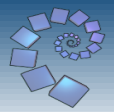
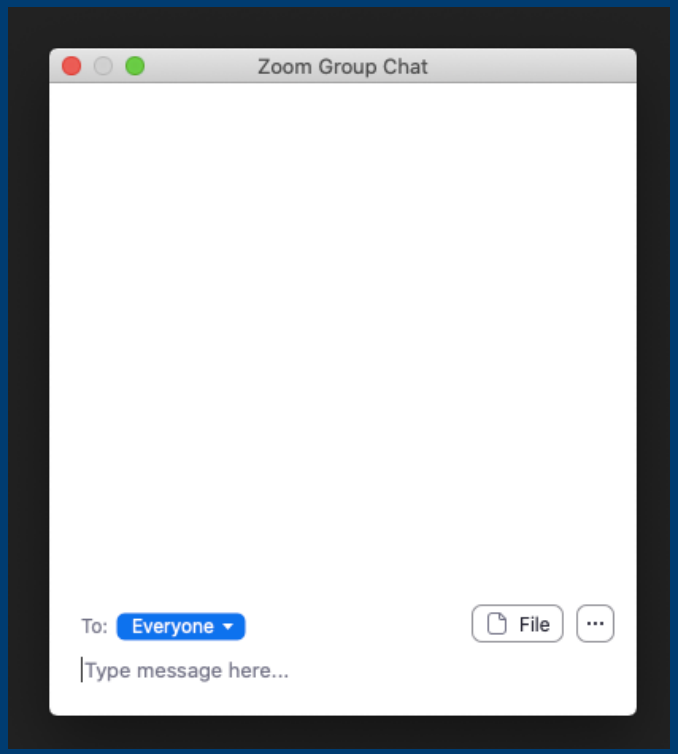
UNIVERSITY OF CAMBRIDGE

NRICH Live
10th June 2020

Charlie Gilderdale
and Alison Kiddle

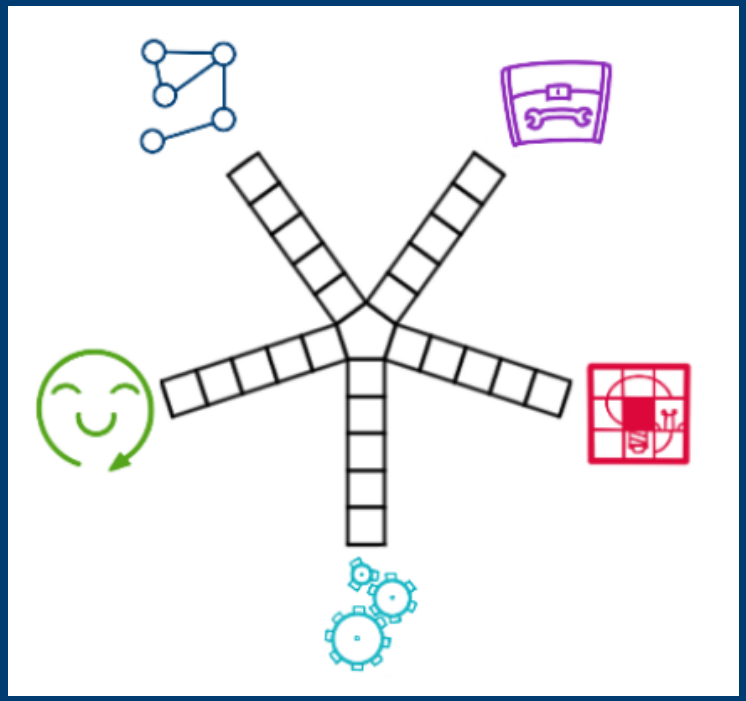




Code of conduct: nrich.maths.org/14698

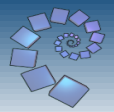
Five Key Ingredients

- Understanding
- Tools
- Problem Solving
- Reasoning
- Attitude



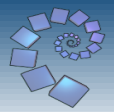
Understanding

Maths is a network of linked ideas. I can connect new mathematical thinking to what I already know and understand.



Tools

I have a toolkit that I can choose tools from to help me solve problems. Practising using these tools helps me become a better mathematician.



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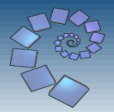

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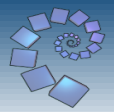
Maths is logical. I can convince myself that my thinking is correct and I can explain my reasoning to others.



