St. Christopher Primary School



St Christopher PRIMARY SCHOOL

Curriculum

Handbook Maths

Updated September 2023

Pages	Contents
3	Key Facts
4	Intent: Rationale, Ethos and Aims
5-6	Implementation
	The Organisation of Mathematics
	Planning
7-9	Medium Term/Curriculum Maps
	Short Term – Weekly Planning
10	Maths Planning and organisation in Early Years
11-12	CPA Approach
13	Problem solving method
14	Guide to written methods
15-17	Written methods for Addition
18-21	Written methods for Subtraction
22-25	Written methods for Multiplication
26-30	Written methods for Division
31-36	Written methods for Fractions
27.20	Impact
57-38	Testing and Assessment

- Learning objectives for short term planning should be derived from year group expectation statements in the Maths Curriculum maps
- Long term planning (Curriculum maps) should be based on a 34 35 week school year taking into account assessment weeks and special events.
- Curriculum maps should not be stuck to rigidly but should empower teachers to use their professional judgement to consolidate learning when appropriate.
- Medium Term plans can be used, alongside the Curriculum maps, to assist with teacher assessment and levelling. They should also inform next steps and planning.
- Teaching time within maths should reflect the calculated weightings across the four strands as outlined in the handbook. As higher ability children are more fluent in their number work, they should be exposed to GSM earlier in the year.
- Children will record Number work and Geometry, Measurements and Statistics work in separate exercise books (from Year 2 onwards).
- The marking policy should be applied to all marking in maths.
- Assessments should be carried out using the agreed documents (alongside teacher knowledge) to ensure consistency and more accurate data for maths across the school.
- As a school, we will teach using the CPA approach. However, where pupils begin to use large numbers, we recognise that children may not necessarily require a concrete approach and this is difficult on a practical level.
- A range of problem solving strategies will be taught using the agreed approach on page 13 of this handbook.
- There is an expectation that each maths setting/classroom is Maths rich. This includes; working
 walls, evidence of prior maths strategies taught, steps to success and a range of numbers reflecting
 the ability of the children.

The Importance of Mathematics

Mathematics is a creative and highly inter-connected discipline that has been developed over centuries, providing the solutions to some of history's most intriguing problems. It is essential to everyday life, critical to science, technology and engineering, and necessary in most forms of employment. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, and a sense of enjoyment and curiosity about the subject.

Rationale

This handbook is written to:

- Provide a consistent approach to the learning and teaching of mathematics across the whole school
- Instil teachers with confidence when planning and delivering mathematics lessons
- Provide a consistent approach to long and short term planning that allows teachers to use professional judgement to teach to the children's needs
- Ensure pupils are assessed accurately and consistently across the school
- Ensure the correct balance of learning and teaching time for number, geometry, measure and statistics in all year groups.

Maths Curriculum Objective

As a result of this handbook we expect all pupils to possess numeracy skills and have an understanding of mathematical concepts and processes in a variety of contexts.

<u>Ethos</u>

As a school we want to promote enjoyment and enthusiasm for learning through practical activity, exploration and discussion providing maths lessons that pupils look forward to, in which they can maximise their potential.

Implementation

As a school we believe that children from all backgrounds can succeed in mathematics. Our focus is on raising standards – working together to show what pupils are capable of and to find effective ways to enable every child to succeed. We do not believe that mathematics should be used to identify those who appear to be naturally more or less able, but rather that all children have the potential to become 'able' mathematicians.

We aim for children to study fewer areas of learning in each term and in each year but develop a greater understanding of each. This will help teachers to focus on quality teaching and not be hindered by a curriculum based on coverage of topics.

Three key features of our maths teaching include:

- High expectations for every child
- More time on fewer topics
- Problem-solving at the heart

We aim to embed a deep understanding of maths by employing a *concrete, pictorial, abstract* approach – using objects and pictures before numbers and symbols so that pupils understand what they are doing rather than just learning to repeat routines without grasping what is happening.

We emphasise:

Language – communicating ideas, proof, clarity and development of mathematical concepts.

Thinking – questioning and task design to promote mathematical thinking.

Understanding – using a concrete, pictorial and abstract approach to deepen conceptual understanding, and making connections to previous learning, to other subjects and to the 'real world'.

Problem Solving – to be mathematical is to solve mathematical problems. Problem solving is both why and how we learn mathematics.



