

Maths at Raglan

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

$$f(x) = \lim_{h \rightarrow 0} \frac{(x+h)^2 - x^2}{h}$$

$$= \lim_{h \rightarrow 0} \frac{x^2 + 2xh + h^2 - x^2}{h}$$

$$= \lim_{h \rightarrow 0} \frac{2xh + h^2}{h}$$

Something to warm up...



Object of the game: Make the number 24 from the four numbers shown.

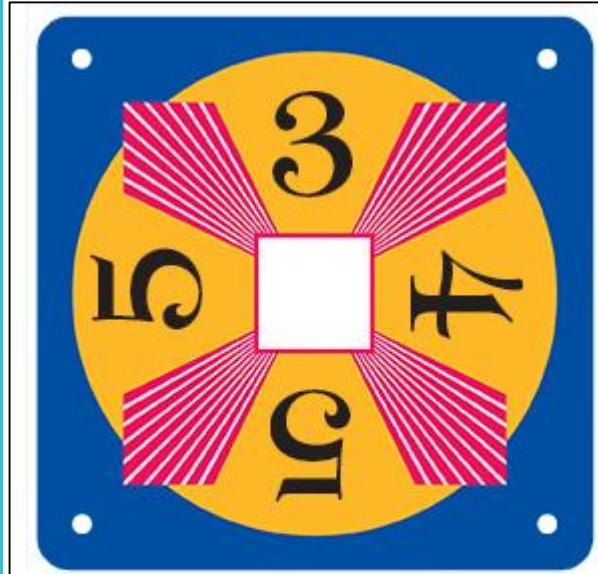
You can add, subtract, multiply and divide.

You must use all four numbers on the card but use each number only once.

You do not have to use all four operations.

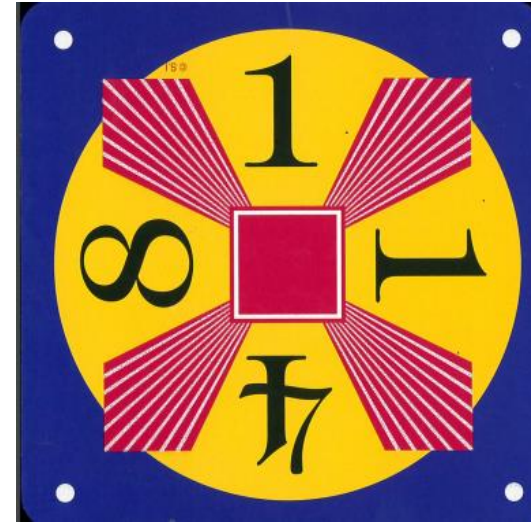
All number nines have a red centre, so you can tell a nine from a six.

Example:

