Primary
& Early Years
Magazine 52

National Centre
for Excellence in the
Teaching of Mathematics

Welcome to Issue 52 of the Primary Magazine. In this issue The Art of Mathematics features the artist Johannes Vermeer. A Little Bit of History continues its series on inventions: in this issue we look at Blu-Tack. Focus on... looks at mathematics trails, and Maths to Share completes the exploration of the proposed changes to mathematics in the draft National Curriculum.

Contents

Editor's extras

NCETM Self-evaluation Tools

The NCETM is beginning to review the current Self-evaluation Tools (SET) so that they reflect the expectations of the new National Curriculum. We would like to know how and when you use the SET - please email us at info@ncetm.org.uk with **Primary Magazine Self-evaluation Tools Survey** in the title line.

National Curriculum 'Essentials'

We have recently published a new 'Essentials' page for implementing the National Curriculum. Implementing the new curriculum is a 'one-stop shop' with links to resources on the NCETM portal that will be helpful to subject leaders who are beginning to consider how to support teachers in readiness for the new programme of study.

The NCETM Professional Development Lead Support Programme

We 've confirmed a number of new dates in the summer term for the NCETM PD Lead Support Programme, a series of national free face-to-face events for CPD leads in teaching schools and improvement agents. These events are for:

- Specialist Leaders in Education (SLEs) and other colleagues from Teaching School Alliances charged with organising and running mathematics PD opportunities;
- teachers based in schools with a remit for supporting colleagues in their own and other schools such as Mathematics Specialist Teachers (MaST) and ASTs
- other teachers who are charged with organising and running mathematics PD opportunities;
- mathematics and/or numeracy advisers and consultants from Local Authority teams;
- independent mathematics consultants and organisations offering mathematics PD;
- colleagues from HE institutions offering PD.

This programme consists of four elements:

- an initial 24-hour residential development day, beginning at 17:30 on the first evening and ending at 15:30 on the second day;
- planning, execution and evaluation of an interim task based on input offered in the first residential;
- a second 24-hour residential (with timings the same as the first);
- a commitment to plan and offer future PD opportunities drawing on the input, discussions and experiences gained during the programme and to offer regular (termly) feedback regarding reach and impact for at least a year following accreditation (a re-accreditation process is offered after one year).

Colleagues completing this programme will be accredited by the NCETM to provide professional development in the priority areas of arithmetic proficiency in primary schools and algebraic proficiency in secondary schools and colleges.

Accredited PD Leads will:

- receive a certificate indicating their status as an 'NCETM Professional Development Accredited Lead';
- be entered into a directory of Accredited PD Leads which will be held on the NCETM portal;
- receive an 'NCETM Professional Development Accredited Lead' logo which can be used on any relevant documentation to signal your accreditation.

There is no cost attached to attendance at the two residentials: accommodation and meals are included, but please note that travel and supply costs if appropriate, should be met by those attending.

Colleagues who have completed the first cohorts have said about the programme:

> *'I really valued the input from experienced colleagues and the diversity of viewpoints was very refreshing.'*
>
> *'One of the main criteria for successful PD is that is stimulates new thinking – it certainly did that for me.'*
>
> *'The course is definitely impacting on my daily work.'*

If you are interested in taking part, you can find out more - including details of how to book your place – here.

Videos to support the implementation of the New Curriculum

As part of our support for the implementation of the new National Curriculum, we have produced a suite of videos focussing on calculation and the associated skills and understandings - for example, the concepts of place value and exchange. The videos seek to demonstrate how fluency and conceptual understanding can be developed in tandem. The National Curriculum aim that children should 'reason mathematically' is demonstrated throughout. Each set of videos has an accompanying presentation to stimulate thought and discussion. We hope you enjoy the videos and find them helpful in supporting teacher professional development. We'd be delighted to hear your feedback and learn how you use them, together with any comments you have.

Funding available from the NCETM Collaborative Teacher Projects programme

The NCETM is providing funding for teachers to work collaboratively, and we are currently accepting applications for Collaborative Teacher Projects (CTPs).

In Primary Schools, we are interested in projects that focus on Arithmetic Proficiency. We are especially interested in receiving applications that cover these areas:

- developing conceptual understanding and fluency in working with fractions;
- developing (pre-) algebraic understanding of arithmetic across the primary school;
- collaborative development of a calculation policy as an opportunity for teacher CPD.

We are also particularly interested in receiving applications that address continuity and progression across the KS2/KS3 boundary.

