Primary Magazine

Issue 12

National Centre for Excellence in the Teaching of Mathematics

Welcome to the 12th issue of the Primary Magazine.
In **Maths to share – CPD for your school**, we are exploring the use of games in mathematics lessons as a way of reinforcing, practising and challenging the objectives taught. Sir Peter Williams recommended in his review that games were used to bring more fun into mathematics. Here is a way to encourage this among your staff!
Our **Up2d8 maths** provides opportunities for work on, 'within the context of…'

Contents

From the editor
In this issue, we encourage you to have a look at the various mathematics intervention programmes available. We would be interested to hear from anyone who is using them. Are they working? Would you recommend others to use them?

Up2d8 maths
This issue of **Up2d8** is based around the recent news of the world's tallest man and last year's official recognition of the world's shortest man. It provides opportunities to explore, among other concepts, data analysis, length and ratio. With some careful planning the suggestions given can be adapted for EYFS, KS1 and KS2.

The Art of Mathematics
This issue explores the artwork of Antony Gormley, an artist born in London in 1950, who has become an internationally renowned sculptor. Possibly one of his most famous works is The Angel of the North, a human-based sculpture erected near Gateshead, Tyne and Wear.

Focus on…
It's the time of year when teachers all around the country will be wondering whether it will rain or shine – whether Sports Day will happen or whether it will have to be postponed or cancelled! This article gives mathematical opportunities to engage children in Sports Day-related mathematical activities.

Starter of the month
Our **Starter of the month** follows the theme of this issue's Focus On, giving ideas for activities surrounding the mathematical possibilities for EYFS, KS1 and KS2 for your school's Sports Day.

A little bit of history
We continue our series of articles on the development of our systems for measuring. In this issue we explore the measurement of capacity, from its origins to our present day systems of both metric and imperial.

Maths to share – CPD for your school
In this issue we look at using games in mathematics. This CPD gives the opportunity to explore the advantages of playing games and hints for successful games. Before leading this session you will need to ask your colleagues to bring a game that they use in their mathematics lessons.

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From the editor

Not so long ago, the National Strategies worked together with QCA to produce APP (Assessing Pupils' Progress), which is now being widely used in schools around the country. Since then, various intervention programmes are being introduced to raise the attainment of children who are not reaching the expected levels in mathematics. Overcoming barriers in mathematics - helping children move from level 1 to level 2 aims to move children in KS1, particularly in Year 2, from a level 1 to a level 2.
We have seen the introduction of one-to-one tuition to raise standards among 11-year-olds. Currently, Every Child Counts, aimed at children in KS1, is being piloted in several local authorities.
Various other interventions are in use in different parts of the country, particularly Numicon, the multisensory mathematics resource, Maths Recovery, Catch up Numeracy, and Numbers Count. We are very keen to hear from anyone who has been involved in any of the interventions mentioned and would like to read your comments in the Primary Forum. We would like to know how successful they have been and any difficulties concerning such things as implementation and sustainability.

Are these interventions the answer to a recent article in The Daily Telegraph, which yet again pointed out that we are failing one in five pupils in mathematics? According to a report, around 30 000 pupils started secondary school last year with the maths skills of a seven-year-old. What do you think? Have you any thoughts on what you think the government should be encouraging teachers to do? Are there too many new initiatives? Should assistance be given to training teachers, for example, on really understanding how to teach using and applying skills and unpicking the objectives? It would be great to have a discussion on this subject led by you, the important people who are actually doing the job!

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Up2d8 maths

This issue's Up2d8 looks at the recent news story about the world's tallest man Zhao Ziang, a 27-year-old from China, who measured a staggering 2.46m (8ft 1in). It also looks at the other extreme, He Pingping, a young man from Inner Mongolia, who was officially recorded as the world's smallest man in 2008. This resource provides a quirky but effective starting point for discussion and mathematics surrounding length, analysing data and ratio and proportion. Most of the ideas can be adapted to fit your classroom and your learners as appropriate.