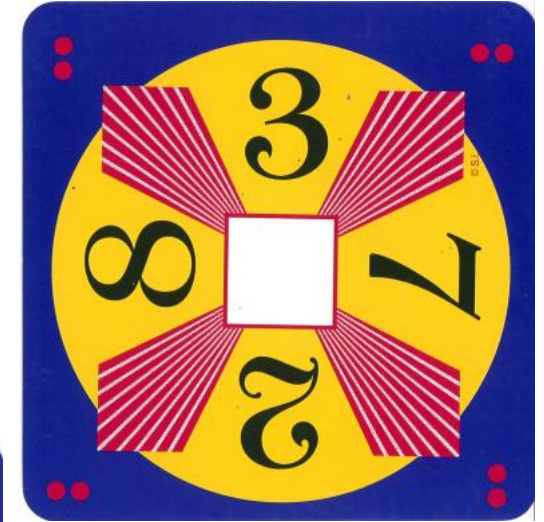


$$\begin{aligned} 5 \times 5 &= 25 \\ 4 - 3 &= 1 \\ 25 - 1 &= 24 \end{aligned}$$

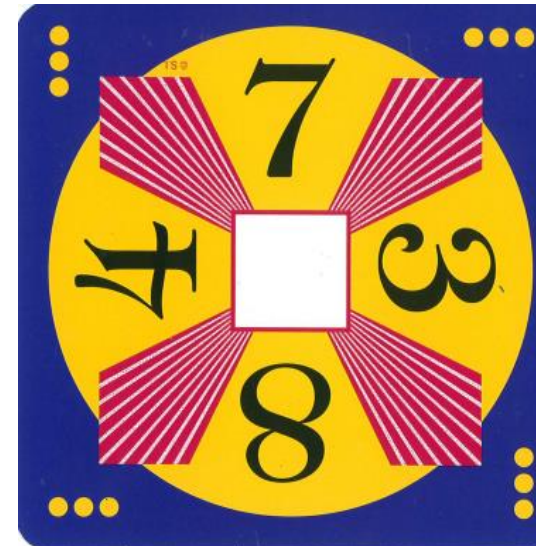
Easy



Medium



Hard



Challenge:



Agenda

National Curriculum – what we are teaching

Maths mastery

Cumulative maths

Concrete, pictorial and abstract

Number facts and patterns

Arithmetic skills and progression

Reasoning

Times tables

Supporting your child

Questions

The National Curriculum



Become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.



Reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language.



Can solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

Teaching for Mastery

At Raglan, we follow the White Rose curriculum overview. This uses a mastery approach to maths teaching. This is a research-driven teaching and learning method that meets the goals of the National Curriculum.

