



Mathematics Policy

2021-2022

At Cromwell Learning Community Multi Academy Trust we believe that learning without limits means we do not put a ceiling on children's achievement.

Mission Statement

“A high-quality Mathematics education provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of Mathematics, and a sense of enjoyment and curiosity about the subject.” (National Curriculum 2014)

At CLC MAT, all our children are given the opportunity to develop their mathematical potential through a rich, engaging curriculum. We want our children to feel confident in using and applying Mathematics in a wide range of situations. We believe that Mathematics is uniquely powerful in helping us to make sense of, and describe, our world and in enabling us to solve problems. It is a fascinating subject, dealing with the nature of number, space, pattern, and relationships. Useful and creative, it requires not only facts and skills, but also understanding gained through exploration, application, and discussion. In Mathematics we aim to develop lively, enquiring minds encouraging pupils to become self-motivated, confident, and capable in order to solve problems that will become an integral part of their future.

School Aims

The purpose of Mathematics education is to offer pupils intellectual excitement and challenge; to provide them with a sense of delight and wonder; to equip them with knowledge and skills and the ability and confidence to use and apply these to meet the needs of present and future society. CLC MAT aims to ensure that all pupils, irrespective of gender, race, and culture, have access to a wide range of stimulating problems and activities which will include the appropriate Programmes of Study of the National Curriculum 2014 and the EYFS curriculum. As they move from home into school and from primary into secondary education, their mathematical experience should be continuous and progressive, producing competent and confident young mathematicians. We ensure that the statutory requirements of the National Curriculum 2014 and EYFS are met and so too are their aims:

- To become fluent in the fundamentals of Mathematics
- Reason mathematically
- Solve problems

Intent

Our pupils will learn to:

- Develop the appropriate mathematical language associated with number, shape, and position.
- Use and apply Mathematics in practical tasks, in real life problems and in acquiring further knowledge, skills and understanding in the subject itself.
- Understand and use the four operations of number in relevant contexts.
- Understand relationships between numbers, learn basic number facts and develop a range of computational methods.
- Understand place value in our counting system and understand how it can be extended into numbers below zero.
- Use their mathematical skills in simple problem solving.
- Collect, interpret, and represent data in tabular, graphical, and diagrammatic form.
- Develop mental methods of calculation.
- Recognise, describe, and represent shapes and patterns in terms of their properties, location, and movement.
- Measure quantities including length, area, volume/capacity, angle, temperature, time, and mass.
- By the time children reach Year 6 they will be introduced to ratio/ proportion and language of algebra as a means for solving a variety of problems.

We will judge the success of our mathematical teaching by: -

- The motivation and interest displayed by our pupils e.g., through pupil voice.
- On-going assessment (formative and summative).
- Success in meeting targets linked to age-related expectations.
- Monitoring of outcomes for pupils
- Observations of the quality of Mathematics teaching.
- Analysis of pupil progress and attainment data.

Teaching and Learning

All pupils are entitled to a broad Mathematics curriculum in which their learning needs are identified and met. Pupils should experience a range of practical and written activities on number, measurement, geometry, and statistics. We operate a planning procedure agreed by the whole teaching staff based upon the National Curriculum Mathematics Programmes of Study 2014 and the EYFS Curriculum. Classrooms should be rich in discussion between pupils and between teacher and pupils. Some facts will need to be memorised, others will need to be practised but underpinning all of this will be the development of mathematical reasoning and understanding through exploration, problem solving and investigation.

Implementation

Long- and medium-term planning

Long term and medium-term planning are taken from the White Rose Hub Mathematics mastery scheme. The schemes provide exemplification for each of the objectives in the new term by term overviews, which are linked to the National Curriculum. The schemes are broken down into fluency, reasoning and problem solving, which are the key aims of the curriculum. Each objective has with it examples of key questions, activities, and resources. These are used with the mastery assessment materials that the NCETM spine materials, Nrich materials and Dfe Primary National Guidance. The guidance identifies the most important conceptual knowledge and understanding that pupils need as they progress from Year 1 to Year 6. These important concepts are referred to as ready-to-progress (RTP) criteria and provide a coherent, linked framework to support pupils' mastery of the primary mathematics curriculum. The guidance is used to support long-term, medium-term, and short-term planning, and assessment, each guidance point is referenced on the lesson-by-lesson overviews by White Rose.

