Primary & Early Years Magazine 49

National Centre for Excellence in the Teaching of Mathematics

Welcome to Issue 49 of the Primary Magazine. In this issue we feature the English artist L S Lowry. A little bit of history looks begins a series on inventions, starting with the television. Focus on... looks at the adventures of Sir Ranulph Fiennes, and Maths to share explores the research of Alison Borthwick and Micky Harcourt-Heath.

Contents

Editor's extras

The latest draft of the National Curriculum was released on 8 February. Have you read the expectations for mathematics? If not, it is important that you do and make your views heard. The Department for Education (DfE) is currently holding a consultation and ministers are willing to listen to any comments you would like to make. This consultation period ends on 16 April. There is also an opportunity to discuss this in the Primary Forum.

The government's Advisory Committee on Mathematics Education (ACME) has recently published an open call for new committee members. You can find out more from our news item or from ACME's website.

A reminder of some events happening this term...

The NCETM Professional Lead Development Support Programme

We have added some new dates in the summer term for the 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.

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

Conferences

And finally...the penultimate reminder for the conference season!

- you may just have time to book for the NAMA conference, Mathematics Learning – Nature or Nurture, which will be held from 14 - 16 March at Aston University, Birmingham. Colleagues are invited to attend all or part of this great CPD opportunity. For full details of this conference, please visit NAMA's website;
- the MA's Annual Conference, Telling the Great Stories of Mathematics, runs from 3 - 5 April at Loughborough University. The speakers are Rachael Horsman, Marcus du Sautoy, David Spiegelhalter and Art Benjamin. For details of how to book, visit their website;
- the ATM annual conference, Maths for Real, will take place in Sheffield from 2 - 5 April. As always there will be a wide range of sessions available, evening activities and, of course the ATM Workshop. To find out more, visit their website.

The Art of Mathematics
Laurence Stephen ('L S') Lowry

Laurence Stephen Lowry was born on 1 November 1887 in Old Trafford, Stretford, Lancashire. He is famous for his drawings and paintings of industrial landscapes of the north of England. His pictures are predominantly of coal mines, factories and terraced houses with crowds of simple dark figures surrounded by grey buildings and industrial fog. The figures he drew are often referred to as 'matchstick men'. His paintings mostly featured scenes in Pendlebury, where he lived and worked for over 40 years, and also Salford, both towns are near Manchester. He also painted unpopulated landscapes, portraits, and the 'marionette' works, which were only found after his death. At first he was referred to as a 'Sunday painter' because of his figures and the lack of weather effects in many of his landscapes. They were considered naïve. This has proved not to be the case any longer, as his work is displayed in many well-known art galleries around the world, and when sold they fetch a lot of money. A large collection of his work is on permanent display in a purpose-built art gallery and theatre complex in Salford called The Lowry which opened in 2000.

The Lowry, Salford

Lowry had a difficult start to his life. His mother, Elizabeth, wanted a girl and found it difficult to accept him. She was said to be very envious of her sister Mary, who had 'three splendid daughters' instead of one 'clumsy boy'. She was a teacher and a talented musician with aspirations of becoming a concert pianist, but after Lowry's birth she became ill and these aspirations were never met. She also had to give up work. By all accounts she was an irritable and nervous woman who had been brought up by her stern father to expect high standards. Like him, she was controlling and intolerant of failure. She dominated both her husband and her son. Lowry said in interviews later in his life, that he had 'an unhappy childhood, growing up in a repressive family atmosphere'.

His father, Robert, was an estate agent with the Jacob Earnshaw and Son Property Company. He was affectionate towards Lowry, but was a quiet, withdrawn and introverted man who had little to do with the raising of his son.

Much of Lowry's early years were spent in the leafy Manchester suburb of Victoria Park, Rusholme, but due to financial pressure in 1909 the family had to move to the industrial town of Pendlebury; here was surrounded by textile mills and factory chimneys, instead of the trees he had been used to.