The Organisation of Maths

- Maths is led and organised by the maths coordinator.
- Evaluating the teaching of the subject by the monitoring of teachers' plans and through work analysis, identify effective practice and 'Even Better Ifs', taking appropriate action to improve further the quality of teaching
- Establishing clear targets for achievement in maths and evaluating progress through the use of appropriate assessments and regular yearly analysis of this data
- Working closely with the senior leadership team to identify areas of strength and areas for improvement.
- Supporting, motivating and advising staff, and work alongside them in the development of their classroom practice, where appropriate
- Leading by example through good practice and, where relevant, model good lessons
- Disseminating information to the staff and providing INSET to promote staff development and improve learning and teaching
- Writing and contributing action-planning in the subject for the school improvement plan
- Ensuring the teaching of maths is resourced effectively and resources are deployed appropriately.

Planning

Long Term Planning KS1

Curriculum maps are designed and based on a 34 week school year (taking into account assessment weeks and special events). The plan should be used as a guide to structure your teaching as follows:

Strand	Approximate Teaching Time
Number and Calculation	25 – 28 weeks
Geometry, Shape and Space	2 – 3 weeks
Statistics (year 2 only)	2 - 3 weeks
Measure	3 – 4 weeks

Long Term Planning KS2

Strand	Approximate Teaching Time
Number and Calculation	20 – 22 weeks
Geometry, Shape and Space	6 – 7 weeks
Statistics	3 - 4 weeks
Measure	3 – 4 weeks

Each year group has a curriculum map that is designed to ensure statutory coverage and clear lines of progression. The map outlines the topics within the strands that will be taught from N to Y6 and is constructed to show clear progression through the number system, breaking down the end of year expectations into clear progressive steps. The objectives are mapped out and broken down; identifying the key objectives and outlining when the different strands of maths are taught.

Assessment weeks and special events do not feature on the long term plan but are timetabled separately. The long term plan provides a guide to the appropriate time allocated to the different areas of maths but should not be stuck to rigidly. Teachers should use their professional judgement and on-going assessments to inform and adapt their planning as and when appropriate.

Example of the Maths Curriculum Map

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		Fractions			
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St Christopher Primary School Maths – Teaching and Learning Policy

Medium Term Planning

The Curriculum Maps in conjunction with Schemes of Learning from White Rose Maths and this handbook for our route through calculations are used to guide a block of work. White Rose Maths is a scheme which is used to enhance the teaching of using and applying mathematical strategies.

Short Term Planning

Although short term planning is not formally requested to be handed in, it should be made available when requested. In accordance with the School Handbook and Teaching and Learning Protocol : ECTs, RQTS and teachers who are subject to a support plan may be asked to include more detail in their short term planning.

The short term planning should state:

- The class
- The date
- The groups within the class and the level at which they are working.

Short term plans should contain information about the following:

- **Tables starter/Rainbow Challenge activity** with a clear Learning Objective— if they are being taught that day.(Note: not needed every day)
- Mental/oral starter A brief description of the activity and what the children are learning with a clear Learning Objective
- **The learning objective for each lesson** The learning objectives should be concise and clearly explain what the children are learning; the objectives should always be derived from the Curriculum Map, in line with the Primary Curriculum.

Main teaching activities - Brief outline of what is going to be taught and any specific resources for this part of the lesson. (More detailed for less experienced teachers) Time should allocated to address Pink for Thinks //Misconceptions.

- **Key vocabulary** The key mathematical vocabulary for the week should be listed.
- **Plenary/assessment** Should give an overview of how the lesson is concluded and what will be assessed, this should not be a detailed description of activities as often mini-plenaries throughout the lesson can impact on learning more effectively.
- Differentiated activities All groups now have an agreed colour which features on the planning pro-forma. The coloured cell should also give the level that the activity is pitched at. This section should contain a brief summary of the task or learning activity/resources/ additional adult support. Green = Upper ability, Yellow = Middle ability, Red = Lower ability.

Short Term Planning Format

4

Year Group:

Set:

St Christopher Primary Maths Planning

Teacher:	Term:			Week Beginning:		
Group/ Level						
Children in each group						
Tables/ Rainbow Acti Mental Oral Starter Fo	vity Learning cus Objectives	Vocabulary	2.	ain Teaching Input and Activi	ities	Plenary
(approx. 10 mins in to	(tal)					
	May need to differentiated		Brief outline of what is going lesson. (More detailed for le	t to be taught and any specific re ss experienced teachers)	esources for this part of the	
Mental/oral starter:	according to the		Ensure that this part of the h	esson revisits previous misconce	eptions or recaps previous	
BE clear on the LO for this	section ability of the		learning from this topic			
of the lesson	group.					

