

King's Hill Primary School



Mathematics Policy

2022 – 2023

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1. Curriculum Statement

Intent

The National Curriculum 2014 for mathematics aims to ensure that all pupils:

- Become fluent in the fundamentals of mathematics, including the 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 non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

The programmes of study are, by necessity, organised into apparently distinct domains, but pupils should make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. They should also apply their mathematical knowledge to science and other subjects.

The expectation is that the majority of pupils will move through the programmes of study at broadly the same pace. Pupils who grasp concepts rapidly will be challenged through being offered rich and sophisticated problems before any acceleration through new content. Those who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice, before moving on.

When teaching mathematics at King's Hill, we intend to provide a curriculum which caters for the needs of all individuals and sets them up with the necessary skills and knowledge for them to become successful both in school and in their future working lives.

Implementation

At King's Hill we are embedding a mastery approach throughout school from EYFS, so that the teaching and learning is consistent and will support all pupils with their understanding and retention. Pupils are required to explore maths in depth, using mathematical vocabulary to reason and explain their workings. Mathematical resources are used and pupils are taught to show their workings in a concrete, pictorial and abstract form wherever suitable. Pupils are taught to explain their choice of methods and develop their mathematical reasoning skills.

We are using the Power Maths scheme, designed for UK schools based on research and extensive experience of teaching and learning around the world and here in the UK. It provides support and challenge for pupils, and is built on the belief that all children can achieve.

Power Maths is structured around a whole class interactive teaching model that focuses on helping all children to build a deep understanding of concepts. The philosophy behind Power Maths is that being successful is not just about rote-learning procedures and methods, but is instead about problem solving, thinking and discussing. Power Maths includes practice questions to help pupils develop fluent recall and develop their conceptual understanding. Power Maths uses growth mindset characters to prompt, encourage and question children. They spark curiosity, engage reasoning, secure understanding and deepen learning for all.

For each year group the curriculum strands are broken down into core concepts. These are taught in blocks of lessons giving sufficient time to develop a deep and sustainable understanding of core concepts. Each concept is broken down into lessons. Each lesson and concept builds on prior knowledge to help children build a robust and deep understanding of the concept before moving on. Opportunities are provided for same day intervention if necessary and also for deepening activities if pupils master the concept.

Impact

Teachers reinforce an expectation that all pupils are capable of achieving high standards in mathematics. The large majority of pupils progress through the curriculum content at the same pace. The Power Maths programme is ensuring pupils experience challenge and success in mathematics by developing a growth mindset. As the mastery approach continues to be embedded at King's Hill, teaching and learning of mathematical skills is becoming more consistent across the school. Regular and ongoing assessment informs teaching, as well as intervention, to support and enable the success of each pupil. We see pupils engaged in their maths lessons, able to talk about the subject and make links with other subjects. Pupils are tackling mathematical challenges with some resilience and are more confidently using concrete resources and visual representations. Pupils are also becoming more articulate when discussing mathematical concepts and accelerated progress is taking place due to the way Power Maths lessons are structured and the impact of immediate, tailored interventions.

Although we are able to maintain our high standards, as of September 2021 we are beginning our third year as part of the mastery maths hub. Due to the impact of Covid-19 interrupting the last two years, we are still working towards embedding the above fluently, confidently and consistently across our school.

2. Teaching and Learning

A typical lesson using Power Maths lasts approximately 1 hour. Maths is taught daily during the morning. The lesson follows the format as below:

- A **Power Up** activity designed to support fluency in all key number facts.
- **Discover and Share** activity where pupils can share, reason and learn. This is often a real-life example, sometimes a puzzle or a game. These are engaging and fun, and

designed to get all pupils thinking. The class shares their ideas and compares different ways to solve the problem, explaining their reasoning with hands-on resources and drawings to make their ideas clear. In KS1, these problems are almost always presented with objects (concrete manipulatives) for pupils to use. Pupils may also use manipulatives in KS2. Teachers use careful questions to draw out pupils' discussions and their reasoning and the pupils learn from misconceptions through whole class reasoning.

