

More to Maths than counting



Supporting your child's mathematical
development and thinking



2009-2010
Positive engagement of older people
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TOWER HAMLETS

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Introduction

Mathematics is just one of the ways in which young children learn to make sense of their world. From the moment of birth, babies are using their senses and developing awareness of everything that is going on around them in an effort to understand. They are born curious, born problem-solvers and born communicators – and these characteristics will help them to become not only mathematical thinkers but scientists and language users, artists, musicians and athletes.

Babies are also born mathematical. Within the first year of life it is clear that babies have many mathematical skills. These include:

- being able to recognise differences between groups of one, two or three objects, actions or sounds;
- making connections between a number of sounds heard and looking at a set of objects with the same number;
- discriminating between simple 2D shapes such as circles and triangles;
- enjoying tasks that require them to figure something out – or problem-solve;
- investigating cause and effect – (if I press that button, the bell rings; if I pull that string the dog comes closer);
- looking for patterns – in common with all human minds, babies' developing brains seek out patterns, a vital aspect of mathematical understanding.

This makes it all the more surprising that most adults have difficulty with maths. This is despite the fact that we all use mathematics to cross the road, cook a meal, gauge how long we need to allow to get to work on time, judge the amount of money, food, time or material we'll need for any particular task or event. We use maths everyday and yet the majority of people feel that it is hard and they can't do it.

The way that maths has often been taught in the past has led some people to believe that maths is only about numbers and, perhaps, shape – but actually it requires much more.



THERE'S MORE TO MATHS THAN COUNTING

The setting up of the Early Years Foundation Stage – a curriculum for children from birth right through to entry to Year 1 – has made it necessary for everyone working with young children to look in depth at what children have to learn in order to become able to use mathematical ideas. It was for this reason that this area of learning and development (which was previously called mathematical development) has been renamed problem-solving, reasoning and numeracy. This new name places a welcome emphasis on mathematical processes – or the way in which maths is used in everyday life.

The aim of this booklet is to give you the confidence to support the development of mathematical understanding in your child. The emphasis is on what you can do with things that are in and around your home. This has the added advantage of showing children that maths is not about special apparatus but about familiar tools and resources.

The booklet also attempts to offer ideas which do not require lots of time or money – you may have several children of different ages and many demands on your time. So with only a small investment of time and very few resources you can promote your child's problem-solving, reasoning and numeracy. You'll probably find that you're already using a lot of these ideas already – without even realising that you're helping your child to become a mathematician!



10 things to do when you're doing housework

- 1 Encourage your child to tidy toys into boxes, baskets, cupboards etc.
- 2 Give your child a cloth or a small dustpan and brush to use when you're using similar things. They'll enjoy being like you and they'll be exploring space and shape as you work.
- 3 Talk about what you're doing as you go about your housework, emphasising words such as on top, behind, in front etc.
- 4 Let your child help you to sort clean clothes – putting pairs of socks together, identifying baby's small T-shirt and daddy's big one.
- 5 Ask your child to help you put away the shopping. You might say, for example, "The small box goes on the top shelf" or "The bag of rice needs to go behind the other two".
- 6 Get your child to help you make the beds – pulling covers out to the corners of the bed; watching the pillows change shape as you plump them up.
- 7 Encourage your child to help you fold towels. As you fold you can talk about how the shape changes.
- 8 Check how many more chairs, or forks or cups you need for a particular meal. You might say – "Oh dear we've only got three spoons. I'd better get two more so there'll be enough for everyone."
- 9 When you're cooking you can ask children to pass you two carrots or to find a small and a large spoon. If you're using scales draw their attention to the numbers. Give babies a sample of the ingredients you're using and talk to them as you work.
- 10 Young children are often fascinated by shoes. You can ask them to help you tidy shoes and boots into neat pairs.



10 things to do during times when you're engaged in care activities (washing, eating etc.)

- 1 Counting toes, fingers, buttons etc.
- 2 Providing a running commentary as you dress a baby or child. You may say, for example, "Pull up your pants, now sit up so I can reach those two buttons at the back."
- 3 Drawing attention to sequences of actions such as getting dressed, getting ready to go out, getting ready for bed. Reminding them for example that first it's bath time, then you have a story, then your bottle, then kiss good night – or whatever the routine is. This reinforces a sense of time and order – both important mathematical ideas.
- 4 Asking whether he or she would like one or two spoonfuls of dahl or one or two spoons of ice cream.
- 5 Singing and moving rhythmically while babies are feeding or being changed. This contributes to understanding number and pattern – vital aspects of mathematics.
- 6 Providing a variety of large and small cups and containers in the bath – and giving time to play with them.
- 7 Drawing attention to similarities and differences – two socks the same, two shoes the same but watch out that you get them on the right feet and so on.
- 8 Drawing attention to quantities – five toes, three buttons, two sausages, lots of beans.
- 9 Using a timer when cleaning teeth.
- 10 Counting brush strokes when brushing hair.