Full information - including a downloadable application form - can be found on the CTP webpage. The deadline for receipt of applications is **noon on 21 June 2013**.

And finally…

Have you seen this interview with a ten-year old mathematics prodigy? It's worth a look!

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The Art of Mathematics
Johannes Vermeer

Johannes Vermeer (also known as Jan or Johan) was born in 1632. The month of his birth is uncertain but we do know that he was baptised on 31 October during that year. He died on 15 December 1675 age 43. He was born and died in Delft in the Netherlands. His father, Reijnier Janszoon, was a silk worker who lived in Amsterdam. When he married Johannes' mother, Digna Baltus, the couple moved to Delft where they had a daughter, Geertruy and then Johannes. Around 1625 Johannes' father began dealing in painting and when he died in 1652 Johannes took over the family art business.

Vermeer memorial, Oude Kerk, Delft

He married Catharina Bolenes in April 1653. She came from a wealthy family which was of great benefit to Johannes. He was made to convert to Catholicism before the marriage probably by his mother-in-law. At some point during their marriage they moved in with Catharina's mother and this is where he lived for the rest of his life. One of the rooms in this house acted as his art studio. He and his wife had 15 children! Sadly, four died when they were very young.


Woman with a pearl necklace

Johannes was a well-known and successful artist in Delft during his lifetime, but relatively unknown elsewhere in the Netherlands and the rest of the world. It appears that he didn't make much money because when he died he left his wife and children in debt. In December 1675 he developed an inflammation of the brain, suffered with fever and delirium and, within a day and a half, he was dead.

Compared with other well-known artists Johannes produced few paintings and after he died his name went into obscurity. It stayed there until he was rediscovered by Gustav Friedrich Waagen and Théophile Thoré-Bürger. He is now considered to be one of the greatest painters of the Dutch Golden Age.

Johannes is best known for painting domestic scenes of middle class life. Much of his work appears to have been set in two small rooms in his house in Delft. They show the same furniture and decorations in different positions. They often portray the same people, mostly women. He used bright colours and sometimes the very expensive pigments lapis lazuli and natural ultramarine. He appears to have enjoyed using the colours cornflower blue and yellow and he also used the earth colours umber and ochre.

The artist David Hockney, among other historians, believes that Johannes used a *camera obscura* to achieve the very precise positioning and photographic realism he achieved in most of his work, particularly in his domestic interiors and the atmospheric light and colours he created. These speculations appeared as early as 1891 in a journal of photography. There is no proof however that these were used at the time that Johannes was alive, and therefore there is no proof that he used one.

A *camera obscura* (Latin for *dark chamber*) is a device that projects an image onto a screen. It consists of a box or a room with a hole in one side. Light from an external scene passes through the hole striking the surface inside. On this surface the scene is reproduced, upside-down, but with the colour and perspective preserved. The image can then be projected onto paper, and traced to produce an accurate representation. It was one of the inventions that led to photography and the camera.


The Allegory of Painting (or The Art of Painting)

You can find Johannes' paintings at Google Art and Essential Vermeer.

Now for some mathematical ideas for the work of Johannes Vermeer…

You could use the instructions from Spoonful and give the children the opportunity to make a camera obscura. The children could then point their camera obscura at a brightly lit scene to see if it is reproduced upside down. They could then trace what they see to produce an accurate representation of the original. You could then explore by how much the reproduced version is reduced by which would lead nicely into some work on scaling.

Show the children View of Delft

You could use this painting to start a discussion about reflection and then ask the children to draw a simple scene on the edge of a river and reflect the parts closest to it as in the painting.

You could experiment mixing white and black paint. What ratio is needed of each colour to achieve the shade used for the darker clouds in Johannes painting?

Show the children Girl with a Pearl Earring

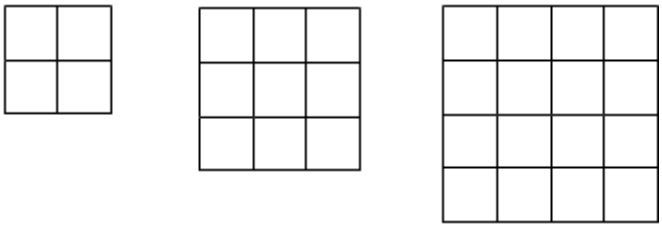
Can the children estimate how many squares there are on the floor including those that are hidden under the cello and table? Discuss ways to work this out.

