



Mathematics Policy

January 2019

Approved by GB: January 2019

Next review due: January 2022

Purpose of Policy

Mathematics is a core subject in the National Curriculum. This policy will form the basis in which we outline the purpose, nature and management of how Mathematics is taught and learned in our school, and will inform new teachers of expectations.

Our policy recognises Mathematics as a functional tool and a valuable key life skill. We want all pupils leaving Churchfields Junior School to not only be numerate, but to be able to transfer their mathematical skills to other curricular areas and into everyday life. By being 'numerate' we are referring to individual's abilities to thinking and reacting mathematically; to applying number sense to everyday situations encountered and to reasoning, using number knowledge acquired. It is important the pupils at Churchfields Junior School are confident in their mathematical ability and can verbally explain their ideas and process using mathematical vocabulary with confidence.

We want to impart to our pupils that Mathematics is not confined to just acquiring mathematical skills, but most importantly it is about fostering inquiring minds, inciting enthusiasm and valuing curiosity.

The policy reflects the views of all the staff of the school. It has been drawn up following consultation with all staff and pupils, and has full agreement of the Governing Body.

Staff have access to the Policy on the school's server via the Teacher's Drive. Parents are also able to access a copy via the school website.

Aims and Outcomes

- To ensure a broad, balanced, creative and stimulating Mathematical education in line with the 2014 mathematics curriculum.
- To present Mathematics in meaningful contexts and to embed a range of practical activities designed to enhance pupils' mathematical experiences.
- To include mathematical skills and content in a range of different curriculum areas.
- To ensure continuity and progression in the pupils' learning as they progress throughout the school.
- To instil in pupils a positive and confident attitude towards Mathematics through the stimulation of thinking and reasoning skills as well as the fostering of logic and mental agility.
- To enhance pupil's use and understanding of the language and vocabulary of Mathematics.
- To develop pupils' use of information and communication technology (ICT) in their Mathematics studies.
- To involve our parents in their pupils' mathematical learning both in school and at home.

Mathematics and the Primary Curriculum

Teachers plan and deliver lessons from the Primary Advantage Maths Programme (PA Maths) – this provides a systematic and structured approach to mathematics teaching across the year groups. Our teachers review, adapt and/or adjust the yearly overviews as well as daily lesson with planned differentiated activities to meet pupils' individual learning needs. Changes to lessons are noted in annotated and updated lesson files following formative assessment of the pupils. Lesson plans are reflected on after each lesson to ensure subsequent lessons build on the prior learning of the pupils.

Pupils work in mixed ability class settings for maths. Pupils attend a minimum of 5, one hour lessons per week. Teachers in all year groups plan their maths lessons in collaborative pairs.

Pupils mostly choose their own level of challenge when completing independent work. They are encouraged to challenge themselves and are taught how to choose appropriate tasks for their learning throughout the school to encourage the pupils taking control of their own learning.

More able pupils are extended through the provision of extension challenges, work with differentiated outcomes, independent/paired problem solving and investigative activities or devising questions/problems for the class to solve. Those pupils who are experts in the unit are encouraged to explain the mathematical methods to others, as well as demonstrate methods practically to ensure depth of understanding in mathematics.

Lower attainers and SEN pupils are supported through effective differentiation of the tasks and levels of support. The use of concrete resources and pictorial tasks allows all pupils to access the current mathematical unit. The level of support or scaffolding provided by the teacher varies depending on the pupils. Their teaching emphasis is on using visual aids (models and images, ICT, maths equipment and games to support learning etc...), to encourage an understanding of number beyond a process.

The Role and Responsibility of the Subject Leader

- To support and guide the classroom practice of teachers and support staff.
- To ensure coverage, continuity and progression in planning.
- To monitor and evaluate the effectiveness of Mathematics teaching and learning through lesson observations, work scrutiny, planning scrutiny and pupil conferencing.
- To update documentation where necessary.
- To produce action plans for the School Development Plan, prepare bids and manage the Mathematics budget effectively.
- To liaise and consult with outside agencies where appropriate.
- To prepare and lead INSET training.
- To attend relevant INSET training.
- To review regularly the contribution made by Mathematics to a meaningful curriculum.

Equal Opportunities and Inclusion

All pupils will be given an equal opportunity to maximise their individual potential; this is regardless of ability, gender, race, religion, disability or talent. Activities both within and outside the classroom are planned in a way that encourages full and active participation by all pupils, matched to their knowledge, understanding and previous experience.