Short term planning

Three lessons a week will begin with daily arithmetic tasks, this will be recorded in books and the class teacher will model the answers, children will mark, TAs will take note of any children falling behind, gap tasks will be set for these pupils with a modelled answer to address misconceptions. The additional two lessons a week will begin with Flashback four, these use the principles of spaced learning to recall the appropriate concepts:

- The first question is likely to be something children did in the previous lesson.
- The next question is something they did last week, to revisit and retain.
- The third and fourth questions are related to concepts they studied last month, or maybe much earlier in the year (or even last year).
- Lesson by lesson overviews provided by White Rose will be followed, these link to the Primary National Guidance.
- Each lesson will ensure that focus is on developing mathematical skill in relation to the 3 aims of the national curriculum. Fluency, reasoning, and problem solving. See – ***Medium- and short-term plans***
- Conceptual understanding (comprehension of mathematical concepts, operations, and relationships) must be considered. See - ***The Big Ideas section on the NCETM Mastery assessment documentation***
- Likely misconceptions must be shared with the children. See - ***NCETM Misconceptions document***

- Concrete- pictorial - abstract resources are readily available and must support learning - See Appendix C
- Vocabulary - any new terminology or vocabulary within the session must be shared.
- Concept questions for understanding - are used to probe children's clarity of understanding of the methods/new concepts taught.
- Questions for deeper understanding - these questions develop children's reasoning skills. See – ***Mastery question stems document***
- *ARE expectations* – the year group expectation will be planned for.
- *GDS expectations* - the expectations for rapid graspers will be planned for.
- Staff must ensure that they only move children on in their learning when they are ready. Staff are not expected to type up any changes / additions to the weekly plan. Planning can be annotated.
- Planning from previous years can be annotated however, a planning proforma with these specifics is provided.

Teaching time and structure

Mathematics is taught for a minimum of 5 hours per week in KS1 and KS2. Mathematics lessons are differentiated using concrete, pictorial, and abstract resources.

Each lesson has the following structure:

- A (4, 5, 6)-A-Day calculation activity or Flash back 4
- The main teaching
- Opportunities to apply new learning through activities focussing on the three aims
- Plenaries/mini plenaries where appropriate

In Reception, Mathematics is taught daily in three differentiated groups. Pupils in Reception use a variety of concrete resources developing on to pictorial representations which are the foundations for abstract methods. Reception will follow the White Rose scheme which underpins the DfE programme for mathematics and embeds mathematical thinking and talk. The scheme promotes a broad mathematics curriculum focussing primarily on the counting principles and learning trajectories.

Recording work

All pupils in KS1 and KS2 use a pencil for mathematical calculations and squared exercise books to aid setting out of calculations. Pupils use 7mm squared books. Pupils are taught suitable setting out of work and this is modelled in everyday practise. On starting new work pupils rule off the last piece of work and date the next piece. The date is recorded in figures e.g., 23.11.03, unit title and the Learning Objective/WALTs are copied or stuck into children's books. Margins are 2 squares wide. 5 a day arithmetic will be self-marked by the pupils, all other work is marked according to the school's Feedback Policy, using live marking where possible.

Preparation for the Year 4 Times Tables check and recall of number facts

The purpose of the MTC is to determine whether year 4 pupils can fluently recall their multiplication tables. Although the check will help school to identify pupils who require additional support, it is not intended as a diagnostic tool.

- The MTC is a key stage 2 assessment to be taken by pupils at the end of year 4.
- The MTC is focused on the fluent recall of multiplication facts. This is included in the national curriculum (2014) statutory programme of study for mathematics at key stage 1 and KS2.
- The MTC will be delivered as an online, on-screen digital assessment. Under standard administration, the check will take each pupil less than 5 minutes to complete. It will be automatically scored, and results will be available to schools once the assessment window closes.

The content domain for the MTC is based on the national curriculum (2014). The national curriculum states, 'By the end of year 4, pupils should have memorised their multiplication tables up to and including the 12-multiplication table and show precision and fluency in their work'.

