

# FINDING THE MATHS

Tips to support your child to engage with Mathematics



### BACKGROUND

Are you a good mathematician?

How much maths do you use in your daily life?

For many of us, our initial responses to these questions may be “No” and “Not much,” yet when we think about it, maths is something that we all use every day, although we may not realise it.



The problem is that the maths we do every day has become so familiar to us that we may not even see it as maths anymore. One of the biggest areas of maths we take for granted is estimation. We use estimation in almost everything we do, from making a cup of tea and cooking food, to having a shower and crossing the road. These simple daily tasks and many more all include elements of mathematics.

So, what has happened? Why is there a disconnect between the maths we do every day and the perception surrounding the maths that is done inside the classroom?

As adults, many of us do not see ourselves as mathematicians, with many going further to suggest that they “hated maths at school”. In some ways, this reaction is not surprising. Too often, the maths that we may remember from school, is no doubt the more challenging maths from our senior secondary years. Complicated formulas and pages of calculations ensured that our final experience of mathematics in school left many of us feeling anxious and confused.

Hope is not lost. The maths we remember from school is not the maths we learnt about in our first years of school. Nor is it the maths currently being explored by students today in the classroom. Students in their first years of school learn about numbers, counting, shapes and location. They order objects and collections and create and continue patterns. They investigate problems, make predictions, use trial and error and talk about their discoveries.

As parents, we need to be thinking less about the drilling our child on their “times tables facts” and more about exploring the maths in our everyday lives. Rather than purchasing a special book, program or application we just need to look for the maths around us.

We can find maths in books, in the kitchen, in the bedroom, in the bathroom, outside, down the park, in the street, in the playground and walking around the shop. Activities that involve time, money, ordering, location words, going for walks, following directions, counting collections, estimating size, looking for patterns, sorting objects into categories, playing card and board games, using construction materials, building with blocks and completing jigsaws; all involve elements of mathematics.

There is a quote, “If we change the way we look at things, the things we look at change” (Dyer, 2013). The challenge for parents is not to share anxieties about the maths we remember (or are trying to forget) from secondary school. The challenge is to realise that the maths we take for granted, the maths skills we use every day, are the very tasks that can help establish an inquisitive approach to mathematics and lead to a love of maths with our children.

We hope that the following activities help you and your child experience the maths that is around us all.

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## GENERAL TIPS & ADVICE

As parents your role is not to replace the teacher. Instead, you should see this time with your child as an opportunity to experience learning together. Here are some tips that may help you get started.

### Asking Questions

You do not have to have all the answers or know all the content – the tip is to ask questions to help discover ideas with your child together. Here are our top 3 questions:

1. What do you think?
2. How did you do that?
3. How can we check if that is right?



### Different Strategies

Recognise that there are different strategies to solve problems in maths, just like there are many ways to make spaghetti bolognese or drive into work. As we discover more about how children learn and retain information many strategies used in maths have been adapted. This does not mean that the strategy that you are familiar with is wrong, nor does it mean the method your child is using is silly. A good idea is to use a strategy, known as a **Number Talk**, to try different strategies and talk about the similarities and differences between them.

### Positive Mindset

Avoid telling your child you 'hate maths' or 'maths is not important' as this can lead to maths anxiety. It is ok not to know the answer or even where to start with the problem. The idea is to think about what you do know about the problem and use this as a starting point. Check out this TED Ed video for more information on maths anxiety: <https://ed.ted.com/lessons/why-do-people-get-so-anxious-about-math-orly-rubinsten>

### Learn Together

It is ok if you do not know something, but the tip is to admit it if you are unsure. Make a note of the question or area of concern and come back to it at a later stage. There is an abundance of resources that can help us discover unfamiliar content and it is ok to ask for help. On the **AMSI Schools** website we have the **TIMES** modules that can provide information about content along with strategies currently being used in schools with students. They are sorted into year level and topic: <https://schools.amsi.org.au/times-modules/>

### Forget Speed

Being fast does not mean that you are better at maths than others. Some of the best mathematicians worked on problems for years (even decades). The tip is not to rush. There is evidence to suggest that time pressure can lead to anxiety and we can all appreciate that stress is not a state that is conducive to learning. So, it is important to give children the time and space to work through their ideas. Walk away and leave them for a while and when you come back encourage them to talk about what they have done so far. This is a great way for children to self-identify errors as they share their learning experience.