In addition to the ideas in the resource, here are some more that you could adapt and try:

- compare the average height of a UK man (1.76m or 5ft 9in) and also woman (1.62m or 5ft 4in) with the height of Zhao
- you could spend some time with the older children discussing how to find the average, take their measurements and work out the average height of the children in your class. You could also discuss the mode, height, range and median
- after the height-measuring activity in the resource, you could convert the metric heights to imperial (1cm = 0.39in) using the grid or a mental strategy for multiplication
- discuss the vocabulary and units for length. Ask the children to work in groups of four and write 15 of the words on paper, cut them up to make cards, pile them up and then give them to another group. Play Just a Minute: one child takes the pile and for each card in turn they explain the meaning of the word without saying it. Give them one minute, they count how many they guessed and put these on the top of the pile. Another child takes the cards, beginning with those guessed correctly, and the process is repeated until everyone has had a go at explaining. Do they get faster and more confident each time?
- locate China and Inner Mongolia on a map. Compare their position in the world with the UK and other places that the children are familiar with, finding the distances in miles and kilometres
- you could ask the children to research the countries and make up a numerical-based fact file that includes information such as annual temperature and rainfall, population, height of mountains, length of rivers. They could present their fact files to the class
- they could present the information on the aspects of climate as bar chartsmake a display using the paper models of Zhao Liang and He Pingping, with a space between for people to stand in and compare their height with both men. Take a photograph of each child as they compare themselves. Repeat at least a month later to see if you can notice any growth
- you could extend the body proportion spread to investigate all the bone lengths further by finding the mode, range and average of each in the class
- the children could make model skeletons out of art straws or something similar, aiming for accurate proportions
- you could use this as an opportunity to teach and practice conversion between metric and imperial measurements as this is a real life context that the children will be interested in
- you could also use this as an opportunity to rehearse equivalent units of length
- you could rehearse some tables and mental calculation skills in this context - eg, if someone's arm was 20cm long, how tall is he?
- you could discuss other record-breaking achievements from Guinness World Records and then organise and put on a 'Record Breakers' show similar to the talent show ideas in Good Morning Britain

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- relate to your current topic by using non-standard units for measuring. For example, in a minibeast topic, measure both Zhao Liang and He Pingping in lizards, frogs or snails, or in sunflowers during a growing topic. You will be able to think of several more. If the children know one measurement, can they estimate the other one?

- you could relate Zhao Liang and He Pingping to the story of Gulliver's Travels and make up some practical activities along this theme.

Click here to download the Up2d8 maths resource - in PowerPoint format.

Click here to download the Up2d8 maths resource - in PDF format.

The Art of Mathematics

Antony Gormley (1950 -)

Antony Gormley OBE was born in London in 1950, where he now lives with his family. He studied archaeology, anthropology and the history of art at Trinity College, Cambridge and has since become an internationally renowned sculptor. Over the last 25 years, much of Antony's work has reflected a human form, using his own body as a subject. Apart from individual human sculptures, he has explored the relationship between humans in his many large scale installations like Allotment, Critical Mass, Another Place, Domain Field and Inside Australia.

Antony Gormley's work has been exhibited in galleries throughout the world, and there are several of his pieces on public display here in the UK. These include:

- Iron Man (Victoria Square, Birmingham)
- Sound II (Winchester Cathedral)
- Planets (The British Library, London)
- Another Place (Crosby Beach, Merseyside)
- You (The Roundhouse, London)
- Resolution (Shoe Lane, London)
- Quantum Cloud (Greenwich, London)
- The Angel of the North (Gateshead, Tyne and Wear)

You can download a PDF file of these works. It would be useful in a discussion of his work.

Quantum Cloud and The Angel of the North in particular are considered to be among the most celebrated examples of contemporary British sculpture.

Antony Gormley's website shows images and details of all his work, along with a short biography and exhibition details.

Focus on… Angel of the North, 1998

Show the children the image of the Angel of the North in pdf format. Try to display it as large as possible, and explain to them that it is in fact 20 metres tall – higher than a five-storey building! Ask them to tell their partner (a) something they like/don't like about it… (b) something they find unusual.

Share their thoughts as a whole group. The children might comment on the sheer scale and size of the sculpture, the lines on the arms/wings and along the length of the body and head, or possibly the material from which it is made (weather resistant steel containing copper that forms a patina on the surface and mellows with age). They are very likely to comment on the fact that the arms look 'too long', something that will become the focus of their activity.

