Learning to love, loving to learn

Let all that you
do be done in love.
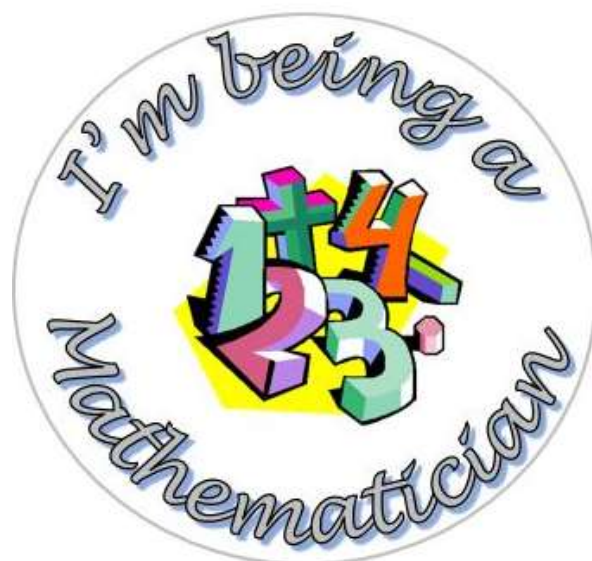1 Corinthians 16:14

Being a Mathematician at St Chad's

I'm being a Mathematician

What do we want Maths to look like at St Chad's?

'Pure mathematics is, in its way, the poetry of logical ideas.'

Albert Einstein

At St Chad's, we believe that maths is integral to everyday life; it teaches children how to make sense of the world around them through developing an ability to calculate, reason and solve problems. We want our children to appreciate the beauty and power of mathematics and to have a love of learning in line with our school vision. We aspire to ensure that every child becomes a confident, analytical and secure mathematician throughout their time at St Chad's.

Through a love of learning, children will be taught appropriate mathematical vocabulary and will gain confidence at talking like a mathematician as they progress through the year groups at St Chad's. With maths being critical to science, technology, engineering, financial literacy and most forms of employment, cross-curricular maths is regularly embedded within lessons at St Chad's. Children are provided with real-life learning experiences and opportunities to ensure they are confident to deal with everyday mathematical challenges. To ensure children have a secure understanding of mathematical concepts, they will be modelled a learning process through 'concrete, pictorial and abstract', whilst demonstrating fluency with what is being taught and showing their mathematical thinking through both verbal and written reasoning.

Overall, we want our children to be provided with the tools to leave our school as confident, skilled and resilient mathematicians, who understand that mathematics is a fundamental part of everyday life and the world we live in.

How do we achieve our aims in Maths at St Chad's?

Maths in the EYFS Curriculum

Developing enthusiastic and motivated mathematicians at St Chad's begins with the learning that takes place within the EYFS classroom. Ensuring the teaching of maths using concrete apparatus is imperative to support children with their early mathematical understanding. With a large focus on counting, comparison, composition, pattern and shape and space, this ensures children progress through EYFS with a good level of development. Using a large amount of repetition helps to ensure children are embedding taught knowledge within their long term memory. Even through the teaching of 'Drawing Club', and within continuous provision, mathematical knowledge is constantly drip fed to the children to progress children's knowledge and ensure security as they progress through their time in the EYFS classroom.

Power through the 5C's of Learning

Alongside St Chad's vision of 'learning to love, loving to learn', St Chad's 5C's of learning drive the creation of our Curriculum. Further information as to how the 5C's of learning positively support the teaching of Maths can be identified in the table below.

St Chad's 5C's	Using our 5C's within Maths
Community	• Visits and Visitors • Participation in different local events • Be a Rockstar Day • Fair Trade event
Communication	• Progression of mathematical vocabulary • Use of APE structure to support mathematical fluency and reasoning. • STEM sentence starters to support all children across the school.
Curiosity	• Opportunities to secure mathematical understanding through problem solving. • Developing children's understanding of how manipulatives can be used in different ways to support learning.
Collaboration	• Working in groups on problem solving activities. • Self and peer-assessment within lessons. • Collaborative partner work when discussing mathematical thinking.
Creativity	• Make links with our Connected Curriculum as well as with Science and Computing. • Exploring mathematical knowledge through real-life contexts both inside and outside of the classroom.