### Make Maths Fun

If the activity you are doing seems like a chore to you, your child no doubt feels the same. Play games with your child and enjoy the learning. Mix things up. Try the same activity standing up or in another room. Go outside and use chalk to try out the problem or play the game. Our **MathsTalk Podcast** on *Using Maths Games and Activities during Home Learning* has some great ideas: <https://calculate.org.au/mathstalk-podcast/>. You can also visit the **AMSI Schools Calculate** website to discover more games and activities you may wish to try: <https://calculate.org.au/games/>.

## ASKING QUESTIONS

The purpose of using questions is to help stimulate children’s thinking and encourage them to explore problems. It is important to use language and ask questions that help to promote discussion and build on children’s ideas. Research undertaken by von Renesse and Ecke (2015) suggest that it important to use language that **reaffirms students’ attempts at learning**. This can be difficult when you know that your child’s ideas are incorrect. Rather than shutting down your child’s thinking, try to encourage them to explain their ideas to hopefully help them realise their error.

### Possible Questions

- Can you help me understand?
- Can you tell me what you are thinking?
- Tell me what you have done so far...
- What do you think?
- What is happening there?
- How is that different?
- What conditions have changed?
- Tell me what you know about this problem
- Do you agree or disagree and why?
- Can you find an example that does not work?
- Do you want more time to think?
- If I use your strategy...
- How about trying...
- Is this problem familiar?
- What do you notice?
- What does this remind you of?
- What do we need to find out?
- What is another example of?
- How is ... related to ... that we discovered earlier?
- Remember when we looked at...
- What I hear you say is...
- How could you explain this problem?
- Is there more than one solution?
- Convince me that you are correct
- How can we check your solution?
- Can we use the solution to find more solutions?



When all other questions fail, and your child still claims that they have no idea how to solve the problem try to use the question: **If you did know, what would you try?** This question seems to promote thinking as the child begins to consider the approaches of someone else and not themselves.

Remember, despite good intentions if your child is still confused by a task it is ok to show them their error. Try to do it in a way that values their learning attempt and makes links to your own learning experiences.

If you are looking for further questions to help promote thinking, check out this list from mathematics educator Dr. Gladis Kersaint: <https://www.gettingsmart.com/2016/01/talking-math-100-questions-that-help-promote-mathematical-discourse/>



## ESTIMATION

Estimation is one of the key areas in maths and yet it is often one that we take for granted. It can help us to quickly find approximate answers to problems that often will suffice. For example, if I needed to arrive at work before 9 o'clock and I estimated that it would take me 20 minutes to travel there, leaving my house at half past 8 should mean that I do not arrive late.

Estimation can also help us to check the reasonableness of our solutions. For example, if we are adding three numbers less than 100, we know that our solution cannot be more than 300. This knowledge can help us to notice simple calculation errors.

Even though we do not often say the word (I estimate that...), we use estimation to complete a range of daily tasks.

- Preparing food
- Cooking
- Getting ready in the morning
- Driving the car
- Giving directions
- Stacking a shelf
- Packing a bag
- Telling the time
- Discussing the weather
- Calculating cost (e.g. shopping items or restaurant bill)
- Predicting size
- Making comparisons



### Discover Benchmarks

Talk to your child about estimating. Help them become aware of some common benchmarks, including their height, their handspan and the length of a step. For example, a large step is about 1 metre, the length of your arm (from your wrist to your elbow) is about 30 cm (or 1 foot), and the width of your little finger is 1 cm. Use a tape measure to help children discover their own measurements so they can use this information to predict other heights or distances, for example, if I am 160 cm tall then the door is more than 200 cm or 2 metres.

### Using Estimation

Before starting to try and solve a problem begin by making a prediction – you can then compare results later. Remember to also **ask children why** they think that. Repeat the process the next day, learning from what you discovered. For example, if you were trying to calculate how many lollies are in a small jar, you may guess 100. Once you have discovered that there were 150 lollies in that jar, tomorrow you might use this information to find out how many lollies fit in a larger jar.



### Getting Better

The tip is with estimation is that over time it is something that you get better at with practise. Think about the shop assistant at the deli who can slice exactly 100 grams of ham or the TV chef (or Nona) who can estimate a cup of flour just by feel. We can all improve our estimating skills – we just need to remember that we are doing maths when we use these skills. The website, *Estimation 180*, has a huge range of images to help children develop their estimation and justification skills. <http://www.esteemation180.com/>

## NUMBER TALKS

Number Talks are a relatively new term being used in education circles. It describes the process of helping children to identify different ways a problem could be solved. This process is intended to help students develop their number sense, i.e. their ability to recognise, understand and use the relationship between numbers to solve problems more effectively.

### Dots

One way to do a number talk is to show children an image of some dots and ask them to explain what they see. For example, how many dots do you see in Figure 1.