The year 4 programme of study for mathematics also states, 'Pupils should be taught to recall multiplication and division facts for multiplication tables up to 12×12 '. The MTC only assesses the instant recall of multiplication facts. Multiplication and division in a wider context will continue to be assessed through the KS1 and KS2 mathematics assessments.

In years 3 and 4 additional time slots will be included on the timetable to ensure children are secure in this knowledge. Pupils will also be provided with a login for Times Table Rock stars which has been developed to engage pupils in daily practice.

For development of base facts in early years and key stage 1 pupils will be provided with a login to Numbots, this will support develop the critical foundations in maths through developing number recognition and rapid recall of addition and subtraction facts.

Calculation policy

CLC MAT follows the White Rose Maths Calculation Policy. The document is broken down into addition and subtraction, and multiplication and division. At the start of each policy, there is an overview of the different models and images that can support the teaching of different concepts. These provide explanations of the benefits of using the models and show the links to the different operations. Each operation is broken down into skills and each skill has a dedicated page showing the different models and images that could be used to effectively teach that concept. There is an overview of skills linked to year groups to support consistency through out school. A glossary of terms is provided at the end of the calculation policy to support understanding of the key language used to teach the four operations.

Impact

How will we know we are successful in this is through:

- Teacher assessment – formative – through ongoing questioning, Quick recall of facts and procedures, dialogue, verbal and written feedback, day to day work, daily arithmetic outcomes, reasoning. Summative end of half term tests, statutory assessments
- Pupil Voice – pupil questionnaires, self, and peer assessment, learning dialogue in the classroom that encourages self-evaluation.
- Data Analysis – internal with SLT, subject leadership, pupil progress meetings, governors, external data (SATS)
- Quality Assurance – lesson observations, drop ins, learning walks, book, and planning monitoring
- Positive Attitudes to Learning – children engaged and inspired by their learning, posing own enquiry questions, taking initiative
- Respect – visibly demonstrated through their school environment, their work, interactions-

A mathematical concept or skill has been *mastered* when a child can show it in multiple ways, using the mathematical language to explain their ideas, and can independently apply the concept to new problems in unfamiliar situations.

These will be assessed through assessment, tracking, pupil progress meetings, performance management, moderation, and standardisation.

Arithmetic

In order to strengthen children's understanding of the basics of mathematics there is a focus in the new curriculum on Arithmetic. In order to develop children's skill, each mathematics lesson will include a daily speedy calculations session.

At the beginning of each maths lesson the children will have a number of calculations to solve within a limited time (see coverage in the table below).

Class	Calculations per day	Addition	Subtraction	Multiplication	Division
Reception	2 a day (on whiteboards) Begin with 3 minutes initially and reduce	<ul style="list-style-type: none"> Two single digit numbers 	<ul style="list-style-type: none"> Two single digit numbers 	<ul style="list-style-type: none"> Double numbers to 10 	<ul style="list-style-type: none"> Halve numbers to 20
Year 1	3 -4 a day 1 minute per question	<ul style="list-style-type: none"> Two 1-digit numbers 1-digit number to a 2-digit number (to 20) Three 1-digit numbers (totalling no more than 20) 	<ul style="list-style-type: none"> Two 1-digit numbers 1-digit number from a 2-digit number (to 20) 	<ul style="list-style-type: none"> Double numbers to 10 	<ul style="list-style-type: none"> Halve a quantity under 20 Quarter of a quantity
Year 2	4- 5 a day 1 minute per question	<ul style="list-style-type: none"> 2- digit to 1-digit 2-digit and a multiple of 10 Add 3 1-digit numbers Two 2-digit numbers Inverse calculation for missing numbers 	<ul style="list-style-type: none"> 1-digit from 2 digit Subtract multiple of 10 from 2-digit number Two 2-digit numbers Inverse calculation for missing numbers 	<ul style="list-style-type: none"> Multiply by 2,3,5, 10 and 0 2-digit number by single digit 	<ul style="list-style-type: none"> 2-digit number by single digit Halves of quantity Quarters of quantity $\frac{3}{4}$ of quantity $\frac{1}{3}$ of quantity
Year 3	5 – 6 a day 1 minute per question	<ul style="list-style-type: none"> Add two 2-digit or 3-digit Add any combinations of 2-digit and 3-digit Two fractions with the same denominator 	<ul style="list-style-type: none"> Subtract two 2-digit or 3-digit Subtract any combinations of 2-digit and 3-digit Two fractions with the same denominator 	<ul style="list-style-type: none"> Multiply by 2,3,4, 5,8 10 and 0 2-digit number by single digit 	<ul style="list-style-type: none"> divide by 2,3,4, 5,8 and 10 Fractions of a quantity
Year 4	6 a day 1 minute per question	<ul style="list-style-type: none"> Add two 2-digit,3-digit or 4-digit numbers Add any combinations of 2-digit,3-digit or 4-digit numbers Two fractions with the same denominator beyond 1 	<ul style="list-style-type: none"> Subtract two 2-digit,3-digit or 4-digit numbers Subtract any combinations of 2-digit,3-digit or 4-digit numbers Two fractions with the same denominator 	<ul style="list-style-type: none"> Multiply by 0,1,2,3,4,5,6,7,8,9,10,11 and 12 2-digit and 3-digit numbers by single digit 3 numbers 	<ul style="list-style-type: none"> divide by 2,3,4,5,6,7,8,9,10,11 and 12 divide 2- digit and 3-digit numbers divide 1 and 2-digit numbers by 10 and 100 giving the answer as a decimal fractions of a quantity

