



Parkland
Primary School

Learning together

Mathematics Subject Policy

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Rationale

This policy outlines the intent, implementation and intended impact for the teaching, leadership and assessment of mathematics at Parkland Primary School. The school's policy for mathematics follows the 2014 National Curriculum Framework and the Early Years Foundation Stage Framework.

Our Mission

At Parkland Primary School, we believe that every child in our school community should have *Limitless Learning* opportunities. We all have the ability to succeed and our school works hard to ensure that our pupils can *Discover their Potential*.

Our Values: Grow, Believe, Achieve, Succeed

Intent

Parkland Primary began its transition towards Teaching for Mastery in 2015 and our maths teaching and learning journey continues to grow. Through our work with the East Midlands South Maths Hubs, our teaching is based on the five key ideas of Teaching for Mastery: Coherence, Representation and Structure, Variation (procedural and conceptual), Fluency and Mathematical Thinking.

Our overarching intent is to instil a love of a mathematics in our children and staff; we want our children to be life-long mathematicians and to understand how mathematics is essential to everyday life and that it is critical to science, technology, engineering and finance. Through developing children's curiosity and gaining an appreciation of the beauty and power of mathematics, we want all children to enjoy the subject and to experience success.

In our teaching and learning, we understand the importance of metacognition and developing self-regulation in children to become independent learners. Through our work on Growth Mindset, we have developed a culture where the children (and staff) understand that mistakes help us learn and we should not be afraid of getting things wrong. To embed this further, we regularly give the children the opportunity to self-mark and reflect; this allows the children to have a feeling of success as well as developing their resilience and perseverance.

We have embedded the three aims of the National Curriculum in our teaching: fluency, reasoning and problem solving. We believe that all three of these are equally important to develop well-rounded mathematicians.

The national curriculum for mathematics aims to ensure that all pupils:

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

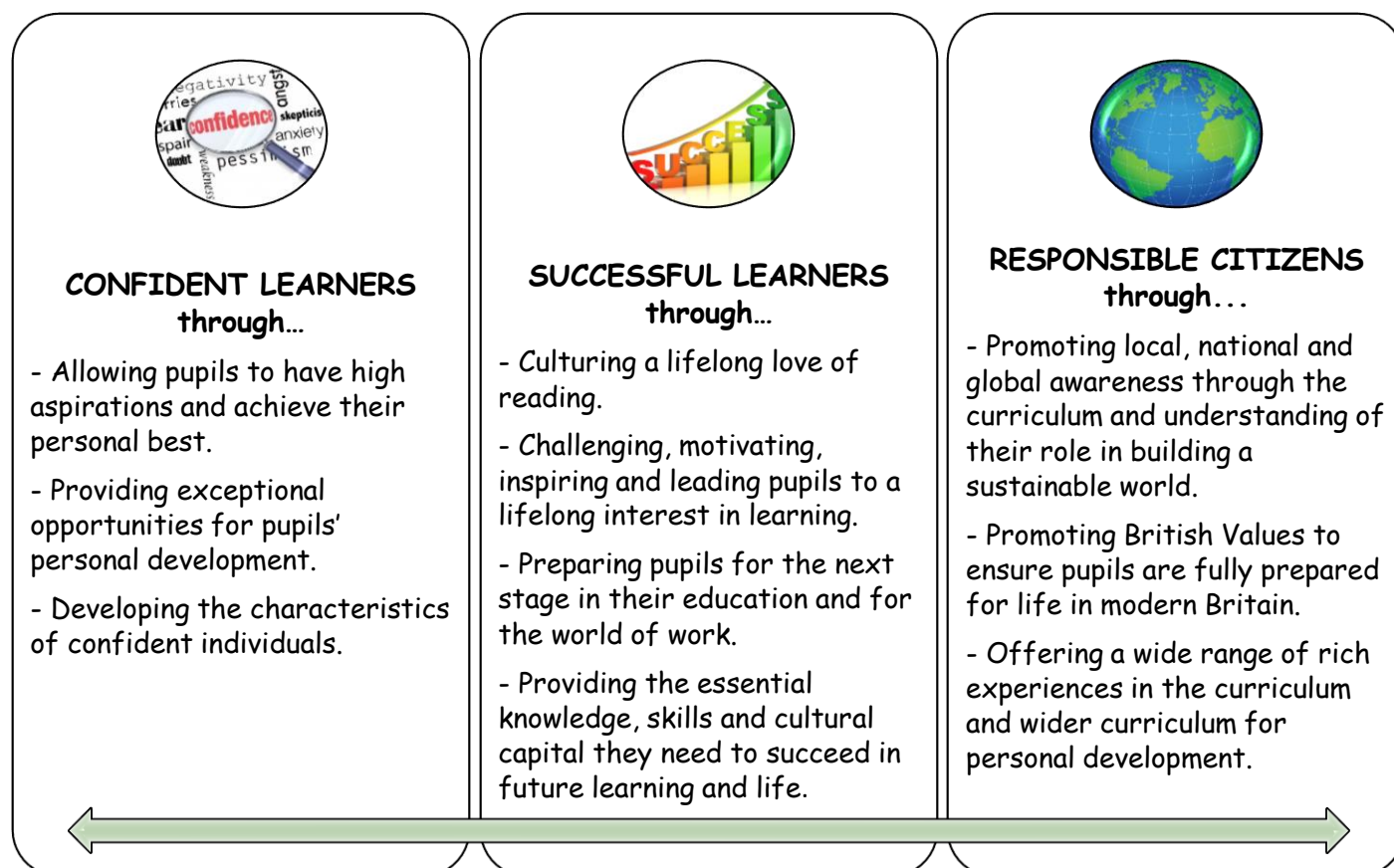
- reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- can solve problems by applying their mathematics to a variety of routine and nonroutine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

