Australian Catholic University

A GUIDE FOR PARENTS

HELPING YOUR CHILDREN WITH MATHEMATICS

The suggestions below have been prepared by staff at Australian Catholic University as a guide for parents in helping their children to learn mathematics.

SOME GENERAL PRINCIPALS

There are a number of general principles which you might keep in mind when you are helping your children.

- Building on success is important. Create the impression that being successful in mathematics is desirable. Reward effort and try not to criticise errors
- People learn, not so much by being told things, as by **working things out for themselves** and linking new ideas to ideas that they already have. You can help by asking your children questions, letting them work out answers for themselves, and then discussing their answers with them.
- Children need **time to think** and **time to answer.** When asking your children questions or talking to them about mathematics give them time. Be patient. Wait for them to answer. Also, explain to older children that they need to give younger time to answer questions, rather than always answering for them.
- Encourage children to **talk.** Talking about mathematics is an effective way of learning and the family is one of the best places to talk, especially when a mathematical situation arises naturally.
- Use **mathematical words** when you describe things. For example, instead of saying “the big red bucket”, you might say “the 10 litre bucket”. Instead of saying “ the large packet of rice”, you might say “ the 2kg packet of rice”. In this way, children get to hear quantities being stated as an everyday way of describing things.
- Buy children’s books with mathematical themes (see page 2 –3).
- Read these with your children and ask them questions about the stories.
- There is **no hurry**. Children develop their mathematics skills gradually and there is no urgency about developing any particular skill. On the other hand, neither can all of the skills wait until the end of their schooling. It is necessary to work progressively on helping them to learn mathematics. In other words, start now, but there is no particular need to accelerate your child’s development.
- **Help your child’s teacher.** Your child’s teacher is vitally interested in your child’s mathematical development. Talk to the teacher about how your child is going in mathematics and find out whether there are any ways that you can help your child. Supporting teachers if they recommend any homework or home-based activities is highly desirable

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SOME SUGGESTED ACTIVITIES

The following are some activities that you can do with your children. Some are general and some relate to specific aspects of the mathematics curriculum.

ESTIMATING

Estimating is an important activity and applies to all aspects of mathematics. Whenever possible, ask your children to guess quantities. Some examples of estimating tasks that you might ask the children to do are:

* Estimate the number of jelly beans in a jar.
* Estimate how many people are in a room.
* Estimate how many pieces of bread are in a loaf.
* Estimate the biggest house number in the street that you have just turned into.
* Estimate how far it is to a particular point in the distance whilst driving.
* Estimate how long it will be until you walk to a particular point.
* Take 15 seconds, say, to walk to the other side of the room.
* Estimate how many steps there are from the bottom to the top when you are walking to the other side of the room.

On some occasions work together to find the actual amount, distance etc.

REMEMBERING

It is helpful for children to get practice at remembering numbers and other information. Examples of the type of information which we commonly try to remember are:

* Telephone numbers: when children are young you might ask them to repeat back to you 2 or 3 numbers in a row; as they get older they should be able to repeat back to you longer strings, and even to remember some numbers such as their own phone number and those of their grandparents.
* Addresses: help the children to learn their own address and others such as their grandparents.
* Car registration numbers.
* Birthdays: children can learn the birth dates in your family, and also those of other relatives and friends.
* Times of special events.

LENGTH

We often compare objects and distances by length and height. Children can first do this without using units, then using informal units (like paces). Then they learn about metres, centimeters and kilometers. Also:

* When you are measuring with sewing or building materials, ask the children to estimate where a particular mark would be .
* Put up a height measurer for children marked in centimeters on which the children can record their height at progressive intervals, such as once every two months. The children take an interest in the way that they grow, and it also provides a language for describing how their height is changing.

WEIGHING

Children can learn first to compare things by hand, and by using balances. Later they learn about kilograms, and grams. You can:

* Talk to children about different ways of weighing things.
* Talk about containers in terms of how much they weigh.
* Compare the size and weight of items in the supermarket.
* Weigh ingredients when you are cooking (learning to cook is helpful in many ways).

CAPACITY

Children learn to compare containers by their capacities. Sometime children think that a tall skinny glass holds more than a short fat one. Playing with containers and water helps. Children can use water or rice to compare the capacity of containers. They also learn about litres, then about milliliters. You can:

* Talk about the size of the containers, of items such as washing detergent bottles and medicine glasses
* Describe objects in terms of their capacity such as the 375ml bottle of coke, or the 5 ml spoon.