Understanding mathematical knowledge

Developing mathematical knowledge is of vital importance and the curriculum is planned and sequenced to ensure fluency and understanding is at the core for all children. Our maths curriculum is built upon developing children's declarative, procedural and conditional knowledge.

Having a sequenced progression of declarative knowledge and mental strategies from EYFS to Year 6 is important to support children with the ability to recall mathematical facts fluently. As seen below, a progression of declarative knowledge ensures that knowledge is learnt and retrieved throughout a child's time at St Chad's.

Year Group	Counting and Place Value	Addition and Subtraction	Multiplication and Division	Measures (Length, Weight, Capacity)	Measure (Time and Money)	Fractions, Decimals and Percentages	Shape and Position
EYFS	I know my numbers in order up to 10. I know how to count backwards from 10 to 0 in order. I know my numbers in order from 0 to 20. I know how to count backwards from 20 to 0 in order. I know how to put numbers in order from 0 to 20.	I can use physical representations to add and subtract up to 20. I can find one more and one less than numbers to 20. I can partition numbers up to 5 into two groups. I can partition numbers up to 10 into two groups.	I can double numbers up to 10. I can halve numbers up to 10.	I know that I can compare mass and use language like heavy, light, heavier, lighter. I know that I can compare capacity using vocabulary such as empty, nearly empty, half full, nearly full and full. I know that I can compare length using the vocabulary taller, shorter, longer, longest, and shortest.	I know that Monday, Tuesday, Wednesday, Thursday, Friday, Saturday and Sunday are the days of the week. I know that Summer, Autumn, Winter and Spring are the seasons of the year. I know the time to o'clock. I know the difference between night and day.		I can identify different 2D shapes such as circle, square, triangle and rectangle. I know different 3D shapes such as cube, cuboid, sphere, cylinder and cone. I can use the vocabulary forwards, backwards, left and right correctly. I know that a circle has one curved side. I know that a triangle has three straight sides. I know that a square and a rectangle has 4 straight sides and 4 corners.
Year 1	I can count to and across 100, forwards and backwards, from any given number. I can count forwards and backwards in steps of 10, linking to measure. I can count forwards and backwards in steps of 2, linking to measure. I can count forwards and backwards in steps of 5, linking to measure. I can identify one more and one less than a number. I can read and write numbers to 20 (numerals and words). I know that an odd number ends in 1, 3, 5, 7 and 9. I know that an even number ends in 2, 4, 6, 8 and 0. I can identify odd and even numbers up to 20.	I know all addition and subtraction facts for all numbers between 0 and 10. I know all addition and subtraction facts for all numbers up to 20.	I know that multiplication requires the making of equal groups. I know that division requires the sharing of objects/numbers into equal groups. I can double numbers up to 20. I can halve numbers up to 20.	I know that I can compare length using the vocabulary taller, shorter, longer, longest, and shortest. I know that the same means equal to. I know that I can compare mass using vocabulary such as heavier and lighter. I know that I can compare capacity using vocabulary such as empty, nearly empty, half full, nearly full and full.	I know that Monday, Tuesday, Wednesday, Thursday, Friday, Saturday and Sunday are the days of the week. I know that January, February, March, April, May, June, July, August, September, October, November and December are the months of the year. I know that Summer, Autumn, Winter and Spring are the seasons of the year. I can tell the time at o'clock and half past. I know that different coins and notes represent different amounts of money.	I know that a half is when an object/shape/number is split in two equal parts. I know that a quarter is when an object/shape/number is split into 4 equal parts.	I can identify a quarter, half, three quarter and full turn. I can use the vocabulary forwards, backwards, left and right correctly. I can describe the position of an object. I can identify different 2D shapes such as circle, square, triangle and rectangle. I know different 3D shapes such as cube, cuboid, sphere, cylinder and cone.