Numbers first

Depth before breadth

Encourage collaboration

Focus on fluency, reasoning and problem solving

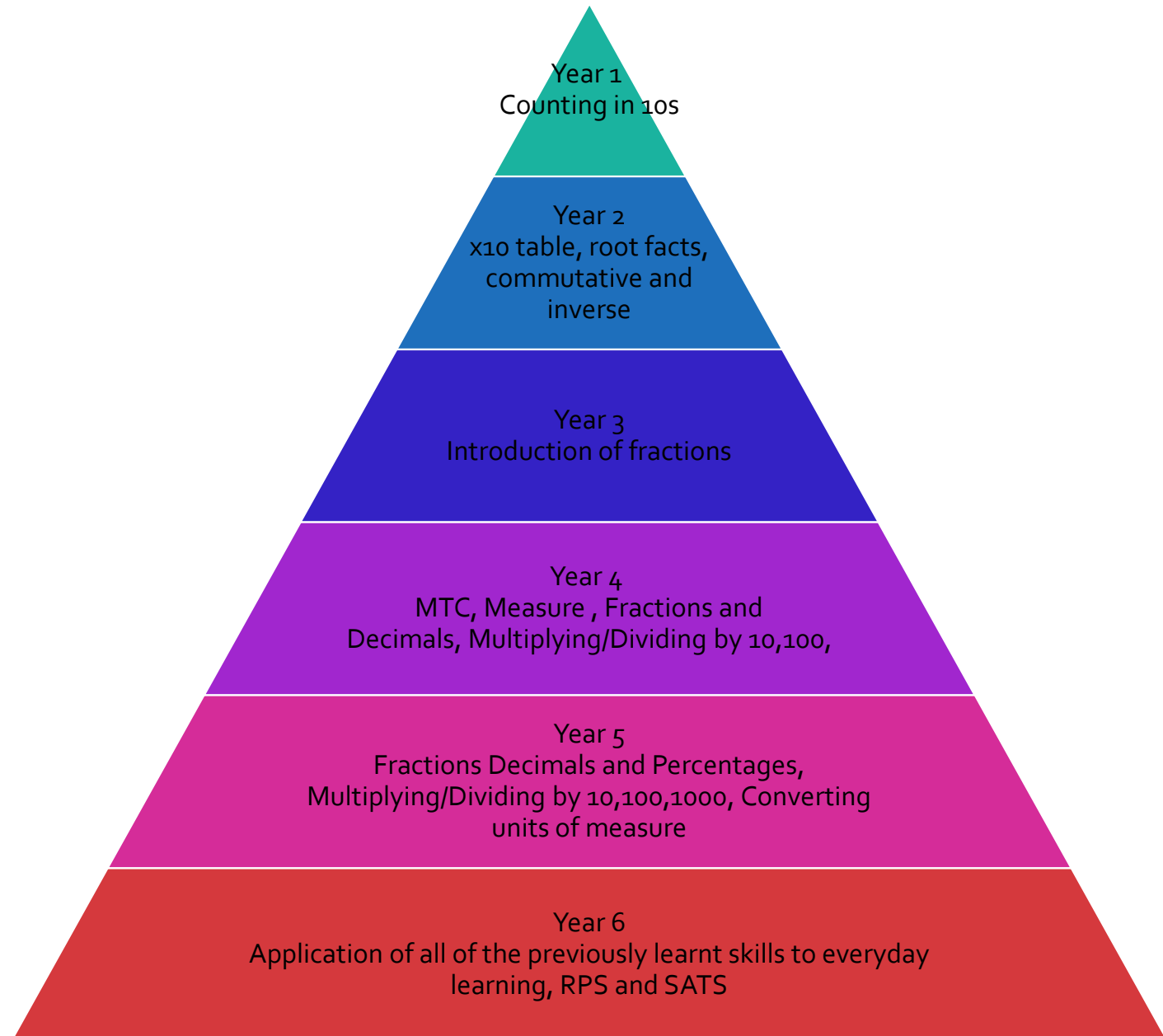
Cumulative Maths

Maths knowledge in the National Curriculum is cumulative.

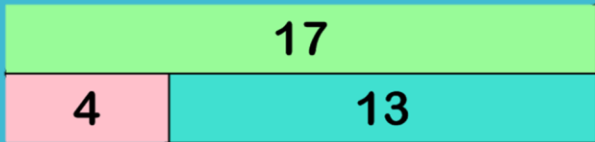
Therefore, having an early understanding of a concept is essential to long-term success within the national curriculum.

Example:

The year 1 objective of being able to count in jumps of 10



Calculation Strategies and Progression



$$4 + 13 = 17$$

Concrete – Pictorial – Abstract (CPA)

Research shows that all children, when introduced to a new concept, should have the opportunity to build competency by following the CPA approach. .

Concrete

Children should have the opportunity to work with physical objects/concrete resources, to bring the maths to life and to build understanding of what they are doing.

Pictorial

Alongside concrete resources, children should work with pictorial representations, making links to the concrete. Visualising a problem in this way can help children to reason and to solve problems.

Abstract

With the support of both the concrete and pictorial representations, children can develop their understanding of abstract methods.

Number, Number Facts and Progression...

Number Bonds

What are number bonds?

Number bonds are two numbers that add together to make a target number. For example, number bonds to 10 might include $2 + 8$, $6 + 4$ and $10 + 0$.

How do number bonds help children?

Learning number bonds helps children to learn the number sense that will inform their skills in addition and subtraction.

They will be able to see that numbers can be split into component parts, which will help them with adding or subtracting larger numbers.

Children will start by learning their number bonds to 5, then they'll quickly move on to number bonds to 10.

Once children are secure with number bonds to 10, it makes learning number bonds to 20, 50 and 100 much easier. They will start to see similarities in the endings of numbers and how they can help them - for example, if they have the number 67, they will immediately know that, to get to 100, the number must have a 3 on the end, because $7 + 3 = 10$. This will also help them to spot mistakes and check working in more difficult maths, such as problem-solving.

Automaticity and Fluency

AUTOMATICITY *

★
★
"Being able to give an accurate response to a posed maths question without giving conscious thought to the calculation."
★ ★

(Bloom, 1986; O'Connell & SanGiovanni, 2011; Parkhurst et al., MULTIPLICATION FACTS 7 2012; Poncy, Skinner, & Jaspers, 2006; Stickney et al., 2012).

What is fluency in maths?

Fluency in maths is a broad concept. The basics of mathematical fluency – as defined by the KS1 / KS2 National Curriculum for maths – involve knowing key mathematical facts and being able to recall them quickly and accurately.

True fluency in maths (at least up to Key Stage 2) means being able to apply the same skill to multiple contexts and being able to choose the most appropriate method for a particular task.

Fluency in maths lessons means we teach the content using a range of representations, to ensure that all pupils understand and have sufficient time to practice what is taught.

This is the arithmetic component to the learning, which builds the fluency and automaticity

Arithmetic

An example
from year 1 –
Addition 4
ways...or is it?