Tell the children about Antony Gormley and give them some facts about the sculpture:

- work began on the 'Angel' in 1994 and it was completed four years later
- the total cost was one million pounds
- it stands on a hill, overlooking the A1, the A167 and the East Coast Main Line rail route, and so has to withstand winds of up to 100 miles per hour
- it is 20 metres tall (as tall as a five-storey building, or four double-decker buses)

- its arms/wings measure 54 metres across, almost the same as a jumbo jet. It is wider than the Statue of Liberty is high
- the body weighs 100 tonnes, and the arms/wings weight 50 tonnes each
- the body is hollow to allow for internal inspections. There is an access door high up on a shoulder blade
- its arms/wings are angled 3.5 degrees forwards, which Gormley has said gives "a sense of embrace"
- a bronze maquette (small scale model), owned by Gateshead Council, was valued at one million pounds on the BBC Antiques Roadshow in November 2008. This was the most valuable item ever valued on the show
- 8 000 visitors a week stop to see what is currently Britain's biggest sculpture close up.

When the sculpture was first erected, it created a great deal of controversy and discussion. Ask the children to consider what they feel about the sculpture… Do they like it? Would they like it to be near where they live? Could it be improved? Why do they think Antony Gormley chose to design it like this?

Show the children some of the comments below… do they agree?

> "Magnificent…it will be the symbol of Gateshead …a fantastic, magical, mystical thing, it can say all kinds of things to all kinds of people."
> *Janet Street-Porter, journalist and broadcaster*

> "Gormley's figure is said to represent an angel, but it more closely represents an old clothes peg and a foot rule…"
> *The Mail on Sunday*

> "Antony's huge talent has produced a piece of public art unique in the history of this country, and in time I think it may only compare with the Eiffel Tower and the Statue of Liberty. I think it is one of the masterpieces of 20th century sculpture."
> *Lord Gowrie, Chairman of the Arts Council*

Ask the children to consider the proportions of the figure. If they haven't already done so, draw their attention to the length of the arms. If the image is being displayed on a whiteboard, ask a child to draw on where they feel the arms/wings should end. Allow time for discussion.
Give the children time, in small groups, to measure each other's arm span. Can they measure any other parts of the body that they could use for comparison? Encourage them to measure their height and record it against arm span. Collect the results of the whole class and discuss what they show. For older children, results could be entered into a spreadsheet and displayed as a scattergraph, showing height against arm span. It should be clear that the general trend is for the two values to be approximately equal.

Measure the height of the projected image of the 'Angel of the North'. Now draw on arms/wings that are the same length. An image of the 'Angel' with shortened arms to show the pupils is available to download.

Do the children think it looks better? Worse? Why?

The idea of perfect human dimensions, if such a thing exists, comes from Leonardo Da Vinci's drawings, entitled Vitruvian Man. They are so called as they are based on the observations and measurements of a Roman architect named Vitruvius. He wrote about other proportions of the human body which are very useful in figure drawing and art. The children could explore them as they did with height/arm span:

- the whole foot from toe to heel is the same as the distance between the elbow and the wrist
- when a person kneels, they reduce their height by a quarter
- the length of a hand is one tenth of the person's height
- the length of the ear is one third of the length of the face.

Can they draw any conclusions? Are these statements correct? Can they find other measurements that compare? Do the measurements of boys and girls differ? Adults and children?
Part of the Learning Outside the Classroom resources has an emphasis on monuments and this includes The Angel of the North.

Some other useful websites to explore The Angel of the North:

- this site has some wonderful images of The Angel from different angles; there's even a poem dedicated to this incredible sculpture
- on this site you'll find an intriguing biography of the sculpture and its artist, with some extraordinary photographs of the sculpture under construction
- Wikipedia has a useful overview of the idea of Vitruvian Man, including other comparative measurements that have been considered.

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Focus on…Sports Day

It's that time of year when all teachers have their eyes firmly on the weather wondering if rain is going to stop play! Whether your school engages in a more traditional Sports Day or Potted Sports Day, there are lots of opportunities to engage children in Sports Day-related mathematical activities. These activities will address Ma1, Ma2 and Ma3 of National Curriculum Attainment Targets and Block D: Calculating, measuring and understanding shape. All of these can be adapted to suit the needs of individual classes or pupils within the age ranges suggested.