- **Think together.** In this section Power Maths takes the approach “I do, we do, you do”, as children apply the knowledge they have just learned in a series of problems that continue to encourage thinking throughout. Pupils are presented with varied similar problems which they might discuss with a partner or within a small group. At this point, scaffolding is carefully reduced to prepare pupils for independent practice. Pupils might record some of their working out in their maths books or on a mini whiteboard. The teacher uses this part of the lesson to address any initial errors and confirm the different methods and strategies that can be used. Pupils are then shown a ‘challenge’ which promotes a greater depth of thinking.
- **Practice** where the skills learnt and used to build fluency and develop deeper understanding of concepts. Challenge questions link to other units encourage pupils to take their understanding to a greater level of depth. Pupils will be encouraged to use concrete resources alongside pictorial representations. Others might be supported through additional scaffolding provided by the teacher, which may include provided models of the calculation method that the children will need to use, or copies of the worded question, with key aspects and vocabulary highlighted. A challenge question and links to other areas of Maths encourages pupils to take their understanding to a greater level of depth.
- **Reflect** which allows pupils to review and reflect on their learning while reasoning and enable the teacher to gauge their depth of understanding.

Additional fluency

To support the fluency of number in Early years and KS1, a further daily, 15 minutes number sense session takes place each day. The **Number Facts Fluency Programme** teaches a core set of number facts (the grid facts) and the calculation strategies.

Modelled on the phonics programmes used in early reading, the programme groups the grid facts and teaches them systematically alongside the calculation strategies that can be used to solve them. All facts are taught comprehensively on the path to fluency.

The programme teaches children to solve a defined set of addition and subtraction facts by applying key visuals, models and calculation strategies. Explicit teaching of the derived facts is the most effective route to fluency in addition and subtraction facts.

These essential facts provide children with the building blocks for all future addition and subtraction calculations. Fluency is developed through reasoning about relationships between numbers, quantities and calculations.

+	0	1	2	3	4	5	6	7	8	9	10
0	0+0	0+1	0+2	0+3	0+4	0+5	0+6	0+7	0+8	0+9	0+10
1	1+0	1+1	1+2	1+3	1+4	1+5	1+6	1+7	1+8	1+9	1+10
2	2+0	2+1	2+2	2+3	2+4	2+5	2+6	2+7	2+8	2+9	2+10
3	3+0	3+1	3+2	3+3	3+4	3+5	3+6	3+7	3+8	3+9	3+10
4	4+0	4+1	4+2	4+3	4+4	4+5	4+6	4+7	4+8	4+9	4+10
5	5+0	5+1	5+2	5+3	5+4	5+5	5+6	5+7	5+8	5+9	5+10
6	6+0	6+1	6+2	6+3	6+4	6+5	6+6	6+7	6+8	6+9	6+10
7	7+0	7+1	7+2	7+3	7+4	7+5	7+6	7+7	7+8	7+9	7+10
8	8+0	8+1	8+2	8+3	8+4	8+5	8+6	8+7	8+8	8+9	8+10
9	9+0	9+1	9+2	9+3	9+4	9+5	9+6	9+7	9+8	9+9	9+10
10	10+0	10+1	10+2	10+3	10+4	10+5	10+6	10+7	10+8	10+9	10+10

-	0	1	2	3	4	5	6	7	8	9	10
0	0-0										
1	1-0	1-1									
2	2-0	2-1	2-2								
3	3-0	3-1	3-2	3-3							
4	4-0	4-1	4-2	4-3	4-4						
5	5-0	5-1	5-2	5-3	5-4	5-5					
6	6-0	6-1	6-2	6-3	6-4	6-5	6-6				
7	7-0	7-1	7-2	7-3	7-4	7-5	7-6	7-7			
8	8-0	8-1	8-2	8-3	8-4	8-5	8-6	8-7	8-8		
9	9-0	9-1	9-2	9-3	9-4	9-5	9-6	9-7	9-8	9-9	
10	10-0	10-1	10-2	10-3	10-4	10-5	10-6	10-7	10-8	10-9	10-10
11		11-1	11-2	11-3	11-4	11-5	11-6	11-7	11-8	11-9	11-10
12			12-2	12-3	12-4	12-5	12-6	12-7	12-8	12-9	12-10
13				13-3	13-4	13-5	13-6	13-7	13-8	13-9	13-10
14					14-4	14-5	14-6	14-7	14-8	14-9	14-10
15						15-5	15-6	15-7	15-8	15-9	15-10
16							16-6	16-7	16-8	16-9	16-10
17								17-7	17-8	17-9	17-10
18									18-8	18-9	18-10
19										19-9	19-10
20											20-10