Year 5	6 a day 1 minute per question	<ul style="list-style-type: none"> Add 2 numbers with more than 4 digits More than 2 numbers Add any combinations of 2-digit, 3-digit or 4-digit numbers Fractions with different denominators Add numbers with up to 3 decimal places 	<ul style="list-style-type: none"> 2 numbers with more than 4 digits Add any combinations of 2-digit, 3-digit or 4-digit numbers Fractions with different denominators Subtract numbers with up to 3 decimal places 	<ul style="list-style-type: none"> Multiples of any number including decimals Square and cube numbers Multiply by fractions 	<ul style="list-style-type: none"> Divide any number including decimals Find percentage of number Fraction of a number
Year 6	6 a day 1 minute per question	<ul style="list-style-type: none"> combinations of up to 8-digit numbers Negative numbers Fractions with different denominators Two mixed numbers <p>Note: children will also complete arithmetic questions of 2 steps e.g., addition followed by multiplication</p>	<ul style="list-style-type: none"> combinations of up to 8-digit numbers Negative numbers Fractions with different denominators Two mixed numbers Decimals 	<ul style="list-style-type: none"> Multiples of any number including decimals and fractions 4-digit number by 2 digits Whole number by a fraction Multiply by a decimal or fraction (including mixed) Square and cube numbers 2 simple fractions 2 mixed fractions Decimal fractions by 10, 100, 1000 Decimal fraction with up to 2 decimal places by a single or 2-digit number 	<ul style="list-style-type: none"> 4-digit number by 2 digits Proper fraction by a whole number Decimal fractions by 10, 100, 1000 Decimal fraction with up to 2 decimal places by a single or 2-digit number Percentage of a number

- At the end of Key stage 1 (KS1 SATs) children must answer 25 arithmetic questions within 20 minutes this is 48 seconds per question. At the end of Key stage 2 (KS2 SATs) children must complete 36 questions within 30 minutes this is 50 seconds per question. We will allow one minute per question (5 questions = 5 minutes to complete)
- Children will put a title under their objective e.g., 5 a day
- Children must also have experience of interacting with questions with missing values and calculations must be varied to ensure that = is taught to show equalities.
- At the end of the time period to complete them, teachers will model how to solve them using the most efficient method (this needs emphasis as children may know several different strategies) Children will self-mark these and correct as necessary.
- Children will self-mark these and correct as necessary.

$$\square + 12 = 34$$

$$\square + \square = 29$$

$$15 + 4 = \square$$

$$6 + \square = 15$$

Please see an example of how this is set out on active inspire

The screenshot shows the ActiveInspire Primary software interface. The main workspace is a white area with a blue border. At the top left, the text '4 a day' is written. Below it, there are four math problems arranged in a 2x2 grid:

$94 - 62 =$	$\frac{1}{4} \text{ of } 24 =$
$52 + 29 =$	$40 \div 5 =$

The software interface includes a menu bar at the top with options: File, Edit, View, Insert, Tools, Help. A toolbar on the right side contains various icons for drawing and editing. At the bottom, there is a Windows taskbar with a search bar and several application icons. The system clock shows 23:16 on 21/05/2016.