Lowry later said of Pendlebury: 'At first I detested it, and then, after years I got pretty interested in it, then obsessed by it...One day I missed a train from Pendlebury, a place I had ignored for seven years and as I left the station I saw the Acme Spinning Company's mill...The huge black framework of rows of yellow-lit

windows standing up against the sad, damp charged afternoon sky. The mill was turning out...I watched this scene, which I'd looked at many times without seeing, with rapture...'

Lowry had few friends when he was at school and wasn't a high academic achiever. After leaving education he worked full-time as a clerk at the Pall Mall Property Company in Manchester. He stayed there until he retired at 65. He even worked for them when he was one of the most successful and popular painters in Britain. Between 1905 and 1925 he had private painting lessons and studied intermittently at the Manchester School of Art, under the French Impressionist artist, Pierre Adolphe Valette, and then the Royal Technical College, Salford, now the University of Salford. It was during this time that Lowry developed an interest in industrial landscapes and began to establish his style.

His father died in 1932 leaving the family in debt, and his mother became bedridden and dependent on Lowry for her care. This meant that Lowry could only paint after she had gone to bed between the hours of 10pm and 2am. She died in October 1939. When she died he became depressed and over time neglected the upkeep of his house. Things got so bad that the landlord repossessed it. Lowry had, by then, earned enough money to buy himself the house in which he lived until his death 30 years later on 23 February 1976.

He worked on his paintings steadily for many years and finally became a popular success in his sixties. His success began to grow following his first London exhibition in 1939, but the importance of his work was underrated until the mid-1960s.

During the Second World War Lowry served as a volunteer fire watcher and became an official war artist in 1943.

In 1953 he was appointed Official Artist at the coronation of Queen Elizabeth II.

Lowry rejected five honours during his life - including a knighthood in 1968 and holds the record for the most rejected British honours! He was also an ardent supporter of Manchester City Football Club.

Lowry died of pneumonia. He did not marry and had no children, so he left his estate valued at £298 459, and a considerable number of artworks by himself and others to Carol Ann Lowry who, in 2001, obtained trademark protection of the artist's signature. In 1957 Carol Ann was an unrelated 13-year-old schoolgirl who wrote to him asking for his advice on becoming an artist. He visited her home in Heywood and befriended the family. His friendship with her lasted for the rest of his life.

Information from:

- Tate
- Wikipedia.

Mathematical ideas for the work of Lowry

The Lowry and the BBC's Your Paintings websites have collections of Lowry paintings that you can use to develop mathematical ideas.

You might like to play the short BBC film clip Discover L S Lowry's Britain at Play by stepping inside the painting. In this film they describe Lowry's painting and tell the children that he used to paint using brushes, cloth, his fingertips and nails. You could explore the idea of painting lines using the different tools he used. Once the children have made their lines, they could cut them out and order them from

thinnest to widest. They could measure their widths in centimetres and millimetres to confirm that they were correct.

In the film they talk about the fact that he used only five colours: yellow ochre, red vermillion, blue Prussian, flake white and ivory black. You could have a paint mixing session. Red, yellow and blue are primary colours. How many other colours can the children make by mixing these? They could use the black and white to make lighter or darker shades. Turn these activities into opportunities to practice ratio and proportion e.g. if they use one blob of red and two blobs of white the ratio would be one red for every two white (1:2). The proportion of red would be 1/3 and white 2/3.

Show Britain at Play

Ask the children to describe what they think is happening in the picture. Agree that, because of the painting's title, it is probably something to do with how people spent their free time. Together estimate the number of people that they can see and discuss why it is impossible to be exact. Do they think there are tens of people or hundreds or thousands?

Ask the children to tell you what they think the items on the land behind the houses could be, e.g. swings, bandstand. Compare this to the parks that children visit today. How many of them have playground areas? Together make a list of the things that they play on. You could ask them for their favourite and make a tally. You could then ask them to display this information as a bar graph, pictogram or pie chart. Ask them who might find this information useful, e.g. a playground supplier to plan ahead for equipment they might construct, a local council if wanting to build a new children's playground.

