Primary Magazine

Issue 42

National Centre for Excellence in the Teaching of Mathematics

Welcome to Issue 42 of the Primary Magazine (incorporating Early Years). In this issue we feature the artist Salvador Dalí. We have part two of the mathematical possibilities of the topic Britain since 1945. Focus on... features Air/Sea search and rescue, and Maths to share continues our exploration of the latest Ofsted report.

Contents

Editor's extras

The Primary Magazine and Early Years

For the last 41 issues the Primary Magazine has mainly focussed on the primary school years. As there will no longer be a separate Early Years Magazine, we will be covering Early Years matters in this magazine.

In this issue we have specifically included EYFS in the Art of mathematics and Maths to share. If there is anything of particular interest that you would like to read about in the magazine it would be good if you would let us know.

National Curriculum draft Programme of Study

As you are probably aware, the draft Primary National Curriculum Programmes of Study were recently made available for everyone to look at and comment on.

Together, the NCETM and ACME have been facilitating discussion with everyone involved in mathematics teaching to bring in subject expertise in an open and transparent way to support the development of a National Curriculum, with Programmes of Study as good as they can be, and with input from the best in their field. The input received from the mathematics community via ACME has been used to inform the public consultation on these draft primary Programmes of Study.

There will be a full consultation before the final Programmes of Study for mathematics is made available for schools in the autumn of 2013. We will keep you posted of any relevant news on this.

We would very much like to hear your comments. You can find out more about how to have your say elsewhere on our website.

A couple of reminders from Issue 41, which are still very relevant

1: The NCETM Professional Lead Development Support Programme
As part of the National Centre's new remit, we are offering a programme of mathematics professional development to support teaching schools and other improvement partners (those who provide professional development) in their work with schools, colleges and teachers.

This programme offers a series of free face-to-face events for CPD leads in teaching schools and improvement agents to work together to develop their roles as providers of professional development. There are 20 places available at each primary event which will be taking place around the country during the next academic year.

Benefits of participation in this programme include:

- accreditation by the NCETM to provide professional development in priority areas (arithmetical proficiency in primary schools/ algebraic proficiency in secondary schools and colleges)
- participation contributes as evidence to an application for the NCETM CPD Standard - a nationally established, widely recognised and quality assured badge of excellence in CPD provision

- being a preferred applicant as part of a Collaborative Teacher Project bid.

If you would be interested in coming along to any of these events, you can find out more details in our News section.

2: Collaborative Teacher Projects (CTP) programme
Following the success of the NCETM funded projects programme, we can confirm that we will be a further round of funding for Collaborative Teacher Projects (CTPs) early in the autumn term. Funding of up to £5 000 will be awarded to teachers to work collaboratively on projects that focus on mathematical proficiency, with a particular focus on arithmetic proficiency:

> **Mathematical proficiency** requires a focus on core knowledge and procedural fluency so that pupils can carry out mathematical procedures flexibly, accurately, consistently, efficiently, and appropriately. Procedures and understanding are developed in tandem
>
> **Arithmetic proficiency** is an appreciation of number and number operations, which enables mental calculations and written procedures to be performed efficiently, fluently and accurately.

Priority will be given to projects which involve one or more schools where mathematical attainment is below national average or where other evidence can be provided of the need to improve mathematical attainment.

Schools, teachers or an 'improvement agent' may lead the application but the project needs to involve more than one school.

Applications for the next round of funding will open early in the autumn term, and full information will be posted then. You can find out more about CTPs on the CTP webpage.

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The Art of Mathematics
Salvador Dalí (11 May 1904 - 23 January 1989)

Dalí is well known for his striking and bizarre paintings and also his work in film, sculpture, photography and books. He was highly imaginative and quite eccentric, enjoying the attention of the public. He used to jump up and down to get attention if he wasn't getting any!! He had an intense fear of germs and grasshoppers.

A brief history of the artist

Salvador Dalí was born in Figueres, Spain. His full name was Salvador Domingo Felipe Jacinto Dalí i Domènech! He is one of the world's best-known surrealist painters. Surrealist painting and writing developed after World War I. Surrealists wanted to free their minds of rational thoughts and to write or paint ideas that were 'buried deep within their minds'. Their work was quite complicated and often didn't make much sense to those looking at it. Many surrealist paintings resembled scenes from a dream or nightmare. They often include imaginary creatures or real life pictures shown in unnatural ways.

