

Thomas Russell Infants' School

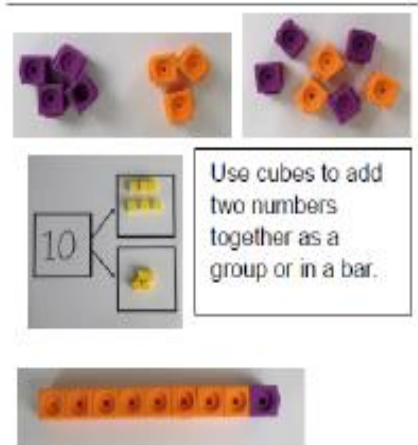
Teaching for Mastery: A Mathematics Guide for Parents



Our aim at Thomas Russell Infants' School is for all children to enjoy maths and have a **secure** and **deep** understanding of fundamental mathematical concepts and procedures.

In line with the National Curriculum and current best practice, the children are taught to become **fluent** in the fundamentals of mathematics (including calculation strategies); **reason** mathematically using **mathematical language** and apply their knowledge and understanding to **problem solving** tasks. In order to achieve these objectives for all our children we follow a Teaching for Mastery approach.

Concrete



The aim of this booklet is to provide parents and carers with an understanding of what Teaching for Mastery looks like at Thomas Russell Infants' School; how we teach the four calculations and how you can support your children at home with their maths learning.



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What does Mastery of Mathematics mean at Thomas Russell Infants' School?

It is achievable for all - we have high expectations and encourage a positive 'can do' mindset towards maths in *all* children, creating learning experiences which develop children's resilience in the face of a challenge and carefully scaffolding learning so everyone can make progress.

Deep and sustainable learning - lessons are designed with careful small steps, questions and tasks in place to ensure that learning is not superficial.

The ability to build on something that has already been sufficiently mastered - children's learning of concepts is seen as a continuum across the school.

The ability to reason about a concept and make connections - children are encouraged to make connections and spot patterns between different concepts and use precise mathematical language, which frees up working memory and deepens conceptual understanding.

Conceptual and procedural fluency - teachers move maths from one context to another (using objects, pictorial representations and word problems) and children need to learn their key number facts (so they are automatic) and have a true sense of number.

Problem solving is central - this develops children's understanding of why something works so that they truly have an appreciation of what they are doing rather than just learning to repeat routines without grasping what is happening.

Challenge through greater depth - rather than accelerated content (moving onto next year's concepts) teachers set tasks to deepen knowledge and improve reasoning skills within the objectives of their year group.

"In mathematics, you know you've mastered something when you can apply it to a totally new problem in an unfamiliar situation."

Dr. Helen Drury,
Director of Mathematics Mastery.



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Teaching for Mastery at Thomas Russell Infants' School has CPA at its core:

Concrete - providing children with objects and resources to manipulate in order to demonstrate their mathematical thinking.

Pictorial - providing opportunities for children to represent their mathematical thinking through diagrams, images, drawings or models.

Abstract - providing opportunities for children to become more familiar with formal mathematical representations including signs, symbols and digits.

Addition: Combining two parts to make a whole.

Concrete

Use cubes to add two numbers together as a group or in a bar.

Pictorial

Use pictures to add two numbers together as a group or in a bar.

Abstract

$$4 + 3 = 7$$
$$10 = 6 + 4$$

Use the part-part whole diagram as shown above to move into the abstract.

This approach is the cornerstone of how we support pupils who are finding a concept more difficult to grasp. Wherever possible, we bring the learning back to the concrete and pictorial.



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Reasoning: Talking and thinking like a mathematician:

The strategies below are used in school and can be reinforced at home too.

It is crucial children have a secure grasp of mathematical vocabulary. For a comprehensive and interactive online maths dictionary visit www.amathsdictionaryforkids.com.

Always encourage your child to *explain* how they have gone about solving a problem, and work with them to test, prove, explain, reflect and spot patterns.

Questioning and prompts are powerful tools to boost your child's mathematical thinking. Encourage your child to answer in complete sentences using accurate mathematical vocabulary. Reasoning about, and discussing maths problems in a way that others can understand, demonstrates depth of understanding - another fundamental aspect of mastering maths.

What do you think...?
Why?
What will happen if...?
What do you notice about ... ?
Can you see a pattern between... ?
What if we try...?

I already know
that ... so ...