total)	Objectives	Main Teaching Input and Activities	Plenary
a aracti∠ ∎	fay need to Utterentiated ccording to the bility of the roup.	Brief outline of what is going to <u>be taught</u> and any specific resources for this part of the lesson. (More detailed for less experienced teachers) Ensure that this part of the lesson revisits previous misconceptions or recaps previous learning from this topic	
		Brief outline of what the children will be doing/ resources for that group/ additional adult support	

Maths Planning and organisation in Early Years

Planning and Learning Objectives for maths in early years should be derived from the St Christopher EYFS maths Curriculum Map

They include the areas:

Numbers: Children have a deep understanding of numbers to 10, including the composition of each number. They subitise (recognise quantities without counting) up to 5 and automatically recalls (without reference to rhymes, counting or other aids) number bonds to 5 and some number bonds to 10. They recall subtraction facts as well as some doubling facts.

Numerical Patterns: Children recognise the counting system and verbally count beyond 20. They compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity. They explore and represent patterns within numbers up to 10, including evens, odds, double facts and how quantities can be distributed equally.

Shape, Space and Measures: Children develop their spatial reasoning skills through selecting, rotating and manipulating shapes. They recognise, copy and create patterns. They compare length, weight and capacity.

Calculating: children work practically to solve problems involving addition (combining groups of objects), subtraction (getting rid of objects) and some very practical experiences of multiplication (groups of) and division (sharing).

Using and Applying: Children begin to use the vocabulary involved in adding and subtracting during practical activities and discussion. They record, using marks that they can interpret and explain. They begin to identify own mathematical problems based on own interests and fascinations.

St Christopher Primary School Approach to Maths Teaching - CPA

CPA – Concrete Pictorial Abstract

We aim to embed a deep understanding of maths by employing a concrete, pictorial, abstract approach – using objects and pictures before numbers and symbols so that pupils understand what they are doing rather than just learning to repeat routines without grasping what is happening. This is the same approach used in Singapore maths.

The concrete-pictorial-abstract approach, based on research by psychologist Jerome Bruner, suggests that there are three steps (or representations) necessary for pupils to develop understanding of a concept. Reinforcement is achieved by going back and forth between these representations.

Concrete representation

The active stage – a child is first introduced to an idea or a skill by acting it out with real objects. In division, for example, this might be done by separating apples into groups of red ones and green ones or by sharing 12 biscuits amongst 6 children. This is a 'hands on' component using real objects and it is the foundation for conceptual understanding.

Pictorial representation

The iconic stage - a child has sufficiently understood the hands-on experiences performed and can now relate them to representations, such as a diagram or picture of the problem. In the case of a division exercise, this could be the action of circling objects.

Abstract representation

The symbolic stage - a child is now capable of representing problems by using mathematical notation, for example: $12 \div 2 = 6$

This is the ultimate mode, for it is clearly the most mysterious of the three.

Concrete



St Christopher Primary School Approach to Maths Teaching - CPA

Pictorial

Using diagrams and images to represent numbers and symbols.

Here, children move away from physical, hands on objects and instead use pictures for demonstrations and also recording.



<u>Abstract</u>

Progressing to the use of numbers and symbols in a conventional written method:



St Christopher Primary School Problem Solving and Conceptual Understanding

At St Christopher, we want all children to be confident problem solvers and to have good reasoning skills. We use a 3 step process to support this.

- 1. **Read the problem** and **explain** what is happening in your own words. Focus on how what is happening in the problem tells us which operation to use, e.g. if something is lost/eaten/sold then it is being subtracted from the total.
- 2. **Underline** or circle the important numbers and words, including those identified in the discussion.
- 3. Write a number sentence and choose an appropriate **written method or mental strategy** to solve it. Remember to write the unit of measure. If there is more than one step, then more than one number sentence needs to be written



Maths – Written Methods

A guide to the written methods that must be taught in mathematics from Early Years to Year 6

Please remember...

Be Flexible!

Methods should be taught in the correct order but depending on the ability of the child, the guidelines for the year groups above and below should be considered.



Estimate First!

Where appropriate, children should estimate answers before attempting mathematical problems.



Expand it!

When revising or extending to numbers with a higher value, you can refer back to expanded methods, practical or pictures to help reinforce understanding.

Check it!

Where possible, encourage children to check answers using another written method, practical, pictures or by using an inverse operation. Wherever appropriate ensure that Steps to Success have been generated with the children and these are displayed.

St Christopher Primary School Addition

Early Years and Year 1



1:1 correspondence and counting.