Dalí had a younger sister and an elder brother, also called Salvador. His brother died nine months before Dalí was born. His parents told him that he had been reincarnated, which was a concept Dalí later believed. This could be why his brother appears embedded in some of his later artworks, including Portrait of My Dead Brother.

It has been said that the young Salvador was a precocious and intelligent child, showing eccentric behaviours and fits of anger towards his parents and school friends. As a result Dalí was subjected to acts of cruelty by more dominant peers or his father. He was also frequently expelled from school.

Dalí's father was a middle class lawyer and notary who had a strict approach to bringing up children. Dalí's relationship with his father wasn't great, partly because there was fierce competition between them to gain the affections of his mother, Felipa.

Felipa didn't have the same approach to child rearing as Dalí's father and it was she who encouraged his art and eccentric behaviour. When Dalí was 16, she died of breast cancer. Dalí adored her and was completely devastated by her death. Shortly afterwards Dalí's father married her sister, an aunt whom Dalí loved and respected.

Dalí Theatre-Museum, Figueres

At an early age Dalí was producing highly sophisticated drawings and both his parents supported his artistic talent. The family often spent time at their summer home in the coastal village of Cadaqués and it was here that his parents built him an art studio.

In 1916, his parents sent him to the drawing school at the Colegio de Hermanos Maristas and the Instituto in Figueres. He was a day dreamer in class and stood out as being eccentric, wearing odd clothing and long hair. It was during this year that he discovered modern art through local artist and family friend Ramon Pichot.

In 1917 his father organised an exhibition of Salvador's charcoal drawings in the family home. In 1919 Dalí had his first public exhibition at the Municipal Theatre in Figueres.

In 1922 Dalí enrolled in the San Fernando Royal Academy of Fine Arts in Madrid. During his studies, he was influenced by several different artistic styles, including Cubism. In 1923, Dalí was suspended from the Academy for criticizing his teachers and allegedly starting a riot among students over the Academy's choice of a professor. That same year, he was arrested and briefly imprisoned in Gerona for allegedly supporting the Separatist movement. He returned to the Academy in 1926, but was permanently expelled shortly before his final exams for declaring that no one on the faculty was competent enough to examine him!

Between 1926 and 1929, Dalí made several trips to Paris, and met with influential painters and intellectuals including Pablo Picasso. During this time, he also met Spanish painter and sculptor Joan Miró, the poet Paul Éluard, and the painter René Magritte. These three people introduced him to Surrealism.

In August, 1929, Dalí met Elena Dmitrievna Diakonova, also known as Gala, a Russian immigrant who was 10 years older than him and the wife of Paul Éluard. Dalí and Gala began a relationship and she left Éluard to spend her life with Dalí, eventually marrying him (twice). She was his inspiration and best friend. Apparently one of the things he liked about her was the fact that she changed her clothes three times a day!! Dalí was not able to deal with the business side of being an artist so Gala took care of his legal and financial affairs.


Castell Púbol

During World War II, Dalí and Gala moved to the United States. They remained there until 1948, when they moved back to Spain. These were important years for Dalí. The Metropolitan Museum of Modern Art in New York gave him his own retrospective exhibit in 1941. This was followed by the publication of his autobiography, *The Secret Life of Salvador Dalí*, in 1942. During the time he spent in the United States, Dalí moved away from Surrealism and into his classical period.

In 1980, Dalí was forced to retire from painting due to a motor disorder that caused permanent trembling and weakness in his hands. He was not able to hold a paint brush. In 1982 Gala, died. The two events led him into a deep depression. He moved to his castle in Púbol, which he had purchased and remodelled for Gala. People think he either went there to hide from the public or to die. In 1984, Dalí was severely burned in a fire at the castle, which confined him to a wheelchair. On January 23, 1989, he died of heart failure. He was 84.

Some mathematical ideas for Dalí's art

These ideas are not exhaustive, a browse through Dalí's galleries on the internet will show many of his paintings which can be used to inspire mathematical links. Unfortunately, for copyright reasons, we are unable to reproduce any of the works directly here.