At Parkland Primary School we have worked together to create a shared language for learning (Appendix 1). Underpinning this and all curriculum design is our whole school definition of learning:

'Learning is the process of building on and strengthening the connections in your brain.'

Curriculum Drivers

At Parkland Primary School, through the delivery of a high-quality knowledge led mathematics curriculum we aspire for our pupils to be...



Implementation

How mathematics is planned and taught:

Teachers use the White Rose planning scheme to support their long-term planning. White Rose suggests how long to spend on each block of learning, but the length of time spent is down to individual teachers to decide what is best for their classes' learning. Teachers work collaboratively to plan mathematics using the learning journey planning format (Appendix 2); the teachers look what the prior learning was then build the current teaching upon that. Teachers use the White Rose progression maps (appendix 3) for overall National Curriculum coverage and use the mental arithmetic progression document (appendix 4) to plan for fluency and arithmetic.

To support our planning we use various high quality resources:

- NCETM PD materials <https://www.ncetm.org.uk/resources/50639>
- White Rose Schemes of learning <https://whiterosemaths.com/resources/primary-resources/>
- NCETM Mastery Assessment documents <https://www.ncetm.org.uk/resources/46689>
- Gareth Metcalfe's 'I See Reasoning' and 'I See Problem Solving'. <http://www.iseemaths.com/>
- NRich resources <https://nrich.maths.org/>
- Interactive representations from mathsbots - <https://mathsbots.com/>
- Third Space <https://mathshub.thirdspacelearning.com/>
- Numberblocks <https://www.ncetm.org.uk/resources/52060>

For the wider curriculum we block learning and re-visit practice over time through a spaced practise approach (Learning Scientists, 2016) as research suggests this will lead to better long-term retention of knowledge. Retrieval practice is a fundamental part of our mathematics curriculum as it is proven to strengthen memory and make it easier to retrieve the information later (Rosenshine, 2012, Jones, 2019, Barton, 2017). Opportunities for retrieval practise occur in many places in the mathematics curriculum:

- **Daily review** to activate prior learning forms the start of most lessons in KS1 and KS2 (example in appendix 5). This will be a mixture of questions to aid retrieval of knowledge and concepts taught over time, focused on re-activating recently acquired knowledge that will be built on in that day's learning. This should support children in securing long-term knowledge acquisition in KS1 and KS2.
- **Fluent in fifteen-** A set number of fluency questions to be completed two to three times a week (example in appendix 6) in KS1 and KS2. This will be based on the arithmetic and mental strategies document (appendix 4). A specific skill will be taught and then the fluent in fifteen questions will follow in the week.
- **Times Tables RockStars-** Completed at least three times a week in KS2.