Combining 2 or more groups of objects.



Year 2

With carrying – record using column addition (not recording carrying at this point).



Expanded Addition – add the least significant digits first.

	2	4		6	7		7	4
+		9	+	2	4	+	5	2
	1	3		1	1			6
	2	0		8	0	1	2	0
	3	3		9	1	1	2	6
	-							

Year 4

Children should progress to using the <u>compact method</u> when they have demonstrated a secure understanding of place value.



Year 5 & 6

The compact method will continue in Years 5 and 6 using decimal numbers to more than one decimal place when appropriate.



St Christopher Primary School Subtraction

Early Years and Year 1

In the beginning... Getting rid of/Taking away objects





Counting on (finding the difference)



'the difference between 3 and 6'



31 – 17



Start at 17 and count on to 31

2 a Ma

Counting back from the first number. 10 – 4 = 4 less than 10 is.... I've got 10 and I get rid of 4.



47 – 23 =



Year 2 **Pictorial** Abstract Concrete т 0 11111 : ; 5 5 6 6 2 2 3 5 3 5 т 0 т 0 Year 3 Standard column method for TO and HTO (without exchanging)



Year 3

Move to exchanging when appropriate and children are secure with place value. **Concrete**





Abstract



Year 4

Standard column method for TO and HTO without exchanging

with exchanging



Continue this method with decimal numbers linked to money.



Year 5 & 6



St Christopher Primary School Multiplication

Early Years and Year 1

Counting in concrete objects





Solve simple one step problems involving multiplication calculating the answer using concrete objects, pictorials and arrays.

2 × 4 = 8





Year 2

Continue to solve simple one step problems involving multiplication calculating the answer using concrete objects, pictorials and arrays.

Repeated Addition



2 + 2 + 2 + 2 + 2 = 10 2 x 5 = 10 2 multiplied by 5 5 pairs

> 10p + 10p + 10p + 10p + 10p = 50p 10p × 5 = 50p 5 jumps of 10

Begin to recall and use multiplication facts for the 2, 5 and 10 multiplication tables.







Recall and use times tables facts up to 12x12.

Year 5 & 6

Children should continue to use the compact method when multiplying by one digit.



This then develops into multiplying by two or more digits.



Further development into multiplying two digit numbers by decimals





Year 2 **Pictorial** Concrete Abstract $10 \div 5 = 2$ • 0 5 2 1 - 0 Number of 'things' to be shared out Introduce grouping and ensure

children understand that division can be sharing or grouping.

Grouping

15 marbles split into groups of 3



17÷3=

Year 3



Year 4

Children should be taught the compact method for division.



Year 5 & 6

Children should be taught the compact method for division up to the 12 times table (bus stop).







Division by times tables over 13 will be taught using a long division method. Remainders will be shown in two different ways.

8 r 1 2 Z '2 ×

4/5 X I × × ×

St Christopher Primary School Fractions (number)

Early Years and Year 1

Practical activities linked to unit fractions







Sharing with objects





Year 2

Finding fractions of amounts





Non-unit fractions and Mental method



Year 3 and 4

Finding fractions of amounts



Non-unit fractions and Mental method



Year 5

Finding equivalent fractions



Converting improper fractions



Converting mixed numbers to improper fractions



Ordering fractions with different denominators.



Adding fractions with different denominators.



Subtracting fractions



Multiplying fractions by whole numbers



Year 6

Simplifying fractions



Adding mixed numbers



Initial stage until children understand the process that is taking place.

Multiplying fractions



Multiply the numerators. Multiply the denominators. Simplify the answer if it is an improper fraction.

Dividing fractions by whole numbers



Multiply the denominator by the whole number.

Impact:

Assessment

On going AFL will inform daily planning and provision

From Y1– Y6 children will be tested twice a Year using the White Rose assessment package.

The maths test are designed and based on end of KS1 and end of KS2 SATs tests.

The tests have been designed based on these principles and contain the appropriate balance of levelled questions.

Reception

Reception use end of unit Master the Curriculum assessment which is based upon the White Rose Curriculum. 1 to 1 practical assessment is carried out in-line with the curriculum.

Year 1

Year 1 will complete assessments which consist of an arithmetic paper and one reasoning paper. They are tested from the Year 1 curriculum across two tests.

<u>Year 2</u>

Year 2 will complete assessment which consists of an arithmetic paper and one reasoning paper. They are tested from the Year 1 to Year 2 curriculum across two tests. The tests will be administered by the class teachers.