*An example of declarative knowledge and mental strategies in EYFS and Year 1.*

Follow this link to see St Chad's Declarative Knowledge and Mental Strategies progression

Meeting Our Curriculum Drivers

As a school, we meet our curriculum drivers through a robust system of planning, a consistent approach to teaching mastery of maths (including varied fluency, problem solving and reasoning), supportive learning environments and a triangulated approach to assessment.

Creating our Mathematics Curriculum

As previously stated, our maths curriculum is based upon developing children's declarative, procedural and conditional mathematics knowledge. We want children to be secure with their understanding of different mathematical concepts and processes, combined with a genuine procedural fluency. A child who has mastered a concept is able to apply their understanding in a different context and choose the appropriate method to solve different types of problems. Using White Rose Maths as the basis for planning, long term planning maps out the South Gloucestershire Age Related Expectations (ARE's) across the year in a logical order with a focus on teaching in small steps. Medium term planning plots the weekly learning objectives for arithmetic, the main teaching concepts, let's explore/ let's re-visit and times-tables expectations. Small steps planning (weekly plans) are used for daily teaching - highlighting teaching procedures as well as types of reasoning and problem solving questions to be shared with the children. Children are taught through the process of concrete, pictorial, and abstract concepts to develop a deeper understanding.
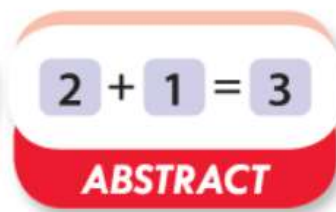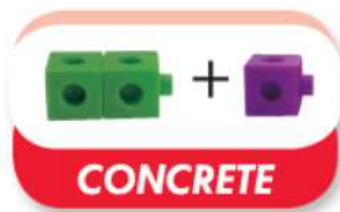
How are lessons structured across the school?

Year Group				
Year 1	Number, Counting, Making links	Main teaching (fluency, problem solving and reasoning)	Let's Explore/Let's revisit	Multiples /times tables
Year 2	Number, Counting, Making links	Main teaching (fluency, problem solving and reasoning)	Let's Explore/Let's revisit	Times tables
Year 3	Number, Counting, Making links	Main teaching (fluency, problem solving and reasoning)	Let's Explore/Let's revisit	Times tables
Year 4	Number, Counting, Making links	Main teaching (fluency, problem solving and reasoning)	Let's Explore/Let's revisit	Times tables MTC practice
Year 5	Number, Counting, Making links (Start 10 to tackle in term 5 and 6)	Main teaching (fluency, problem solving and reasoning)	Let's Explore/Let's revisit	Times tables Calculation
Year 6	Ten to tackle questions	Main teaching (fluency, problem solving and reasoning)	Let's Explore/Let's revisit	Time tables Calculation

| First 10 minutes of the lesson |
|---|
| Last 10 minutes of the lesson |
| First 5-10 minutes after lunch |

Number, counting, making links:

'Knowing more, remembering more and making links' is at the core of our mental maths teaching. For the first ten minutes of every maths lesson, children complete a mixture of maths talk and retrieval activities focused upon developing children's declarative knowledge and mental strategies. Following a maths talk structure, children will have the opportunity to learn, discuss and use a variety of strategies when answering mathematical sums using a mental method. The oracy aspect of this opening 10 minutes is important to provide children with a chance to discuss their mathematical thinking within a safe and secure environment. Children use hand gestures to agree, build or challenge their peers' mathematical thinking and sentence stems are used to support verbal sentence construction.

