

Maths



Maths at Hook Lane
Logic of Learning

Maths at Hook Lane



Maths is taught for an hour every day. In KS2, classes are mixed across the year group. Children working at the top end of age expected and above expected are mixed in one group and the second group is children who are working at the lower end of age expected and below.

Although we are using a mastery approach to maths which is usually against the idea of setting, we find that this benefits our children and we are fluid with the movement of children across groups. Teachers work together in planning lessons to ensure that the same learning objectives are being met but teachers may choose to approach the learning in a slightly different way to meet the needs of their children.

We follow the White Rose Scheme of Learning to help structure our Maths planning across the year and ensure we cover all areas of the curriculum.

Maths Mastery



Teaching for Mastery is something that we are working on as a school, ensuring that all of our children have a solid understanding of mathematics - all of our children should leave Hook Lane being mathematicians. We have taken part in training led by NCETM and the Maths Hub to help strengthen our knowledge and understanding of how to teach Maths with a mastery approach.

We are working on the 'mastery for all' approach by encouraging teachers to highlight the connections between lessons. Teachers should think about what the main starting point for the topic coverage is, the building blocks that children have studied in previous years and feel comfortable and confident with, and aim to use this understanding to build new learning. The aim of this is to prevent overload on working memory, highlight the underlying connections between areas of learning and to also boost the confidence of the children.

Maths Mastery



Another aspect of Maths Mastery that we are encouraging at Hook Lane is the use of stem sentences to help deepen our understanding and help improve our reasoning skills. When a new connection, topic or aspect of learning is introduced to the children, a generalization sentence is made in which the values can be removed and changed to suit the question. An example of this would be in partitioning a 4 digit number - 'In the number $\underline{\quad}\underline{\quad}\underline{\quad}\underline{\quad}$, there are $\underline{\quad}$ thousands, $\underline{\quad}$ hundreds, $\underline{\quad}$ tens and $\underline{\quad}$ ones.' This sentence is then repeated as a class, individually, in pairs etc until the children are confident. Children are also encouraged to use the phrase 'this represents $\underline{\quad}$ ' during the lesson to help strengthen the connection between the representation they are using and the mathematical concept.

We have a big push on using precise vocabulary in Maths, ensuring that our children have an understanding of the names of the numbers in a calculation. We have found that encouraging children to use the precise vocabulary has had a beneficial impact on their ability to reason and problem solve as they have a deeper understanding of the purpose of the numbers.

Maths Mastery



In order to support our teachers, we encourage the use of a range of materials to plan our lessons. Although we follow White Rose for our lessons we allow our teachers to be flexible with their teaching to suit the needs of the class.

The materials we encourage teachers to use include:

- White Rose Small Steps
- White Rose Premium Resources
- NCETM Spine Materials
- Classroom Secrets
- IXL

Teachers are free to use different aspects of all of these resources to find activities which will benefit their children.

CPA Approach



The Concrete Pictorial Abstract (CPA) approach is a system of learning which uses physical and visual aids to build a child's understanding of abstract topics.

Pupils are introduced to a new mathematical concept through the use of concrete resources (e.g. numicon, Dienes, place value counters). When they are comfortable solving problems with physical aids, they are given problems with pictures – usually pictorial representations of the concrete objects they were using.

When ready, they are asked to solve problems where they only have the abstract i.e. numbers or other symbols. Building these steps across a lesson or series of lessons can help pupils better understand the relationship between numbers and the real world, and therefore helps secure their understanding of the mathematical concept they are learning.



CONCRETE

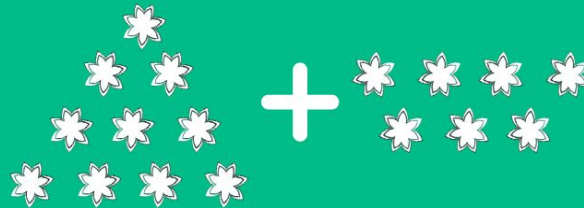


Children might begin by handling real objects...



...then using physical representations of them.