Year 3

Year 3 will complete assessments which consist of an arithmetic paper and one reasoning paper. They are tested from the Year 2 to Year 3 curriculum across two tests. The tests will be administered by the class teachers.

Year 4

Year 4 will complete assessments which consist of an arithmetic paper and one reasoning paper. They are tested from the Year 3 to Year 4 curriculum across two tests. The tests will be administered by the class teachers.

Years 5 and 6

Years 5 and 6 will complete assessments which consist of an arithmetic paper and one reasoning paper. They are tested from the Year 4 to Year 6 curriculum across two tests. The tests will be administered by the class teachers. Year 6 will also administer previous years SATS papers at the start of Year 6 and in a Mock SATS week prior to the actual SATs in May.

After each assessment point, the class teacher completes an analysis grid which informs planning for the next term. The maths lead will analyse the whole school picture and outcomes will be used to inform upcoming CPD and School Improvement.

igraph	5						Styles
M	White Rose Asse	ssments					
s	o the conversion	n grids would lo	ok something li	ke <u>this ;</u>			
		White Ros	e Autumn Term	Assessments C	onversion Table		
	Potentially Well Below	Below	At	Risk	At ARE	Slightly Above	Greater Depth
Year 1	1-6 Marks <27% below	7-9 Marks 28%-39%	10-11 Marks 40%-47%	12-13 Marks 48%-55%	14-17 Marks 56%-71%	18-21 Marks 72%-87% 6 Years 2	22-25 Mari >88%
TCUT I	Syrs 2 Months	Months (Rec W+)	Months (Rec S)	Months (Rec S+)	Months (1b)	months (1w)	Months (1w+)
Year2	1-9 Marks <27% below 6 yrs 2 Months	10-13 Marks 28%- 39% 6 Years 4 Months (1wa)	14-16 Marks 40%-46% 6 Years 6 Months (15)	17-19 Marks 48%-56% 6 Years 8 Months (154)	20-24 Marks 57%-70% 6 Years 10 Months (2b)	25-34 Marks 71%-89% 7 Years 2 months (2w)	32-35 Marl >90% 7 years 4 Months (2wa)
Year3	1-14 Marks <29% below 7 yrs 2 Months	15- 19 Marks 30%- 39% 7 Years 4 Months (2w+)	20-24 Marks 40%-49% 7 Years 6 Months (25)	25-28 Marks 50%-57% 7 Years 8 Months (25+)	29-35 Marks 58%-70% 7 Years 10 Months (3b)	36-43 Marks 72%-86% 8 Years 2 months (3w)	44-50 Marl >87% 8 years 4 Months (3we)
Year4	1-14 Marks <29% below 8 yrs 2 Months	15- 19 Marks 30%- 39% 8 Years 4 Months (3w+)	20-24 Marks 40%-49% 8 Years 6 Months (3s)	25-28 Marks 50%-57% 8 Years 8 Months (3s+)	29-35 Marks 58%-70% 8 Years 10 Months (4b)	36-43 Marks 72%-86% 9 Years 2 months (4w)	44-50 Mar >87% 9 years 4 Months (4w+)
Year5	1-14 Marks <29% below 9 yrs 2 Months	15- 19 Marks 30%- 39% 9 Years 4 Months (4we)	20-24 Marks 40%-49% 9 Years 6 Months (45)	25-28 Marks 50%-57% 9 Years 8 Months (45+)	29-35 Marks 58%-70% 9 Years 10 Months (5b)	36-43 Marks 72%-86% 10 Years 2 months (5w)	44-50 Mar >87% 10 years - Months (5we)
Year6	1-14 Marks <29% below 10 yrs 2 Months	15-19 Marks 30%-39% 10 Years 4 Months	20-24 Marks 40%-49% 10Years 6 Months	25-28 Marks 50%-57% 10 Years 8 Months	29-35 Marks 58%-70% 10 Years 10 Monthr	36-43 Marks 72%-86% 11 Years 2 months	44-50 Mar >87% 11 years

Impact:

By the end of Year 6, transitioning to secondary school, we aspire that a St Christopher mathematician will have developed a bank of efficient and accurate skills that can be used to calculate effectively. These will have been underpinned by the C-P-A process so children understand rather than just do, which ultimately will allow children to identify when answers do not make mathematical sense. Children will be able to apply these calculation skills and understanding of other areas to become confident and resilient problem -solvers with the ability to reason and articulate their ideas mathematically. Due to the embedding of fact sentences, children will have the language to be able to justify, reason and explain their answers