Show the painting Landscape of Butterflies.

Children in the EYFS could count the butterflies, describe the patterns on them and their shapes. They could make symmetrical butterflies by painting different colours on one half of a piece of paper. They fold

it in half and they (or you) cut out a butterfly shape. They could then work in small groups to paint a background, stick their butterflies onto it and make up their own version of Dalí's painting.

The length of the painting shown in this link is 140cm and the width is 110cm. Young children could find out how many of their footsteps are the same length and width as the painting. They could compare this with the lengths and widths made from different sized cubes, matchsticks etc. This would help reinforce counting.

Older children could investigate the actual measurements in metres, millimetres, feet and inches. They could scale the painting down by dividing by the measurements by ten and draw or paint a miniature. They could also use scaling to investigate how much bigger the butterflies in the painting are than actual butterflies.

 Show the children The Sacrament of the Last Supper.

Salvador Dalí explicitly used Fibonacci's golden ratio in this masterpiece, The dimensions of the canvas make up a golden rectangle. A huge dodecahedron, with edges in golden ratio to one another, is suspended above and behind Jesus and dominates the composition.

You could do some work around the golden ratio and the golden rectangle. A little bit of history in Issue 20 of the Primary Magazine has information and some ideas to explore.

Can they spot the dodecahedron? Using the golden ratio (length is approximately 1.6 times the width) can they work out the possible dimensions of the painting?

You could use this painting to explore different 3D shapes. The children could explore making nets for different shapes and then see if they can construct one of a dodecahedron.

 Show the painting Elephants Reflecting Swans.

Can the children spot the swans and the elephants? You could use this painting to explore reflections, rotations and translations. The children could make paintings of their favourite animal that show reflections in a river or a lake. Can they make an animal that reflects as another one like Dalí did?

They could draw an animal, cut it out and make a surrealist style picture by reflecting, rotating and translating their animal and drawing around it.

Younger children could paint patterns on one half of a piece of paper, fold and press firmly and then open for a reflecting paint blob pattern that also shows symmetry.

Another Dalí painting that would be a useful starting point for exploring shape is Crucifixon. Focus on the shape of the cross rather than the image of Christ as some children may find it disturbing.

You could give the children interlocking cubes and ask them to make the cross in the painting. Can they use the same number of cubes to make a cuboid? How many different cuboids can they make? What about a large cube?

Older children could make cubes after exploring physical 3D shapes. Encourage them to visualise what the net of one of these might look like. They make as many cubes as are needed and then stick them together to make the cross.

You could discuss the 2D shapes that can be seen in the painting and talk about their properties. You could discuss perpendicular and parallel lines and angles. They could then make a surrealist style picture using a variety of 2D shapes, e.g. different triangles, quadrilaterals, a mixture of different shapes depending on the age of the children.

 Show Portrait of My Dead Brother.

Can the children spot Dalí's brother Salvador? What other things can they see in the painting? What do they think the people are doing? You could ask the children to draw a picture like this that involves an image of their choice surrounded by figures. When they draw the figures they could explore body ratios. You will find some of these in Issue 12 of the Primary Magazine, others are easily accessible on the internet. When they have specific ones such as ratio of length of head, foot, arm and leg to height they can work out the proportions if their figures are, say, 21cms tall and measure them accordingly, e.g. length of the head 3cm as the ratio is 7:1.

You could give a copy to pairs of children. They cut out the picture of Salvador and then cut it in half. Each child sticks one half of the picture on paper and sketches the other half. Another focus on symmetry!

Information sources:

- biography.com
- Brian Sewell Art Directory
- Wikipedia.

Image Credits

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National Centre for Excellence in the Teaching of Mathematics

Focus on…The mathematical opportunities in Air/Sea Search and Rescue Services

This is the second article based on the work Steve Pratchett carried out in some of his local primary schools. You can find out more about Steve in Editor's extras in the previous issue.

This article describes Steve's fieldwork trip to Plymouth Lifeboat Station and some of the related activities that were part of a much wider half term geography project based around the work of the Air/Sea Search & Rescue Services. He worked with the children in Year 6 from Bere Alston Primary School in Devon. In this article we focus on the mathematical opportunities of the project. You might be interested in reading Steve's full unedited article, which includes a geographical as well as a mathematical theme.