BUILD   CHALLENGE   AGREE

repeat
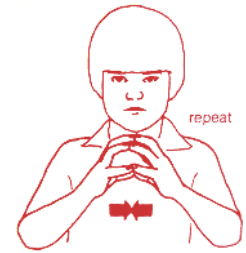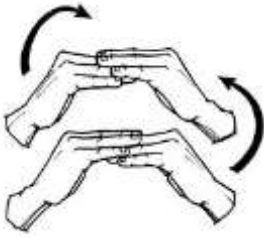
|	Number Talk session (10 mins)				Every Friday is an 8 to tackle based upon arithmetic methods.	
	Term 1 (Place Number)	Term 2 (Addition)	Term 3 (Subtraction)	Term 4 (Fractions)	Term 5 (Addition and Subtraction through measures)	Term 6 (Fractions)
1	2, 5 and 10 x table. I can understand 2D numbers. I can count forwards in 10s from any number.	4 x table and 2 x table. I know my number bonds within 100. I can identify 10 more for a number up to 100.	3 x table. I can identify 10 less for a number up to 1000.	9 x table. Compare and order fractions with the same denominator. Count in halves and quarters.	4 and 8 x table. Converting measures (length). Add and subtract length.	9 x table. Calculating fractions of amounts with unit fractions.
2	1, 5 and 10 x table. I can count backwards in 10s from any number. I can count forwards in 100s from any number. I can understand 3D numbers.	4 x table and 2 x table. I know my number bonds within 100. I can identify 10 less for a number up to 100.	3 x table. I can identify 100 less for a number up to 1000.	9 x table. Find ½ and ¼ of number and quantities. Find 2/4 and ¾.	4 and 8 x table. Converting measures (capacity). Add and subtract capacity.	9 x table. Calculating fractions of amounts with non-unit fractions.
3	2, 5 and 10 x table. I can count backwards in 100s from any number. I can understand 3D numbers.	4 x table. I can identify 100 more for a number up to 100. 2 digit by 2 digit adding (adjusting e.g. 63 + 29).	3 x table. 2 digit by 2 digit subtraction (adjusting e.g. 63 – 29). 2 digit by 2 digit (partitioning).	9 x table. Count in fifths and tenths. Find 1/5 and 1/10 of number and quantities.	4 and 8 x table. Converting measures (weight). Add and subtract weight.	9 x table. Identifying equivalent fractions.
4	2, 5 and 10 x table. I can understand 3D numbers. I can partition a 3D number.	4 x table. 2 digit by 2 digit adding (adjusting e.g. 63 + 29). 2 digit by 2 digit (partitioning).	8 x table. 2 digit by 2 digit subtraction (adjusting e.g. 63 – 29). 2 digit by 2 digit (partitioning).	11 x table. Find 1/3s of a number or quantity and 2/3. Compare and order unit fractions.	3 and 6 x table. Add and subtract within the context of money.	11 x table. Gap filling.
5	2, 5 and 10 x table. I can partition a 3D number. I can compare and order numbers.	8 x table. 2 digit by 2 digit (doubling e.g. 35 + 36). 3 digit by 2/3 digit (doubling e.g. 235 + 236).	6 x table. I can identify my number families for a single number sentence.	11 x table. Identifying equivalent fractions.	3 and 6 x table. Mental addition and subtraction within different contexts (using adjusting, partitioning and doubling strategies).	11 x table. Gap filling.
6	2, 5 and 10 x table.	8 x table.	6 x table.	11 x table.	3 and 6 x table.	11 x table.

Example long term plan for the 'Number, Counting, Making links' part of the lesson.

Main teaching
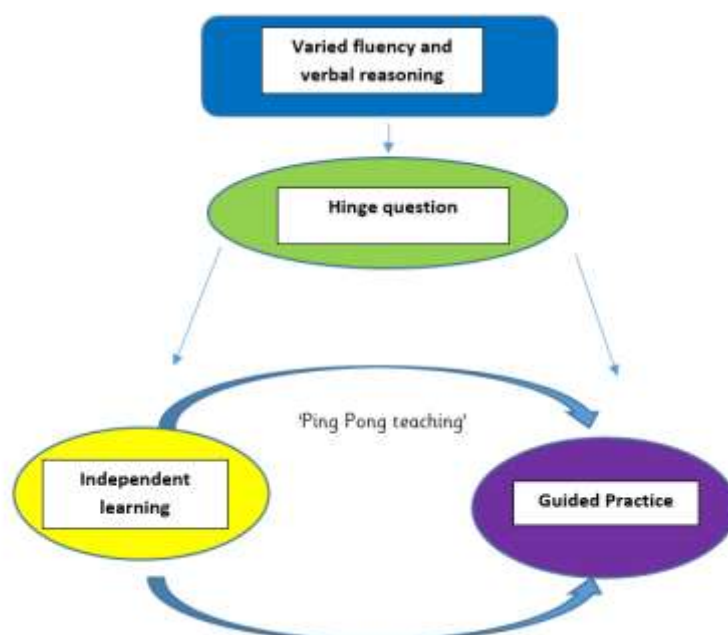
To support the fluent understanding of mathematical facts and concepts, each small step is taught over at least two days. An example teaching structure can be identified below:

