Becta
ICT Advice
Promoting Effective Practice




Using **web-based resources** in Primary Mathematics

Using web-based resources in the Mathematics lesson

Many good mathematics applications can be accessed using the internet. These can be bookmarked and set to be used offline. Some can be downloaded and adapted by the teacher to meet specific learning objectives. The examples given here describe a number of lessons in which ICT is used effectively to support the teaching of mathematics to children in Key Stages 1 and 2.

All web addresses have been checked and were correct at time of printing.

Unit the Robot KS1 & 2

This is a downloadable resource which requires the children to direct or program a robot in order to complete a task.

URL: **http://www.mape.org.uk/startower/unit/index.htm**

Relevant to the following mathematics strand(s):

Measures, shape and space: Shape and space

Sorting Game KS2

This is a downloadable resource where the children have to use a binary tree to define objects/numbers.

URL: **http://www.mape.org.uk/kids/index.htm**

Relevant to the following mathematics strand(s):

Numbers and the number system: Properties of numbers and number sequences
Solving problems: Reasoning about numbers

A Year 5 teacher used this program with a small group to revise what they knew about the properties of numbers.

She explained that the computer was going to work out what number the children had chosen by asking them questions about the number.

The children used their knowledge of odd and even numbers, prime numbers, square numbers, multiples and factors in order to answer the questions.

Children do not acquire mathematics skills and strategies by magic. They need to be taught how to work things out in their heads, how to check whether their answers are reasonable and how to plan ahead when solving mathematical problems. They need opportunities to discuss their ideas with their teacher and their peers, to test things out and to listen to how other children arrived at their solutions. This interaction is vital for developing mathematical ideas and this is where the skills of the teacher are so important, to question and probe children's understanding.

Some children will benefit from using the computer to practise and consolidate their mathematical knowledge and understanding and this can usefully be done during a break time, after school or at home. Use of ICT during the daily lesson should focus on modelling mathematical concepts and strategies for the whole class, or smaller groups and should aim to raise standards in mathematics.

A Year 2 teacher was working with his class on giving instructions and using directional vocabulary.

He introduced this program to the whole class. He chose the 'Play' option to allow the children to explore the effects of the different buttons.

What do you think that button does? Why?

He let the children take turns to make Unit do something and encouraged them to describe the action using positional language, for example forwards, backwards, up, down.

The National Numeracy Strategy Framework for Teaching Mathematics from Reception to Year 6 makes specific reference to how ICT can be used to support teaching and motivate children's learning. Schools do not need to buy a large amount of software to support the teaching and learning of mathematics. What they do need to do is make sure that they have a range of targeted applications available that can be used by different year groups as part of the daily mathematics lesson.

Three Dart Checkout KS2

This is an online darts game for two.

This game requires children to use their knowledge of single, double and treble numbers to reach a stated target.

URL: **http://www.primarygames.co.uk/dartscheck/dartsthrowres.html**

Relevant to the following mathematics strand(s):

Calculations: Mental calculation strategies (+ and –), Mental calculation strategies (x and ÷)

A Year 5 teacher used this program with the whole class. She reminded the children about single, double and treble numbers. She also pointed out the inner bull's eye (50 points), outer bull's eye (25 points), the treble ring and the double ring. She asked questions such as:

- *What is the highest score we could get with just one dart? How could we get that?*
- *What would be the highest total we could get with three darts?*
- *This is our target, what number should we aim for? Why?*

Teachers have traditionally used a range of software to reinforce mathematical concepts like the four rules of number, to focus on the development of specific mathematical concepts and to demonstrate mathematical knowledge and understanding through problem solving. The introduction of projection technologies means that ICT can have a real impact on direct teaching in the daily mathematics lesson.

The role of the teacher, or a teaching assistant, is paramount in raising standards. They can use ICT as a demonstration for modelling mathematical ideas and strategies, to demonstrate, explain and question, stimulate discussion, invite predictions and interpretations of what is displayed and ask individual children to give an instruction or a response. ICT can be used just as effectively in a plenary session where it can be used to 'model' what children have been engaged in, allowing them to explain what they have learned and how they worked out their answers.