1	$1 + \square = 9$

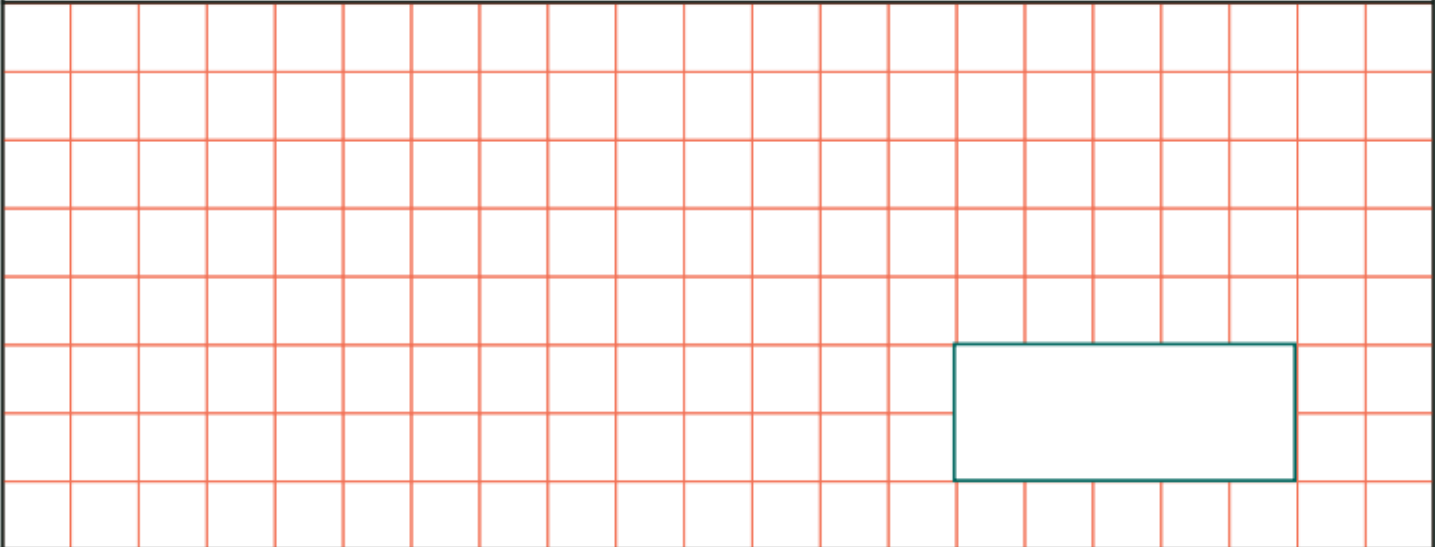
2	$10 = \square + 6$

3	$2 + 5 = \square$

4	$5 = 1 + \square$

Arithmetic

Manipulating
the numbers
and using
place value
knowledge...

19	$7 - 1.08 =$	<input data-bbox="2321 751 2397 825" type="checkbox"/> 1 mark
		

Reasoning and Problem Solving

The Contextual problem:

Polly Parrot squawks every 9 seconds; Mr Toad croaks every 21 seconds.

They both croak at the same time.

After how many seconds will they next make a sound at the same time?

What is this problem really asking?

What is reasoning in maths?

Reasoning in maths is the process of applying logical thinking to a situation to derive the correct problem-solving strategy for a given question and using this method to develop and describe a solution. Put more simply, mathematical reasoning is the bridge between fluency and problem solving. It allows pupils to use the former to accurately carry out the latter.

What is problem-solving in maths?

It's sometimes easier to start off with what problem solving is not. Problem solving is not necessarily just about answering word problems in maths. If a child already has a readily available method to solve this sort of problem, problem solving has not occurred. Problem solving in maths is finding a way to apply knowledge and skills you have to answer unfamiliar types of problems.

Times Tables

Why do we need them?

Learning the multiplication facts are essential as they make a very large contribution to numeracy and underpin our mathematical system - like counting, number bonds and place value. If children can get a firm grasp of their times tables, then they have a solid arithmetical foundation for future problem-solving.



The cumulative nature of the maths curriculum



Multiplicative thinking



Freeing up the working memory

The brain's working memory can only hold half a dozen or so pieces of new information at one time and therefore, in any intellectual activity, such as problem solving or critical thinking, the brain needs instant access to a store of information in its retained memory.