TIME

It is important that children can read both analogue (clock face) and digital time. It is useful to get them to learn to do particular tasks, such as:

* Setting VCRs/DVDs, which not only require setting up a particular time, but setting it for particular lengths of time as well.
* Asking the children “what is today’s date?”
* Keeping track of family birthdays and knowing which ones are coming.
* Estimating then checking how long it would take to find a particular name in the phone book.
* Examining use-by dates on items and comparing the dates with today’s date.
* Reading timetables: for example, ask “what time train would we need to catch to get to the football by one o'clock?”
* Asking time calculations like “how long is it from now until...bedtime?” How long till your next birthday?”

MONEY

For obvious reasons, children can learn about money at home. This can include:

* Calculating money amounts and different ways to use coins and notes to present particular amounts—e.g. “Show me $2.50”, “ How much do I have in my hand?”
* Keeping track of money e.g. using a calculator when going around the supermarket to keep track of the cost of purchases .
* Calculating which of two different size items in the better buy.
* Giving change, particularly change from $1 or $10, and asking how much change they would expect to get.

DIRECTIONS

Parents have a variety of opportunities to help children learn about directions. You might like to :

* Describe how to do various household tasks e.g. setting the table, give instructions like “Put the fork on the left hand side, the knife and soup spoon on the right hand side of the knife.”
* Use north, south, east and west to give directions rather than simply pointing.
* When travelling in the car if you need to use the street directory, let the children direct you. Let them find out how to locate your destination and then direct you using the street directory.
* When there are maps, such as maps of the school, maps of the suburb, or maps of the city that the children need to use for navigating or locating, let the children take some responsibility for interpreting such maps.

SHAPES

Children can learn about shape names by hearing them used in everyday speech. You can also:

* Use shape names to describe objects, such as the square table, or the rectangular vegetable garden.
* Get them to sort the cutlery drawer.
* Have them help tidy items in the tool shed.
* Make building using different shaped blocks.
*

LEARNING TO COUNT

Learning to count is important. Counting 1,2,3,4… is the main way, but also counting using pattern:

2,4,6,8…..

5,10, 15,20...

100, 99, 98, 97…

100, 90, 80, 70...

0.5, 1, 1.5, 2….

a, b, c ,d

Monday, Tuesday, Wednesday…
January, February, March…
Nursery rhymes help. "Five little ducks; "1,2,3,4,5 once I caught a fish alive"; "10 green bottles", are just a few examples of the nursery rhymes you can say together.

NUMBER FACTS

Knowing numbers facts is very useful for the future mathematical studies of your children. You can help by taking an interest and by giving them practice. There are a number of important elements about learning tables and number facts.

First is that all the number facts come in families. If the children know, for example, that 5 +2=7 is the same as 2+5=7, and relates to 7-2=5 and 7-5=2, then they know a lot of facts. The same is true for multiplication. If they know that 5 x4 =20, they also know 4x5=20, 20 divided 5=4 and 20 divided by 4=5.

Next they need to learn general principles such as adding 1, adding 2, doubles, near doubles (5 + 6 is the same as 5+5+1), adding 9 (by adding 10 and taking away 1). For multiplication they can learn about doubling (x by 2), multiplication by 10, 5, 11, 3, 4 first, then the rest.

NUMBER GAMES

There are a range of games which are published in books and which are suitable as family games and which practice mathematical skills. One card game commonly available now is called Numero which can be purchased in games shops and newsagents. These provide practice with mental arithmetic. There are also more traditional games such as Cribbage and Pontoon which provide some experience at addition and useful practice for children.

When playing games for which there is a degree of logical thinking implied, talk with the children about better moves, or plays which lead to winning. Think together about ways which help not to lose rather than to win. Verbalising strategies are important for logical thinking.

Some other games that can be played easily include:

Car Number Plates

When you car pulls up behind the car in front, you might have a competition to see how many different answers children can make using the numbers from the car number plate. For example if the number plate is 152 the children might say

1x5 + 2 is 7, or 1+5+2 is 8, or (1+5) x2 is 12 and so on.

Another idea is to add the digits like this 157 becomes 1+5+7 which is 13, then 1+3=4 and to see which number plate will give a special target number.

Guess the pattern

One player thinks of a rule (such as double and add 1). Other players can suggest a number (such as 5) and the first player tells them the number which results from the pattern (11). The players can keep testing numbers until they can tell what is the rule.

