by a mathematical rule. This can be expressed as a term-to-term rule (how to get from one term to the next e.g. add 3) or as a position-to-term rule (pth number = $3 \times p + 1$).

Vector = a physical quantity having magnitude and direction.

Circle formulae

Circumference and area of a circle

Where r is the radius and d is the diameter.

Circumference of a circle = $2\pi r = \pi d$

Area of a circle = πr^2

492

was the average maths points score of UK 15-year-olds in 2015, according to OECD. The OECD average is 490 points.

NUMBER DETECTIVE

A good game to encourage creative thinking and numerical reasoning to find the hidden number using the clues below.

- The number has two digits.
- Both of the digits are even.
- The digit in the tens place is greater than the digit in the ones place.
- The ones digit is not in the three times table.
- The tens digit is not double the ones digit.
- The sum of the two digits is a multiple of five.

18	86
120	42
46	64
84	8
20	87

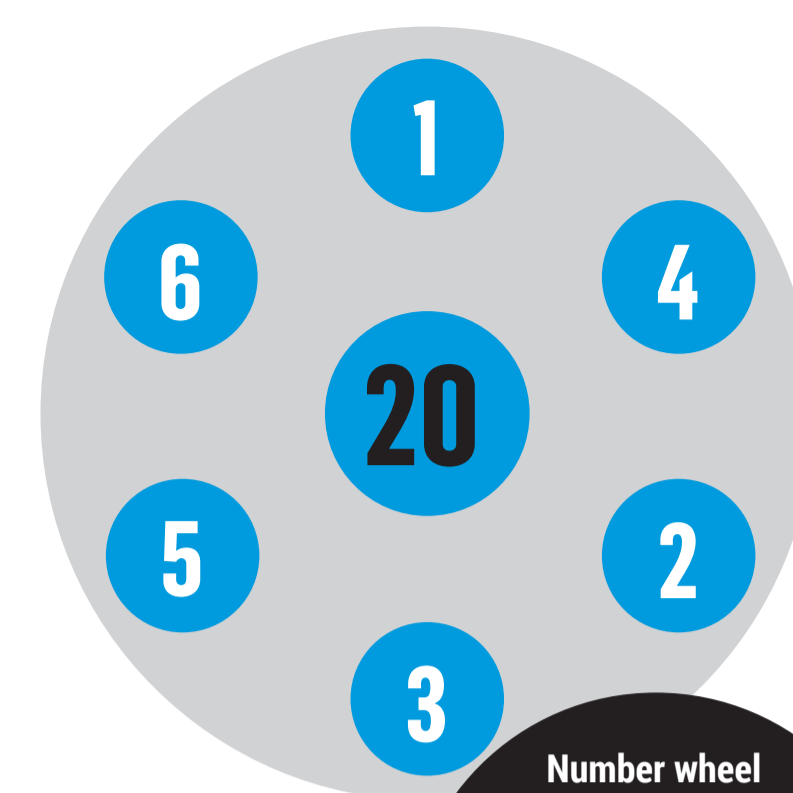
MEAN, MEDIAN, MODE AND RANGE

The mean is the average, so add up all the numbers and divide the total by the number of values (numbers) you added up.

The median is the middle value, e.g. in a series of nine numbers the median is the fifth number. In a series of 10 numbers it is the sum of the fifth and sixth numbers, divided by two.

The mode is simply the number that is repeated most often in a series of numbers.

The range is the difference between the highest value/number in your series and the lowest.



Number wheel

Can your learners make the number in the centre of the wheel by using the numbers around the outside?

They can only use the numbers once, but can use any mathematical function to reach the middle number.

ALMOST
80

per cent of pupils in England who do not achieve a grade 3 in GCSE maths or English fail to attain this mark during their resits, according to Department for Education figures.