Foundation Stage and KS1

Show the children a ruler and tell them that they are going to throw the beanbag as far as they can. Ask questions such as:

- If we put these rulers in a line, how many rulers do you think we'd use to measure how far you can throw the beanbag?
- Do you think it will be further than five rulers? 10 rulers?

Take some guesses. Write down the smallest guess and the biggest guess. Help the children to take it in turns to throw the beanbag. Together, arrange the rulers in a line from the throwing position to the beanbag and write down the answer. Repeat for all the children.

- Who threw the beanbag the furthest?
- Which was the shortest throw?

Compare the throws with the smallest estimate. Did we all throw the beanbag further than that? Compare the throws with the largest estimate. Did we throw the beanbag as far as that?

Help groups of children to set out the equipment needed for their Sports Day activities, eg put the mat next to the bench – choose a child from each group to follow your instructions. Now ask this child to give some instructions to the next child in the group. Ask them to include a particular word/phrase such as up, down, left, right, across, over or under. The other children should help them to follow the instructions.

Set up an activity in which four skittles, numbered 1, 2, 3, and 4, should be knocked down or beanbags thrown into buckets labelled with the same or similar values. Children have three tries. Design the challenge so that the highest score is not always the winner in order to encourage the children to consider what skittles to knock down or buckets to throw into. What is the highest score? What skittles would you need to knock down to make five? Nine?

Lower KS2

Ask the children to design their own Sports Day. Discuss what would they need to think about, eg what races or activities would they include? What else do they need to consider: supporters, refreshments, time, day, and equipment?

Ask children to measure out the areas/track for events using metre sticks and/or a measuring tape. One child could measure and a second could check.

Taking an example of the traditional Sports Day athletic events, eg javelin, triple jump, long jump, shot put, etc. Ask the children to carry out the following activities (this example uses long jump):

- Ask the children to estimate how far they can jump. Then ask them to compare their estimates with their friends. Whose estimate looks most realistic? Why? Why not? Ask children to consider whether they want remain with their original estimate or do they want to revise it? Why?

- Ask the children to make a jump and using a metre stick or measuring tape measure and record their jump. Ask children to record their jump in centimetres and you could extend this to metres and centimetres for those who are able. You may want to give them a framework grid to facilitate this.
- Ask children to compare the actual measurement with their estimate. Ask "How does it compare with your estimate?" The children could work out the difference between predicted and actual times (this could be done back in the classroom). Ask children what they learned about themselves, estimating and measuring. Finally, ask children to jump three more times, either during the same session or in consecutive PE lessons, and record their jumps. Ask the children what they notice.

As a link with KS2 Science Sc2 Life Processes and Living Things, ask the children to conduct an investigation to measure the effect of exercise and rest on pulse rate:

- Ask them to think about what happens to them during exercise, ie speculate about factors which could change the pulse rate.
- Discuss the relationship between pulse rate and the heart.
- Show them how to measure resting pulse rate and ask them to take and record their own several times. Explain that it is important to make several measurements and ask why they think this is.

Ask the children to repeat the task after exercise, eg 100m relay:

- What did they find out?
- Why did this happen?
- Which was the most common range for pulse rate before and after exercise?

You could ask higher order questions such as: would we have got the same results if we'd used adults instead of children?

Upper Key Stage 2

Ask the children to make a plan of a school sports event on the field using cm-squared paper/template. Give them the dimensions of the activities and tell them they need to allow room for spectators and transition between activities, judges and refreshments. The most appropriate design could then be measured out on the field for the real event using a metre stick and measuring tape. One child could measure and a second could check.

Taking an example of the traditional Sports Day athletic events e.g. javelin, triple jump, long jump, shot put, etc., ask the children to carry out the following activities, as for lower KS2, but extend to include data handling activities. In sprints and long distance running activities children could work in pairs to improve performance. You could ask the children to repeat the above activity and use a stopwatch to time outcomes.

In the classroom, those pupils who are more confident could work out mean, mode and median of their times and compare with their friends.