> *"Geography provides opportunities for pupils to develop application of number through providing real-life contexts for the use, application and understanding of number, using maps (for example, involving co-ordinates, directions, distance and scales)."*
> (Geography National Curriculum 1999 p.9.)

Some of the activities that are described in this article make a significant contribution to mathematics, for example:

- distance in kilometres and miles;
- more than, less than, difference;
- bearings, angles, degrees, rotations;
- radius, within a radius of, outside a radius of;
- scale;
- the relationship between speed, distance and time.

The project outline

At a lifeboat station jobs and weather are inextricably linked. So, geography and mathematics must be inextricably linked too! The fieldwork trip helped the children to locate Plymouth Lifeboat Station at Millbay Docks in relation to their own village, the city of Plymouth itself and the region. Through interviewing crew members, using the lifeboat's maritime charts and accounts of rescues in the local media, the children located significant geographical features and places in the Devon and Cornwall region. By talking to the crew about some of their search and rescues, the children appreciated the links between and the interdependence of Plymouth Lifeboat Station in Devon and Culdrose Royal Navy Helicopter base at Helston in Cornwall.

By using a local street map of the area around the lifeboat station and the addresses of the lifeboat crew, the children were able to investigate patterns in distribution and sphere of influence and also distances the crew had to travel.

The children used a variety of fieldwork techniques to gather data from human as well as physical sources. They learned to read, use and make maritime charts and were involved in decisions regarding the best route into port and where to place a lighthouse on their chart. They used a large-scale street map to investigate how far crew members had to come when there was a "call out".

The children focused on a locality of Plymouth but investigated links with other places and features in the South West region.

The Mathematical Activities

Activity 1 - Questions to ask about the lifeboat equipment

Prior to the field trip, the children were put in groups of three to examine RNLI posters featuring all the equipment carried on board a lifeboat.

Through discussion and consulting dictionaries, they tried to deduce what each item of equipment was used for. Their ideas were recorded, along with cost per item which they researched from the RNLI website.

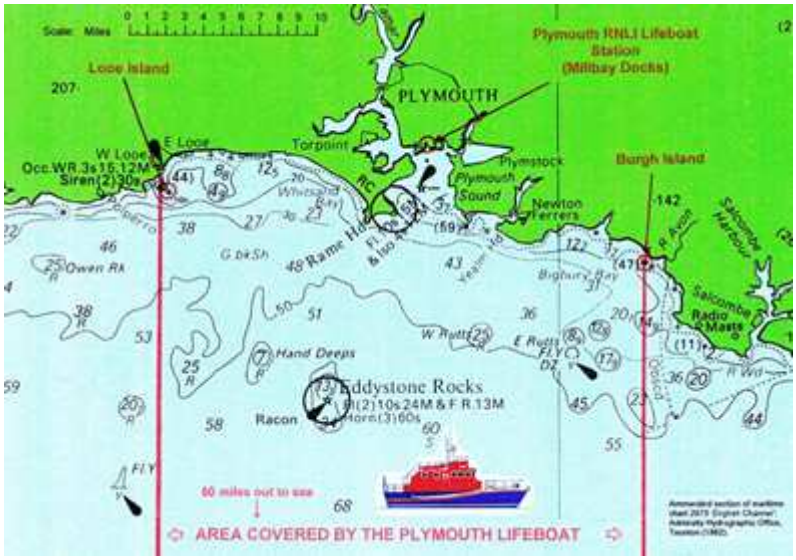
A group of children discuss their hypotheses about the possible uses for items of lifeboat equipment featuring on an RNLI poster. One child uses her calculator to keep a running total of the cost of the items

The idea behind this activity in preparation for the field trip was to encourage the children to:

- develop their vocabulary (spoken, read and written);
- develop their skills of discussion, argument, reasoning, and debate in a group forum;
- look out for the equipment on the Plymouth lifeboat;
- test out their hypotheses or find unknown answers by asking the lifeboat crew informed questions;
- appreciate the cost of the equipment bought by charitable giving.