The grids do not include all addition and subtraction within 20 as not all of these facts are building block facts. $12 + 4$, for example, uses the building block fact $2 + 4$, and $17 - 3$ is an application of the building block fact $7 - 3$

Number sense maths aims to develop a deep understanding of the numbers to 10, the relationships between them and the patterns within those numbers. The programme supports the following aspects of the educational programme for mathematics in the 2021 statutory framework for the early years foundation stage:

- Provide rich opportunities for children to develop their spatial reasoning skills
- Develop positive attitudes and interests in mathematics, look for patterns and relationships, spot connections, 'have a go', talk to adults and peers about what they notice and not be afraid to make mistakes.

The programme also covers the following elements:

- Subitising
- Number composition
- Fluency within 10
- Ten and A Bit numbers
- Bridging 10
- Extending to two digit calculation

The lesson consists of 3 parts

- Part 1: individual practise of previous learning
- Part2: teaching and group discussion
- Part 3 individual consolidation of the days learning.

Fluency in Key Stage 2 continues to be supported through providing opportunities for our pupils to use the Times Table Rock Stars programme. This is a fun and challenging programme designed to help pupils master times tables by allowing pupils to follow a sequenced programme of daily times tables practice. Teachers set pupils times tables challenges daily and pupils complete these within a given time period. Pupils are exposed to a paper based form or online and this can also be accessed from home.

Pupils also complete challenges using NumBots' which supports pupils to become fluent in solving more complex problems, *NumBots'* intelligent practice methodology focuses on automatic recall of *number* facts as well as well as developing conceptual understanding. Pupils are exposed to a variety of representations and question styles for each concept, from pictorial to abstract.

This depth-before-breadth approach allows pupils to build up connections between key concepts and ideas, while the visual representations help to create mental models for more advanced questions. It helps pupils to recall fluency in addition and subtraction so that pupils move from counting to calculating.

3. Assessment

Assessment for Learning:

Pupils receive daily, effective feedback through live marking. We have moved away from detailed written feedback as research indicates this has minimal impact after the lesson. The structure of the teaching sequence in Power Maths ensures that pupils know how to be successful in their independent work. Guided practice, which takes place within the 'Think Together' part of the lesson, provides further preparation for pupils to be able to apply the skills, knowledge and strategies taught during the 'Discover and Share' phase. Common misconceptions are addressed within the teaching sequence and key understanding within each 'small step' is reviewed and checked by the teacher and the pupils before progression to further depth.

Formative Assessment:

Short term assessment is a feature of each lesson. Observations and careful questioning enable teachers to adjust lessons and brief other adults in the class if necessary. The lesson structure of Power Maths is designed to support this process and the reflect task at the end of each lesson also allows for misconceptions to be addressed. At the end of each blocked unit of work, pupils may complete the carefully aligned 'End of Unit Assessment' to further evidence learning. The outcome can be help ensure that any identified gaps in understanding, can be addressed.

Summative Assessment:

Teachers administer PUMA tests termly. Data analysis enables teachers to identify any common areas of weakness so appropriate consolidation work can be done. They are also used alongside the end of unit assessments and outcomes of work, to inform the whole

school tracking of attainment and progress of each pupil. The end of year data is used to measure the extent to which attainment gaps for individuals and identified groups of learners are being closed. The data is also informs whole school and subject development priorities for the next school year.

4. Planning & Resources

The use of mathematical resources is integral to the C-P-A approach and thus planned into teaching and learning. These resources are used by our teachers and pupils in a number of ways including:

Demonstrating or modelling an idea, an operation or method of calculation.