This is true here
because ...

The pattern I
noticed was ...

I used the
inverse of ...

In school, teachers give children access to different types of reasoning questions, including:

<p>Fill in the missing numbers Do, then explain Sometimes, always, never Spot the mistake Other possible answers</p>	<p>Convince me/ prove it Make up an example True or False? What comes next? Working backwards</p>
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How do we ensure all children succeed?

The 2014 Curriculum set higher expectations for children achievement and the expectation that the majority of children will move through the programmes of study at broadly the same pace. To develop true fluency, reasoning and problem solving skills, mastery is about keeping children together and not moving on at an over rapid pace.

Children are given time to fully understand, explore and apply ideas rather than accelerate through new topics. This approach enables children to truly grasp a concept and the challenge comes from investigating it in new, alternative and more complex ways. Teachers will set challenge or investigative tasks accordingly.

Year 2 Greater Depth Challenge:

Captain Conjecture says,
'An odd number + an odd number + an odd number = an even number.'
Is this sometimes, always or never true?

Explain your reasoning.

Concrete resources might help pupils to explain their reasoning.



Year 1 Greater Depth Challenge

If your child finds maths tricky you may be concerned that they will not keep up with whole-class teaching. However we aim to break learning down into small, deliberate, purposeful steps. By using a CPA approach, wherever possible, and spending more time on difficult concepts, we build children's understanding and confidence.

Alex and Eva are trying to add 7 and 8 together using a number line.

Alex shows it this way:

$$7 + 8 =$$



Eva shows it this way:

$$8 + 7 =$$



Who is correct?

Explain your answer.



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How can you help at home?

Encourage a growth mindset - *all* children can achieve in mathematics! There is no such thing as a 'Maths person' (the belief that some children can do maths and others cannot). By doing this at home and at school, we will foster the following beliefs in your child:

- * Effort creates success.
- * Skill and ability can be increased over time.
- * Mistakes should be viewed as an opportunity to learn and develop.
- * Resilience - don't give up easily.

Help your child learn key number facts at home using the Key Instant Recall Fact sheets (KIRFs) that are sent home each half term.

Practising number facts

- ☆ Have a 'fact of the day'. Pin this fact up around the house. Practise reading it in a quiet, loud, squeaky voice. Ask your child over the day if they can recall the fact.
- ☆ Play 'ping pong' to practise complements with your child. You say a number. They reply with how much more is needed to make 10. You can also play this game with numbers totalling 20 or 100. Encourage your child to answer quickly, without counting or using fingers.
- ☆ Throw 2 dice. Ask your child to find the total of the numbers (+), the difference between them (-) or the product (x). Can they do this without counting?
- ☆ Play Bingo. Each player chooses five answers (eg numbers to 10 to practise simple addition, multiples of 5 to practise the five times tables). Ask a question and if a player has the answer, they can cross it off. The winner is the first player to cross off all their answers.
- ☆ Give your child an answer. Ask them to write as many addition sentences as they can with this number (eg $10 = \square + \square$). Try with subtraction.



- ☆ Give your child a number fact (eg $5+3=8$). Ask them what else they can find out from this fact (eg $3+5=8$, $8-5=3$, $8-3=5$, $50+30=80$). Add to the list over the next few days.

Counting ideas



- ☆ Practise chanting the number names. Encourage your child to join in with you. When they are confident, try starting from different numbers or practise counting backwards.
- ☆ Give your child the opportunity to count a range of interesting objects (coins, pasta shapes, buttons etc). Encourage them to touch and move each object as they count.
- ☆ Count things you cannot touch or see. Try lights on the ceiling, window panes, jumps, claps or oranges in a bag.
- ☆ Play games that involve counting (eg snakes and ladders, dice games, games that involve collecting objects). Your child could have fun creating their own game.
- ☆ Look for numerals in the environment. You can spot numerals at home, in the street or when out shopping.
- ☆ Cut out numerals from newspapers or magazines. Then help your child to put the numbers in order.
- ☆ Make mistakes when chanting, counting or ordering numbers. Can your child spot what you have done wrong?
- ☆ Choose a number of the week eg 10. Practise counting to and from 10. Count out groups of 10 objects or see how many places you can spot the numeral 10.
- ☆ Count back from 75 in fives. 'Starting at six, count up in tens. How far can you count?'
- ☆ Let children sort the washing! Matching and counting pairs of socks is a great way of practising odd and even numbers, counting in twos and the 2 times table and means it is one less job for you!
- ☆ Look at the pattern of house numbers as you walk along - are they odd or even numbers? What house number will be next?