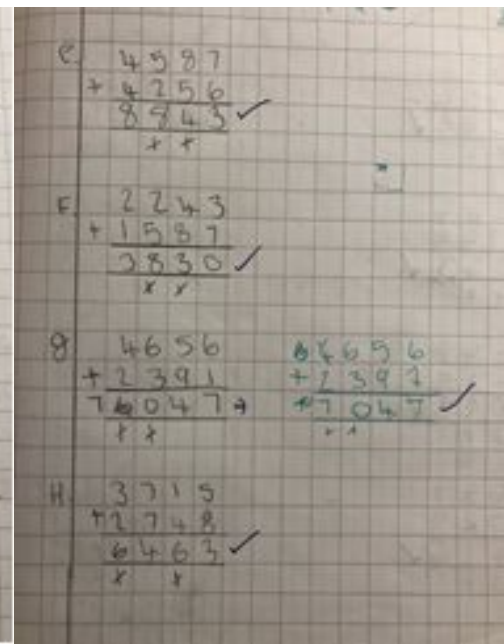
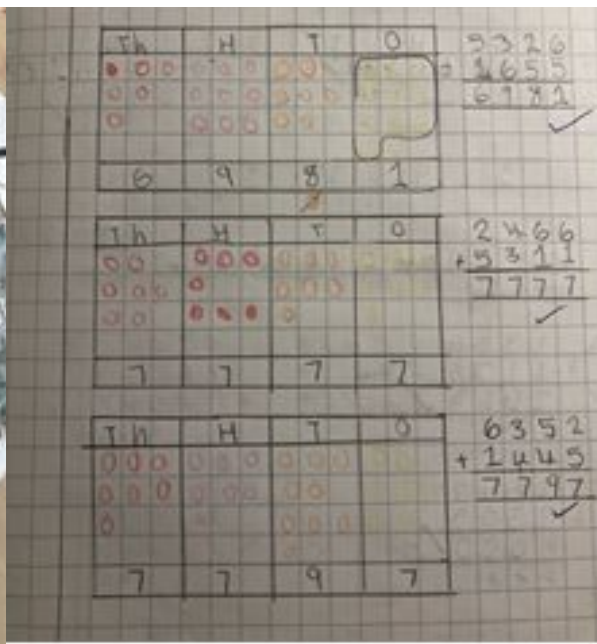
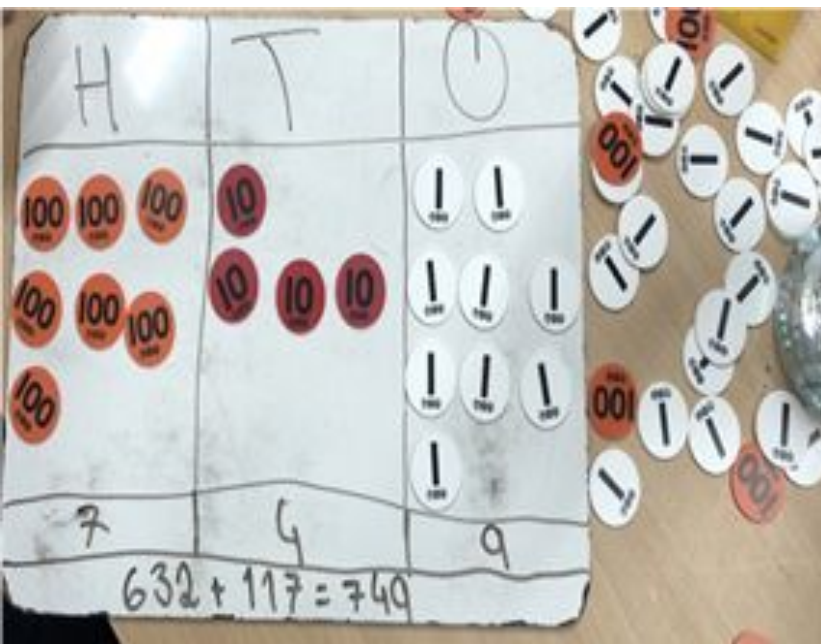
PICTORIAL



Drawings act as a bridge between the concrete objects children have been using and the abstract symbols they must learn to use.

Finally, children learn to use abstract symbols to solve problems.

$$10 + 7 = 17$$



Concrete:

Children start exploring column addition through the use of place value counters.

Pictorial:

Children are moved on drawing out the place value counters into their books and writing the calculation alongside it to match the picture.