Activity 2 - Interpreting the Maritime Chart of the area covered by the Plymouth Lifeboat

Prior to the field trip, the lifeboat crew gave Steve a copy of the maritime chart that they used in navigating their lifeboat. It showed the area for which the Plymouth lifeboat is responsible, stretching from Looe Island in Cornwall to Burgh Island in Devon. Steve modified the chart by enlarging, annotating and introducing colour to help primary children interpret it more easily.



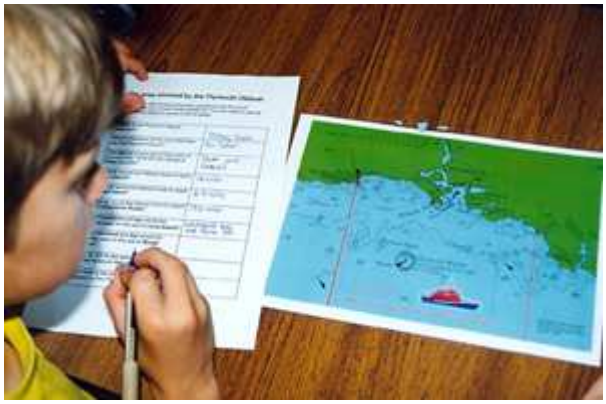
The original is 'English Channel', Chart 2675 from the UK Hydrographic Office

By working with the chart, the children became familiar with rescue locations mentioned by the crew and the main geographical features of coastline and out to sea. They were also encouraged to generate some questions to ask the crew about the chart when they arrived at the station.

Using the chart they plotted routes and calculated the Plymouth lifeboat's journey distances and times to some of its "call-out" locations.

After the visit to lifeboat station, the children were given various activities to help them to interpret the information they had gathered. One activity comprised of "launching the lifeboat" from Millbay Docks on the map to some of the locations described by the crew where the Plymouth lifeboat had been called out e.g. Looe Island in Cornwall. The children used the chart scale, lengths of cotton and pieces of Blu-tac to measure the distance to these locations and then calculated the journey times.

Two children use a length of cotton to calculate the distance and journey time for the Plymouth lifeboat to reach an incident at Looe Island



A child records distances the Plymouth lifeboat travels to various incidents and calculates the journey times

Data on the speeds of the lifeboats from the RNLI was made available to the children. As can be seen in the example below, a child calculated that the Plymouth lifeboat travelling at a speed of 21 miles per hour would take 40 minutes to reach Looe Island, 34 minutes to reach the Eddystone Lighthouse and 46 minutes to reach Burgh Island.

Chris

The area covered by the Plymouth lifeboat

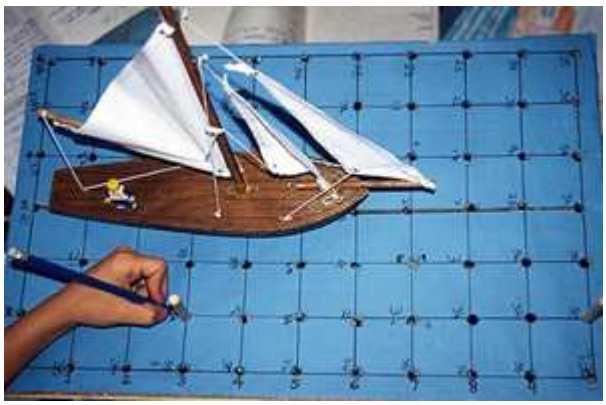
Look at the map showing the area covered by the Plymouth lifeboat and then answer these questions. You will need to use the map scale to work out some of the answers.

Where is the Plymouth lifeboat stationed?	Millbay Docks
What is the name of the river that flows into the Plymouth Sound?	Tamar
The lifeboat covers part of the coast of two counties. What are the names of these counties?	Devon + Cornwall
How far would the lifeboat travel to reach **Looe Island**?	14 miles
How far would the lifeboat travel to reach **Burgh Island**?	16 miles
How far would the lifeboat travel to reach The **Eddystone Rocks**?	12 miles.
What **headland** and **bay** would the lifeboat pass on the way to **Looe Island**?	Rame Hd Whitsand Bay
What **headland** and **bay** would the lifeboat pass on the way to **Burgh Island**?	YEALM HD Bigbury Bay
How far out to sea does the area covered by the Plymouth lifeboat stretch?	50 miles
How wide is the area from west to east covered by the Plymouth lifeboat?	23 miles
Can you calculate the area in square miles covered by the Plymouth lifeboat?	115 miles square
The Lifeboat is called to a rescue at **Eddystone Rocks**. If it travels at its maximum speed of 21 mile per hour how long will it take to get there?	34 minutes
The Lifeboat is called to a rescue at **Looe Island**. If it travels at its maximum speed of 21 mile per hour how long will it take to get there?	40 minutes
The Lifeboat is called to a rescue at **Burgh Island**. If it travels at its maximum speed of 21 mile per hour how long will it take to get there?	46 minutes