You can view all of the web-based resources online at:

www.ictadvice.org.uk/webbasedresources

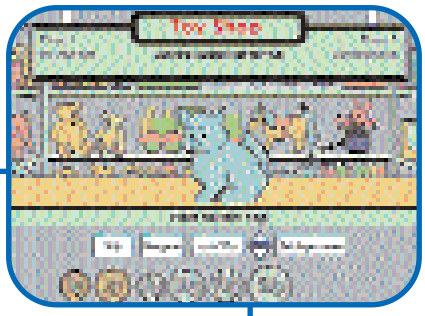
Toy Shop KS1 & 2

This is a downloadable game of strategy where two teams compete against each other to purchase a toy. The team which plays the last coin wins.

URL: **http://www.standards.dfes.gov.uk/numeracy/publications/?pub_id=512&top_id=0&atcl_id=0**

Relevant to the following mathematics strand(s):

Money; Real life problems



A Year 3 teacher had been teaching money to her class.

She introduced this program to the whole class and split them into two teams. She set the level to include values up to 99p.

The teams took it in turns to decide which coin they were going to pay towards the cost of the toy (remembering that the team who lays the last coin wins). She asked questions such as:

If you choose that, what do you think the other team will choose? Is there a single coin that you can choose to win? Which coins could you choose?

Transformation Golf KS2

This is an online resource.
The children have to use their knowledge of reflection, rotation and translation in order to 'pot' a golf ball.

URL: **http://www.mathsonline.co.uk/nonmembers/gamesroom/transform/golftrans.html**

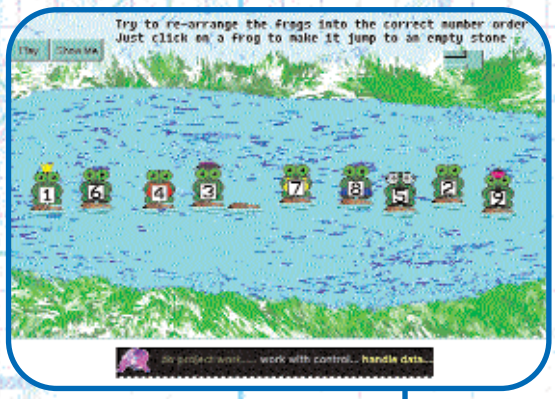
Relevant to the following mathematics strand(s):

Measures, shape and space: Shape and space

A Year 6 teacher had been working on reflective and rotational symmetry with his children.

He used this program with his top group to challenge them to use their full knowledge of reflection, rotation and translation in order to pot the golf ball in each hole.

He reviewed their progress with them once they had completed the challenge and discussed ways in which they could have completed the challenge in fewer moves.



Frogs KS1 & 2

This is an online program that allows children to order digits.

URL: **http://www.logo.com/imagine/project_gallery/frogs.HTM**

Relevant to the following mathematics strand(s):

Counting and recognising numbers: Comparing and ordering numbers. Solving problems: Reasoning about numbers or shapes.

Tangrams KS2

This is an online and downloadable resource where children use the seven shapes of the Tangram to complete different pictures.

URL:**http://microworlds.com/library/math/tangrams/index.html**

Relevant to the following mathematics strand(s):

Measures, shape and space: Shape and space

A Year 5 teacher had been looking at the properties of regular plane shapes with her children.

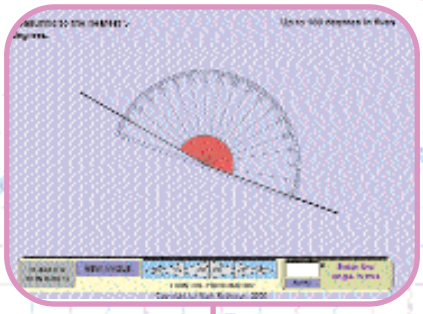
She used this program with the whole class and talked in some detail about the properties of the shapes involved. She encouraged the children to look at shapes of equivalent area. She loaded a Tangram picture and asked the children firstly to visualise possible places where the different shapes would fit. They realised that most shapes needed to be rotated in order to complete the picture.

A Year 1 teacher has been helping her class to recognise, name and order the numbers up to 5.

She introduced this program, set up with 5 frogs, to a small group of children. She asked them to say the name of each numbered frog in turn.

Are the frogs in the right order? Which frog should come first? Who should be next? Who needs to move? Which way? Why?

Using 'trial and error' at first, the children ordered the frogs correctly.



What's My Angle? KS2

This is an online resource for teaching about angle of turn and the measurement of angle.