Abstract:

Children encouraged to complete the calculations with just the numbers and no pictorial representations.

Planning and Lesson expectations



Using the White Rose Maths scheme gives us the chance to look through the small steps of learning and choose the concrete manipulatives that will be best suited to draw out that particular concept. This then ensures that all teachers are using the CPA approach across their lessons.

At Hook Lane, our maths lessons start with an arithmetic starter of 3 - 5 questions. These can be completed in books or on whiteboards but they should be used at the beginning of every lesson as a way of warming up children's brains! The lesson should then start by recapping previous learning as a way of making links towards the new learning in that lesson.

Questions should contain varied fluency, whether that is procedural variation whereby small changes are made within each question or conceptual variation, where the same concept is shown with different models. Once children are fluent in answering questions, they should be moved onto reasoning and problem solving around the concept. This is where the stem sentences used during the teaching of the concept will come in useful and allow children to verbalise their ideas.

Key Stage 1 focus:



By the end of Year 2, it is our aim to get all children fluent in rapid recall of number bonds and to be able to use these number bond facts to help with larger and more challenging numbers. Being able to spot number bonds within calculations will massively reduce cognitive load and make concepts become a lot clearer.

In order to ensure that our children are confident with their number bonds, we encourage children to use the website 'NumBots'. This website/app works through all of the initial stages of counting and addition, from subitizing to using numicon, matching parts to their whole to bridging over 10. Year 2 teachers provide children with weekly number bond tests in order to keep these facts embedded.

Teachers in Year 1 are encouraged to start teaching children to count in groups of 1s, 2s, 5s and 10s before moving into 1x, 2x, 5x and 10x tables in Year 2.

Key Stage 2 focus:



By the end of Year 4, it is our aim to get all children fluent in rapid recall of all times tables facts up to 12x12 before they complete the Multiplication Tables Check in the Summer term. Similarly to number bonds, being able to spot multiplication patterns within calculations will reduce cognitive load and make concepts become a lot clearer. After the MTC, multiplication will still be a focus in Years 5 and 6 where teachers are constantly revising facts in order to help with other areas of maths, including long division and fraction work.

As the MTC is such an important element of KS2, Year 3 and 4 have weekly times tables tests where scores are recorded by teachers. In order to keep children engaged, we use TTRockstars as part of children's weekly homework. Weekly battles are set between classes and the winning class is awarded with a certificate on Friday.

Although the National Curriculum states which times tables need to be taught, we have created a system which is based on intelligent practice.

Each half term, we introduce a times table by making connections between the new times table and ones which have been previously taught. Making connections with our times tables links with our mastery approach throughout the school.

YEAR	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 1	Experience of counting in 1s, 2s, 5s, 10s					
Year 2	1x	(1x) 2x	5x	(5x)10x	0x	revision
Year 3	(2x) 4x	(4x) 8x	3x	(3x) 6x	(6x) 12x	revision
Year 4	X9	x7	x11	Squares	revision	MTC Check

Marking and Feedback



As in line with the school's feedback policy, marking should be done during the lesson where possible. Teachers should aim to acknowledge every child's work during the lesson in the attempt to resolve misconceptions as soon as possible. If, during marking, there are a lot of children with the same problem, teachers are encouraged to stop the whole class and give whole class specific feedback on this problem.

Children are to correct their mistakes with green pen to show what they struggled with and how they overcame this problem.

If teachers choose to mark books after the lesson has finished, they are encouraged to work with children during the next lesson (or as soon as possible) to help solve any problems.

Assessment



Teachers use both summative and formative assessments throughout the year. Through live marking and instant feedback during lesson time, teachers are constantly assessing where children are in terms of their understanding of that topic area. Our arithmetic starters at the beginning of each lesson are a good opportunity for assessment through spacing - teachers will be able to see who has understood a topic area through revisiting it again weeks later.

Years 1, 3, 4, and 5 formally assess children using NFER tests and Years 2 and 6 assess using past SATS papers at the end of each term. These tests give teachers an idea on where the children are working independently and where the class have gaps in their knowledge. These assessment results, combined with teacher in-class assessment, inform our tracking of children's progress throughout the year. Low stakes testing is used weekly throughout the school - number bonds in Year 2, times tables in Year 3 and 4 and arithmetic tests in Year 5 and 6.