Planning and Teaching in EYFS

Maths is taught as part of the Area of Learning designated as 'Mathematics' in the EYFS Curriculum. The EYFS Curriculum is made up of two strands: Number and numerical patterns. The children receive four whole class, teacher led maths teaching per week and they have access to independent child initiated maths activities daily. EYFS staff also provide opportunities for the children to work as guided groups weekly to apply the whole class learning. Children are given opportunities to work on maths activities both indoors and outdoors. These activities are based on the main areas as outlined in the EYFS curriculum.

Throughout the year in EYFS, the numbers 1-10 are covered, as well as shapes that link: Autumn 1 focusses on the numbers 1-3 and circles and triangles; Autumn 2 focuses on 0, 4 and 5 as well as squares, doubles, addition and subtraction; Spring 1 focusses on 5, 6, 7, addition, subtraction, time, shape and doubling; Spring 2 focusses on 8,9, 10, halving, doubling, sharing, number bonds and shape; Summer 1 focusses on consolidating and efficient use of numbers and Summer 2 focusses on numerical patterns to 20, money and shape.

As in the rest of the school, the Maths planned builds on previous learning and allows time for children to develop 'mastery' in the key areas of Mathematics without moving onto a new concept too

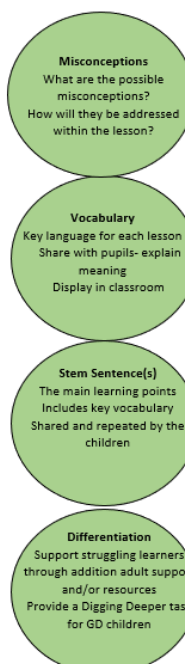
quickly. Daily Review and retrieval are also key to the EYFS teaching and learning, where the daily review links back to prior learning.

Planning is updated daily taking into account previous learning. This ensures the maths activities are appropriate and relevant to the children's learning needs and their interests. Maths activities in Continuous Provision are planned taking into account both the children's interests and curriculum coverage.

Key Stages One and Two:

At Parkland Primary, there are distinct parts to our maths lessons and the Rosenshine Principles of Instruction can be seen in a maths lesson in the following ways:

Rosenshine's Principles of Instruction	Mastery Maths – Lesson Design	
1. Daily Review 10. Weekly and Monthly Review	<p><u>Daily Review</u></p> <p>What is a non-negotiable for this year group that needs to be constantly recapped? What did they learn last year that needs to be reviewed? What was new last lesson? Last week? Last month? What is a common misconception that needs to be constantly re-addressed? What is a common gap in their learning that you know from formative and summative assessment? Use of retrieval toolkit to vary techniques used for this.</p>	<p> ■ Daily Review ■ Teaching ■ Doing ■ Guided Practice ■ Independent Practice </p>
	<p><u>In Focus</u></p> <p>An introductory activity for pupils. Often an open task that gives pupils the opportunity to talk and explore. Ask for different ways of solving it Putting the learning into a real life context</p>	
2. Present new material using small steps 3. Ask questions 4. Provide models	<p><u>Episodic Teaching (Ping-Pong)</u></p> <ul style="list-style-type: none"> New concepts are introduced through a CPA approach. Concepts are introduced in small steps Teaching and Practice to be interweaved where the teacher models (Worked Example) the new learning and explains their thinking and then the children practice that new learning (Your Turn) with support if needed. It is key here that the Your Turn is very similar to the Worked Example so that the cognitive load is not too great Vocabulary introduced. Teacher may use concrete equipment, models and images to develop understanding. Misconceptions are addressed Teacher makes deliberate mistakes to ensure key misconceptions have been addressed 	<p> ■ Teaching ■ Doing </p>
5. Guide student practice 6. Check for student understanding 7. Obtain a high success rate	<p><u>Guided Practice</u></p> <p>Quick questions given where teachers and support staff to use AFL to identify any pupils who may need further support. Give time to guide student practice supported by modelling, corrective feedback and re-teaching where gaps remain. Check for understanding using questioning Teacher and pupil input where necessary. This part of the lesson might move between teacher and pupil. Children may be regrouped and teacher/support staff may have a focused group.</p>	
8. Provide scaffolds for difficult tasks 9. Independent Practice	<p><u>Independent Work</u></p> <p>Using Intelligent practice and variation in question types (both procedural and conceptual) Rapid Interventions where teachers and support staff may work with children who need additional support An opportunity to apply learning and develop both conceptual and procedural understanding. Questions include fluency, reasoning and problem solving It is important that the material that students practise is the same as during guided practise for appropriate levels of success to be secured</p>	