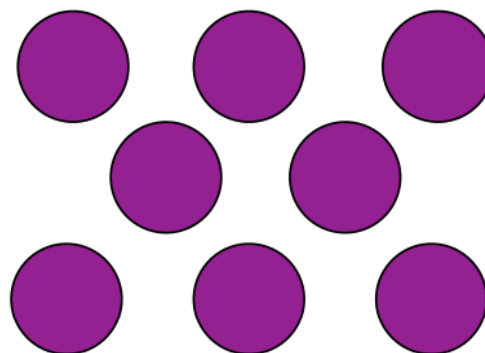


Figure 1: How many dots do you see? (Math for Love, 2020)

|  |   |
|--|---|
|  | I see 5 dots (like on the dice) and 3 more to make 8 dots.      |
|  | I see a row of 3 dots, then 2 dots, then 3 more to make 8 dots. |
|  | I see 2 groups of 3 dots and 2 more to make 8 dots.             |

Through this process we can begin to recognise whether children are trusting the count, i.e. are they able to recognise collections (up to 5 dots) or do they need to count by ones to find the total. More dot images and instructions on how to do Number Talks can be found at *Math for Love*:

<https://mathforlove.com/lesson/number-talks/>

### Numbers

Another way to do a number talk is to present children with a problem. For example,  $9 + 17$ . Children are given time to solve the problem, then solutions are shared. For example:

- I know that 10 and 17 is 27, so, then I subtracted 1 to get 26.
- I made the 17 into 20 and did  $9 + 20$  is 29, then took away 3
- I put the 17 in my head and used my fingers to count on 9



A discussion can then take place about all the different ways the problem can be solved. Is one method more efficient than the others? Which method works best for you? Would this method always work? What if the numbers were bigger or there were more numbers? A video of Jo Boaler (Stanford University) explaining a number talk can be found here: <https://www.youcubed.org/resources/stanford-onlines-learn-math-teachers-parents-number-talks/>

### Other Talks

Really any problem or image could be used as a basis for a *Number Talk*. A collection of images related to fractions can be found on the *Fraction Talks* website: <http://fractiontalks.com/>

More examples of *Number Talks* can be found on Steve Wyborney's blog: <https://stevewyborney.com/>.

Also, check out the **AMSI Schools Calculate** website: <https://calculate.org.au/2018/09/14/building-number-sense-through-number-talks/>

## BOOKS

Picture story books can be a great source of mathematical content. Do not think that you need to purchase special maths books that are designed to highlight mathematical concepts. Most picture story books can be used as a starting point for discussions in maths.

### General Suggestions

- Count the characters, objects or the places visited
- Use location words to describe the position of objects or characters
- Create a map to show where the characters travelled
- Describe the sequence of events using ordinal numbers (1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, etc.)
- Use the ideas in books for inspiration for your own investigations



### Book Ideas

Here are some ideas related to popular children's picture story books.

| BOOK   | AUTHOR              | SUGGESTION (S)  |
|--|---------------------|---|
| Each Peach Pear Plum                         | Allan Ahlberg       | Describe the location of the characters   |
| Who sank the boat?                           | Pamela Allen        | Count the number of animals. Prove which animal sunk the boat                       |
| Window                                       | Jeanie Baker        | Describe the location of the objects  |
| Dear Zoo                                     | Rod Campbell        | Count the number of animals   |
| The Very Hungry Caterpillar                  | Eric Carle          | Count all the food eaten  |
| Hairy Maclary from Donaldson's Dairy         | Lynley Dodd         | Count the number of dogs at different stages of the book                            |
| The Gruffalo                                 | Julia Donaldson     | What order were the animals seen?   |
| Possum Magic                                 | Mem Fox             | Count all the different foods eaten or places visited                               |
| Where is the green sheep?                    | Mem Fox             | Count the number of sheep. How many sheep were sitting/standing, wearing hats, etc? |
| Diary of a Wombat                            | Jackie French       | Count the number of things eaten by the wombat                                      |
| Are We There Yet? A Journey Around Australia | Alison Lester       | Create a map or order the list of places visited                                    |
| The Cat in the Hat                           | Dr Seuss            | Describe the location of different objects  |
| Green Eggs and Ham                           | Dr Seuss            | Create a map showing where the characters travelled                                 |
| Goodnight Moon                               | Margaret Wise Brown | Describe the location of the objects. How many objects were there altogether?       |
| Harry and the Bucketful of Dinosaurs         | Ian Whybrow         | How many dinosaurs did Harry have? What locations did they visit?                   |

A more extensive list of books for different year levels, linked to investigation ideas, can be found on the NZ Maths website: <https://nzmaths.co.nz/picture-books-mathematical-content>. Also, check out the University of Chicago's *Everyday Mathematics* website: <http://everydaymath.uchicago.edu/teachers/k/literature-list/>



## AROUND THE HOUSE

### In the Kitchen

There are several mathematical activities that take place in the kitchen, including preparing food, measuring ingredients, estimating cooking times, plating dishes and setting the table.