The children could investigate what musical instrument she is playing (virginal: keyboard instrument of the harpsichord family). What shape would it be if the lid was down? The children could make cuboids from card with a lid that will open and a side that can come down. They could then draw the keyboard of the virginal and stick it inside. The instrument has four octaves, if an octave has eight white keys, how many white keys will there be altogether? They could investigate the ratio and proportion of black keys to white.

Show the children The Little Street

This painting gives plenty of opportunity to focus on counting, arrays and 2D shape. What shapes can the children see? How many small squares of glass can they see in the larger windows? Expect them to use multiplication to answer this, point out the array they make. They could draw their own window and

divide it into small squares and then work out the number of small squares there are. For a challenge they could work out how many squares there are altogether. Before doing this they could try finding the number of squares altogether in these:



There are five in the 2 x 2 square: four small, one large
There are 14 in the 3 x 3 square: nine small, four 2 x 2, one large
There are 30 in the 4 x 4 square: 16 small, nine 2 x 2 four 3 x 3, one large

Can the children see a pattern emerging? Can they explain it to you? Once they can ask them to use the pattern to work out how many small squares there are in their window and then one of those in the painting.

You could explore the symmetry of the house. Give children a copy of the painting and ask them to cut the house out. They stick it on paper and then draw the missing part making sure that they finish with a symmetrical house. Some children might find this easier to do on squared paper. They could then cut this out and use it to make reflections, rotations or translations as suggested in the art of Picasso from Issue 10 of the Primary Magazine.

The ideas here are just to give you a taster of the mathematical activities that could be involved when looking at artists such as Johannes Vermeer. We know you can think of plenty of others! If you try out any of these ideas or those of your own, please share them with us!

Explore further!
If you've enjoyed this article, don't forget you can find all the other *Art of Mathematics* features in the archive, sorted into categories: *Artists*, *Artistic styles*, and *Artistic techniques*.

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Focus on…
Mathematics trails

In this issue of *Focus on...* we share the mathematics trail designed by two students at Kingston University, Louisa Johnson and Olivia Moorhouse.

Louisa and Olivia are mathematics specialists in their second year at university. They say:

> *'Despite having some negative experiences of maths when we were at primary school, it is now one of our favourite subjects. No matter where we look, maths is there and so as maths teachers we think it is really important for children to comprehend and enjoy their maths learning, fully engage with the subject and feel confident in their mathematical capabilities. As a result we aim to make each of our maths lessons interactive and motivating, emphasising that maths is fun and inspiring children's confidence and creativity.'*

Their trail takes us around Legoland. The ideas here can be reproduced for most theme parks around the country. So if you are planning a trip to one, use some of their ideas, we are sure they would be delighted. If you do please let us know how you get on.

Of course there is always plenty of mathematics involved in planning a trip to such a place, for example:

- using calendars to plan the date
- working out the cost
- finding a suitable route and working out how long it will take in a coach travelling at an average speed of 50mph
- finding a coach of a suitable capacity
- working out what time to leave school to get there for 9am and what time you will return.

Back to the mathematics trail…

Every activity outlined in this trail meets one or more of the aspects of the Mathematics National Curriculum and can be adapted to suit both Key Stage One and Key Stage Two. This includes:

- addition, subtraction, multiplication and division
- calculating heights, widths and lengths
- area and perimeter
- handling money
- creating tally charts and other similar graphs
- estimating
- map skills, including compass points and directional and positional language
- recognising shapes and patterns.

Problem Solving is also a large component of the trail, with each activity containing an element of this. In turn, children would be encouraged to work actively to discover solutions for themselves, work independently of the teacher and with confidence and make connections between different aspects of their mathematical learning. This trail also puts mathematics into context and allows children to recognise that maths is incorporated into numerous aspects of everyday life and can be fun.

Have fun exploring the mathematical possibilities of Legoland!

Explore further!
If you've enjoyed this article, don't forget you can find all previous *Focus on...* features in our archive.

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A little bit of history – Blu-Tack

In this issue of the Primary Magazine we are continuing our short series of articles on inventions. We are looking one of the teacher's most coveted resources - Blu-Tack…

Blu-Tack has been used in the home, school and office by people all over the world since the 1970s. It is so well known that it's become an icon in Australia and the United Kingdom!