Guess my number

One player thinks of a number, say between 1 and 100, the other player can ask questions only using the words "more or less". For example a player might ask " Is the number more than 52?" The first player must answer either yes or no.

Race to 10

This game has two players. Starting at 0 they take turns and can add either 1 or 2 to the last number said. The player who says 10 is the winner.

For example, suppose:

A says	B says
1	3
4	6
7	8
10 so A wins.	

Note that the game has a winning strategy. This game is flexible. You can play Race to 21 counting by numbers from 1 to 3, or race to 50 using 1 to 6, for example.

One you lose

You can play this game with two players on each team, or individually. The first player to score 100 wins. Each player in turn rolls a dice and adds the number shown to their total for this turn. They can stop their turn at any time. If they roll a "1" then their turn is over and they score nothing in that turn. If they stop before rolling a "1" their total for this turn is added to the previous total. This is their score. They do not lose this score even if they roll a"1" on a future turn. Depending on the age, the children might add the dice numbers in their head, but add the score totals on paper. Each player keeps his/her own score. The game is mainly for practice of adding on with numbers up to 100.

Fruit Salad

This is based on a party game, where each child is given a fruit. The chairs are arranged in a circle, with one less chair than people. The child in the centre calls on fruit, then all children with a particular fruit must move to a different chair, and the child in the centre must also try to find a seat. The child who is left calls the next fruit. On the call of "fruit salad", all children must move seats. For example, you might have number cards say 1 up to 20, and call out even numbers, between 7 and 12, is a factor of 36, is prime is divisable by 5 etc. NOTE: This can be done for shapes, time words, numbers, in fact anything based on classification.

Children's literature that incorporates a mathematics theme

These books have been grouped under various themes in alphabetical order. Brief comments have been made for each publication.

Counting:

Allum, M., & Watson, J.	(2005). *How many peas in a pod?* Surry Hills, NSW: Little Hare Books.
A counting book from 1 – 12 using flaps to be lifted to reveal the answers to each question.	
Boynton, S.	(2000). *Hippos go berserk.* New York: Simon & Schuster.
A humorous rhyme that counts Hippos up to 10, and back down again.	
Burningham, J.	(1980). *The shopping basket.* London: Red Fox Books.
Steven goes shopping and buys 6 eggs, 5 bananas, etc. On the way home, animals wanting his goods meet him.	
Carle, E.	(2005). *10 little rubber ducks.* London: HarperCollins Publishers Ltd.
A beautifully illustrated book that looks at 10 ducks washed from a boat. Uses 1^{st}, 2^{nd}, 3^{rd}, etc to tell the story of each duck. Children will love the added press-button quack sound.	
Carle, E.	(1995). *Rooster's off to see the world.* London: Puffin Books.
Rooster decides to travel and meets up with two cats, three frogs, etc. Later they return to their homes, counting back down from 5 fish to one Rooster.	
Cave, K.	(2002). *One child one seed: A South African counting book.* Great Britain: Frances Lincoln Ltd.
A multicultural look at counting.	
Dale, P.	(1988). *Ten in the bed.* London: Walker Books.
Counts down from 10 according to the rhyme.	
Hutchins, P.	(2000). *Ten red apples.* London: Red Fox.
Counts down from 10 using repetitive language that the children can join in with,	
Oliver, N.	(2003). *The very blue thingamajig.* Sydney: Scholastic.
A delightful and unusual counting book that would really appeal to children's imaginations.	
Parish, S.	(1998). *123 of Australian wildlife.* Queensland: Steve Parish Publishing Pty Ltd
A beautiful Australian book featuring colour photos of native Australian wildlife.	
Parker, V., & Bolam, E.	(2002). *Bearum scarum.* London: Hodder Children's Books.
A book where the hunter becomes the hunted. An amusing counting back from ten book.	
Root, P.	(1999). *One duck stuck.* London: Walker Books.
Counts up to 10 using beautiful descriptive language.	
Ross, T. ·	(2002). *Centipede's 100 shoes.* London: Andersen Press Ltd.
An amusing story with addition and subtraction using shoes and socks.	
Sayre, A., & Sayre, J.	(2003). *One is a snail ten is a crab.* London: Walker Books.
A counting book to 100, using feet. Shows different combinations for many numbers eg 30 is 3 crabs or 10 people and a crab.	
Straw, W.	(2001). *5 little ducks.* Melbourne: Borghesi and Adam Publishers.
Counts down from 5 according to the popular song. Big, clear illustrations.	
Wood, A., & Wood, B.	(2004). *Ten little fish.* New York: Scholastic Inc.
Counts colourful fish from 10 to 1 and back. Leaves each answer to the following page.	