Resources for this would include: double sided counters, a number line; place value cards; ten frames; Dienes; place value counters and grids; money or coins; measuring equipment for capacity, mass and length; bead strings; the interactive whiteboards and related software; 3D shapes and/or nets; Numicon; multi-link cubes; clocks; protractors; dice; number and fractions' fans; individual whiteboards and pens; and 2D shapes and pattern blocks, amongst other things.

Enabling pupils to use a calculation strategy or method that they couldn't do without help, by using any of the above or other resources as required.

Standard resources, such as number lines, multi-link cubes, Dienes, hundred squares and counters are located within individual classrooms. Resources within individual classes are accessible to all pupils who should be encouraged to be responsible for their use. An interactive teaching tool for the purpose of modelling strategies is available to all teachers as part of the Power Maths scheme. Resources to support teachers' own professional development and understanding of new approaches as part of a mastery approach are available on the Power Maths 'activelearn' platform. As well as overviews of learning, these include short videos which demonstrate new methods to ensure accuracy. The subject leaders attend regular training through the Maths Hub and signpost new resources, including those published by the National Centre for Excellence in the Teaching of Mathematics (NCETM), for use in specific areas of maths. High quality Power Maths textbooks (as well as an online version are used across the school. Teachers are encouraged to use the school grounds as an outdoor classroom where this will provide more purpose and context to the learning, for example, when teaching length, area or perimeter.

5. Organisation

The school has implemented a blocked curriculum approach to the teaching of mathematics. This ensures pupils are able to focus for longer on each specific area of maths and develop a more secure understanding over time. This approach is also designed to enable pupils to progress to a greater depth of understanding.

Subsequent blocks continue to consolidate previous learning so that pupils continually practise key skills and are able to recognise how different aspects of maths are linked. For example, when pupils have completed a block which has enabled them to master the multiplication of two-digit numbers, a subsequent block on area and shape might provide

opportunities to use this understanding when calculating the area of shapes with 2-digit length and width dimensions.

6. EYFS

In Nursery, mathematics is delivered through adult led group sessions, adult lead focus tasks, weekly challenges in the maths area, though continuous provision and implemented throughout the daily routine. In Nursery the children begin to develop their understanding of simple mathematical concepts such as counting to 5 (then 10 and then 20), maintaining 1 to 1 correspondence, simple addition and subtraction, to recognise and describe simple 2d and 3D shapes etc. Children are taught these concepts using physical and pictorial resources, songs, games and role-play activities.

In Reception, Mathematics is delivered through whole class teaching, adult led focus activities, weekly challenges in the maths area, though continuous provision and implemented throughout the daily routine. In Reception, mathematics lessons are split into three parts, which broadly follows the Power Maths programme consisting of:

- Whole class oral and mental starter – 5 minutes
- Whole class main teaching – 10 minutes
- Adult led focus activity

The Oral and mental starters focus on a broad range of topics such as shape, measure, time, patterns etc. to help develop an understanding of these concepts. Whole class main teaching follows Reception Power Maths planning. We teach a short whole-class lesson following the teaching sequence set out in Power Maths; starter stimulus, discover & share, think together, challenge and practical activities.

Children enjoy sharing their understanding, talking about maths and the practical elements of these maths activities. The clarity and focus of the Power Maths resources allow teachers to focus on developing and strengthening fundamental maths concepts and skills and also to address any misconceptions that may arise. The structure of the lesson enables teachers to secure a good balance between whole class work, group teaching and individual practice. It also allows teachers to establish regular routines thereby maximising teaching time. It supports assessment, as well as providing individual verbal feedback to children, ensuring that children have a clear understanding of the task they have completed, as well as any next steps.

7. KS1 and KS2

As acknowledged by the National Centre for Excellence in the Teaching of Mathematics (NCETM) and the Maths Hub programme – ‘The use of well-designed and tested textbooks is critical for the successful implementation of teaching for mastery. A good textbook is both an aid for the teacher in planning lessons and for the pupils during lessons and working on their own.’ Through Years 1 to 6 we use a coherent programme of high-quality materials and exercises, which are structured with great care to build deep conceptual knowledge alongside developing procedural fluency.