Day 1	Day 2
Teaching of objective through varied fluency questions.	Recap of varied fluency from the previous lesson to consolidate learning.
Focus on using the St Chad's teaching structure to incorporate lots of modelling, checking for understanding and guided practice before children move onto independent varied fluency practice.	Focus on using the St Chad's teaching structure to incorporate lots of modelling, checking for understanding and guided practice before children move onto independent reasoning/problem solving practice.
Physical manipulatives used to support children's understanding of the taught knowledge	Physical manipulatives used to support children with reasoning and problem solving, when required.
Open-ended problem solving questions used to further progress children who have a fluent understanding.	Some children might need further fluency practice to eradicate any misconceptions that might have arisen.

Within the main part of the lesson, our children have the confidence to choose their level of learning from the 'hinge question' and are then directed to appropriate fluency, problem solving and reasoning activities to deepen understanding. With guided practice tailored to individual needs, each child can move in and out of support ('ping pong') where necessary. Children of all abilities develop their mathematical understanding through the use of manipulatives such as 'bar models', 'base ten', 'place value counters' and 'numicon'. There is no ceiling to achievement in our lessons and children report that they feel happy to make mistakes, enabling them to improve along their journey.

Let's explore/Let's re-visit:

We believe that making connections between the new and what has already been learned is vital to deepen knowledge and make progress. This is why the last 10 minutes of the lesson is dedicated to explore and re-visit key concepts.

St Chad's Calculation Policy

As previously suggested, within the main teaching section of a maths lesson, teachers introduce mathematical concepts through a concrete, pictorial, abstract approach to support the child's conceptual understanding of the concept being taught. St Chad's Calculation Policy is a progressive document that outlines the mathematical methods taught, and manipulatives used to do so, in each year group of the school. The focus is on supporting children to become confident at using mathematical strategies accurately and as they move up the school, they will become more efficient and independent at using these.

Follow this link to see the St Chad's Calculation Policy.

Developing a secure understanding of times tables

Following our times-tables progression document, each class will practice times-tables in a variety of ways including chanting in and out of order, finding corresponding fact families and using switchers. This takes place after lunch for 10 minutes each day.

[Follow this link to see the St Chad's Times Tables Progression Document](#)

How do our learning environments support development of knowledge?

