

Maths at Brookhill Leys Primary School

Curriculum changes

The 2014 national curriculum for mathematics has been designed to raise standards in maths, with the aim that the large majority of pupils will achieve mastery of the subject. Mathematics programmes of study state that:

- All pupils should become fluent in the fundamentals of mathematics, including through varied and frequent practice, so that pupils develop conceptual understanding and are able to recall and apply their knowledge rapidly and accurately to problems.
- The expectation is that the majority of pupils will move through the programmes of study at broadly the same pace. When to progress should always be based on the security of pupils' understanding and their readiness to progress to the next stage.
- Pupils who grasp concepts rapidly should be challenged through rich and sophisticated problems before any acceleration through new content. Those pupils who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice, before moving on.

Our approach

At Brookhill Leys we ensure that the teaching of Maths is based upon these key principals:

- * All pupils will be given a personalised Mathematics curriculum that closes the gap, ensures accelerated progress and places direct emphasis on the mastery of Mathematics skills and knowledge at an age appropriate level. This means the large majority of pupils progress through the curriculum content at the same pace.
- * Lessons will be built upon the principals of Solo taxonomy with skills being taught through the Collect – Connect – Communicate Stages to ensure mastery of skills before moving on, ensuring an engaging and challenging approach to deepen thinking and learning.
- * As Arithmetic and written number knowledge (especially knowledge of times tables) are crucial to mastery of Maths and progression, Arithmetic will be practised daily at the start of each Maths lesson. The week will end with an Arithmetic test.
- * Teachers reinforce an expectation that all pupils are capable of achieving high standards in mathematics.
- * Teachers use precise questioning in class to test conceptual and procedural knowledge, and assess pupils regularly to identify those requiring intervention so that all pupils keep up.
- * Practice and consolidation play a central role. Carefully designed variation within this builds fluency and understanding of underlying mathematical concepts in tandem.

* 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 by the third teacher.

The intention of these approaches is to provide all children with full access to the curriculum, enabling them to achieve confidence and competence – ‘mastery’ – in mathematics, rather than many failing to develop the maths skills they need for the future.

Lesson Structure

- Every lesson will begin with a 10-15 minutes 'daily practice' session which will focus on arithmetic skills.
- Learning outcomes for each lesson will come from our 'Busy Ant Maths' scheme.
- Learning will take the form of progression through – **Collect** (children collecting the knowledge during 'upfront teaching' and practising it through independent learning) **Connect** (children making deeper connections to learning, applying through problem solving situations or reasoning) **Communicating** (developing critical thinking, further learning and ensuring deeper understanding via the opportunity to explain or justify their thinking/ reasoning).
- The children will have the option of completing 3 differentiated challenges in the form of our 'Reach for the Stars' challenge system. When relevant (in KS2) these can be taken from our 'Busy Ant' text books. Because we expect most children to progress through the curriculum at the same rate, differentiation should not be through the topics taught, particularly in KS1.
- Higher attainers will be challenged through more demanding problems which deepen their knowledge of the same content.
- In KS1, lessons will mainly end with the children completing their 'Bus Ant Maths Activity Book' in order to see which children are secure in their learning for that lesson. The teacher will use the books to decide who needs to be involved in a Maths intervention group during the afternoon. In KS2, lessons will mainly end with the children explaining their mathematical thinking. They will either describe/ explain/ convince/ argue or prove their solutions are correct.
- Working walls should be used to demonstrate the thinking/learning process and to provide prompts, reminders and scaffolds to pupils.
- Any children who are not secure in the learning will be addressed with rapid intervention – commonly through individual or small group support in the afternoon by the third year group teacher.

An example lesson – Year 3

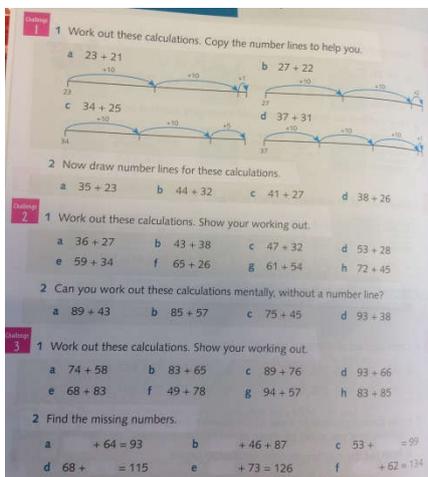
1) Daily Practice

★ $36 + 18 =$	★ ★ $136 + 128 =$	★ ★ ★ $1336 + 148 =$
$47 + 21 =$	$447 + 221 =$	$5437 + 261 =$
$83 + 15 =$	$813 + 115 =$	$5683 + 175 =$
$35 + 47 =$	$735 + 173 =$	$3752 + 747 =$
$73 + 24 =$	$573 + 224 =$	$5673 + 264 =$

The lesson begins with 10 - 15 minutes of 'daily practice' (arithmetic). There are 3 challenges the children can choose to do or swap between with the hope that most do the two star challenge which is age appropriate.