Equal emphasis will be given to the roles of both men and women using Mathematics in society. Every effort will be made to ensure that activities are equally interesting to both boys and girls.

Teaching and Learning

The Learning Objective is displayed and shared with the pupils during each lesson (this will typically, but not necessarily be at the start of the lesson). The Success Criteria are clearly specified to the pupils, and often discussed and generated as a class. The Learning Objective and Success Criteria are stuck into every child's book for each lesson using the template provided. Relevant vocabulary is displayed on all slides and its use and understanding is developed through pair talk throughout the lesson. Visual aids, models and images, and concrete resources are always used to support teaching and learning. Pupils are all aware of where the resources are and understand that they can use these throughout any lesson to support their learning.

- In each lesson, children should complete a starter which recaps work from the previous week. A reasoning question should be completed and be clearly visible in book work three times a week by using the subheading 'Reasoning Question'.

Churchfields embraces ICT as an effective enhancing teaching tool in aiding Pupils' learning process and in raising attainment. Interactive teaching programmes (ITPs), relevant software and internet links are incorporated into daily lessons. Pupils are encouraged to use the IWB to demonstrate ideas and methods to their peers.

Varieties of teaching strategies are used to engage and interest pupils and further their learning. Consideration is given to different learning styles - visual, auditory and kinaesthetic. These could include:

- Peer teaching/evaluation and use of talk partners
- Individual work
- Paired work
- Group work
- Mentors and learners
- Investigative work including exploring, pattern seeking, sorting and classifying, making a survey and problem solving
- Presentation of knowledge directly imparted by the teacher or another adult, incorporating pupils' experiences and making it relevant to their lives
- Demonstration and modelling of skills and techniques, and provision of time for practice
- Opportunities to communicate ideas to each other and to teachers
- Use of practical and concrete resources to help scaffold understanding of mathematical concepts

Each maths teacher has access to a comprehensive calculation policy, mental calculation policy, and the PA Maths progression and planning document. The implementation of these methods is the responsibility of all Maths teachers.

The maths teacher is expected to work with a small group of pupils in a guided maths session on a daily basis. This guided maths session should have a distinct teaching focus appropriate to that group of pupils and be clearly stated on the plans. Pupils often have a choice about whether they want to join the teacher's masterclass and the ethos of the school ensures that pupils are confident and secure about wanting help.

Spaced Learning

- Teachers should use spaced learning as a theory on which to structure their teaching. Spaced learning encourages **long-term memory creation**, and is formed from research that gives considerable weight to its use in education. It targets the idea that **knowledge cannot be learnt in one sitting**, but rather in short and repeated bursts in order to make it **stick**.
- For this reason, teachers should re-visit the topic taught the previous week in their starters for the following week, recap knowledge frequently through oral reminders and ensure that a 'spaced learning formative assessment' (as outlined in the assessment section) is conducted weekly to allow children to draw upon prior learning.
- Also outlined in formative assessment is the need to ensure that 'Next Steps' tasks set through written feedback connect different topics together and refer to previous learning to encourage children to make links between different areas of maths, e.g. A question linking temperature to fractions could be *It was 33 degrees. The temperature fell by 1/10. What is the temperature now?*

Lesson structure

Where possible, children should be exposed to three main question types within a maths lesson:

Fluency

- The National Curriculum states that pupils should become fluent in the fundamentals of mathematics through varied and frequent practice. While a part of this is about knowing key mathematical facts and recalling them efficiently, fluency means so much more than this.
- Fluency gives pupils the ability to delve deeper into Maths; to develop number sense and choose the most appropriate method for the task at hand; to be able to apply a skill to multiple contexts.

Problem Solving

- Children should be given the opportunity to wide range of problems which include multiple steps. These problems should relate both to the application of mathematics to everyday situations within the pupils' experience, and also to situations which are unfamiliar.'

Reasoning

- Children should be exposed to reasoning questions as they need to be able to justify their ideas clearly.
- They will need to be able to use and apply that knowledge to a range of contexts. As such, it's clear that we need to provide them with a strong foundation of reasoning skills

Arithmetic practice

- Children in Years 5 & 6 should be practising arithmetic strategies with their class teacher for one lesson per week. This should include the completion of arithmetic questions from previous assessment papers or at the teacher's own discretion.
- This practice should be embedded into Year 5 teaching for the summer term.