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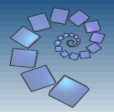

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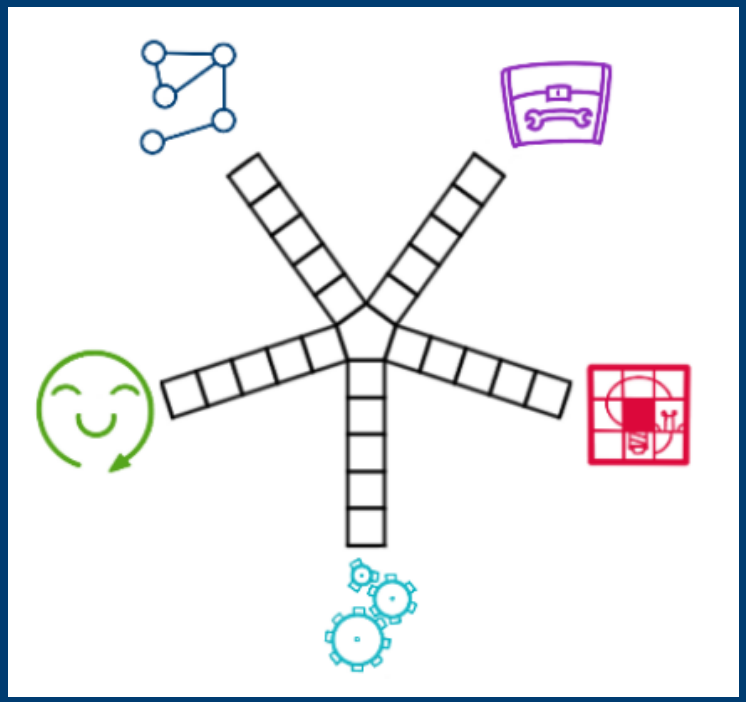


Maths at Home

Teachers

Free curriculum-linked resources to develop mathematical reasoning and problem solving

Early Years
Primary
Secondary

Primary Pupils

This feature will help you develop the five key ingredients that make successful mathematicians.

See all Resources for ages 5-11

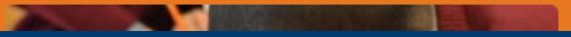
Secondary Students

What makes a good mathematician? This collection of activities will help you to find out!

See all Resources for ages 11-18

Events, Roadshow and PD

Your Solutions



Tweets by @nrichmaths

Welcome to the Secondary Teacher homepage

Secondary Curriculum

Resources organised by mathematical topics (based on the English NC)
Secondary (ages 11-16)
Post-16

Interactive & Printable Resources

Working Mathematically

Tasks to encourage your students to work as mathematicians

Thinking Mathematically
Mathematical Habits of Mind

STEP Support Programme

Latest Feature

The tasks in our latest feature can be used to help develop students' mathematical proficiency.

See all Live Secondary Problems
See all Previous Features

Professional Development

News and Recent Solutions

Tweets by @nrichmaths

Nurturing Successful Mathematicians

In this feature, we showcase several sets of linked activities which can be used to help develop students' mathematical proficiency. We encourage you to share with your students our model of What Makes a Good Mathematician, and help them to self-assess their levels of mathematical proficiency as they work through the sets of linked tasks.

Maths at Home - Nurturing Successful Mathematicians

Age 5 to 16

This short article for teachers and parents explores what it means to be a successful mathematician, and suggests how we can support young people at a time when many are learning at home.

From the Particular to the General

Age 11 to 18 ★

These problems encourage students to move from the particular to the general

From Isolation to Collaboration

Age 11 to 16 ★

These problems are designed to encourage students to consider multiple approaches

From Random to Systematic

Age 11 to 16 ★

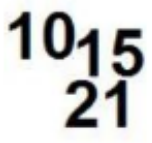
These problems are designed to help students work systematically

Related Enriching the Secondary Curriculum | Nurturing Successful Mathematicians

From Random to Systematic

Students don't always know how to approach a problem systematically and often work in a random and chaotic manner. This collection of problems provides opportunities to discuss ways of organising and structuring ideas, and can be used to help draw attention to the benefits of working systematically.

Sticky Numbers and 1 Step, 2 Step include solutions that have previously been submitted to NRICH, so students may wish to try these problems first and then compare their own approaches with the published ones. Then they could go on to try M, M and M and Counting Factors, which are open for them to submit their own solutions.



Sticky Numbers

Age 11 to 14 ★

Can you arrange the numbers 1 to 17 in a row so that each adjacent pair adds up to a square number?

1 Step 2 Step

Age 11 to 14 ★★

Liam's house has a staircase with 12 steps. He can go down the steps one at a time or two at time. In how many different ways can Liam go down the 12 steps?