Shapes and measures

- ☆ Choose a shape of the week eg a cylinder. Look for this shape in the environment (tins, candles etc). Ask your child to describe the shape to you (2 circular faces, 2 curved edges).
- ☆ Play 'guess my shape'. You think of a shape. Your child asks questions to try to identify it but you can only answer 'yes' or 'no' (eg Does it have more than 4 corners? Does it have any curved sides?).
- ☆ Hunt for right angles around your home. Can your child also spot angles bigger or smaller than a right angle?
- ☆ Look for symmetrical objects. Help your child to draw or paint symmetrical pictures/patterns?
- ☆ Make a model using boxes/containers of different shapes and sizes. Ask your child to describe their model.
- ☆ Practise measuring the lengths and heights of objects (in metres or cm). Help your child use different rulers and tape measures correctly. Encourage them to estimate before measuring.



- ☆ Let your child help with cooking at home. Help them measure ingredients accurately using weighing scales or measuring jugs. Talk about what each division on the scale stands for. Practise doubling/halving by baking eg 'If we wanted to make Grandad and Grandma a cake too, what are the total ingredients we would need? 'If I only wanted to make 10 buns rather than 20, what ingredients would I need?'
- ☆ Choose some food items out of the cupboard. Try to put the objects in order by weight, by feel alone. Check by looking at the amounts on the packets.

- ☆ Let your child borrow your watch and ask them various questions (eg Can you tell me when it is 2 o'clock? Can you tell me how long it takes for us to walk from our house to grandma's? You can play on the computer for 30 minutes. Can you tell me when the 30 minutes are up?)
- ☆ Play games like 'What's the time Mr Wolf?'
- ☆ What can your child do in exactly one minute? (eg hop on one leg, tidy their toys away, clear the table, count the seconds in their head)
- ☆ Buy your child a pocket diary or calendar and help them plan a daily timetable for their week. Write in the times of activities on the days of the week. 'How many days/weeks until your birthday/Christmas/our holiday?'

General/problem solving

- ☆ Food can be a very motivating way to help children learn their times tables and the corresponding division facts! For example, sweets can be grouped and counted, children can count the biscuits in a packet in twos as they put them in the biscuit tin, chunks on a chocolate bar can be counted in pairs, and so on. Pose questions such as 'There are five people in our family. If we have 2 biscuits each, how many will we eat altogether?' 'I have 15 sweets. If I share them between you and your two friends, how many will you get each?'
- ☆ Money can also be very motivating and the real stuff is the best! Give your child a jar of coins to sort by the different value coins. Ask them to 'Find the biggest coin. Is it worth the most?' 'Find the smallest coin. Is it worth the least?' 'Put them in order of value.' Use 2p, 5p and 10p coins to support learning the times tables.
- ☆ Create a shop. Ask your child to make price tags for different items around the house and use real money to play at being the shopkeeper. 'I'd like a teddy for 12p and a tin of beans for 10p - how much will that cost? If I give you 50p, how much change will I get?'
- ☆ Practise fractions by cutting pizza or sandwiches into halves and quarters. 'Is there a different way that I could cut my sandwich into quarters?'
- ☆ Peel an orange. Divide it into segments. Count how many there are. Eat one piece and ask how many are left. Eat half of the segments and ask how many pieces were eaten.
- ☆ 'Supercalifragilisticexpialidocious' How many letters has this word got? If the vowels cost 5p and the consonants cost 10p, how much would the word be worth? In the same way, how much is your child's name worth? How many words can you write for one pound?
- ☆ Look for repeating patterns all around you. Can your child create their own repeating patterns? Maybe they could draw a repeating pattern as a border for a thank you letter or special picture.
- ☆ Play 'I'm thinking of a Number'. Begin by giving clues such as 'My number is more than 50 but less than 100, it is an odd number, it is two more than 37 etc.' As your child becomes more confident, they can try to find out by asking questions eg 'Is it odd or even?' 'A multiple of 5?' 'More or less than 30?'



Maths is all around us and we're using it every day!

Many of you will already be doing these mathematical activities and practising your child's numerical skills without even thinking about it!

The most important thing is to make learning maths FUN.