The Primary Advantage Maths Programme

All teachers use the PA Maths programme to **assist** the planning of their lessons, and routinely take into account the key principles of the programme. The programme is used in conjunction with tasks set from both CGP (in the form of textbooks) and a question pool from White Rose.

1) The Concrete, Pictorial, Abstract approach

New skills in **year 3** are taught using the concrete, pictorial and abstract approach. Resources, such as dienes and place value counters, are used to provide the pupils with the 'Real Story' – facilitating solid understanding and meaning. This is taught simultaneously with a pictorial representation, and the abstract recording of the number sentence or formal written method. Once the child is able to verbally explain what is happening, they may no longer need the concrete resource. Ultimately the concrete and pictorial resources are visualised by the child, and they will only need to physically record the abstract maths, or the 'Maths Story'.

2) The use of 'Real Story, Maths Story'

The concrete, pictorial and abstract approach is evident in the pupils' workings, as they **initially** record the 'Real Story' (the pictorial representation of the calculation), and the 'Maths Story' (the abstract formal maths recording of the calculation). Formal recording of this approach should be present until the child is fluent in the relevant method and can move on to record only the 'maths story'.

3) The use of bar modelling to support problem solving activities

Bar modelling is used to visually represent all worded problems. This method has proven to improve pupils' understanding of what the question is asking, and select an appropriate operation or approach. It develops pupils' ability to visualise a problem and confidently discuss and justify their choice of method.

4) The implementation of 7 learning dispositions

The PA Maths programme promotes learning dispositions for effective teaching and learning of mathematics. As a school, the following 7 learning dispositions have been created, with the PA Maths dispositions in mind, which apply to all subjects across the school.

- i) Determination
- ii) Collaboration
- iii) Independence
- iv) Curiosity
- v) Resilience
- vi) Communication
- vii) Reflection

These learning dispositions are understood by all pupils and are referred to regularly during all lessons.

Each year group has a hard copy of the PA Maths programme to refer to during planning. A digital copy can also be found on the T:drive.

Regular CPD is provided to all staff on a regular basis to strengthen understanding of the programme.

Pupils' Work

Pupils must always work in pencil in their Maths books and show their methods (workings out). This can be in the form of 'Real Story/Maths Story' when appropriate. Pupils should always write the short date at the start of each piece of work, and stick in their The Learning Objective and Success Criteria Strip. A 2 square margin should be ruled down the left hand side of the page and through the centre of the page (unless a graph or table is being drawn). Pupils are to be encouraged to write one digit for every square in their Maths books.

Please refer to the Maths Presentation Policy for more detail. Pupils' books are monitored weekly.

Maths Challenge

Maths Challenge is an initiative aimed to raise the profile of times tables, promote positive attitudes towards maths, improve pupils' mental calculation skills and their knowledge of the number system.

- Maths Challenge should be completed at an appropriate time at the discretion of the class teacher. It should, however, be completed once a week.

When completing the multiplication and division questions the pupils are given a set time, dependent on their year group. The question sheets are named: Starter, Bronze, Silver, Gold, Platinum and Diamond. Each stage has 4 different question sets, allowing for all times tables to be covered. These all require knowledge of times tables up to 12×12 and get progressively harder. Once the Silver set of questions have been achieved, the Gold questions include division questions as well, focussing on the pupils' understanding of inverse operations. After the Gold questions, Platinum focuses on the pupils' knowledge of related number facts and requires pupils to not only use inverse operations, but to also understand how, for example, if $3 \times 4 = 12$, therefore $0.3 \times 4 = 1.2$. Diamond grid then progresses to include multiplication and division of fractions.

The aim of these Maths Challenge sessions and question sets is to fully embed the knowledge of times tables and their related number facts, providing clear understanding of the number system and also developing excellent recall of times tables, which supports understanding of further maths concepts. Pupils challenge themselves to improve their personal best each week, whether by moving onto a harder question set, or by completing more questions correctly. Each child is expected to complete all 4 question sets correctly before progressing to the next challenge level. Each week, the child's score is recorded in a table in the back of their books, to enable the child to see and celebrate their own progression. All pupils' names are displayed in the classroom on the appropriate named challenge level.