10 things that might keep your child occupied while you're busy nearby

- 1 Babies can be engrossed for long periods by a small collection of everyday objects. For example, as they play, with a wooden spoon, a potato masher, a wooden egg cup, two conkers and a scarf they are learning about many mathematical ideas such as shape, size, weight.
- 2 Playing with a calculator.
- 3 Cutting numbers out of catalogues, newspapers etc.
- 4 Using empty boxes, cartons, tubes etc. for building or sticking.
- 5 Filling small bags and boxes with objects.
- 6 Dough, bun tins and cutters can occupy children for long periods. The dough may be pastry scraps, shop-bought play dough or home made. (A recipe is included in this leaflet.)
- 7 Unbreakable mirrors – young babies may simply enjoy looking. Older children can get interesting effects by building on top of, or in front of, a mirror.
- 8 A washing up bowl containing water, sand or uncooked rice together with spoons, sieves and cups of different sizes will keep children productively occupied for long periods.
- 9 Collections of shells, stones, pegs, toy animals, cars or buttons for sorting, filling containers or simply lining up across a table.
- 10 Making and hiding in a den – which could just be an armchair with a sheet thrown over it!



10 things to do when you have a few minutes to spend with your child

- 1 Any of the things suggested on the page before.
- 2 Cutting footprints or handprints out of newspaper and seeing how many you need to stretch from one place to another.
- 3 Making EID or birthday cards.
- 4 Wrapping presents (real or pretend).
- 5 Singing and dancing.
- 6 Reading about and choosing TV programmes.
- 7 Using the remote control to select the appropriate channel.
- 8 Consulting a diary or calendar to check birthdays etc.
- 9 Looking carefully at a clock or watch when deciding if you've enough time to do something. If you put a toy clock with the hands set to a particular time (such as the time of a favourite TV programme or time to collect brothers and sisters from school) next to the working one, you can encourage your child to check it regularly.
- 10 Joining in their play – making a pretend shop or going to the garage. Lots of opportunities to use mathematical words and phrases.



10 things to do while you're shopping

- 1 Describing what you are putting into the basket – four apples, a large bar of soap and a small bag of noodles.
- 2 Letting babies handle some of the things that won't be easily damaged as you place them in the basket or trolley.
- 3 Asking children to collect some of the items – "I need five onions; can you pick the biggest one. Is there a smaller one?"
- 4 Reading the quantities on boxes and tins.
- 5 Packing shopping bags – "Can you carry this lighter bag?"
- 6 Categorising shopping – "I'm only going to put bottles and jars in this bag" or "Put all the tins in that box".
- 7 Referring to your list and reminding children that you'll need six eggs or two mangoes.
- 8 Drawing attention to numbers and shapes on price tickets and display materials.
- 9 Talking to your child about the money you're using – coins, cards, notes etc.
- 10 Counting items as you pack them away – perhaps asking children if they can carry two particular items.



10 things to do outdoors

- 1 Checking door numbers, bus numbers and numbers on lifts.
- 2 Checking and talking about whether you have enough change for bus fares or a drink.
- 3 Looking for shapes and patterns when walking in the street.
- 4 Stepping in a puddle and seeing how many footprints you can make.
- 5 Riding through puddles on your bike (or buggy) and seeing how far the track goes.
- 6 Checking different sizes and kinds of footprints.
- 7 Checking how many wheels different cars and lorries have.
- 8 Counting trees or lamp posts.
- 9 Maths I-spy – looking for something shaped like a book (or rectangle); something which has a number four on it etc.
- 10 Exploring different kinds of movement in the playground – swings go back and forth, the roundabout goes round and round, climbing to the top of the slide and whizzing down to the bottom.



Suggestions for games, stories, songs and rhymes to support problem-solving, reasoning and numeracy

- **Action games** – these can take many different forms. For the youngest children it might be simply copying a clapping rhythm or simple dance. As children get older you can make these games more complex. You might, for example, play a game that involves a sequence – one hop, two jumps, three twirls etc.
- **Singing games** – familiar ring games such as 'The Farmer's in His Den' or 'Ring-a-Ring-a-Roses' or involve sequences of words and actions: chik, mik, chile, mile, core.
- **Skittles** – you can buy these but you can also make them out of plastic bottles. Put a little bit of sand, gravel or water in the bottom so they don't topple over too easily!
- **Snap** – you can buy these very cheaply but you can also use ordinary playing cards. Children quickly become familiar with them. You could also make a set of snap cards with your child – cutting out favourite figures from catalogues or finding some clip art images on the computer.
- **Board games with dice** – most homes have some of these such as snakes and ladders but again you can make these up. Children can have a great time creating games that involve favourites such as Postman Pat or relate to family events.
- **Dominoes** – there are lots of different domino games to be purchased or you can make your own using numbers, shapes etc.
- **Songs and rhymes** – lots of rhymes involve numbers because music and rhyme help children to get the sequence in the right order. All cultures have a wealth of number rhymes and songs – use a variety and change them if you like to include your child's name or things they especially like.