Investigations for Upper Key Stage 2

How high you can jump determines how far you can jump in the long jump. True or false?

Ask children to design an investigation that could determine whether the above statement is true.

You may want to help the children consider:

- What data they will collect?
- How they will collect it?
- How they will measure?
- How they will represent their data? (You may need to introduce scatter graphs)
-
- What does the data tell you?
- Ask children higher order questions, eg what other factors would influence the ability to jump the long jump? How can we measure/test this?

On a curved track, how can you make sure every runner has the same length of track? This will require knowledge of finding the circumference of a circle C = ΠD so the circumference of the circle would be the width of the track (D) x 3.14. This would then need to be divided by two to measure half of the circle.

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Starter of the Month

Foundation Stage and Key Stage 1

Run, hop or skip:
Using a number track, ask children to run, hop or skip a short distance. After a short time, ask children to stop and stand still. Model the vocabulary of position and speed using the language of 'first', 'next', 'after', 'last', 'quick', 'quicker', 'quickest', 'quickly', 'slow', 'slower', 'slowest', 'slowly',

Race to 20:
Place number tiles or something similar to 20 along an imaginary track. In pairs, roll a die and ask children to race to that number. Who was quickest? How did you know what number to race to?

Start at zero:
Ask a child to hop from zero to five, using the number tiles from above, on one leg and from there to 10 on the other leg. How many left-leg hops did you do? How many right-leg hops?

Lower Key Stage 2

How far can you run in 10 seconds? In pairs, one child runs while the other times 10 seconds. Children should measure how far using metre stick, trundle wheel or tape measure. They then swap. Who ran furthest? Who is fastest? How do we know? How far could you run in one minute without measuring?

Upper Key Stage 2

Write on the board: 100 cm = 1 m, 1 000 mm = 1 m, 1 000 m = 1 km.
Say a unit of and write it on the board, eg 50 cm. Ask children to work in pairs and write the same measurement in a different unit on whiteboards. Discuss variations.

Write on the board: 'centimetres per second', 'centimetres per minute', 'centimetres per hour', 'metres per second', 'kilometres per hour'.
Say an animal. Ask the children to write the unit they would use to measure its speed, eg spider – cm per second. Discuss how fast spiders move and how we could work it out. Repeat with other animals.

How fast can you run? Ask children to work in pairs. Measure out a distance in the playground (suggest 100m if necessary). One person times how long it takes the other to run the distance. Ask children if they think they know how to work out the speed. (Distance divided by time to find the metres per second. To find the metres per hour, multiply by 60 seconds then by 60 minutes, ie 3 600). Once children have worked out the speed, compare with other animals, eg cheetah 95 km/h.

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A little bit of history

The history of volume and capacity

To begin this article we should confirm the difference between volume and capacity:

- **Volume** is the amount of space a container occupies, this is always three-dimensional. It is measured in cubic units which are commonly metres, centimetres and other such measurements of length;
- **Capacity** is the amount a container can hold when it is full – usually measured in litres or similar.

In the very early days of civilisation, people didn't have a reliable standard of volume. Nature provided equipment such as goatskins which were used as a rough guide. They also made items like baskets and pottery jars which gave approximate consistent sizes suitable for many of the everyday transactions they might make. When exact amounts were needed they relied on weight rather than volume or capacity.

As with most things, the Babylonians were the first people who began to standardise volume and capacity. The Bible and tablets from the royal archives of King Nebuchadnezzar (605 BC - 562 BC) unearthed in the ruins of Babylon, bear witness to the fact that they used special units to measure capacity. Here is an inscription from one of the tablets:

10 (sila of oil) to the king of Judah, Yaukin
2 1/2 sila (oil) to the offspring of Judah's king
4 sila to eight Judean men.

From this evidence we know that they began standard measures of capacity with the unit *sila* which is equivalent to approximately one litre. They also had smaller units: a *sila* was the same as 60 *gin* which was equal to 180 *she*. Apparently, they worked out solid volume in a similar way to us, using the area and a height known as *kush*.