It is crucial that children develop quick recall of multiplication facts and that all children know their times tables to 12x12 by the end of Year 4. To this end, children receive times tables practice (both as part of the mental/oral work in lessons and during afternoon registration) as well as a weekly times tables homework. Children are tested on their times tables every week and their achievement is tracked on the 'Times Tables Record of Achievement' displayed in every classroom. Children also learn the related division facts. Children's progress and achievements are celebrated in assemblies and are regularly monitored by the Maths Leader to ensure all children are making progress.

Number facts weekly homework

The following is an overview of all to be completed over the course of an academic year. These will be tested weekly like spelling tests and will be given in addition to regular homework. Each academic year should begin with a test based on facts from the previous year's learning; any gaps in learning should be addressed in intervention. If a child makes an error or gets answers wrong in ks1 or 2, they should stay in to write them out again 3 times each.

Assessment for learning

Year	Autumn term focus	Spring term focus	Summer term focus
Nursery Assessment through play against Early Years' Outcomes	Counting songs Counting to 5	Representing number using fingers or marks	Counting numbers to 10 in order. Matching quantity to numbers to 10.
Reception Assessment through play against ELG	Count and order numbers to 20. +/-1 +/-2 +/- 3 +/-5	Use quantities or objects to add or subtract 2 single digit numbers and count on or back to find the answer. +/-4 +/-5 +/- 6 +/- 7 +/-9	Double numbers to ten. Halve numbers to 20
Year 1 Times tables to be mixed up 6 per week (the same multiple)	Read and write numbers from 1 to 20 in numerals and words 5 per week (4 weeks) Read and write numbers to 100 in numerals.	Ten times tables Five times tables	Two times tables
Year 2 Times tables to be mixed up 6 per week (the same multiple)	read and write all numbers to at least 100 in numerals and words 5 per week (6 weeks) Four times tables 6 per week	Eight times tables	Three times tables
Year 3 Times tables to be mixed up 6 per week (the same multiple)	Six times tables	Nine times tables	Seven times tables
Year 4 Times tables/Number facts to be mixed up 6 per week (the same multiple)	Eleven times tables	Twelve times tables	Square numbers relating to 1-144
Year 5 Number facts to be mixed up 6 per week.	Prime numbers to 100	All factors of numbers to 100	Square and cubed root of numbers
Year 6	Year 6 are to reinforce and revise number facts		

Cross Curricular Links

Mathematics is an integral part of our daily lives and therefore manifests itself in many areas of the curriculum. Links with ICT are continually developed through use of laptops and appropriate software.

Equal Opportunities/More Able Pupils/Special Educational Needs/EAL

All children at CLC MAT will have access to Mathematics teaching and resources regardless of gender, race, or cultural background. Through monitoring and assessment, teachers will identify the needs of particular children and amend their planning to meet those needs.

Close links with the school's SEN leader will ensure that any specific needs requiring specialist resources are addressed promptly. Children with general learning difficulties will be given the opportunity to use carefully selected programmes.

In Mathematics lessons, children with learning difficulties will be supported in a number of ways:

- Through targeted support by class teacher or TA.
- Through peer group support, paired with higher-achieving children or in small groups.
- Children with more specific needs may be withdrawn to work individually or in small groups at a classroom computer with a TA.

All relevant staff will be responsible for monitoring and recording any information relating to action plans for SEN pupils.

Pupils with EAL will be included in similar ways to those highlighted above; including, where available, the use of bilingual staff to support their understanding and develop their spoken English skills.

Rapid grasping pupils will be stretched through challenging questioning focussing on greater depth, as well as having the opportunity to extend and develop their maths skills through applying them to rich and sophisticated problems across the curriculum and in different contexts.

Assessment, Recording and Reporting

To develop learning, pupils are continuously assessed using a variety of strategies e.g., observation, questioning and marking in accordance with our school feedback policy. In Reception, pupils will be assessed, and the Foundation profile completed throughout the year. In KS1 and KS2 children are assessed as either working towards, expected or at greater depth. Data is then used to inform future planning and provision, and to identify children for intervention and support. The Class Teacher, Maths Leader, SEN Leader and the SLT keep records of assessments. Summative end-of-term assessments will take place using tests that are in line with the expectations of the 2014 curriculum.