On the Maritime chart of the area covered by the Plymouth lifeboat there are lots of numbers and lines marked on the sea. One such number that fascinated the children was marked "7 Hand Deeps" near to the Eddystone Lighthouse. These were depths in metres and contour lines showing the relief of the seabed. These were very abstract concepts for young children but with the right teaching strategy they can become exciting to explore. Steve presented the children with a series of activities based on a model made from a cardboard box laid on its side with a sheet of blue card on top to represent the sea. The card was marked with a co-ordinate grid and holes pushed through at intersections. A slot was cut the full length of the box to allow the keel of a toy yacht to project below the surface. Rocks were placed inside the box to simulate the seabed and then these contents were concealed with a "curtain". The children used doweling rods or fishing weights on string calibrated in centimetres to find the depth of the sea beneath each hole in the blue card. They recorded these depths by writing a number next to each hole, in effect creating a maritime chart with depth soundings for ships to use in its navigation. The numbers could also be joined by drawing a line to create contours.

The children were set the challenge to "find any location where the sea was not deep enough for the draught of the yacht and mark it with a model Eddystone lighthouse!" As you can see in the photographs below, they measured the yacht's keel and were able to identify where it would crash into rocks below the surface. The children place their lighthouse in position and then removed the "curtain" to see if they were correct. They also checked their answer by sliding the yacht across and watching to see if the keel struck the rocks.

The children taking depth soundings with calibrated sticks and creating a maritime chart recording the depth in centimetres at each hole on a grid



A toy yacht slides along a slot cut across the grid on top of the box. Its keel projects down into the box where rocks very near the surface are hidden. The children know the depth of the yacht's keel and have to decide from their soundings whether it will clear the rocks

The children have placed a lighthouse where their depth soundings indicated that the depth is too shallow for the yacht

The children remove the curtain from the side of the box to reveal the seabed and to check if their depth soundings on the blue chart and placement of the lighthouse were correct to warn the yacht that there was insufficient draw between its keel and the rocks

The class teacher and children discuss the depths on the maritime chart used by the Plymouth lifeboat crew with the chart the children have made on top of their 'above and below sea-level model'

Children examine the depth soundings on the maritime chart for the Plymouth lifeboat area and interpret the depths and symbols

The cardboard 'Above & Below Sea-level' box model is used by the children with a screen across the front so that they have to visualise the underwater terrain entirely from their depth soundings

This same exercise could also be carried out using a fish tank and water. This would permit a further elaboration of doing the exercise at high and low tide and help children understand the symbol on the maritime chart for rocks that are covered or uncovered by the sea depending on the tide.

Activity 3 - Cake stalls and exhibitions

Prior to the visit, the children decided to raise funds for the RNLI so they could take a donation with them to the Plymouth Station. They made cakes in school, wrote a letter home to parents asking them to make cakes, and set up a stall to sell them after school. To educate those who came to buy cakes, the children set up an exhibition of RNLI posters and their own work to illustrate the work of lifeboat crews. In total they raised over £200 which they presented to the lifeboat crew at Plymouth.

Activity 4 - At the lifeboat station: Where do the lifeboat crew come from?

The members of the lifeboat crew gave the children their addresses and locations for where they worked during the day. Back in the classroom the children plotted these on a large-scale map of the area of Plymouth near the lifeboat station. Using a compass the children drew concentric circles around the station at intervals of 0.5 miles. This enabled the children to work out who lived and worked within what radius of the station. The children plotted the shortest route for each crew member to take during a "Call-out". The children had been able to talk to the crew about the time it took them and what mode of transport they used. This developed the concepts of 'within a radius', 'sphere of influence' and 'distribution'.