Our KS1 and KS2 teachers use textbooks from the DfE approved Power Maths series. This scheme is aligned with the 2014 National Curriculum. The Power Maths textbooks are arranged in chapters and, over the course of the academic year, all units of the 2014 National Curriculum are covered. There is no requirement for any formal planning due to the nature of this approach, however teachers are free to plan and source activities and additional tasks which offer support and also provide further challenge for pupils who are able to progress further in their learning. Lessons in both key stages follow the same sequence (see the previous section on Teaching & Learning). In KS1 -and possibly KS2- the teacher might use 'mini-plenaries' to explain each question during completion of the practice book and also to check pupils' understanding before they complete the next question. This ensures that all pupils are able to complete the task with confidence.

8. Equal Opportunities and Inclusion

The school is committed to ensuring the active participation and progress of all pupils in their learning. All pupils will be given equal opportunities to achieve their best possible standard, whatever their current attainment and irrespective of gender, ethnic, social or cultural background, home language or any other aspect that could affect their participation or the progress of which they are capable.

With a mastery approach, differentiation occurs in the support and intervention provided to different pupils, not in the topics taught, particularly at earlier stages. The National Curriculum states: 'Children who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content. Those who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice, before moving on.' There is little differentiation in the content taught but the questioning and scaffolding individual pupils receive in class as they work through problems will differ, with higher attainers challenged through more demanding problems, which deepen their knowledge of the same content before acceleration onto new content. Pupils' difficulties and misconceptions are identified through immediate formative assessment and addressed with rapid intervention – commonly through individual or small group support later the same day.

Although the expectation is that the majority of children will move through the programmes of study at broadly the same pace, the 2014 National Curriculum states: 'Decisions about when to progress should always be based on the security of children's understanding and their readiness to progress to the next stage.' In exceptional circumstances, if a pupil's needs are best met by following an alternative plan, including coverage of the content from a previous year, this will be detailed on the pupil's provision map and any specific arrangements for the provision of pupils with SEND will be shared with relevant staff and communicated to parents at SEND reviews/parent meetings.

9. Role of the Maths Team

The team members will:

- Work to raise the profile of maths at King's Hill through best practice. They will provide support as required as part of the staff members continued professional development.
- Ensure classroom environments are conducive to learning, through effective use of displays and accessibility and availability of resources
- Involve the school in 'celebrations' of maths, including participation in events such as 'Maths Week'.
- Monitor progression and continuity of maths throughout school through observations and regular monitoring of outcomes of work in maths books.
- Ensure that all staff have access to year group plans and the relevant resources which accompany them.
- Monitor pupils' progress through the analysis of whole school data. This will be used to inform the subject development plan which will detail how standards in the subject are to be maintained and developed further.
- Organise, audit and purchase maths resources.
- (Through ongoing involvement in the DfE funded Maths Hubs programme) Keep up to date on current developments in maths education and disseminate information to colleagues.
- Ensure that all staff have access to professional development including observations of outstanding practice in the subject.

10. Parental Involvement/Home Links

At King's Hill we recognise that parents and carers have a valuable role to play in supporting their child's mathematical learning.

- An overview of the maths curriculum and our adopted calculation policy are readily available on the website.
- Activities which link to each maths topic are suggested for parents and carers to try at home with their child
- Pupils are given maths homework at least once a week from Reception to Year 6. In addition to this they are encouraged to access Numbots (KS1) and TTRS (KS2) at home to practise and consolidate the learning they have done in school.
- Parents are informed of their child's progress at Parents Evenings and this is also communicated in written school reports. Information about their child's standards, achievements and future targets in maths is shared during these meetings, as well as ways that parents/carers may be able to assist with their child's learning.
- The year group expectations are shared with parents so they are able to support them at home.
- Year 6 parents are invited to attend an informal End of Key Stage 2 SATs meeting during Spring Term during which they are given all relevant information and have the opportunity to ask any questions or raise any concerns they may have.

To be reviewed September 2024