They could work in pairs or small groups to create their own playground. Give them pictures and the measurements of different pieces of apparatus, e.g. see-saw: length 3.7m, width 0.4m, sandpit: length 3.5m, width 2.5m, obstacle course: length 4.8m, width 3m, height 2.2m, geodrome: diameter 6m. They need to plan their design and make a drawing to show where the items will be placed. They could do a bird's eye view, by scaling the measurements down, drawing the appropriate shapes (rectangles and circles), cutting them out and sticking them on A4 paper. They could then make a model, using measurements two or three times the size of their scaled down ones, out of art straws and card.

Show A Street Scene (St Simon's Church)

The children could estimate the number of people that they can see in this painting and check their estimate by counting. Encourage them to consider efficient ways to count other than counting in ones, e.g. in twos, adding small groups of people.

Focus on the church and discuss the shapes that can be seen and the symmetry. Ask the children to make a copy of the front of it, making it symmetrical.

You could ask the children to make a church using construction equipment or boxes. Which shapes would they use for the main part? What about the tower? Older children could make shapes, such as cubes, cuboids, triangular prisms, tetrahedrons to use to build their church. This would give the opportunity to explore nets of shapes.

For more ideas, you might be interested in looking at the microsite Learning Maths Outside the Classroom, which features places of worship.

Show A River Bank

Ask them to describe what they can see in this painting. You could give pairs of children copies of this painting and ask them to estimate and then count the numbers of boats, towers and buildings. You could then ask them to draw some of the buildings that show symmetry and to mark on the lines of symmetry.

They could make a model scene like this, creating the buildings from card. Encourage them to explore the 3D shapes that would be best to use and then make these from nets that they work out for themselves, e.g. cuboid and triangular prism for some of the buildings, cylinders for the chimneys. What shapes would they need to make for the boats? This type of activity would include careful measuring as well as work on 3D shape.

Show An Old Street

Ask the children what mathematics they can see in the picture. Encourage them to consider shape, arrays (in the window), angles, perpendicular and parallel lines, number, for example, of people, buildings, windows, chimneys, buckets, bricks in the wall at the front of the picture. Take some of these ideas and explore them further. The children could make up a street scene of their own ensuring that is has the same number of buildings and people, windows that show arrays etc.

Show the painting Ann

What do they notice about Ann? Lowry has made her face and body symmetrical. The children could draw and colour, using the same colours as Lowry, a portrait of a friend. They draw half of their friend's face and shoulders and then make the other half a symmetrical copy of the first. They could do this for other things such as animal and flowers.

Show Lowry's still life Chinese Lantern and Oranges

Ask them to look carefully at the picture and to tell you the 2D shapes that they can see in it, e.g. circle, ellipse. They could create their own simple 'still life' out of a few items from around the classroom. Once they have, they look carefully at the 2D shapes they can see in their design and then draw it using these 2D shapes.

Show Coming Out of School

Explore the shapes that can be seen in the buildings. The children could practice estimating and counting efficiently. How many rectangles are there? They could count the people, buildings and windows.

Give them copies of the painting and ask them to choose two or three of the children that are in different poses. They measure their heights, legs, arms and recreate the children to these measurements, making sure the feet, the length from knee to ankle etc. are in proportion to Lowry's. Once they have done this they could scale their drawings up to make larger ones. They could then, as a class create a school scene like this and add their children.

The ideas here are just to give you a taster of the mathematical activities that could be involved when looking at artists such as Lowry. 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!