The Ancient Greeks measured volume according to either dry or liquid capacity for measuring grain and wine. The most common unit used was the *cotyle* or *cotyla* and its value ranged from 210ml to 330ml (about the capacity of a cup or a drinks can). A larger unit was the *choenix* which was around the volume of a man's daily ration of grain.

Both the Greeks and Romans used containers called *amphora*. They often used these for liquids. They had a special one called a *wine amphora* as in the photo. Each wine amphora carried 39l of wine.

It was in the 18th century that the British started to standardise volume and capacity. Until then, standard containers were defined by the weight that they could carry, usually in terms of such things as wheat or beer. The gallon was the basic English unit of volume and was originally the volume of eight pounds of wheat. This led to many other units for different sizes of goods:

- quart – a quarter of a gallon
- pint – an eighth of a gallon
- peck – two gallons
- bushel – four pecks.

You could ask the children to measure a litre of water and find out if it weighs the same as a kilogram, and also 500ml and 500g…do they correspond? Does this make estimating easier?

Larger volumes were carried in barrels, hogsheads and other containers. Their sizes in gallons varied and couldn't always be accurately assessed. The Americans simplified this, and around 1700 we began to use only two types of gallon measures: one for dry goods and one for liquids.

In 1824, the imperial system was introduced, and in this system a gallon was designed to hold exactly ten pounds of water. The Americans decided against adopting it and they still have the two gallon measurements (dry and liquid). The British and Americans both measured smaller amounts in fluid ounces, which are approximately equal to one ounce of water. It is interesting to note that weights and capacities are linked and approximately equal.

In 1971, the UK went metric and it was hoped, at that time, that all imperial measures would disappear by 1978. This hasn't happened, and the European Commission now says we can use some of them, for example the pint can be used for draught beer and cider, and milk which is sold in returnable bottles. Up2d8 in the fifth issue of the Primary Magazine, has an interesting spread on disagreements over metric and imperial measures.

These tables show the sorts of units we would have been teaching in the 19th and early 20th centuries – eek!

Volumes

60 minims	= 1 fluid drachm
8 fluid drachms	= 1 fluid ounce
20 fluid ounces	= 1 pint
4 gills	= 1 pint
2 pints	= 1 quart
4 quarts	= 1 gallon
2 gallons	= 1 peck
4 pecks	= 1 bushel
8 bushels	= 1 quarter
36 bushels	= 1 chaldron

Ale measures

9 gallons	= 1 firkin
4 firkins	= 1 barrel

Wine measures

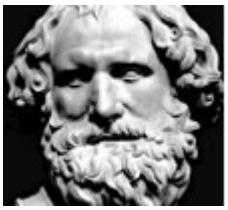
52½ gallons	= 1 hogshead
26⅔ fl oz	= 1 bottle

Can you imagine teaching measures in those days?!

Did you know…

- One litre of water weighs the same as one kilogram of water, which reflects the ancient measures. In those days, when exact amounts were needed, they relied on weight rather than volume or capacity.
- The Scots had *chopins* and *mutchkins* as measures of capacity. A *chopin* was half a pint and a *mutchkin* was half a *chopin*.
- Before 1624 the hogshead measure was the size of the hog's head that it was carried in!
- Archimedes arrived at the principal of buoyancy after a trip to his local baths! The following information is taken from the Eureka! children's museum website:

Archimedes and King Hieron II of Syracuse's gold crown



The king commissioned the crafting of a crown as a tribute to the gods. He gave a carefully weighed amount of gold to a smith, who produced a beautiful crown. The king became suspicious that the craftsman had not used all of the gold he had been given. It was a common trick to alloy gold with cheaper silver, but the King had no way of proving the craftsman had been dishonest. He called upon his close friend Archimedes to solve the problem.

Archimedes knew that gold and silver have different densities, meaning that a lump of gold will weigh about twice as much as a lump of silver the same size. The trouble was that no one knew how to work out the size of an irregularly shaped object like a crown. While he pondered this conundrum, Archimedes went to the public baths to relax. As he slipped into the water he noticed some spilling over the edge, and he had a sudden flash of inspiration. The amount of displaced water must be exactly the same volume as him. And if you know the volume of an object you can now easily calculate its density. All Archimedes had to do was find out whether a lump of pure gold, with the same volume as the crown, weighed more. The crown would be lighter than it should be if the craftsman had deviously used some silver instead. Archimedes, in a fit of jubilation, leapt straight out of the bath and ran naked down the streets shouting "Eureka! – I've found it!" The goldsmith soon confessed and was dealt with by the King.