Teach and Do diagram adapted from McCourt (2019) page 296

In Key Stage 1 and 2 children have a daily mathematics session of approximately 60 minutes. Teachers in Key Stage 1 and 2 also plan and provide opportunities for children to use and apply maths knowledge and skills in other areas of the curriculum. Currently in year 1, the AfL is conducted more throughout the lesson and they do not have a guided practice as they work to move the children from EYFS style of teaching.

Effective teaching of Mathematics:

Parkland Primary School prides itself on being a research informed school. Following staff training on Rosenshine's Principles in Action (Sherrington and Caviglioli, 2019), involvement in the Teacher Research Groups, Teaching for Mastery (McCourt, 2019) and How I Wish I'd Taught Maths (Barton, 2017), school teachers are expected to actively present material and structure lessons using the ten principles of instruction below. These principles not only facilitate the memorising of information, but allow pupils to understand it as an integrated whole, and to recognise the relationships between the parts. This **does not** mean that every lesson needs to follow the exact structure or sequence and this is **not** intended to be used as checklist for each lesson; these elements can occur at different points

in a lesson, or over a sequence of lessons, and can be integrated in different ways and at different times.

Principles of Instruction:

1. **Daily Review** – lessons begin with a short review of previous learning to re-activate recently acquired knowledge.
2. **Present new material using small steps** – recognise the limitations of the working memory by breaking down concepts and procedures into small steps.
3. **Ask questions** – teachers need to ask large numbers of questions to check for understanding
4. **Provide models** – a central feature of giving good explanations. These may include concrete models to aid abstract concepts, worked narrative examples modelling a process
5. **Guide student practice** – give time to guide student practice supported by modelling, corrective feedback and re-teaching where gaps remain.
6. **Check for student understanding** – teachers use their questioning to ascertain from as many children as possible what they have understood? A range of questioning strategies below can be used to do this (see below).
7. **Obtain a high success rate** – teachers need to engineer a high success rate (around 80%) where children are reinforcing error-free, secure learning, improving fluency and confidence providing a platform for independent practice. However, it is still important pupils are challenged here (a success rate a 90%+ is too high).
8. **Provide scaffolds for difficult tasks** – temporary aids may be required to support children in developing a level of independence but are withdrawn at the right point so that pupils don't become reliant upon them.
9. **Independent Practice** – here teachers need to construct learning so that students are able to do challenging things by themselves without help. It is important that the material that students practise is the same as during guided practise for appropriate levels of success to be secured
10. **Weekly and Monthly Review** – to ensure that previously learned material is not forgotten and break the forgetting curve. A variety of retrieval techniques can be used to do this.

Questioning and Reasoning Strategies used at Parkland Primary School:

- How do you know? Justify Why?
- What's the same? What's different?
- Explain how you got your answer? What did you do?
- What do you notice?
- How many different ways can you show me?
- Mathematical Superheros: Captain conjecture, Ace organiser, Canine the Convincer, The Classifier, The Specialiser, The Visualiser and Excellent Expressor
- Think – Pair – Share
- Cold call (no hands up)
- No opt out (bounce back if a child isn't able to answer initially)
- Probing questions (staying with a child to probe deeper to check understanding)
- Say it again better (ask children to rephrase answers a second time to build a deeper, high quality answer)

- Agree, Disagree, Add your own... (to structure class discussion around a question)
- Whole class response: choral, whiteboard, ABCD, thumbs up + down for true or false

Classroom environment

Every classroom has a maths working wall where key concepts, representations, models, vocabulary and methods are developed with the children and displayed to develop the overall learning journey. This allows the whole class to have ownership of their learning and to be able to refer to key concepts through the learning journey.