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The Lowry, Salford by Bernt Rostad, some rights reserved

Focus on…
Sir Ranulph Fiennes and *The Coldest Journey*

As you may know, Sir Ranulph Fiennes has had to pull out of the expedition to Antarctica, The Coldest Journey, *due to frostbite. However, the expedition is still continuing, so this article is still a good starting point for exploring the maths behind expedition - and, of course, Antarctica, a land of snow and ice, freezing blizzards and -70° temperatures.*

Sir Ranulph Fiennes

On 6 December last year Sir Ranulph Fiennes began his latest adventure - a six month expedition on foot across Antarctica during its winter. This has become known as *The Coldest Journey*. He will cross terrain where temperatures can be as low as -90°C! Most people probably think that spending six months walking around in sub-zero temperatures is a totally mad thing to do. On a training session close to the Arctic Circle, Sir Ranulph, a pensioner of 68, said 'We do it because we like to break world records. Sometimes we don't succeed, but it's what we go for. It's our speciality'.

He also reportedly said 'We looked at this 25 years ago and realised it was impossible…we heard a rumour that Norwegian explorers were contemplating this. We realised we were going to have to have a go'.

This expedition is the latest of many of his amazing record attempts. Guinness World Records describes him as the world's greatest living explorer.

A little about this great explorer

Sir Ranulph Fiennes was born on 7 March 1944 in Windsor, Berkshire shortly after the death of his father, Lieutenant-Colonel Sir Ranulph Twisleton-Wykeham-Fiennes. His father was a baronet and Sir Ranulph inherited this title when he was born, becoming the 3rd Baronet of Banbury. He is the third cousin of actors Joseph and Ralph Fiennes and a distant cousin to the Royal Family.

After the Second World War his mother, Audrey Joan Fiennes, moved the family to South Africa, where Sir Ranulph lived until he was 12 years old. At 12 he came back to the UK to be educated at Sandroyd School, Wiltshire, followed by Eton. After finishing his education at Eton he joined the army.

Sir Ranulph has been an adventurer since the 1960s. Here are some of the things that he has done:

- 1969: he led an expedition up the Nile on a hovercraft
- 1970: he led an expedition on Norway's Jostedalsbreen Glacier, again on a hovercraft
- 1979-1982: he and two friends went on the Transglobe Expedition, this was the first journey around the world ever made crossing through the North and South Poles and also the Antarctic and Arctic Oceans.
- 1990: he set the world record for unsupported northerly polar travel
- 1991: he led an expedition that discovered the lost city of Ubar on the Yemeni border
- 1992-93: he made the first unaided crossing of the Antarctic continent
- 2000: he attempted to walk solo and unsupported to the North Pole. On this trip his sleds fell through weak ice and he had to pull them out by hand. He sustained severe frostbite and had to abandon the trip. On returning home, his surgeon insisted he kept the finger tips for several

months before amputation, to allow regrowth of the remaining healthy tissue. He was in too much pain to do this, so he amputated them himself!

- 2003: he ran seven marathons on seven continents in seven days - after suffering a heart attack a few months earlier
    - 26 October – Race 1: Patagonia (South America)
    - 27 October – Race 2: Falkland Islands ('Antarctica')
    - 28 October – Race 3: Sydney (Australasia)
    - 29 October – Race 4: Singapore (Asia)
    - 30 October – Race 5: London (Europe)
    - 31 October – Race 6: Cairo (Africa)
    - 1 November – Race 7: New York (North America).
- 2009: he became the oldest Briton to reach the summit of Mount Everest, aged 65.

Time for a mathematical-idea break!

You could ask the children to make a time line of Sir Ranulph's adventures.

The children could explore each of the expeditions highlighting possible routes on a map and then working out the distance he travelled during each one. They could then look these up on the internet and compare with the actual routes.

You could ask the children to make up a mathematical fact-file about each of the countries he visited. These could include such things as monthly temperature and rainfall, population, currency, time zones. The children could display this information using a representation of their choice – this would be an ideal opportunity to rehearse different charts and graphs. Once all these facts are represented the countries could be compared. They could order them according to number of people living in them, from coldest to hottest December temperatures and so on.

The children could explore the coldest places on earth and find the range of temperatures in them. You could follow some of the ideas in The polar regions from Issue 30 of the Primary Magazine.