Archimedes continued with this line of thought to arrive at the principle of buoyancy. He realised that if the weight of water displaced is greater than the weight of the object itself, then it will float.

Useful websites from which this information came and where you can find more about the history of capacity and volume:

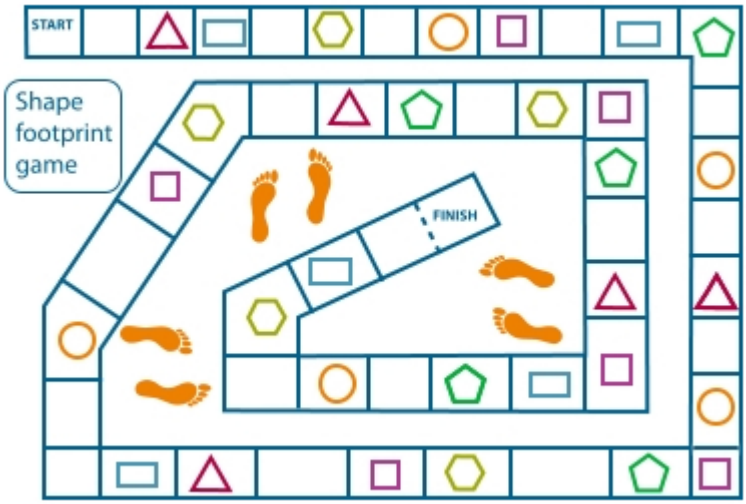
- English Weights and Measures
- Jo Edkins
- University of North Carolina

Maths to share – CPD for your school

Using games in mathematics
Ask your colleagues to bring to the session a game that they use in mathematics.

Before the meeting
Before the meeting, you might find it useful to read the background information. This is a general overview of the justification and reasoning for playing games in mathematics. You will also need to download a copy of the games template (which will need to be printed and enlarged to A3 size for each year group). In addition, download a copy of Using Games in Mathematics booklet from South Gloucestershire Council for each participant.

The Staff Development Meeting
Print out the handout – a copy of the advantages of playing games and the hints for successful games – and distribute to participants as they arrive for the session. Begin the session by discussing the extract by Jenni Way on the handout. First, focus on the advantages of playing games in mathematics. Do colleagues agree with the statements? This will give you the opportunity to open a discussion on how often they play games in their classroom, who with and how do they record any observations. Encourage colleagues to use games at least once a week, not as a 'maths games' session, but by using a game to focus on a particular objective.



Move on to the second part of the handout, Hints for Successful Classroom Games. One of the reasons colleagues are likely to give for not using games is the lack of resources. Show everyone the games template. This could easily be one of your basic games structures. Show the Shape Footprints Game. This uses the template to focus on the properties of 3D shapes. Children have to roll a die and move their counter accordingly. When they land on a shape, they must name a 3D shape which could leave that 2D shape as a footprint. If they cannot name a 3D shape, they must return to the square they were on. Children could also receive points matching the number of faces of the named 3D shape. The winner could be the one who gets to the finish line first or the person with the most points.

Give colleagues 15 minutes to work in year groups to identify an objective from the next mathematics unit and think how they could use the template to create a game. Allow each group a few minutes to

feed back about their game. Use the Hints for Successful Classroom Games handout as a checklist for each game.

Finally, give each of your colleagues a copy of the Using Games in Mathematics booklet from South Gloucestershire Council. Look through the booklet together. It identifies many of the skills which are developed through familiar games, a useful starting point for thinking about using games in future.

Something to think about

As a result of this session, you might like to consider the use of mathematics games for homework. You could set up a maths games library with games from a company such as the Homeworking School and Parent Partnership, or give each child an appropriate copy of Play Away Maths from BEAM, for children in Years 1 to 6. Take a look at what Sarah Stopps did in Using mathematics games at home to help raise attainment for KS1 & KS2 students, part of the NCETM Teacher Enquiry Bulletin.