A few facts about Blu-Tack…

It seems that, as with the Post-it Note featured in Issue 51, the birth of Blu-Tack was somewhat of a mistake as well! In 1970, a laboratory researcher called Alan Holloway was working on a sealant for Palli Bondite in Waterlooville, when he produced a substance that was useless as a sealant but was very pliable and semi-elastic. It was initially thought of as a novelty product and was demonstrated to visitors by the Ralli Bondite management as a way of mounting notices on the wall. There was very little interest as few people could see its potential. After research into this product, Bostik launched the first Blu-Tack in 1973. It was originally white but due to concerns that children might mistake it for edible sweets the colour was changed to blue.


Blu-Tack

It will be Blu-Tack's 40th birthday this year and the Bostick factory in Leicester plans to celebrate with a day in June when staff will be wearing 1970s clothes and an exhibition about the early days of Blu-Tack will be unveiled.

The factory produces 100 tonnes of Blu-Tack, which is made from chalk, oil and other chemicals, every week. 90% of the market is British. The other ten per cent produced is exported to Africa, Australia and the Far East.

In the UK in March 2008, Blu-Tack changed colour for the first time to pink. This was to help raise money for Breast Cancer Campaign. 20 000 numbered packs were made and ten per cent from each pack went to the charity. Since then many coloured variations have been made including green for a Halloween pack and also white.

Blu-Tack is widely available around the world but often under a different name. For example in Canada it is known as *Zrokai*, in South Africa *Prestik* or *Sticky Stuff*, and in Iceland it is known as *'kennaratyggjo'* which means *'teacher's chewing gum'*!

Other companies now produce similar products.

Did you know…?

In 2012 teachers at a Scottish primary school were banned from using Blu-Tack after being told it 'might explode' if it comes into contact with glass! It was proved that this was a myth.

Blu-Tack has been used for sculpture! In 2007 artist Elizabeth Thompson created a 200 kilogram sculpture of a house spider using Blu-Tack over a wire frame. It took around 4 000 packs and was exhibited at London Zoo. Other artists have created works from the material including stop-motion animation.

Information from:
Blu-Tack

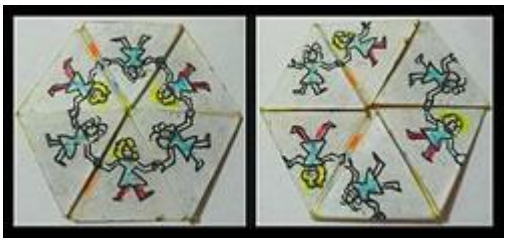
And now for some mathematics…


Here's Jerry

Why not ask the children to make some Blu-Tack sculptures? There are some lovely examples that you could share with the children on the Blu-Tack website. You could make 3D shape a focus of their sculptures. This could involve exploring the shapes first discussing their properties in terms of number of faces, edges and vertices, the shape of their faces and the number of lines of symmetry they have. Alternatively, you could ask them to make anything as long as it is symmetrical.

Apparently Blu-Tack can also be used to pick up and transfer images from printed cartoons. You could find out if this is true by asking the children to make a transfer from comics or newspapers and then ask them to make repeated patterns or pictures which involve translation or rotation of reflection.

While investigating mathematical things to do with Blu-Tack we came across Flexagons. Really, the only relevance to Blu-Tack is that you need it - or glue or staples - to attach parts of the flexagon together. But, hey, they look great fun for a shape lesson! Why not try the triflexagons with your children or be ambitious and have a go at a hexaflaxagon? Let us know how you get on and if you have any results please let us know - we would love to publish your photos!


Hexahexaflexagon – two sides

You could try the experiment from Planet Science which links mathematics to science and PSHE. The challenge the children are given is to build a 30cm tall spaghetti tower using only spaghetti and Blu-Tack. The tower should be able to support at least one glass marble at least 20cm up the tower. If you try this, it would be great to see some photos!

You could ask the children to investigate the other companies, in this country and worldwide, that produce similar products to Blu-Tack and compare their prices. This could involve currency conversion. You could locate them on a map of the world and find out how far they are from the Bostik factory in Leicester.

You could locate the countries that Bostik sell to on a map and ask the children to make mathematical fact files about them. These could include temperature, rainfall, highest point and lowest point (both in metric and imperial) and population. How many miles away are they from your school?

There are various percentages and numbers in the main part of the article that you could explore in whatever way is appropriate to your children.

If there is any area of history that you would like us to make mathematical links to, please let us know.

Explore further!

If you've enjoyed this article, don't forget you can find all previous A little bit of history features in our archive, sorted into categories: *Ancient Number Systems*, *History of our measurements*, *Famous mathematicians*, and *Topical history*.