Antarctic view (Admiralty Bay)

The children could work out the logistics involved in getting to the seven marathons in the seven continents! They could use the internet to explore flight times and find some that would enable this to be possible. Once they have, they could make up a timetable to show - for example, arrival time necessary at airport (two to three hours before take-off), departure and subsequent arrival of plane, time to get to the race. They could also find the length of a marathon, the average speed of a marathon runner and then figure out roughly how long it would have taken Sir Ranulph to complete each one…and add this to their timetable.

They could look in more detail at the different expeditions and draw out the mathematical facts. For example:

As part of the Transglobe Expedition, Sir Ranulph and one of his colleagues travelled through the Northwest Passage. This is a sea route through the Arctic Ocean. They left Tuktoyaktuk on 26 July 1981, in an 18ft open whaling boat and reached Tanquary Fiord on 31 August 1981. This was the first open boat transit from West to East. It covered around 3 000 miles (2 600 nautical miles or 4 800 km) taking a

route through Dolphin and Union Strait following the south coast of Victoria Island and King William Island, north to Resolute Bay via Franklin Strait and Peel Sound, around the south and east coasts of Devon Island, through Hell Gate and across Norwegian Bay to Eureka, Greely Bay and the head of Tanquary Fiord. Once they reached Tanquary Fiord, they had to trek 150 miles via Lake Hazen to Alert before setting up their winter base camp.

The children could:

- work out the distance of the boat trip
- look for the places mentioned on a map and plot the route taken
- find how long the whaling boat is in metres and centimetres and draw a scaled down version of what they think it might have looked like.
- explore the equivalences between miles, nautical miles and kilometres
- find the average temperature for this area in July and August and compare with those for your area of the UK.

Back to *The Coldest Journey…*

Sir Ranulph and his team (totalling six) are doing this remarkable trek with the aims of

- raising $10 million for the charity Seeing is Believing with matched funding from the bank Standard Chartered
- providing important scientific data, for example:
  - on the sea voyage to the Antarctic coast they will carry out tasks to provide data on marine life, oceanography and meteorology
  - while crossing Antarctica they will help scientists who are compiling data on changes to the ice shelf and the effect of climate change on both Poles
- form the basis of an education programme.

This is a very dangerous trip, it is said to be an impossible expedition. A hundred years ago on the same ice shelf, Captain Scott died on his polar expedition as he was caught out by the start of the southern winter. So planning, organising and training are crucial and these have taken years.


moonrise over Antarctica

Sir Ranulph and his team set off on 6 December 2012 on the SA Agulhas from London, on what is the world's first ever attempt to cross the Antarctic in winter. The team will be dropped off from the ship on the Pacific coast of the continent and wait for the equinox on 21 March 2013 (beginning of winter) before setting off over the ice shelf. They will climb 10 000ft on to the inland plateau, and head onwards to the South Pole. After that, they will travel several hundred miles before dropping 11 000ft back on to the ice shelf, and finally reach the Ross Sea. They hope to have finished their journey by 21 September.

They estimate that they will travel a total of 4 823km and that it will take 145 days, 109 of these will be skiing and 36 resting and planning for unexpected outcomes. They will expect blizzards, darkness and 'white-outs'. Frostbite will inevitably be a problem. At -40°C during the Swedish training, the fingers of one team member simply froze up after exposure to the cold for too long.

Expedition advisor Dr Mike Stroud said: 'It is as extreme as you can possibly get...Your lungs definitely suffer. The air going in is so cold it's going to freeze some of the moisture that's in that system'.

However, as well as your own ideas, Sir Ranulph and his colleagues have set up a website, The Coldest Journey, dedicated to this expedition which might give you more inspiration. The website has a map of the route, details of what they will be doing, and the training and planning that have been undertaken in preparation for the expedition. When the team sets off onto the ice it is possible to follow them. It is well worth adding to your 'favourites' and exploring it from time to time over the next six months.