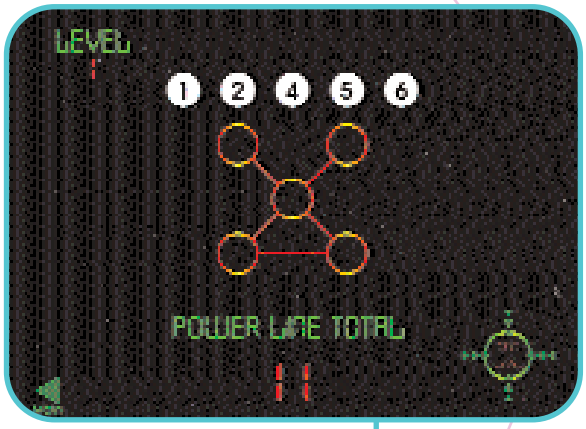
URL: **http://www.standards.dfes.gov.uk/numeracy/publications/?pub_id=446&top_id=0&atcl_id=0**

Relevant to the following mathematics strand(s):

Measures, shape and space

A Year 5 teacher used the introduction to this program to revise how to use a protractor to measure an angle. She reminded the children how to place the protractor correctly and how to read off the angle.

As a main teaching activity she worked with one group on estimating and measuring a series of angles. One child explained: *"I could tell that an angle was about 50 degrees because I imagined a right angle and halved it and this angle was just a bit bigger than half."*



Power Lines KS2

This is an online resource where the children have to make two or more lines add up to the same given total using numbers provided.

URL: **http://www.primarygames.co.uk/pg2/powerlines/powerlines1.html**

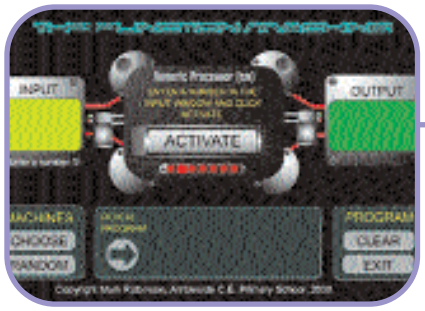
Relevant to the following mathematics strand(s):

Calculations: Rapid recall of addition and subtraction facts
Solving problems: Reasoning about numbers

A Year 3 teacher used this program set at Level 1 with the whole class, working initially by trial and error.

He introduced the activity by saying:

- *This is the target number. How many different ways can we use just these numbers to make this target?*
- *Look at the two numbers linked at the bottom; they must total 11 what must those two numbers be? How do you know?*
- *Do we know which number goes in which of the other circles? Does it matter? Can you explain why?*



Archimedes KS2

This is a graphic simulation of water filling a bath with options to have the plug in or out and Archimedes in or out of the bath. A graph beneath plots the level of the water against time whilst another plots the depth of water every 10 seconds.

URL: **http://www.mathsonline.co.uk/ nonmembers/gamesroom/sims/archi/data.html**

Relevant to the following mathematics strand(s):

Handling data: Handling data

A Year 6 teacher used this program with a small group. She explained how the program worked and ran the program once, allowing the children to experiment pointing out the graph forming at the bottom of the screen. She showed the group one graph print-out and asked the children to suggest what might be happening at each stage.

She asked questions such as:

How long after the bath started running did… happen? For how many seconds was Archimedes in/out of the bath?

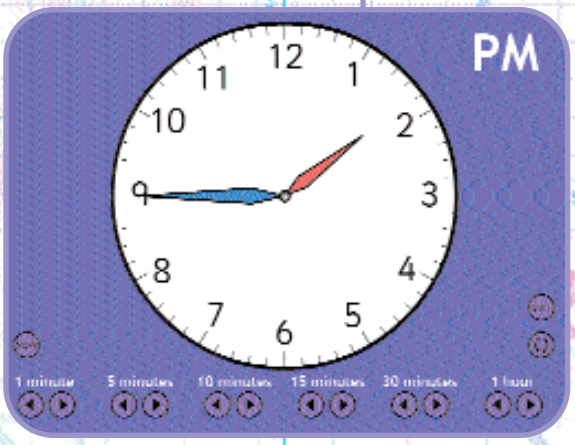
Teaching Time KS1 & 2

This is a collection of online teacher resources and printable worksheets for teaching analogue and digital time.

URL: **http://www.teachingtime.co.uk/**

Relevant to the following mathematics strand(s):

Measures: Time, Problem solving: 'Real life' problems involving time



Function Machine KS1 & 2

This is an online resource which looks at number sequences and patterns.