Daniel Willingham, Why Don't Students Like School? 2021

Times tables Progression

EYFS	Children to be exposed to counting in 2s, 5s and 10s when ready
Year 1	Multiples of x2, x10, root facts, commutative and inverse AIM to also know 5s
Year 2	Multiples of x5, x3, x4 root facts, commutative and inverse – AIM to start 6 and 8 as doubles
Year 3	Multiples of x6, x7, x8, x9 root facts, commutative and inverse
Year 4	Multiples of x11, x12 root facts, commutative and inverse Doubles and halves of 20-50
Year 5	Multiplying single digit numbers by 10, 100 and 1000. Dividing up to 4 digit numbers by 10, 100, 1000. Related multiples of 10/100/1000. Squared numbers and square roots. Doubles and halves of 50 -100. Multiplying decimals.
Year 6	Cubed numbers and cube roots Revision of all skills and maths fluency

The progression of times tables in this document is in-line with the national curriculum.

This is what will be taught in lessons.

However, knowing and recalling the facts as soon as possible will enable to children to free up their working memory to tackle the new concepts.

As we have seen, they are cumulative.

You can never learn the times tables too soon!

It is also never too late!

Strategies for Learning Times Tables

According to Nick Tiley-Nunn in his book, 'How To Teach Primary Maths', when we are teaching times tables then it's a good idea to 'SMASH' them to pieces.

S

- **Short and Sweet**
- Spend approximately 5 minutes on a times table related activity every day.

M

- **Mix it Up**
- Ensure that children can recall their multiplication facts forwards, backwards and jumbled up so they can work out related division calculations.

A

- **Arrangement**
- Represent numbers in as many ways as possible (e.g. arrays, patterns etc)

S

- **Stir and Stimulate**
- Encourage variety, movement and competition through times tables circuit training (make several stations where pupils use times tables to solve questions each station requiring physical activity)

H

- **Hammer Away**
- Consistent practise and plenty of repetition to develop resilience and perseverance.

It's worth remembering, times tables is a 'long game' and children need to go through several learning stages over many years before they can understand and apply them.

Times Tables Check – Practical Task

The multiplication tables check (MTC) is statutory for all year 4 pupils registered at state-funded maintained schools, special schools or academies, including free schools, in England.

What the DfE say:

The purpose of the MTC is to determine whether pupils can recall their times tables fluently, which is essential for future success in mathematics.

It will help schools to identify pupils who have not yet mastered their times tables, so that additional support can be provided.