Times Tables Rockstars

Times Tables Rockstars is a website which provides children the opportunity to practice their multiplication and division facts both at home and in school. Children's progress on the tool is to be monitored by both the class teacher and maths lead to ensure that they are participating and increasing their accuracy. Children can be placed into 'bands' to make the question types given more appropriate for their level of understanding.

Assessment

The use of formative and summative assessment is an integral part of learning and teaching.

Formative assessment

Daily formative assessment checks pupils' learning throughout the lesson against learning objectives and success criteria. This informal assessment notifies the teachers of the next step in their planning to address learning needs. After every lesson, pupils mark their own work against each of the success criteria. Some lessons are peer assessed at the child's partner marks their learning against the success criteria also. Pupils are encouraged to self-evaluate their work to engage them in making judgements about the stages of their learning and consequently empowering them to become skilled reflective learners and critical thinkers

Evaluative written feedback is given in pupils' books to help consolidate learning. These next steps are indicated using the 'next steps' footprint stamp which has been supplied to all teachers, and is carried out at least once a week, more often where necessary. Next step marking is related directly to the success criteria and learning objective, and requires an action or response from the child. Teachers should ensure that next steps encourage children to think about the work completed but also how this might link to other areas of the curriculum. Teachers should vary types of next step given and should sometimes ask children to refer to work completed in previous weeks in line with the spaced learning approach. The pupils respond to next steps in full using the purple ink pens provided, and teachers acknowledge all pupils' responses. Please refer to the Marking and Feedback Policy for more information.

Friday lessons should incorporate a 10-minute recap test of the learning that has been completed in the previous 2-3 weeks. The questions should be taken from the 10-minute test books from 'CGP'. This is with the exception of year 6 classes where the teachers should formulate 10 questions as part of their planning. There should be 10 questions and the answers and scores should be recorded underneath the LO for the Friday lesson with the subheading 'Spaced Learning'. The reason for this is to build a better system for children to cyclically re-visit previous learning, embedding this into their long-term memory.

Summative assessment

Summative assessment is carried out once a term through the use of PUMA tests in years 3, 4 and 5 and previous SATs papers in Year 6. Age related scores, standardised scores and ARE scores for each child are recorded centrally on the pupil tracker. Data analysis of pupils' test results and teachers' assessments are intrinsic to identifying target pupils for intervention. These include the under-achievers and those making less progress than expected. Pupils that show high attainment, and are making significantly higher progress than expected, will also be identified and considered as more able and working at greater depth.

Homework

All pupils work from the Target Maths homework books. These homework books are of high quality and support the strategies that pupils are using during lessons and the principles the lessons are planned around.

Maths homework is to be set from these books on a weekly basis. The pages and due dates are to be recorded in the on the year groups homework sheet which gets emailed to parents on a weekly basis. The homework and expectations are also shared and discussed with pupils in class.

Parents are encouraged to purchase answer books to go through homework with their child, ticking the correct solutions and discussing the incorrect ones. Teachers will then review the homework (where necessary) with the pupils each week, and use the information as a form of assessment to inform future teaching and learning. Parents are encouraged to discuss their homework with their child, encouraging the child to share their methods and understanding. Parents should mark their pupils' work with them, entering into dialogue about their work.

Calculation

Policies surrounding calculation are not intended as a straightjacket or a scheme of work. It recognises that children will develop their mathematical skills at different rates and have their own individual learning styles. They will develop calculation skills through a combination of practical, oral and mental activities. Written calculation strategies will be taught alongside mental calculation strategies and should be seen as complementary to, and not as separate from them.

Informal written recording will take place regularly and is an important part of learning and understanding. More formal written methods follow only when the child is able to use a wide range of mental calculation strategies. The emphasis of our teaching will always be to facilitate understanding and not simply to arrive at a correct answer. It should also be noted that

the intention is not for the child to reach the last step as quickly as possible, but to progress through the steps at their own pace, focusing on understanding and becoming fully comfortable with the method.

Teaching of these calculation methods will always compliment the concrete, pictorial, abstract principle as described in the Primary Advantage Maths Programme.

Our aim is for children to be able to select an efficient method of their choice (whether this be mental or written) that is appropriate for a given task. They will do this by always asking themselves:

- ‘Can I do this in my head?’
- ‘Can I do this in my head using drawings or jottings?’
- ‘Do I need to use a pencil and paper procedure?’