In all classrooms, there is a maths learning wall, readily available manipulatives/ practical equipment and APE sentence stems. By reducing the amount on classrooms walls to focus on the key knowledge children need to achieve and progress within lessons, this helps to reduce the extraneous load for children and therefore helps to lower the cognitive overload.
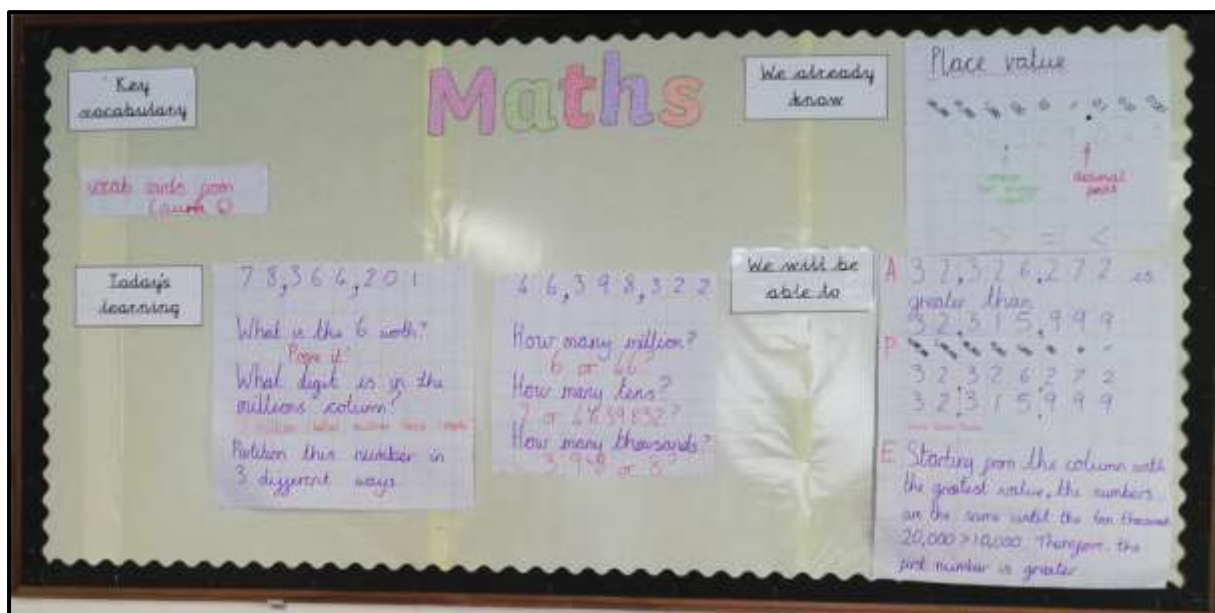
Learning walls are added to as the learning progresses, with examples of learning going on the display as they happen. They contain key vocabulary (for each unit of work) what we already know (yesterday's work), today's learning and an example of what the children will be able to do after the teaching input. These walls will act as prompts to support teaching and learning throughout maths lessons. The aim is to allow children to become more engaged with their environment and use the prompts available to them. To develop their oracy skills, children use APE sentence stems to help them explain their answers when reasoning.

How maths is linked in closely with the connected curriculum?

With maths being critical to science, technology, engineering, financial literacy and most forms of employment, cross-curricular maths is regularly embedded within lessons at St Chad's. Children are provided with real-life learning experiences and opportunities to ensure they are confident to deal with everyday mathematical challenges. Within our connected curriculum, maths can be seen in lessons such as computing, science, DT, and humanities. Walking through our school, you will notice our corridors are filled with high quality cross-curricular displays, reflecting the children's love of the subject.

Using Key Instant Recall Facts (KIRFs) to support the learning of declarative knowledge

A child's fluent understanding and instant recall of key mathematical facts is vital in supporting them implementing mathematical knowledge within lessons. A progression of KIRFs is implemented across the school focusing on children learning key mathematical facts at home as part of their homework structure. A new KIRFs sheet is provided to children at the beginning of every term with a range of different helpful tips and practical activities that parents can use with their child to support their instant recall of the mathematical facts. To ensure success a little and often approach is advised to parents to ensure knowledge is continually being retrieved and memory schemas strengthened. Throughout the term, regular check-ins happen with children to ensure that they are learning their KIRFs, whilst in their home environment.

Follow this link to see the St Chad's KIRFs Progression document

An example of a KIRF sheet used in Year 2.

How is progress assessed in Maths?

Use of retrieval opportunities, including the use of Plickers to check for understanding of taught knowledge and vocabulary.

Use of Tapestry as an evidence tool to demonstrate learning through multi-sensory approaches.

Use of a range of questioning techniques to check for children's understanding of knowledge that is taught in small steps.

Assessment of Maths

Scrutinies of children's written work.

Pupil Conferencing and learning walks by the subject leader.

End of unit assessments of children's understanding of key knowledge. Intervention programmes are used to support children's gaps in learning.

End of term assessments against the year group ARE's to identify progress that the children have made across the academic year.