Please let us know how you have built in mathematical links to this – it would make a good *Focus on*… in a future edition of the magazine.

Information from:

- BBC News
- Wikipedia.

A little bit of history – the television

In this issue of the Primary Magazine we are beginning a short series of articles on inventions. We start off with the television. If any of you have a particular history topic that you would like us to find some mathematics links for, please let us know and we'll do our best to put something together for you.

Due to the large amount of ideas and resources, this feature can only be read directly on the portal, otherwise the interactive nature of the way they are presented will be lost.

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Maths to share – CPD for your school

Calculating: What can Year 5 children do?

In this issue of *Maths to share* we look at the research carried out by Alison Borthwick and Micky Harcourt-Heath. You will need to print copies of their research and give to colleagues to read before the meeting.

Alison and Micky say that:

> *Calculation strategies in the UK have been well-documented by researchers such as Ginsburg (1977), Hughes (1986), Thompson (1997, 1999) and Anghileri (2000, 2007). Our study focuses on a comparison between different strategies for each of the four calculations, for example, number lines and decomposition for subtraction. The thrust of this research is related to the relative merits of a range of strategies. Some, as will be demonstrated through the outcomes of this research, are more effective for children because they demonstrate transparency, build on mental calculations strategies and are efficient as they result in a correct answer. What seems to be lacking is research relating to the effectiveness of these suggested strategies, built on empirical studies. Our work is a contribution to this field.*

A few days before your meeting give colleagues four calculations, one for each operation, to give to a group of children to answer. The ones below are those asked of the Year 5 children in the research:

- 546 + 423
- 317 - 180
- 56 x 24
- 222 ÷ 3

Adjust these to make them suitable for each year group. Ask colleagues to bring their results with them to the meeting.

At the staff meeting, compare results. Discuss these findings from the research:

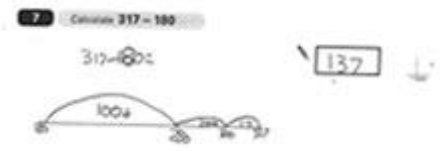
> *While just over half of the children in the study answered this question correctly, this data shows that 4 out of every 10 children are still unable to reach a correct solution. A range of strategies were chosen, with almost 45% of pupils selecting the number line as their method and of these children 84% gained a correct answer.*
>
> *It is interesting to note that the responses in the 'other' category included some where children had added the numbers together. The most random answers were given in the 'answer only' category; these ranged from close to the correct answer to what appeared to be guesses, often bearing little or no relationship to the question. The examples below show a typical successful number line strategy and an error made by some children involving partitioning of both numbers and then merely subtracting the smaller from the larger with no regard for the original numbers.*

- how do these findings compare with the results from the children at your school?

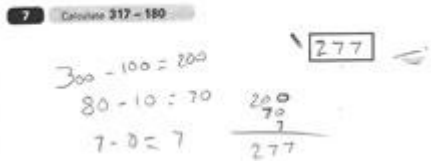
- what are the methods that your children use?
- are there a range of strategies used?
- if so which are the most effective/efficient?

Refer to these subtraction examples from the research (click the images to see larger versions):

Example 1



Example 2



- are these strategies that your children use?
- what has the child in the second example done that shows he/she lacks understanding?
- what understanding does he/she lack?
- what would colleagues do to address the second child's misconceptions?

The results from the research found that for addition in Year 5, most of the children achieved the correct answer and between them used a variety of methods. The most popular were the standard written method (standard algorithm), partitioning, expanded vertical and a mental strategy with no jottings.

Compare these methods with those that your children used.

- are these the same as the children in your school?
- what is similar, what is different?
- which are the most common strategies used?
- are methods consistent throughout each year group? If not, is this something that you need to address? It may be worth having some time as a whole school to update your mathematics policy.

The research results for subtraction found that only 58% achieved the correct answer. Is this the same in you school? If so, why do colleagues think this is? If not, why? According to the research, most of the children who were successful used the number line.