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Maths to share – CPD for your school

The Primary National Curriculum for Mathematics

In *Maths to share* we have the final article in our series on the changes to mathematics in the proposed draft of the National Curriculum. In Issues 50 and 51 we looked at the changes for KS1 and lower KS2 respectively. In this issue we explore some of the key changes for upper KS2. We are comparing the proposed National Curriculum with the expectations from the Primary Strategy framework as many schools are familiar with this and some still use this for guidance on what mathematics to teach. It would be a good idea to copy the mathematics-related objectives for Years 5 and 6 for colleagues to examine in detail. You could use the information below about the changes to stimulate discussion and work out the implications in the teaching of mathematics at your school. It would be a good idea to involve all staff in any discussions as teachers in KS1 and lower KS2 need to be aware of what the children will be learning.

It must be emphasised that this document is a draft, and what is written here is purely to promote discussion.

It is worth reminding colleagues that the National Curriculum for mathematics aims to ensure all pupils:

- become **fluent** in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils have conceptual understanding and are able to recall and apply their knowledge rapidly and accurately to problems
- **reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- can **solve problems** by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

If you haven't done so already, share these aims with colleagues. What do they think of them? Hopefully they will think these are really sound and form a good basis for what we would wish for the children we teach. How does the teaching and learning in your school currently measure up to these aims?

Probability has been removed from the Primary Curriculum. How do colleagues feel about this?

Some of the key changes in Year 5

- it is expected that children will be able to count in steps of powers of 10 of any number, read, write, order numbers to 1 000 000
- children are expected to read Roman numerals to 1 000 and recognise years written using them
- there are higher expectations with prime numbers and factors, including prime factors
- children will need to recognise cube numbers have been introduced
- the children are expected to solve problems with numbers up to three decimal places
- the children are expected to be able to add and subtract fractions with the same denominator and related fractions
- they need to multiply proper fractions and mixed number fractions by whole numbers
- standard written methods are specified for all four operations when working with numbers that have more than four digits, informal methods are not given as an option
- they are expected to be able to estimate and calculate volume.

Ask colleagues to pick out the changes listed that most concern them. Are these common to all?

Do they think their Year 5 children have a secure enough understanding of place value to be able to confidently count or read numbers to one million? If not, what do they think they need to put in place in order to help them do this?

As a staff you could try this digit card activity which is helpful for practising making and reading large numbers and identifying their place value:

- make 34, now 234, now 2 348, 23 487, 123 487, 9 123 487
- ask them to show the cards that show how many hundreds there are, tens, millions, thousands, tens of thousands
- swap the digits in the number and ask whether the number is now bigger or smaller and by roughly how much: 9 123 487, swap the 1 and 8, the number is bigger by roughly 700 thousand.

You could also give copies of Gattegno's place value grids to nine million. You may need to photocopy it onto A3 paper. Ask staff to pick a number from each row and build a millions number. Ask questions such as 'make it ten thousand bigger and three thousand smaller what is the new number?'

Do staff think that activities like these might help their children reinforce their grasp of place value in order to count or read numbers to one million? What other ideas do colleagues have? It would be worth making a list of ideas that may, for example, make good starter activities which can be practised regularly in mathematics lessons.

How do colleagues feel about the requirement to use the standard written method for all the operations for numbers with more than four digits in both Years 5 and 6? Do they think this is meant for every set of numbers or are there exceptions? You could ask staff to make up some five digit calculations which they think should be answered using a standard method and some that they think could be answered mentally, for example, 21 346 +/- 19 999.

You might find it helpful to watch the upper Key Stage 2 video clip which shows children moving from the grid method to the standard column method from the new suite of NCETM videos. There is a helpful PowerPoint which shows the progression that you might like to share with colleagues.

What do colleagues think of teaching the children to write Roman numerals to 1 000 and to recognise years written in them? You might like to refer back to the last issue of Maths to share, where there was an activity for converting our numbers to Roman numerals and vice versa. If you haven't worked through it, it might be worth using the information given in order for colleagues to practice by making up some dates, for example 2013. It might also be worth Year 5 colleagues giving it to their children as an investigation and see how they get on.

There are Roman numeral convertors which are fun to explore, like the one on The Calculator Site. Can colleagues think of ways that something like this would be helpful to use with their children?

As there is likely to be a requirement to teach prime numbers, factors and square and cube numbers, it might be helpful to explore with all staff what these are. You could give them each a 100 square and ask them to shade all the prime numbers and ask them what they notice, for example, the prime numbers are either one or more less than a multiple of six unless there is a multiple of five, e.g. 35. See The Prime Pages for proof.