Children draw concentric circles on a Plymouth street map at intervals of 0.5 miles to calculate within what radius each lifeboat crew member lives of the lifeboat station. The crew all gave their addresses to the children and they plotted these on the map first

Children draw concentric circles on a laminated Plymouth street map at intervals of 0.5 miles to calculate within what radius of the lifeboat station each crew member lives. This data was mapped onto a distribution graph

Kayleigh & Dean

Where do the lifeboat crew live in relation to the Plymouth Lifeboat Station?

Within a radius of:	Number of crew members out of a total of 12	Names of crew
0.5 miles	4	Keith, Chris, Andrew Dave
1 mile	6	+Tony, Derek
1.5 miles	8	+Sean, Yetsin
2 miles	8	
2.5 miles	10	+John, Pat
3 miles	10	
3.5 miles	10	
4 miles	10	
4.5 miles	12	+Secretary & Dave

Two children have recorded where the lifeboat crew live in relation to the Plymouth Lifeboat Station. They have used intervals of 0.5 miles radius to analyse distributions

During the term a cross-Channel ferry ran aground in Plymouth Sound because it strayed from the deep-water channel. On the visit to the lifeboat station the children were able to discuss the role of the lifeboat in this incident with the crew. Next to the station they were shown a tall red and white tower with a radar beacon on top. Across Plymouth Sound the children could also see another beacon on Drake's Island. They were told how the ferries use these beacons to triangulate their position on the approach to port. Back at school the children simulated this triangulation of ship and radar beacons on a floor map.

The class gathers round to watch a demonstration of triangulation between ship and two radar beacons as it approaches port so that they can use the skill to plot the route for a ferry into Plymouth Sound on a map

The children use a 360° bearing rose to take bearings from two radar beacons as their ship approaches port

The children were then given a map of Plymouth Sound showing the deep-water channel and three radar beacons. Working in pairs, they used a 360° bearing rose with two lengths of cotton emanating from its centre to calculate a list of bearings that the captain of a ship would need to navigate along the deep-water channel into port.

Two children navigate the deep-water channel on a map of Plymouth Sound by using a 360° bearing rose to triangulate bearings between the ship and the radar beacons

Evaluation of the mathematical element of the project

- the activity based on the lifeboat equipment poster produced some good deductions from the children, and when on board the lifeboat it was noticeable that they were more observant as they looked for and noticed items of equipment they had discussed and found the cost of.
- the work on interpreting maritime charts fascinated the children. Using the depth sounding box was a highly motivating activity and stimulated the children's interest in charts and how they are used by sailors for navigation.
- the exercise in using triangulation of radar beacons to navigate a ferry into port provided useful opportunities for assessment as it involved generalisation and transfer of skills from an earlier exercise in triangulating bearings from Air/Sea Rescue helicopter bases to a new problem of plotting a route.
- the higher attaining mathematicians successfully used the maritime chart to develop their skills in manipulating speed, distance and time to calculate the journeys of the Plymouth lifeboat
- the children showed great enthusiasm and commitment to the cake stall and fundraising.
- the map work on the location of crew members' homes was a successful and meaningful context for the teaching of radius. The children were able to express the notion of 'within a radius of' both orally and in writing and were able to numerically analyse the pattern generated.

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A little bit of history
Britain since 1945, part two

This is the second of our articles on Britain since 1945. In this article we focus on the decades from the 1980s to the present day. You might remember that these articles were as a result of a request by one of our readers. 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

Mathematics: made to measure, part two

In this issue of *Maths to share* we explore the other key findings from Ofsted's report Mathematics: made to measure. In Issue 41 we explored the first five that were particularly relevant to primary schools, including those with early years settings.

Before the staff meeting, you will need to ensure that your colleagues have a copy of the report and are familiar with the key findings at least.

8th finding

The quality of teaching varied by key stage, leading to uneven learning and progress as pupils moved through their mathematics education. In each phase, those pupils nearest to external assessments received better teaching. Less experienced, temporary and non-specialist teachers were more likely to teach lower sets or younger pupils.

Is this reflective of what happens at your school? If so, should you consider placing more experienced teachers with these children?