- Estimate then count the number of cups needed to fill a large pot
- Use a timer when preparing food or monitoring cooking times
- How long does it take to make the perfect cup of tea?
- Give directions to help your child set the table or plate food
- Investigate the different shapes of objects and food items in the house
- Can you find any items that do not belong? (non-example) Can you describe why they are different?
- Order containers from smallest to tallest or lightest to heaviest
- Think about the different shapes we can make when we cut vegetables
- How do these shapes and sizes effect cooking times?
- Can you measure half a cup using a  $\frac{1}{3}$  of a cup measure?



### In the Bathroom

The bathroom is another great place to find maths activities, including comparing capacity and ordering objects.

- Use the bath or large tub to investigate whether objects sink or float
- Make a boat using paper and time how long it stays afloat
- What if you add weights (or blocks)? Does it still float?
- Fill containers with water to find out which one has the largest capacity
- Compare the height or weight of containers
- Order the containers according to their size
- What if I give you one more container? Where would you place it? Why?



### Other Rooms

The other rooms in your house, including the garage or garden shed, may also contain interesting items that could be the starting point for an investigation.

- Hide an object and give someone else directions to locate it
- Find a measuring tape and use it to predict then measure the size of different objects or distances
- Sort a collection of objects according to their colour, shape or size
- Use materials, such as books or newspaper, to build the tallest tower or the strongest bridge
- Count the number of stairs or the number of steps it takes to get to different rooms
- Create a map of your house or draw a map of your dream house
- Find all the shoes in the house – sort them according to size or colour
- Use materials in the house to create your own Rube Goldberg Machine – check out some suggestions on the *Digital Trends* website: <https://www.digitaltrends.com/cool-tech/best-rube-goldberg-machines/>



**OUTSIDE**

You do not need to be in the house to find great maths activities. Often good activities are just outside your front door.

- Go for a number walk in your local area – look for numbers on street signs, house numbers and shop fronts
- If you see a number think about: What number comes before or after? What is ten more or less than the number? What else do you know about the number?
- Go to a local park – use location words to describe the position of the different objects
- Create your own obstacle course and follow the directions given to you by someone else
- Use a timer to see how long it takes you to complete the course
- Hide an object and give someone directions to find it
- Draw a map to the local shops or park
- Count the number of steps to arrive at a favourite location – if the distance is too far consider using a phone app or fitness tracker
- Be the first person to find an object (or objects) that shows a certain number or characteristic, for example, find 5 leaves, find something that is blue, find something that would fit inside a matchbox, find something hard, find something that could be used to collect water, etc.
- Can you find something that does not fit any of the categories? (a non-example) What makes it different?
- Buy some large chalk and use it to create your own maths challenges, pathways or games
- Create a pattern with the chalk and have some explain and continue it
- Check who can do the longest standing jump or jump with a run up or the highest jump
- Take some sporting equipment outside – investigate how far can you kick a ball, throw a ball, hit a ball with a bat or throw a frisbee
- Visit the *Dude Perfect* website and create your own challenge – remember to count the number of attempts made, calculate distance or investigate angles: <https://dudeperfect.com/>



## AT THE SHOP

Shopping (like cooking) is probably the most recognisable activity that is linked with mathematics. Going to the shop is not just an opportunity to look at prices or estimate the cost of the grocery bill. There are several other activities that can lead to investigations in maths.



Photo by Mike Petrucci on Unsplash

### Shopping Ideas

- Estimate how many of an item you will need, for example, how many lamb cutlets should we buy so we have enough for dinner?
- Use the scales in the grocery department to compare the mass of different fruits and vegetables
- Calculate how many bananas you will need to make one kilogram? Tomatoes? Potatoes? Grapes?
- Compare the cost of different items – What is the best value purchase?
- Calculate the possible savings when there is a percentage off sale (use the shortcut that if 10% of \$5 is 50 cents then 30% of \$5 would be three times that or \$1.50)
- Calculate whether you have spent over your budget – use estimation to help you, for example, if each item is about \$3 and there are 10 items, the total cost should be about \$30



Photo by nrd on Unsplash

### Money

With our tap and go society seemingly taking over our lives you may be surprised to know how little some children know about money, particularly the physical coins and notes.