You could give colleagues Factors and Multiples Puzzle, a challenging sorting activity from NRICH, and discuss ways an activity like this can be developed as an investigation on squared, cubed and prime numbers and factors.

What do colleagues think of the expectations for fractions? Do they think that addition and subtraction of fractions with the same denominator and related fractions is manageable if the children are taught the related objectives for the years before Year 5?

Discuss how multiplication of proper fractions and mixed number fractions by whole numbers can be achieved. What prior knowledge do the children need in order to do this? Do the children have the misconception that multiplying a number always gives an answer that is the same or bigger? It might be worth linking halving numbers to multiplication and fractions: if you halve 24 you are actually multiplying 24 by $^1/_2$ which gives a smaller number as the answer. You could also do this for other fractions that the children are familiar with, for example finding $^1/_4$ of 32 or multiplying 32 by $^1/_4$.

What do colleagues think of the introduction of estimating and calculating volume? Volume is to be introduced to children in Year 1. This will mean that there will be a clearer definition of this and capacity early in the Primary school. Will this mean that estimating and calculating should be straight forward?

Some key changes in Year 6

- standard written methods are expected to be used for all four operations
- children are expected to be able to multiply and divide simple fractions
- there is explicit mention of using algebra, for example expressing missing number sentences algebraically
- they need to find the area of parallelograms
- the children need to know the names for different parts of a circle including radius, diameter and circumference
- they need to begin to construct pie charts.

Discuss the changes listed in the Year 6 curriculum. Ask colleagues to pick out those that most concern them.

What do colleagues think about teaching their children to multiply and divide fractions? Consider what they will have done in Year 5, should this make multiplying them easier?

Have colleagues thought about arrays to teach this? You could talk through this idea:

$^1/_2 \times {}^1/_4$

Draw a rectangle:

Divide it in half horizontally and shade one half:

Now divide the rectangle (or each half) into quarters vertically, so making an array:

$^1/_4$ of $^1/_2$ is $^1/_8$

This is the example given in the statutory requirements of the draft. You might find it beneficial to do this with other fractions, for example $^1/_2 \times {}^2/_3$:

Shade one half, then the rectangle (and so each half) into thirds:

$^2/_3$ of the $^1/_2$ is $^2/_6$ or $^1/_3$

Can colleagues see how this works? Can they see the link between this and the 'rule' of multiplying the two numerators and then the two denominators? How could they explain this to the children? Is this a visual representation that they might use with those that are at the stage where they are ready to multiply fractions?

Do children have the misconception that, unless dividing by one, dividing numbers results in a smaller number answer? You could consider beginning division of fractions with the children by asking 'How many halves are there in one? How many in two? What about three?...'and so on. Dividing by fractions and whole numbers is the same concept: how many of the divisor goes into the number?

Do colleagues understand what 'algebra' means? What do colleagues think about the expectation that algebra is used? As a group, reflect on current practice by tracking back in year groups to where missing number sentences begin. This will probably be Year 1. How does this type of work relate to algebra? Are squares that are substitutes for numbers really unknowns? Then is this an example of early algebra? Discuss activities that colleagues already do with their classes that can be classed as algebra. You might be interested in asking colleagues to read When Letters are Numbers by Jenny Murray on the NRICH website. There are links within the article to activities for KS1 and KS2 to try and explore their suitability for the children in your class.

Do colleagues believe that their children would be able to meet the expectations mentioned for parallelograms and circles? Do they consider these raise expectations and provide a greater scope within which to work?

Ask colleagues how they would find the area of a parallelogram. You could suggest that they draw one, cut it out and then make a rectangle by cutting off one of the 'triangles' at each end. They then use the formula for the area of a rectangle to find the area of the parallelogram. This is the sort of investigation that most children in Year 6 could do and would find enjoyable

Do colleagues think that Year 6 children could draw pie charts? Discuss where the children will have seen them in real life, for example food packaging. The guidance suggests that children 'connect their work on angles, fractions and percentages to the interpretation of pie charts.' Can colleagues suggest how this should be done? Do they think that the children could construct them using the same connections?

We hope that this has been helpful in possibly allaying some of the fears that might be present in implementing the new National Curriculum in upper KS2!

Explore further!
If you've enjoyed this article, don't forget you can find all previous *Maths to share* features in our archive, sorted into categories, including *Calculation*, *Exploring reports and research*, and *Pedagogy*.