You might like to consider looking at the guidance package, Supporting colleagues in my primary school with your colleagues. The materials include:

- support for developing your own subject knowledge and that of the teachers you work with
- practical ideas and resources for the classroom.

You might also find it useful to work through the guidance package, Where can I find mathematics classroom resources and support for Primary NQTs? with any NQTs you might have. These materials include:

- practical ideas and resources for classroom activities
- support for developing your own subject knowledge
- stimulating materials to help you reflect and develop as a teacher.

9th finding

Teaching was strongest in the Early Years Foundation Stage and upper Key Stage 2 and markedly weakest in Key Stage 3.

Where would you say teaching is strongest at your school?

If you are a primary or infant school with an early years setting why do you think Ofsted consider teaching was strongest in the EYFS? Is this reflected in your school? If so, make a list of reasons why this is. Can these be developed and used in Years 3 and 4?

If you are a primary or junior school, are Ofsted's findings reflected in upper KS2 at your school? What about lower KS2? Are there issues that need addressing?

You might like to share the Case Study in Issue 24 of the Early Years Magazine, which looks at the work at Throston Primary School in Hartlepool, one of Ofsted's 'Good Practice in Early Years and Childcare' examples. Discuss with your colleagues what could be learnt from this.

You might also like to explore the case studies on the microsite Developing the use of the subject knowledge SET with practitioners in the EYFS with early years colleagues who might be lacking in confidence in their mathematics subject knowledge. If there are issues at your school in lower KS2 it might be worth discussing what these are. If they are a matter of subject knowledge, try to plan some time working through elements of the mathematics content knowledge section of the Self-evaluation Tools with colleagues.

You might also be interested in sharing an NCETM funded project undertaken by Whiteparish All Saints Primary School, Salisbury, who followed the theme Collaborative Practice: Working together on our own subject knowledge and pedagogy as an effective vehicle for rich CPD.

10th finding

While the best teaching developed pupils' conceptual understanding alongside their fluent recall of knowledge, and confidence in problem solving, too much teaching concentrated on the acquisition of disparate skills that enabled pupils to pass tests and examinations but did not equip them for the next stage of education, work and life. Teachers' use of assessment in lessons has improved although it remained a weak aspect of teaching. Monitoring of each pupil's understanding was not strong enough to ensure that pupils learnt and progressed as well as they could.

Do your children progress as well as they should? If not why do you think this is?

How much teaching to KS2 tests is there?

You could plan staff meeting or individual time to look through the mathematics-specific pedagogy section of the Self-evaluation Tools with colleagues. Hopefully this may lead into useful discussions on how to improve teaching. If teachers' use of assessment is weak, they might find it useful to read about the NCETM funded project, Using assessment to promote learning in mathematics, carried out by St Mary's CE (VA) Primary School, Mildenhall.

11th finding

Very few schools provided curricular guidance for staff, underpinned by professional development that focused on enhancing subject knowledge and expertise in the teaching of mathematics, to ensure consistent implementation of approaches and policies.

Do you provide curricular guidance for all your staff and provide professional development during INSET days or staff meetings?

It might be time to ask the school to prioritise mathematics and run a series of staff meeting on subject knowledge and pedagogy. The obvious place to guide your colleagues to is the Personal Learning area of the NCETM website. Why not try to arrange for some staff development using this tool?

12th finding
Schools were more aware than at the time of the previous survey of the need to improve pupils' problem-solving and investigative skills, but such activities were rarely integral to learning except in the best schools where they were at the heart of learning mathematics. Many teachers continued to struggle to develop skills of using and applying mathematics systematically.

How is using and applying mathematics integrated into teaching plans?

How frequently do children have the opportunity to develop their problem solving and investigative skills?

Why not consider this approach:

- think of a problem that needs solving
- share it with the class
- the class tells you what mathematics they need to know about to solve it
- have a time of review, teaching and practising
- use and apply the skills reviewed/taught/practised to solve the problem

You could try this approach with your staff using ideas from the NRICH website or articles from previous Primary Magazines - for example, Proof in Issue 34, or Using the internet for real data handling in Issue 29.

We hope this exploration of Mathematics: made to measure in this and the previous issue has given you food for thought and provided useful ideas for your school to consider if appropriate.

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