M, M and M live

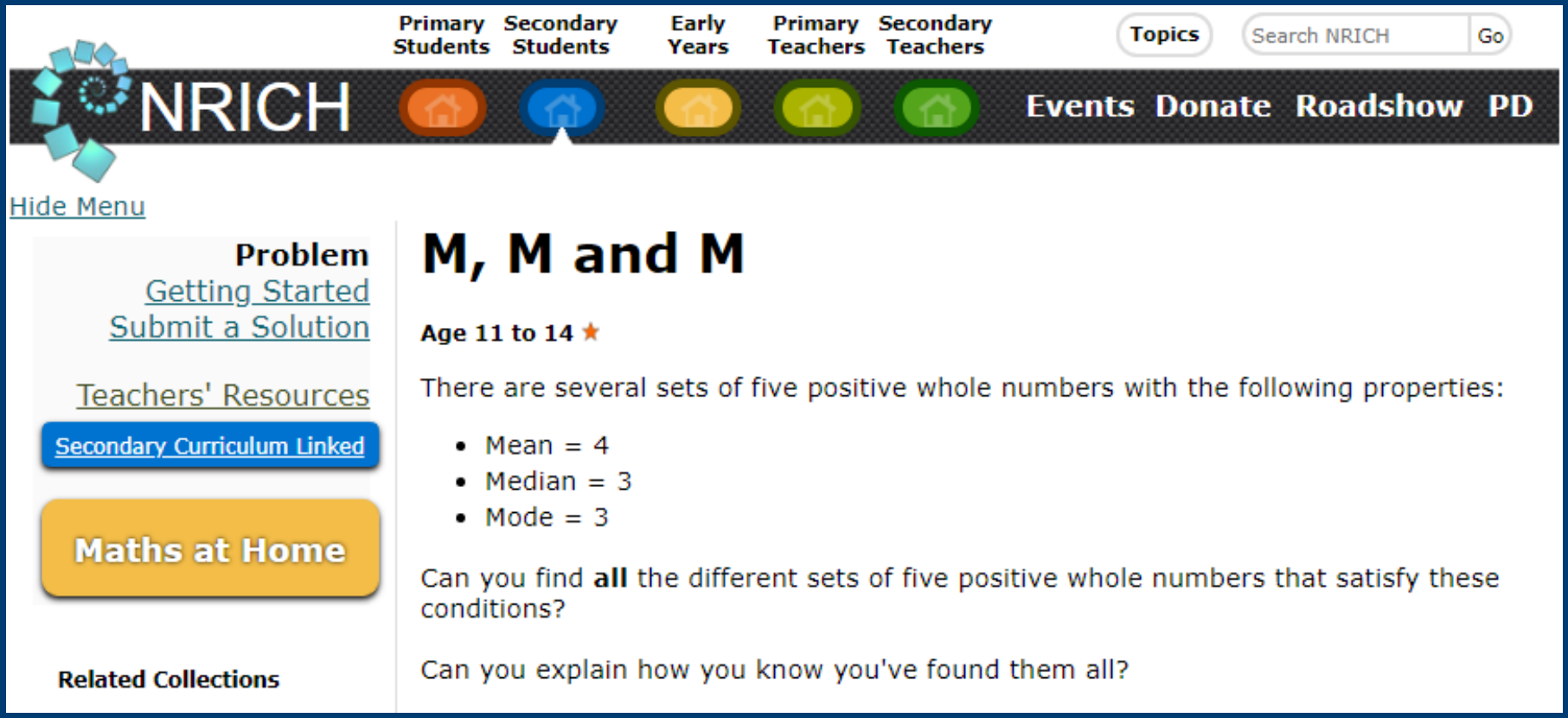
Age 11 to 14 ★

If you are given the mean, median and mode of five positive whole numbers, can you find the numbers?

Counting Factors live

Age 11 to 14 ★★

Is there an efficient way to work out how many factors a large number has?



nrich.maths.org/6267

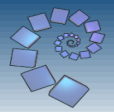
M, M and M

4, 2, 14, 8, 2

Mode =

Median =

Mean =



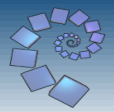
M, M and M

Can you find other sets of 5 positive whole numbers with:

Mode = 2 Median = 4 Mean = 6

How many sets are there altogether?

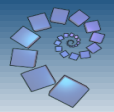
Post your answer in the chat



M, M and M

How might students convince each other that they have found all the possible sets?