- 2) **The Collect Stage** - children collecting the knowledge during 'upfront teaching' and practising it through independent or partner learning.

This 'upfront teaching' part of the lesson will be guided by the planning suggested by our 'Busy Ant Maths' scheme.



The independent or partner learning part of the lesson is to practise the new learning – for KS2 this, when appropriate, will be in the form of our challenge system in the 'Busy Ant Maths' books.

- 3) **The Connect Stage** - children making deeper connections to learning, applying through problem solving situations or mathematical reasoning.

The class will then build on their new learning by solving problems or using their mathematical reasoning skills. This can come from a variety of sources although the **nrich website** <http://nrich.maths.org/8935>, the **NCETM reasoning progression maps**

<http://www.eversley.enfield.sch.uk/ProgressionMaps-with-reasoning> and the activities in this document http://upload.reactcdn.co.uk/woodhill_blog/uploads/document/2_0_maths-learning-resources.pdf are a good starting point.

Are these number sentences true or false? Prove it by showing your working out.

$$59 + 36 = 84$$

$$34 + 48 = 82$$

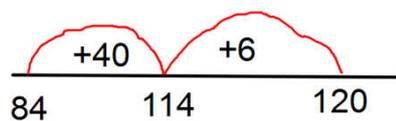
$$68 + 45 = 113$$

4) The Communicate Stage

The final part of the lesson provides opportunities for children to explain or justify their mathematical reasoning, first orally and then by writing.

Explain where have I gone wrong and demonstrate how to work it out correctly.

$$46 + 84 =$$



My advice would be to write down the number sentences. Then draw your number line draw the 0. Next look at the number sentence and count on your jumps until you reach the first number then cont your jump thats the answer. ✓

Can you explain the mistake in the following calculation and model how to solve the sum correctly.

$$46 \times 56 = 1080$$

x	6	6		300
40	240	240		300
50	300	300		240
				<u>240</u>
				1080

Your mistake is that when you have to ^{add} HTU and at the top then your other HTU on the side not the units together and your the tens together

x	506	2000
40	2000 240	300
6	300 36	240
		<u>36</u>
		2576

This work is wrong because you added instead of take away.

$$\begin{array}{r} 246.25 \\ - 132.15 \\ \hline 114.10 \end{array}$$

114.10 is the answer ✓

Great you are able to identify misconceptions in calculation and offer advice.

To begin with, it will be important to provide thinking/ writing frame to help the children explain their reasoning. Here are some examples:

<p style="text-align: center;">Question or Learning Challenge</p> <p>Can you explain what is wrong with the example below and correct the error...?</p> <p style="text-align: center;">This will help me ...</p> <ul style="list-style-type: none"> * use logic and reasoning to check answers * solve single / multi step problems by systematically reviewing learning * explain my maths thinking to others * read information and make necessary changes 	<p style="text-align: center;">Thinking Frames </p> <p style="text-align: center;">“The answer below is wrong because...”</p> <p style="text-align: center;">“I know this because ...”</p> <p style="text-align: center;">“The correct answer is... I can see the error was...”</p> <p style="text-align: center;">Suggested Support Strategy</p> <ol style="list-style-type: none"> 1. Verbalise the question/task. Identify key learning 2. Reflect on which resources can help (e.g. learning wall/my partner’s learning) 3. Ask myself “can I tackle this another way?” 4. Talk through thinking with a partner 5. Review: “Am I trying my very best? What am I doing well/not so well?”
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<p style="text-align: center;">Question or Learning Challenge</p> <p>If ... is the answer, what could the question have been? Describe your strategy</p> <p style="text-align: center;">This will help me ...</p> <ul style="list-style-type: none"> * use logic and reasoning to estimate what the question might be * solve single / multi step problems by systematically reviewing learning * explain my maths thinking to others * read information and make necessary changes 	<p style="text-align: center;">Thinking Frames </p> <p style="text-align: center;">“The question was... I know this because...”</p> <p style="text-align: center;">“To solve the problem I...”</p> <p style="text-align: center;">“My strategy was...”</p> <p style="text-align: center;">Suggested Support Strategy</p> <ol style="list-style-type: none"> 1. Verbalise the question/task. Identify key learning 2. Reflect on which resources can help (e.g. learning wall/my partner’s learning) 3. Ask myself “can I tackle this another way?” 4. Talk through thinking with a partner 5. Review: “Am I trying my very best? What am I doing well/not so well?”
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Question or Learning Challenge

Explain to your partner how you know. Remember to use the correct language!