- **Story books** – almost all children's books and stories include some mathematical ideas. Just think about 'Goldilocks and the Three Bears' or 'Going on a Bear Hunt'! There are a vast number of counting books – suitable for all ages. Listed below are a few books that you might not have come across and might enjoy with your child:

Andreae, G. and Sharratt, N. (2007)
'Pants' Picture Corgi Books

This book (and many others illustrated by Nick Sharratt) have eye-catching pictures and offer a fun way of looking at pattern.

Boynton, S. (2000) 'Hippos Go Berserk' Simon and Schuster

This is a board book and a counting book which goes from 1 to 10 and back again. However it is so cleverly written and illustrated that it tells a story and hooks older children and adults in with some calculation. Like many of Sandra Boynton's books, it is witty and this is both unusual and important. Humour helps children to learn but is not something which is often associated with maths! Perhaps that's why so many people find it hard?

Cowell, C. and Ellis, A. (2001) 'One Too Many Tigers' Hodder Children's Books

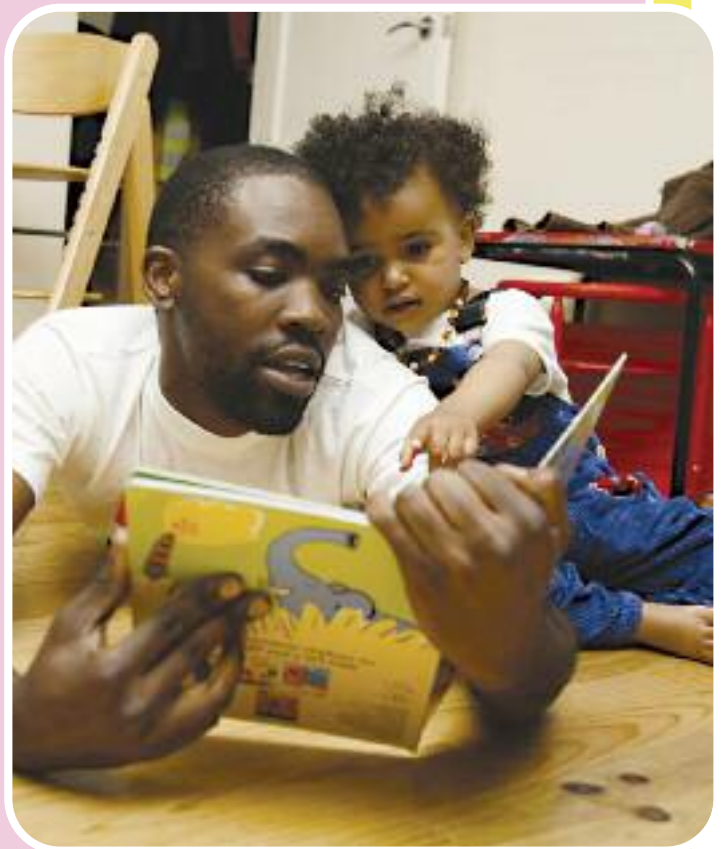
Another counting book with a story line. The numbers involved are small and the story concerns the jealousy that the young tiger feels when a new baby is born.

Dunbar, J. and Dunbar, P. (2005)
'Shoe Baby' Walker Books

Any books involving giants offer lots of opportunities to talk about size – bigger, smaller etc. This one has beautiful colourful pictures and involves a giant shoe becoming a car, a boat and a plane.

Luciani, B. and Tharlet, E. (2003)
'How Will We Get to the Beach?' Michael Neugebauer Books

This is a gentle book about a mother taking five things (including her baby) to the beach. Her car breaks down and she has to find another way to take all five things to the beach. It's subtitled 'A Guessing Story' and it offers lots of opportunities for guessing and conversations about problem-solving.



What is your child learning about problem-solving, reasoning and numeracy?