Feel free to share suggestions in the chat



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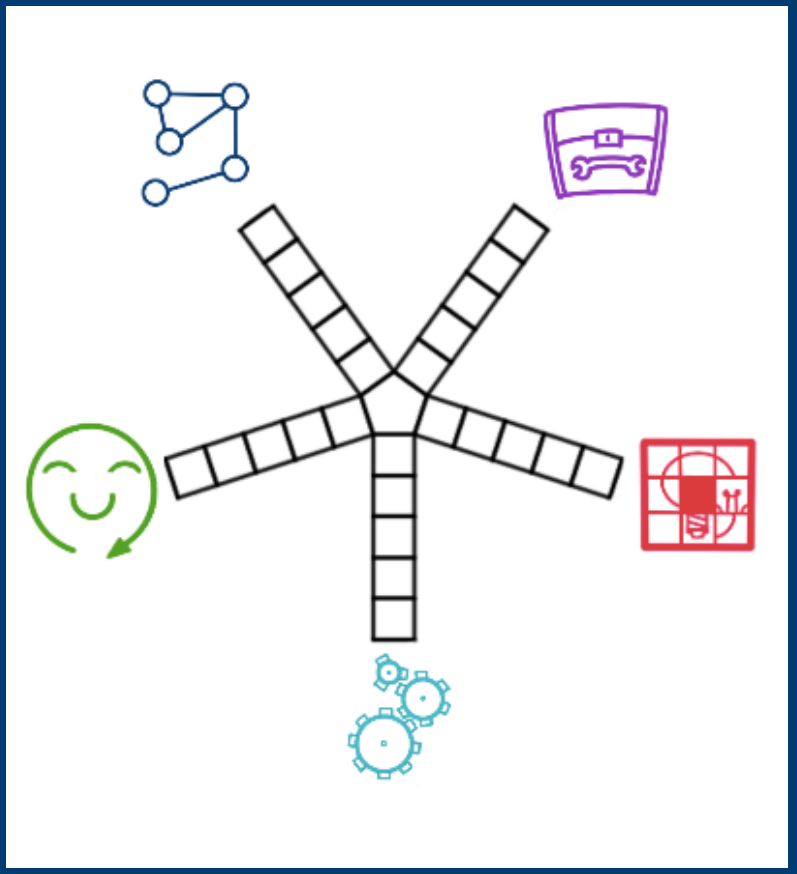


From the Particular to the General

Each of the problems in this set offers students an opportunity to explore particular numerical cases which give rise to patterns that they may be keen to explain. When they are ready, students can make generalisations, and appreciate the power of algebra to capture the generality in a concise and elegant way.

Multiple Surprises and Square Number Surprises include solutions that have previously been submitted to NRICH, so students may wish to try these problems first and then compare their own approaches with the published ones. Then they could go on to try Tilted Squares and Difference of Two Squares, which are open for them to submit their own solutions.

Multiple Surprises

Age 11 to 16 ★

Sequences of multiples keep cropping up...

Square Number Surprises

Age 14 to 16 ★★

There are unexpected discoveries to be made about square numbers...

Tilted Squares live

Age 11 to 14 ★

It's easy to work out the areas of most squares that we meet, but what if they were tilted?

Difference of Two Squares live

Age 14 to 16 ★★

What is special about the difference between squares of numbers adjacent to multiples of three?

Problem
Solution

Teachers' Resources

Secondary Curriculum Linked

Maths at Home

You may also like

Latin Numbers

Can you create a Latin Square from multiples of a six digit number?

Counting Factors

Multiple Surprises

Age 11 to 16 ★

Here are some challenges involving consecutive numbers and multiples.

Can you find **three consecutive numbers** where the first is a multiple of 2, the second is a multiple of 3 and the third is a multiple of 4?

Can you find several examples?
What do you notice?
Can you explain your findings?

What if the first is a multiple of 3, the second is a multiple of 4 and the third is a multiple of 5?

What if the first is a multiple of 4, the second is a multiple of 5, and the third is a multiple of 6?

nrich.maths.org/11173

Multiple Surprises

Can you find **three consecutive numbers** where:

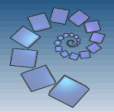
the first is a multiple of 2

the second is a multiple of 3

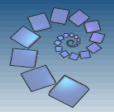
the third is a multiple of 4?

Can you find more than one set?

Feel free to post a suggestion in the chat



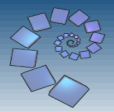
Multiple Surprises



Multiple Surprises

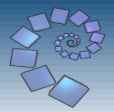
What if the first is a multiple of 3
the second is a multiple of 4
the third is a multiple of 5?

What if the first is a multiple of 4
the second is a multiple of 5
the third is a multiple of 6?