These will link to the learning objectives for their year group and allow the children to understand their next steps in learning. Statutory Assessment Tasks (SATs) will be administered in accordance with the DfE at the end of KS1 and KS2. An Annual Report is sent to parents towards the end of the Summer Term. These reports cover progress and achievement in Mathematics, set targets for future improvement and include the level achieved in the SATs if appropriate.

Assessment points and processes

Cold tasks - These will be used to assess pupils starting points to pinpoint progressions points and prior understanding

End of block assessments - These will be used as a summative assessment to see strengths and areas of development that will be addressed through interventions.

Half termly assessments - White Rose half termly assessments can be used to assess pupils understanding in line with the scheme.

School wide assessments – See assessment policy

Class teachers will be responsible for annually reporting to parents on their children's progress in Mathematics. The Maths Leader will be responsible for monitoring these processes and addressing the training/professional development needs of staff. The Maths Leader will also be responsible for collecting and collating data in order to report standards to parents, governors and the LA as required.

Updated August 2021

E. Karwowski

Maths Lead

Appendix A

Mathematical websites to support learning

White Rose Maths - <https://whiterosemaths.com/>

NCETM - <https://www.ncetm.org.uk/>

NRich - <https://nrich.maths.org/>

Learning trajectories - <https://www.learningtrajectories.org/>

The Early Maths Collaborative - <https://earlymath.erikson.edu/>

EEF Special Need in Mainstream guidance –
<https://educationendowmentfoundation.org.uk/tools/guidance-reports/special-educational-needs-disabilities/>

EEF EYFS and KS1 improving maths guidance -
<https://educationendowmentfoundation.org.uk/tools/guidance-reports/early-maths/>

EEF KS2 and KS3 improving maths guidance –
<https://educationendowmentfoundation.org.uk/tools/guidance-reports/maths-ks-2-3/>


Appendix B

Flash Back four examples

Flashback 4 Year 2 | Week 1 | Day 1



1) What is 2×8 ?

2) There are 5 flowers in each vase.
How many flowers altogether?



3) Complete the sequence. 2, 4, 6, __, __

4) Find the sum of 3, 4 and 7




Flashback 4 Year 2 | Week 2 | Day 4

1) Calculate $80 \div 10$ **8**



2) Multiply 5 by 6 **30**

3) How much money altogether?



25 p

4) Find the sum of 26 and 44 **70**



Appendix C

Year Group Maths Resources and Manipulatives

Based on White Rose and our Calculation Policy. Each class will have the following resources available in class.

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Linking cubes	Linking cubes	Counters	Counters	Counters	Counters
Numicon	Numicon	Base 10	Base 10	Base 10	Place Value counters
Counters	Counters	Place Value counters	Place Value counters	Place Value counters	(including decimals to
Tens frames	Tens frames	(thousands, hundreds,	(thousands, hundreds,	(including decimals to	0.001)
Bead strings (to 10 and 20)	Bead strings (to 10 and 20)	tens, ones)	tens, ones, 0.1, 0.01)	0.001)	
Straws	Straws	Hundred squares	Hundred squares		
Number lines - labelled (to 20)	Number lines – labelled and blank (to 20)	Straws			
	Hundred squares	Numicon (times tables)	Numicon (times tables)		
	Base 10 (hundreds, tens, ones)	Bead strings (times tables)	Bead strings (times tables)		
	Place Value counters (hundreds, tens, ones)				

Appendix D

Covid 19 Pandemic recovery

White Rose Primary Schemes of Learning for 2021/22 have been updated to reflect the missed learning of pupils during the pandemic. These new schemes provide additional support and guidance for teaching mathematics 2021/22. The lessons by lesson progression documents indicates learning that may have been missed due to school closure, these lessons may need addition time spent on them to revisit the previous year's learning to secure understanding.

If a Local/National lockdown is in place

White Rose have provided Home learning resources <https://whiterosemaths.com/homelearning/>. Parents will be directed to the schools Homeworking hub and learning platform. Video links to lessons will be provided and worksheets.