- Talk to children about the different coins and notes we have in Australia
- Are all coins the same? Who is the person on the back? Where are the animals from? Who are the people on the notes? What are the other special features on the notes you notice? Why do we have these features?
- Encourage children to collect coins in a Money Box and save up for something they may want to purchase
- Put the coins in order (amount NOT size) and use the coins and notes to make different amounts



Photo by Jonas Leupe on Unsplash

Further ideas about helping your child learn about money can be found at the Australian Government's (ASIC) *Money Smart* website: <https://moneysmart.gov.au/teaching-resources>



**TIME**

Learning to tell time on traditional clocks is a skill that all of us have had trouble with at some stage. Supporting your child at home is one way to encourage children to see learning to tell the time as an important part of their lives.



It sounds simple, but one of the easiest ways to support your child to learn time is to ensure you are discussing times at home. You would be surprised to find out how many children know very little about the times of regular events in their lives.

**Familiar Events**

| TEACHER                                 | STUDENT               |
|---|-----------------------|
| What time do you go to bed?             | Bedtime               |
| What time are your swimming lessons?    | After school          |
| When does your favourite TV show start? | After dinner          |
| What time is dinner?                    | When my dad gets home |

To support your child to learn the time of familiar events in their lives, remind your child of the time these events or activities occur. For example:

| ACTIVITY         | PARENT  |
|------------------|---|
| Bedtime          | Ok it is 7.30 now, time to go to bed  |
| Swimming lessons | After school we need to be organised so we can get to swimming lessons at 4 o'clock |
| Television show  | Finish clearing the table as the show you want to watch starts at half past 6.      |
| Dinner           | Dad will be home at 6 o'clock so help me set the table for dinner                   |

**Clock Features**

Once your child becomes more familiar with the times of regular events or activities, encourage them to begin using a clock to tell you the time. To begin help your child identify the important features of both analogue and digital clocks.

| ANALOGUE CLOCKS   | DIGITAL CLOCKS   |
|---|--|
| <ul style="list-style-type: none"> <li>• Hour hand (small)</li> <li>• Minute hand (big)</li> <li>• Numbers represent the hours in a day</li> <li>• Strokes represent the 60 minutes in each hour</li> </ul> | <ul style="list-style-type: none"> <li>• First two numbers represent the hour</li> <li>• Second two numbers represent the minutes</li> <li>• For example, 10:45 is 45 minutes past 10</li> </ul> |

Although digital clocks are becoming more prevalent in society, the language of time is often still analogue. When reading clocks encourage your child to use the terms *past* and *to*. For example, four-thirty can be read as half past 4 whereas four forty-five would be read as quarter to 5.

**Telling Time**

The important thing to remember when learning about time is that it is a gradual process. Children will progress through a number of stages, from beginning to recognise features of clocks in the first year of school to being able to tell time to the minute on analogue and digital clocks (using the language of past and to) by the end of Year 3. By assisting your child at home, you are equipping them with the knowledge to not only support their success in the classroom but are also helping them develop an important life skill.



## TOYS & GAMES

Toys are a great resource to investigate different areas of mathematics. You do not need to purchase toys that have a specific maths focus, instead you may just simply need to look at some of the toys you already have from a different perspective.

### Toys

- Estimate then count the number of toys in the box
- Work out how many different outfit combinations the toys can wear
- Use blocks to create different representations of numbers
- How many ways can I show 10 using blocks?
- Investigate how many blocks will be needed to cover a given area
- Make a racetrack and predict which car will come first, second, etc.
- Sort toys into different categories then explain your thinking
- Can you find a toy that does not belong to a category? (a non-example) What makes it different?
- Use location words to describe the position of toys



### Games

- Play board games such as Snakes and Ladders with more than one dice, dice of different sizes or allow players to decide whether to move forwards or backwards each time they roll, i.e. in order to avoid a snake or reach a ladder
- After the player rolls the dice, ask them to predict where their counter will end up before moving it
- What number comes before or after their number? What will they need to roll to complete the game?
- Use playing cards or dominoes to look for or create number patterns
- Build towers or paths with cards or dominoes
- How many cards/dominoes did you use? How high was the tower? How long was the path?
- Compare statistics on collectable cards



Photo by Kelly Sikkema on Unsplash



For more ideas about ways to play games with your child, visit the *Love Maths* website by Michael Minas that includes videos of popular maths games:

<https://www.lovemaths.me/games>

**MORE INFORMATION**

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