Operations and Computation:

Anno, M., & Anno, M.	(1983). *Anno's mysterious multiplying jar.* New York: Putnam & Grosser Group.
A comprehensive lesson plan outlining how this book may be used to encourage mathematical thinking may be found in Lovitt and Clarke (1988). A beautifully illustrated book that covers the topic of factorials ie 5x4x3x2x1.	
Clement, R.	(1990). *Counting on Frank.* North Ryde, NSW: Bluegum.
A very popular book that involves estimation and encourages children to work mathematically.	
Dodds, D. A., & Mitchell, T.	(2000). *The great divide: A mathematical marathon.* London: Walker.
As the name implies this book involves the division concept – especially halving.	
Hutchins, P.	(1986). *The doorbell rang.* London: Penguin.
This story involves sharing cookies among a group of children. For a comprehensive discussion of this book being used in a classroom setting and how children solved problems associated with this book see Griffiths and Clyne (1986). For a detailed lesson plan on how this book may be used to stimulate mathematical thought see Lovitt and Clarke (1988).	
Puttock, S.	(2006). *Don't count your chickens.* London: Macmillan Children's Books.
Gentle humour is used in this book on doubling.	
Tang, G.	(2003). *Math appeal: Mind stretching math riddles.* New York: Scholastic.
This book follows on from The Grapes of Math and is aimed at children moving from addition to multiplication.	
Tang, G.	(2003). *Math-terpieces: The art of problem-solving.* New York: Scholastic.
Uses well-known works of art to motivate children to find different ways to add.	
Tang, G.	(2002). *The best of times: Math strategies that multiply.* New York: Scholastic.
Uses problem rhymes to show better ways to multiply numbers from zero to ten,	
Tang, G.	(2001). *The grapes of math: Mind-stretching math riddles.* New York: Scholastic.
Uses problem rhymes to look at simple computations in a different way, looking at some interesting strategies..	

Anthologies and Books with Many Mathematical Ideas:

Dunn, O., & Gon, A.	(2003). *Number rhymes to say and play.* London: Frances Lincoln Limited.
Heap, S.	(1999). *What's in a number? A collection of poems.* London: Walker Books
Newcome, Z.	(2003). *Five little monkeys: Over 50 action and counting rhymes.* London: Walker Books Limited
Newcome, Z.	(2004). *Ten in the bed and other counting rhymes.* London: Walker Books Limited
Vulliamy, C.	(1999). *If I were bigger than anyone and other poems.* London: Walker Books

Others:

<table>
<tr><td>Agard, J., & Kitamura, S.</td><td>(2002). Einstein: The girl who hated maths. Great Britain: Hodder Wayland.</td></tr>
<tr><td colspan="2">Poems that inspire various mathematical concepts. Could be used as the starting pint for maths investigations.</td></tr>
<tr><td>Ayers, K., & Tusa, T</td><td>(2003). A long way. Massachusetts: Candlewick Press.</td></tr>
<tr><td colspan="2">A young girl investigates different ways to take a gift to Grandma.</td></tr>
<tr><td>Burningham, John.</td><td>(1978). Would you rather… London: Red Fox.</td></tr>
<tr><td colspan="2">Although this is not strictly a 'mathematics' storybook, it can be used to stimulate mathematical discussion and problem solving.</td></tr>
<tr><td>Enzensberger, H.</td><td>(1997). The Number Devil. London: Granta Books.</td></tr>
<tr><td colspan="2">An excellent book to use as a class novel.</td></tr>
<tr><td>Juster, N.</td><td>(1999). The Phantom Tollbooth. London. Collins</td></tr>
<tr><td colspan="2">A great class novel.</td></tr>
<tr><td>McGuire, B. (2003).</td><td>The smell of chocolate. Perth: R.I.C. Publications.</td></tr>
<tr><td colspan="2">While this book was primarily designed to help children understand what it is like to live with someone who has Alzheimer's disease there are many references to mathematical ideas.</td></tr>
<tr><td>Pittau & Gervais. (2001).</td><td>Elephant elements. London: Chrysalis Children's Books.</td></tr>
<tr><td colspan="2">A quirky book using the language of opposites.</td></tr>
<tr><td>Scieszka, J., & Smith, L.</td><td>(1995). Maths curse. New York: Viking.</td></tr>
<tr><td colspan="2">For anyone who has an aversion to mathematics</td></tr>
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