All teachers should refer to the PA maths overview to draw upon the calculation procedures outlined. Please see appendix for further information.

Resources

All classes are equipped with basic mathematical resources. Calculators, counters, dice, digit cards, rulers, protractors, dominoes, dienes, place value counters and number lines are clearly labelled and are readily available to the pupils in order to promote independent learning. New resources may be purchased when funding is available. The Mathematics Leader is responsible for completing an annual financial bid for the maintenance and development of the subject, in which new resources are highlighted.

All pupils should have opportunities to use ICT, including the internet and I-pads.

Review

This policy is monitored by the maths subject leader and the Senior Leadership Team through:

- Regular scrutiny of pupils’ books
- Regular monitoring of teaching plans
- Evaluation and review of assessment data
- Lesson observations to monitor the quality of teaching and implementation of teaching plans
- Pupil interviews

This policy is reviewed by staff and governors at least once every three years, and reviewed whenever Government policy changes. The next review is due January 2022. Parents are most welcome to view this policy on the school website and comments are invited from anyone involved in the life of the school.

Appendix

YEAR	ADDITION	SUBTRACTION	MULTIPLICATION	DIVISION
3	TU + TU developing to HTU + TU or HTU + HTU <ol style="list-style-type: none"> Use of number lines to count on Horizontal expanded method, using partitioning Vertical expanded method adding most (or least) significant digit first 	TU – TU, developing to HTU – TU or HTU – HTU <ol style="list-style-type: none"> Use of number line to count up Use of number line to take too much and add back Use of partitioned vertical form (expanded form) Decomposition using expanded form 	<ul style="list-style-type: none"> Repeated addition Describing an array Concrete written Scaling 	<ul style="list-style-type: none"> Grouping Sharing Remainders
4	HTU + TU then HTU + HTU <ol style="list-style-type: none"> Vertical expanded method adding most significant digit first Vertical expanded method adding least significant digit first Leading to regrouping below the line Calculations extended to include addition of two or more 3-digit sums of money 	HTU – TU then HTU – HTU <ol style="list-style-type: none"> Decomposition using expanded form Decomposition using compact form Calculations extended to include the difference between two 3-digit sums of money 	TU x U <ol style="list-style-type: none"> Grid method (TU x U) Standard expanded short multiplication (TU x U) Compact short multiplication (TU x U) 	TU ÷ U <ol style="list-style-type: none"> TU ÷ U – using short division
5	HTU + HTU then ThHTU + ThHTU <ol style="list-style-type: none"> Vertical expanded method adding least significant digit first Compact written method regrouping below the line Calculations extended to include addition of two or more decimal fractions, with up to three digits and the same number of decimal places, in vertical format 	HTU – HTU, then ThHTU – ThHTU <ol style="list-style-type: none"> Decomposition using expanded form Decomposition using compact form Calculations extended to include subtraction of decimals, with up to 3 digits & the same number of decimal places, in expanded format leading to vertical format 	HTU x U and TU x TU <ol style="list-style-type: none"> Grid method (HTU x U & TU x TU) Standard expanded short multiplication (HTU x U) Compact short multiplication (HTU x U) Long multiplication (TU x TU) Calculations extended to include multiplying decimal fractions with one decimal place by a single digit 	HTU ÷ U <ol style="list-style-type: none"> HTU ÷ U – using short division
6	ThHTU + ThHTU and then any number of digits <ol style="list-style-type: none"> Compact written method regrouping below the line Calculations extended to include addition of two or more decimal fractions with up to four digits & either one or two decimal places 	ThHTU – ThHTU and then any number of digits <ol style="list-style-type: none"> Decomposition using compact form Calculations extended to include subtraction of two or more decimal fractions with up to 3 digits & either one or two decimal places in vertical format 	ThHTU x U and HTU x TU <ol style="list-style-type: none"> Grid method (ThHTU x U & HTU x TU) Standard expanded short multiplication (ThHTU x U) Compact short multiplication (ThHTU x U) Long multiplication (HTU x TU) Calculations extended to include multiplying decimal fractions with two decimal places by a single digit 	HTU ÷ TU <ol style="list-style-type: none"> HTU ÷ TU – using chunking HTU ÷ TU – efficient chunking HTU ÷ TU – efficient standard method Extend to decimal fractions with up to two decimal places