Children also have access to manipulatives to support them in their learning: number lines, place value charts, multiplication grids, fraction walls, Numicon, dienes, cubes, bead strings and other key resources.

Marking

At the end of the Guided Practice and Independent Practice, children will self-mark their answers: yellow for correct and blue for wrong (from year 2 onwards). This enables the teacher to assess which children need support/challenge and allows the children to self-correct in purple pen (in KS2). Teachers mark correct in green and orange for wrong.

Challenge



Children are challenged through the lessons with directed questioning but they can also be challenged through further tasks: Digging Deeper. The Digging Deeper Tasks focus on the Greater Depth skills of open ended challenge, creating own tasks and proving and justifying their reasoning (<https://nrich.maths.org/11336>).

Multiplication Tables

Throughout the year groups in Parkland Primary, children are developing and consolidating their multiplication knowledge in line with our arithmetic and mental strategies document and age-related National Curriculum expectations. This includes a variety of tasks:

- Counting stick
- Multiplication games
- TTRS booklets - 60 questions in 3 minutes
- MTC simulation practice
- TTRS online

Inclusion and Equal Opportunities (challenge for all):

In line with our mission statement, we believe every child will have equal opportunity to achieve their full potential and access an ambitious and coherent curriculum that leads to deep learning and an understanding of a sustainable world. Regardless of race, gender, cultural background, ability or Special Educational Needs or Disability.

If a child has a special educational need of disability, we will do our very best to ensure we meet that child's individual needs when accessing the mathematics curriculum. We comply with the requirements set out in the SEND Code of Practice. If a teacher has concerns about the progress of a child, then they will liaise with the in school SENDCO to arrange appropriate assessment of need and set up personal provision through initially writing a Personalised Provision Plan. In some cases, where the demands of the curriculum may be too much, this may involve the use of PIVATS targets to track small step progress for this child or differentiation within the classroom environment to meet the needs of that child.

Impact

Assessing Progress

Formative Assessment:

Pupils' progress will be assessed using regular formative assessment in lessons through strategies such as questioning, regular retrieval practice, quizzing, independent learning tasks, pre and post assessments and assessment of work in books and feedback.

At the start of each maths learning journey, the children will complete a **pre-learning** assessment (where appropriate and using previous year's objectives) and at the start of each learning journey block to assess prior learning; they will be assessed formatively through the use of a **post assessment** (appendix 7) at the end. Teachers will use both these assessments to provide further feedback or re-teach concepts where necessary to close gaps and ensure pupils have mastered the curriculum content at that point.

Assessing long-term learning:

Summative Assessment:

Summative assessment in Mathematics takes place at the end of every term in line with the School and Trust Assessment Schedule. In years 1, 3, 4 and 5 this take the form of Rising Stars Assessment and in years 2 and 6 it is previous SATs papers.

In year 4, the children complete the Multiplication Tables Check (MTC) in June each year.

Years 2 and 6 also take part in the Statutory Assessment Tests (SATs) that take places in May each year.

Tracking Pupil Progress:

In mathematics children are tracked in multiple ways:

- Online **SAB sheets** where each child has a mark for working below, working towards, working at or working above for **each National Curriculum Statement**
- Online **SAB sheets** where children have an **overall judgement** for working below, working towards, working at or working above for each half term
- Online **fluency tracking** for specific multiplication (and number bonds in KS1) statements for each year group for each half term- Years 3 and 4 use their MTC simulation data to inform trackers
- Tracking of EYFS to end of KS1 **statutory assessment data** and end of KS1 statutory assessment data to end of KS2 statutory assessment data

- Baseline assessment in EYFS and tracking against Early Learning Goals

Individual progress is reported to parents through two termly Parents' Evenings and an end of year report.

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