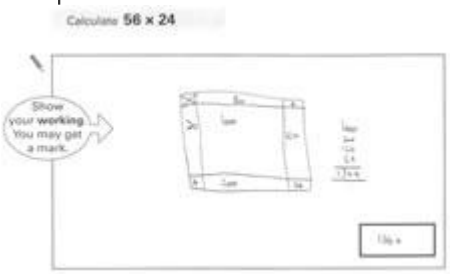
- how is the number line used at your school? It might be worth mapping out the stages in its use during this meeting
- how frequently is the standard written algorithm used?
- how is it taught? Do colleagues teach it in a way that leads to conceptual understanding?

When it came to multiplication, most children in the research didn't answer the question correctly. However, all but 9 out of 351 children that did used the grid method. What do colleagues think of this method?

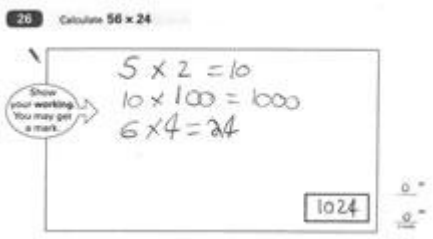
- is the grid method widely used at your school?
- how do colleagues move from the grid method to the standard algorithm?
- do colleagues think this is necessary? Why/why not?
- is this something that needs developing? If so, this might be something that needs discussing at a future staff meeting where you look at your mathematics policy. You could direct colleagues to the NCETM Self-evaluation Tools to explore this further

Show the examples given in the research (click the images to see larger versions):

Example 3



Example 4



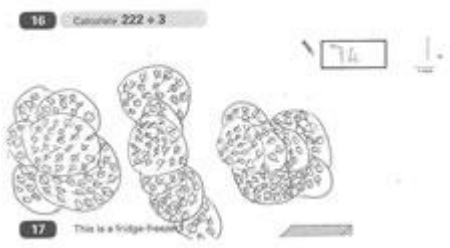
Discuss the strategies these children have used.

- how do these match what is done in your school?
- what is the progression through multiplication in your school?

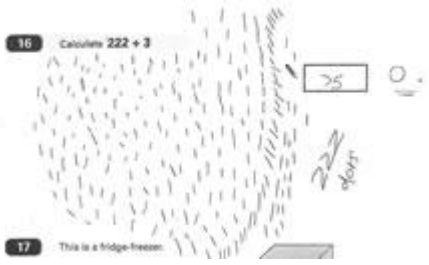
For division, only 33% of the children in the research were successful. Discuss with colleagues why this might be. The most successful methods were chunking (or grouping) up and using a number line. Give colleagues the opportunity to rehearse these two methods.

Show the examples of how the children in the research answered the division question (click the images to see larger versions):

Example 5



Example 6



These examples show a successful but inefficient strategy and a similar one where the child demonstrates less understanding about what division means.

Discuss the strategies used in your school.

- how do the examples match what is done in your school?
- how do colleagues feel about teaching division? Are they confident in their teaching of this area of mathematics? Recent Ofsted reports indicate that this is an area of weakness. Is this true for your colleagues?
- what is the progression through division in your school?

Discuss the final conclusion from the research:

> *The results of this research demonstrate that the more successful strategies are those based on mental calculations, for example, subtraction using counting up and recorded on a number line.*
>
> *This research shows that children demonstrate higher levels of competence when dealing with addition and subtraction than multiplication and division. It demonstrates for multiplication and division in particular, that children do not seem to have a particular strategy to use. This has implications for schools in terms of what they are including in a Calculations Policy and whether this is being consistently adhered to across the primary years.*
>
> *In summary, it would appear that many children, at the end of Year 5, still do not appear to have what Anghileri (2000, p1) refers to as, 'number sense'.*

What do you and your colleagues think?

We hope that this article has given some food for thought, or given some opportunity for discussion on how the four operations are taught with your colleagues.