Maths in the Classroom



Each classroom should have a display board dedicated to Maths. There may be some parts of the display which do not change, such as place value reminders or times tables facts, but the main part of the display should be a 'working wall'.

Our working walls should consist of flipchart paper which has examples of problems solved within the lesson. We encourage teachers to model how to solve problems on the flipchart as part of their teaching and they should be something that children can refer back to in order to help them progress with their learning.

Teachers should model the importance of using one digit per square for place value columns when writing numbers as well as using a ruler, just as would be expected in children's books.

Working walls should also contain an example of a sentence stem to be used within that series of lessons.

MATHS

Less Than <

Greater Than >

Equal to =

Add whole numbers

1) 345621

2) 5377

3) 6918

2a)

Th	H	T	O
7	4	3	5
+	2	4	5
9 8 9 1			

 When using the column method, we begin at the **Ones** column. We exchange by carrying the 1.

Inverse Operations

Addition is the inverse of subtraction
Subtraction is the inverse of addition

① $436 - 320 = 116$
 ② $320 + 116 = 436$
 ③ $116 + 320 = 436$
 ④ $436 - 116 = 320$

4	3	6
3	2	0
1	1	6

Whole: 436
 Little part: 320, 116

Factors

2 and 3 are factors of 6
 6 is a multiple of 2 and 3.

$2 \times 3 = 6$
 factor of 6, factor of 6, multiple of 2, multiple of 3

The factors of 6 are: 1, 2, 3, and 6.

5, 10, 15 and 25 are all of 5!

multiple of 5: $5 \times 4 = 20$

Misconception!!!
 $0 \times 8 = 8 \times$
 $1 \times 8 = 8 \times$
 Zero times any number is zero!

Partition numbers to 1000

2	5	4
---	---	---

254 is equal to 4 ones, 5 tens and 2 hundreds.

 $254 = 200 + 50 + 4$

Addition with regrouping

$437 + 254 =$

H	T	O
4	3	7
+	2	5
6 9 1		

HTO
 4 3 7
 + 2 5 4

 6 9 1

addend, addend, sum

Find a group of 10 and exchange

If the digits in each column equal more than 10, you need to regroup.

$437 + 254 = 691$

Mimend

$583 - 117 =$

H	T	O
5	8	3
-	1	1
4 6 6		

5 8 3
 - 1 1 7

 4 6 6

difference

I know I need to exchange when the mimend is less than the subtrahe

I don't need to exchange when the mimend is greater than the subtra

MATHS

Discuss

$\frac{15}{25} > \frac{3}{4}$

$\frac{3}{4} < \frac{4}{5}$

I think the statement is (T or F) because...
 False

25 doesn't divide equal into 4

The Highest Common Factor is 5 and $25 \div 5 = 5$ so the denominator should be 5.

Highest Common factor
 12: 1, 12, 2, 6, 3, 4
 36: 1, 36, 2, 18, 3, 12, 6

The H.C.F. of 12 and 36 is 12.

When we know the H.C.F. of the numerator and denominator we must divide them by it.

12	12	1
36	36	3

Long Division

$13 \overline{) 153.8}$

$13 \overline{) 153.8}$
 11
 43
 11
 32
 25
 78
 65
 13
 8

Use the correct order of operations: BIDMAS

$(3 \times 4) = 12$
 $(3 \times 4) = 12$

Which answer is correct?
 I know that answer number is correct as it follows BIDMAS. You need to multiply before adding.

Adaptive teaching



Using adaptive teaching to provide the opportunity for all pupils to experience success by adapting lessons, whilst maintaining high expectations for all. This may be through:

- Concrete and pictorial resources to support understanding
- Bar models/ part-whole models
- Focused arithmetic starters on skills they are still building
- Stem sentences
- 'I do, we do, you do' scaffolding and modelling
- Working wall/prompts reflects previous learning and key vocabulary
- Retrieval practise specifically tailored to individuals to ensure continued building of skills and fluency
- Visual word banks/visual supports
- Colourful semantics for positional language
- Scaffolded and modelled examples
- Increased fluency work to build up confidence and ability in a skill
- Visual examples of methods -step by step breakdown checklist to support independent working