This will help me ...

- * use logic and reasoning to explain maths thinking
- * use mathematical vocabulary accurately
- * explain my maths thinking to others giving reasons

Thinking Frames



- “I know...because...”
- “The maths vocabulary I used to help me includes...”
- “The maths skills I used were...”

Suggested Support Strategy

1. Verbalise the question/task. Identify key learning
2. Reflect on which resources can help (e.g. learning wall/my partner's learning)
3. Ask myself “can I tackle this another way?”
4. Talk through thinking with a partner
5. Review: “Am I trying my very best? What am I doing well/not so well?”

Question or Learning Challenge

Draw a picture to explain or demonstrate what you have worked out.

This will help me ...

- * use logic and reasoning to explain maths thinking
- * use mathematical vocabulary accurately
- * explain my maths thinking to others giving reasons

Thinking Frames



- “This picture means...”
- “The picture shows...”
- “I worked this out by...”

Suggested Support Strategy

1. Verbalise the question/task. Identify key learning
2. Reflect on which resources can help (e.g. learning wall/my partner's learning)
3. Ask myself “can I tackle this another way?”
4. Talk through thinking with a partner
5. Review: “Am I trying my very best? What am I doing well/not so well?”

<p style="text-align: center;">Question or Learning Challenge</p> <p style="text-align: center;">Convince your partner / teacher that you are right about an answer.</p> <p style="text-align: center;">This will help me ...</p> <ul style="list-style-type: none"> * use logic and reasoning to explain maths thinking * use mathematical vocabulary accurately * explain my maths thinking to others giving reasons 	<p style="text-align: center;">Thinking Frames </p> <p>“I know I am right because...”</p> <p>“The maths knowledge I used to prove this is...”</p> <p>“Another example to prove my understanding is...”</p> <p style="text-align: center;">Suggested Support Strategy</p> <ol style="list-style-type: none"> 1. Verbalise the question/task. Identify key learning 2. Reflect on which resources can help (e.g. learning wall/my partner's learning) 3. Ask myself “can I tackle this another way?” 4. Talk through thinking with a partner 5. Review: “Am I trying my very best? What am I doing well/not so well?”
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<p style="text-align: center;">Question or Learning Challenge</p> <p style="text-align: center;">Can you explain any patterns in the numbers / shapes?</p> <p style="text-align: center;">Can you see a pattern in the answers? Explain</p> <p style="text-align: center;">This will help me ...</p> <ul style="list-style-type: none"> * use logic and reasoning to explain maths thinking * use mathematical vocabulary accurately * explain my maths thinking to others giving reasons 	<p style="text-align: center;">Thinking Frames </p> <p>“Number patterns I can see are...”</p> <p>“A pattern in my answers is...”</p> <p>“I think this because...”</p> <p style="text-align: center;">Suggested Support Strategy</p> <ol style="list-style-type: none"> 1. Verbalise the question/task. Identify key learning 2. Reflect on which resources can help (e.g. learning wall/my partner's learning) 3. Ask myself “can I tackle this another way?” 4. Talk through thinking with a partner 5. Review: “Am I trying my very best? What am I doing well/not so well?”
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Question or Learning Challenge

Find an odd one out and explain why it doesn't fit. Could another one be the odd one out? Why?

This will help me ...

- * use logic and reasoning to explain maths thinking
- * use mathematical vocabulary accurately
- * explain my maths thinking to others giving reasons

Thinking Frames



"An odd one out is...I think this because..."

"I think... could be the odd one out because..."

Suggested Support Strategy

1. Verbalise the question/task. Identify key learning
2. Reflect on which resources can help (e.g. learning wall/my partner's learning)
3. Ask myself "can I tackle this another way?"
4. Talk through thinking with a partner
5. Review: "Am I trying my very best? What am I doing well/not so well?"

Question or Learning Challenge

Make up a real life story or word problem based on the maths questions you have completed.

This will help me ...

- * use logic and reasoning to justify a point of view
- * use mathematical vocabulary accurately
- * explain my maths thinking to others giving reasons

Thinking Frames



"I created this maths story / word problem to demonstrate..."

"The maths equation this story tells is..."

Suggested Support Strategy

1. Verbalise the question/task. Identify key learning
2. Reflect on which resources can help (e.g. learning wall/my partner's learning)
3. Ask myself "can I tackle this another way?"
4. Talk through thinking with a partner
5. Review: "Am I trying my very best? What am I doing well/not so well?"