What is your child learning when...	The mathematical learning includes...
Sorting through your pots, pans and kitchen utensils?	<ul style="list-style-type: none"> • Developing understanding of weight, length, shape • Learning to categorise – identifying similarities and differences
Playing in the bath	<ul style="list-style-type: none"> • Gaining experience about cause and effect • Comparing quantities and the different amounts that various containers hold
Digging in soil or sand	<ul style="list-style-type: none"> • Developing understanding of weight, depth, quantity and the properties of different materials
Playing with cardboard boxes	<ul style="list-style-type: none"> • Exploring size and shape • Becoming familiar with the properties of different kinds of packaging • Exploring different materials
Putting toys, magazines, cushions etc into trucks, bags and boxes	<ul style="list-style-type: none"> • Exploring size and shape • Learning about weight and distance
Singing and dancing	<ul style="list-style-type: none"> • The development of counting through beat and rhythm • The development of areas of the brain needed for mathematical thinking
Climbing, rolling, jumping etc	<ul style="list-style-type: none"> • Developing understanding of distance, height, length • Exploring shape and space • Becoming familiar with relative measurement – higher, shorter, lower, longer etc.
Riding wheeled toys and pushing buggies	<ul style="list-style-type: none"> • Experiencing different speeds, distances and directions • Judging different gaps and angles • Managing different weights and lengths • Exploring patterns when wheels run through puddles

Looking for opportunities to develop your child's mathematical thinking and development

Encourage guessing (or estimating)

- Guess how many sweets I have in my pocket?
- I bet I've got more cars than you.
- Which box do you think is bigger?
- Do you think this string will reach all the way to that tree?

Look for and talk about patterns

- We've got three more sleeps till your birthday – go to bed, wake up, go to bed, wake up, go to bed, wake up – hurrah! It'll be your birthday.
- Jo's got three stripes on his socks and so have you.
- Wow!! look at the pattern you've made with your cars – two reds, one blue, two reds, one yellow...
- Well done – you've found two things the same.

Draw attention to numbers (whether they're just labels like bus numbers or related to a quantity like ages or eggs)

- I'd like that small box of eggs because we only need six – we don't need 12 today.
- We get the number nine bus to grandma's house, don't we? Can you see it yet?
- Teletubbies is on at three o'clock. Has the little hand got to three yet?

Make use of mathematical language in order to familiarise children with it.

- We need three apples for our lunch. Oh dear, I've only got two. Can you pass me one more?
- I thought I had four sweets – but someone must have eaten one, because now I've only got three.
- We'll have to share these biscuits. That's right, one for you, one for me and one for Iqbal. Can we have more?

Draw attention to mathematical features such as shapes; ideas such as underneath, inside, behind and so on and to weight, height, length etc.

- I can't see you – are you inside the tunnel? Are you behind the slide?
- I can see you've put the horse in the field and now the farmer has disappeared into his little house.
- Let's put the long ones in here. Make sure the heavy ones go at the bottom.

THERE'S MORE TO MATHS THAN COUNTING

Encourage your child to imagine or visualise things – as this will help them to develop the abstract thinking needed for mathematics.

- I wonder how many shoes would fit in that bag?
- How tiny do you think a toy for an ant would be?
- When I cut this pizza in half what shape do you think it will be?

Children are best at problem-solving when they've discovered a problem for themselves. You can promote problem-finding and problem-solving by commenting on what children are doing but also by describing your own problem-solving:

- What a fantastic house you've made in the kitchen! How are you going to get the roof to stay up?
- Oh dear! This birthday card keeps falling over – I'm just going to move this vase so it has something to lean on.



Conclusion

This booklet was intended to give you confidence to go on supporting your child's mathematical understanding. The ideas shown are just that – ideas which you can build on. You don't have to spend a lot of extra time and money. What is really important is that you:

- give your child lots of interesting things to explore
- talk to them about the things they see, hear and touch – highlighting features such as quantity, shape, size, pattern
- have fun together – show them and find out for yourself that maths is interesting and all around us
- remember that there's more to maths than counting!

Suggestions for further reading

If you'd like to find out more about problem-solving, reasoning and numeracy you could try to get some relevant books from the library. The three listed below were written for early years practitioners but are written in a straightforward style and include a lot of practical ideas:

Pound, L. (2008)

Thinking and Learning
about Mathematics
in the Early Years
Nursery/World/ Routledge

Skinner, C. (2005)

Maths Outdoors
BEAM Education

Williams, H. (2006)

Let's Pretend Maths
BEAM Education



Recipe for playdough

Place equal amounts of plain flour and salt in a bowl and stir together.

Add a splash of cooking oil and enough water to create a firm dough.

You can add food colouring with the water if you want.

The dough can be made with gluten-free flour for children who are allergic to gluten but it is more expensive.

This will keep for several days in the fridge if stored in an airtight plastic container or well-sealed plastic bag.

If you like, the things that your child makes with the dough can be baked dry in a low oven. When cooled they can be painted.



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