Times Tables Check – Practical Task

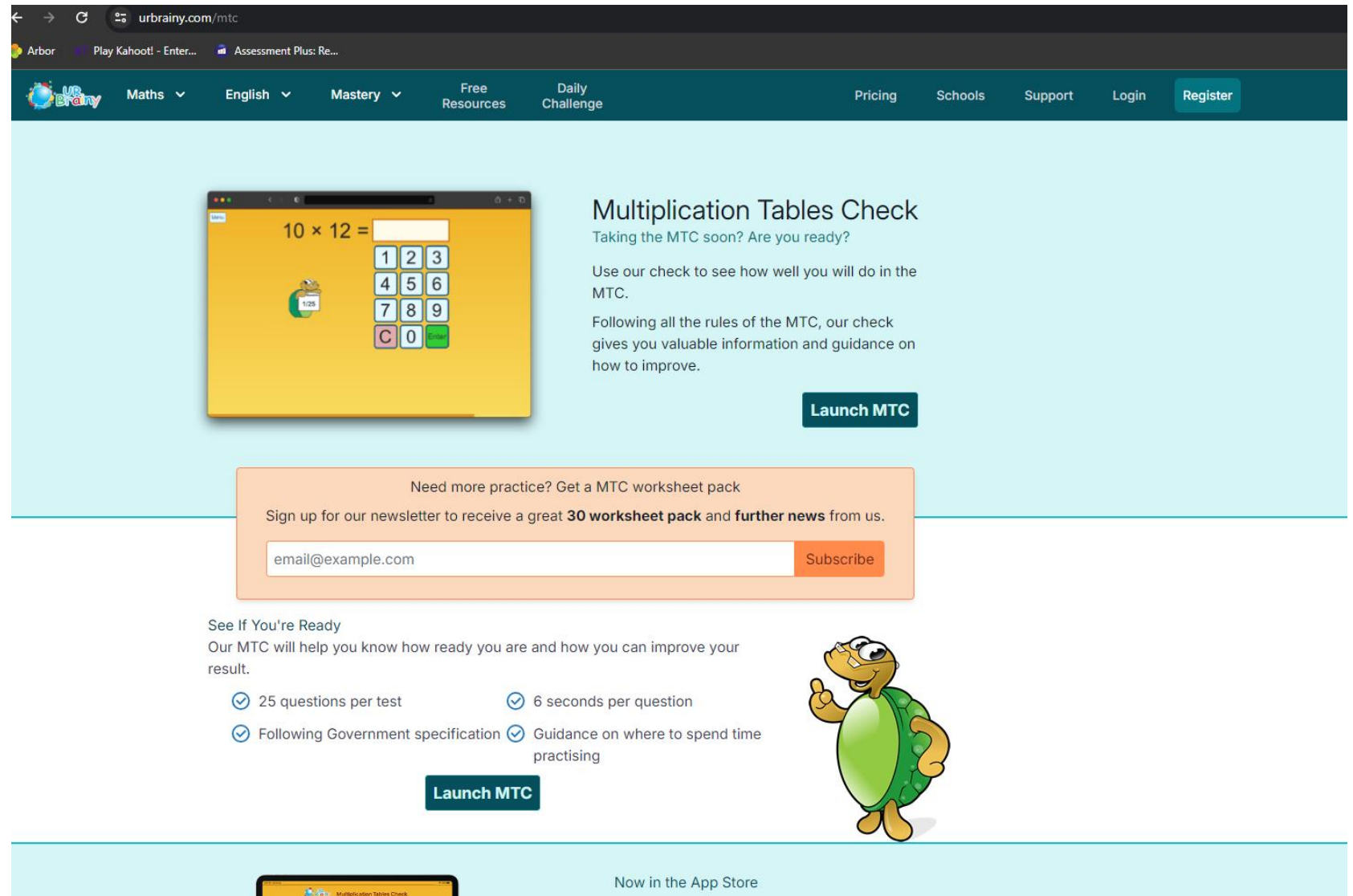
Your turn:

With your
learning partner...

Go to:
urbrainy.com/mtc

Click: Launch
MTC

You will have 6
seconds per
question...



The screenshot shows the website urbrainy.com/mtc. The navigation bar includes 'Maths', 'English', 'Mastery', 'Free Resources', 'Daily Challenge', 'Pricing', 'Schools', 'Support', 'Login', and 'Register'. The main content area features a calculator interface with the equation $10 \times 12 =$ and a numeric keypad. To the right, the heading 'Multiplication Tables Check' is followed by the text 'Taking the MTC soon? Are you ready?' and a description: 'Use our check to see how well you will do in the MTC. Following all the rules of the MTC, our check gives you valuable information and guidance on how to improve.' A 'Launch MTC' button is positioned below this text. Below the main content is a newsletter sign-up box with the text 'Need more practice? Get a MTC worksheet pack' and 'Sign up for our newsletter to receive a great 30 worksheet pack and further news from us.' It includes an email input field with 'email@example.com' and a 'Subscribe' button. Further down, the section 'See If You're Ready' states 'Our MTC will help you know how ready you are and how you can improve your result.' It lists four features: '25 questions per test', '6 seconds per question', 'Following Government specification', and 'Guidance on where to spend time practising'. A 'Launch MTC' button is located below this list. On the right side of this section is a cartoon turtle character. At the bottom of the page, there is a footer with 'Now in the App Store' and a small image of a smartphone displaying the app.

Supporting Your Child



- **Point out the maths in everyday life.** Include your child in activities involving numbers and measuring, such as shopping, cooking and travelling
- **Be positive about maths.** Try not to say things like "I can't do maths" or "I hated maths at school" – your child may start to think like that themselves
- Look at the school website and year group curriculum letters for useful websites and the concepts being covered
- **Regular practice** and reinforcement – refer to the **SMASH** approach
- Online resources and learning platforms.

Questions
on what we
have covered
today...