URL: **http://www.standards.dfes.gov.uk/numeracy/publications/?pub_id=448&top_id=0&atcl_id=0**

Relevant to the following mathematics strand(s):

Numbers and the number system: Properties of numbers and number sequences

A Year 4 teacher had been looking at number sequences made up by doubling the previous number. As an extension, with two of his groups, he used 'Function Machine' and set the rule to be 'Double the number and add a single digit number.' He talked with the children about their strategies for calculating the output number and predicting the rule.

One group explained that at first they inputed any number to see what the output would be, but they found that confusing. They found they could guess the rule more quickly if they were systematic in their entry and recording of the numbers.

Awards Ceremony KS2

This is an online resource for ordering numbers from single digits to numbers with two decimal places.

URL: **http://www.mathsonline.co.uk/nonmembers/gamesroom/awards/awardc.html**

Relevant to the following mathematics strand(s):

Numbers and Number System: Place value, Ordering and Rounding: Decimals

A Year 5 teacher used this program with the whole class to practise ordering decimal numbers. He selected one of the running events from the Menu.

He asked questions such as:

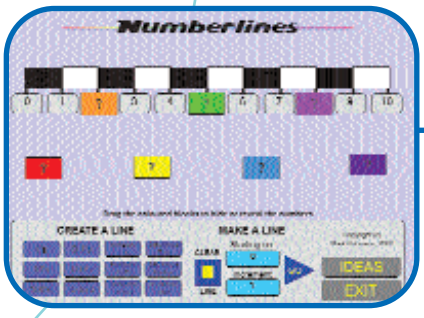
If it is a running event, would the fastest or slowest times come first? How did you know this was the right answer?

One child answered, *"I looked at the whole number first and then at the first decimal place and then the last decimal place."* When all the numbers were ordered on the table, he clicked on 'Award medals' to check their results.

A Year 4 teacher used this program to prepare worksheets for her different groups as part of a lesson on time.

She was able to give each group work at an appropriate level, as the program allowed her to select the range of times to be included on the worksheet.

For those children who required extra practice or reinforcement, she was able easily and quickly to print out worksheets for them to have as homework.



Ambleside Number Lines KS1 & 2

This is an online resource for counting on and sequencing numbers which can be adapted by teachers.

URL: **http://ambleweb.digitalbrain.com/ambleweb/ambleweb/ambleweb/mentalmaths/numberlines.html**

Relevant to the following strand(s):

Numbers and the number system: Properties of numbers and number sequences
Solving problems: Reasoning about numbers

A Year 4 teacher used this program to set up the number line to range from -5 to 5.

He covered all the negative numbers and asked the children to count with him from zero to five and back to zero. He asked the children what number they thought was covered. Some thought the covered numbers were fractions, some thought they were decimal numbers.

The teacher removed the covers one at a time and introduced the numbers 'negative one', 'negative two' and so on.

These programs are also featured on the CD-ROM which is part of the National Numeracy Strategy, 'Using ICT to support mathematics in primary schools' Inset pack. This pack may already be in your school, but if not, it can be obtained free of charge from the DfES distributor, Prolog.
Tel: 0845 60 222 60 quoting ref: DfES 0260/2000. You will also need to give your DfES number at the time of ordering.

Spin to Win KS1 & 2

This is a game of strategy based on place value. It can be played at three levels.

URL: **http://www.primarygames.co.uk/spintowin/wheelres.html**

Relevant to the following mathematics strand(s):

Numbers and the number system: Place value and ordering

A Year 3 teacher had been working on place value. She introduced the program, set up with three boxes, to a small group and explained the object of the game to them. As the spinner stopped she asked questions like:

"Which box should we put it in if we want to make a really big number? How many is that worth?" for example 5 tens or 6 hundreds.

She continued until all boxes were filled.

"Which team won? Why did they win? Look, the computer has told us how many more points the winner got. Can you tell me what number that is? How many hundreds? How many tens? How many ones?"

Roman Calculator KS2

This is a downloadable program that does calculations using Roman numerals.

URL: **http://microworlds.com/library/math/calculator/index.html**

Relevant to the following mathematics strand(s):

Numbers and the number system: Place value, ordering and rounding

A Year 4 teacher had been working with her children on multiplying by 10. She asked,

"When we multiply a number by 10 what digit do we always get in the units column? What appears in the 10s column? Does this always happen? Is there a pattern?"

She introduced the Roman Calculator program and did some calculations multiplying by the Roman numeral X. Before pressing '=' she asked the children what they thought would happen.

"What happens when you multiply a number by 10 using Roman numerals? Is there a pattern? If you had been a Roman child do you think it would have been easy to learn multiplication? Why not?"

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