Multiple Surprises

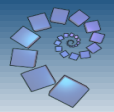
Is there a way to find sets of five consecutive numbers which are multiples of 2, 3, 4, 5 and 6 (in this order)?



Multiple Surprises

Can you use what you have discovered to help you find a few sets of ten consecutive numbers in which:

the first is a multiple of 1
the second is a multiple of 2
the third is a multiple of 3
the fourth is a multiple of 4
the fifth is a multiple of 5
the sixth is a multiple of 6
the seventh is a multiple of 7
the eighth is a multiple of 8
the ninth is a multiple of 9
the tenth is a multiple of 10?



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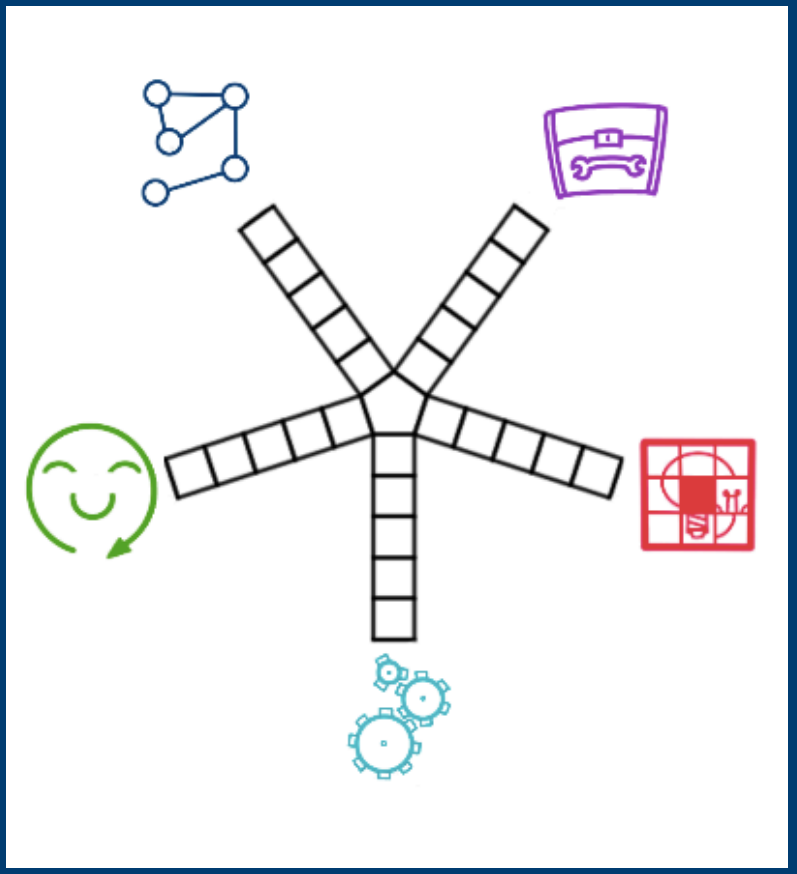

Nurturing Successful Mathematicians

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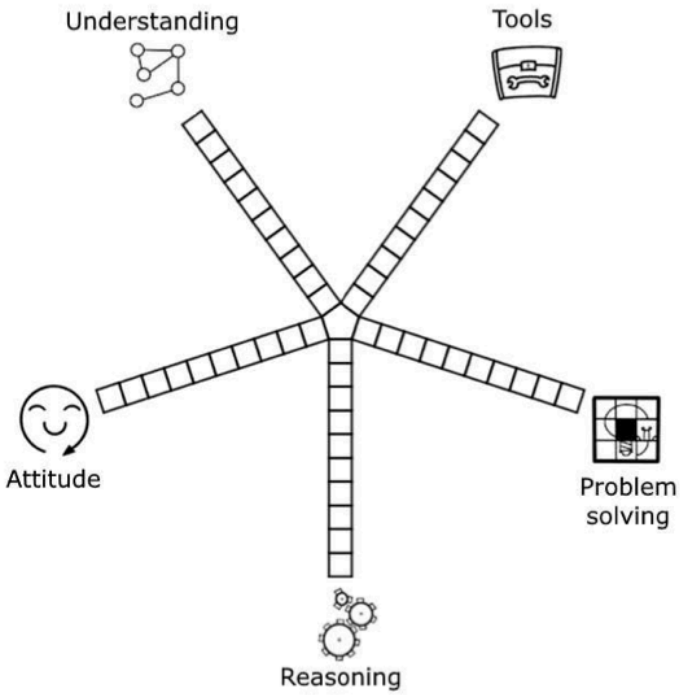
	Tools	
	Problem solving	
	Reasoning	
	Attitude	



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