Hove Learning Federation

Mathematics

Intent: Mathematics at Hove Learning Federation

Our Goal

Our vision for excellence within our maths curriculum is created in line with the National Curriculum Programme of Study and ensures that all pupils:

- **become fluent** in the fundamentals of mathematics, including through varied and frequent practice, so that pupils develop conceptual understanding and recall and apply knowledge
- **reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and using mathematical language
- **solve problems** by applying their mathematics to a variety of routine and non-routine problems

Our intention is to:

- engage, inspire, motivate, support and challenge

- ensure our learners progress academically and become more expert as they progress through the curriculum

- develop successful, engaged, thoughtful, confident learners, who make a positive contribution to the community and society.

Intent: Values & Curriculum Drivers

At Hove Learning Federation, mathematics is driven by the following values:

	**Love of Learning**	• Adults model a passion for maths to inspire and enthuse the children to develop a love of the subject. • Planning uses a creative, cross-curricular approach, including whole school maths days. • Our lesson design model builds on previous learning and encourages self-belief, curiosity, excitement and motivation, with a focus on building connections and making learning worthwhile and relevant. • Mathematical reasoning is woven into every lesson and pupils work with challenge partners to develop their oracy skills.
	**Equality & Inclusion**	• Learning is scaffolded for all through - use of manipulatives, dual coded vocabulary, pre-teaching, stem sentences and guided group work. • Use of high quality materials and tasks to support learning are integrated into lessons. These may include visual images and concrete resources. • Children are encouraged to reflect on their own learning styles using the school's learning characters. • Children collaborate with their challenge partners or in larger groups. • Children are encouraged to take risks and learn from their mistakes.

Intent: Values & Curriculum Drivers

	**Aiming High**	• Speaking and listening skills and core mathematical vocabulary are explicitly taught. • Interactive teaching strategies are used to engage all pupils in order to develop effective communication skills. • Mathematical vocabulary is supported in Reception and KS1 with the use of Makaton signs, hand gestures and dual coded symbols. • Key questions are planned to challenge thinking and develop learning for all pupils. • Children are required to prove their answers and explain their reasoning. Characters and visual prompts are used to support younger children with this. • Contexts and representations are carefully chosen to develop reasoning skills and to help pupil's link concrete ideas to abstract mathematical concepts.
	**Respect and Well-being**	• Our pupils have opportunities to develop their resilience and confidence in mathematical learning through investigations and maths games. • Pre-teaching and well-chosen challenge partners are used to support maths anxiety. • Staff model positive language through constructive feedback and praise pupils working respectfully together. • Pupils use sentence stems to respectfully challenge ideas such as "I disagree with ___ because…"
	**Nurture and Citizenship**	• Maths is linked to real-life where possible, to develop future life skills and give the learning context.

Intent: Learning Characteristics Animals

Independence

Our children use self-motivation and positive thinking to improve as mathematicians. They make decisions about how to calculate efficiently, to explain their reasoning and 'journal' their mathematical thinking.

They consolidate their learning through neatly presented 'Independent Work' where calculations are laid out to aid accuracy.

Pupils use their initiative to find solutions to problems using their prior knowledge and know that struggle is a vital part of learning.

Perseverance

Pupils know that learning is a journey. They have a growth mindset – a belief that intelligence is not fixed and abilities can be developed through effort, persistence, trying different strategies and learning from mistakes.

They use different strategies when faced with a challenge and work in partnership with their peers to solve our 'Explore' tasks. They dive deep in challenge questions to solve word problems, explain misconceptions and 'journal' their mathematical thinking.

Intent: Learning Characteristics Animals

Curiosity

Pupils are keen to learn and make links between concepts. They routinely analyse problems to work our which information is relevant and use manipulatives to explain their mathematical thinking.

Our 'Explore' part of the maths lesson involves learners working together with whiteboards and manipulatives to solve a real life problem. They activate prior knowledge and have 'light bulb moments', spotting patterns, generating mathematical rules (generalisations) and building on each others' ideas.

Imagination

Children explore and experiment with resources to try out their mathematical thinking. They are approach problems in new and unusual ways.

Pupils are encouraged to have their own voice, express themselves openly with their challenge partner without judgement and make their own choices.

In Key Stage 2, they present their ideas in a mathematical 'journal' that records their thinking, reasoning and problem solving.

Intent: Learning Characteristics Animals

Co-operation

Co-operation is at the heart of our maths lessons. Children develop their speaking and listening skills through carefully chosen challenge partners. The mathematical talk is modelled and structured by class teachers so that 'Challenge Partner A' has a turn and 'Challenge Partner B' has the opportunity to agree, build upon or challenge mathematical thinking. Sentence stems are used to scaffold pupils present their ideas and key vocabulary is presented on the walls of the classroom alongside images and gestures to develop pupils' understanding.

Pupils are explicitly taught how to work collaboratively in maths to develop their mathematical reasoning. Explaining to a partner is a brilliant way to check for understanding of mathematical concepts and our children enjoy working in a collaborative way with their classmates.

Intent: Long Term Sequence

All children are supported to develop and improve their mathematical skills. We follow the EYFS Statutory Framework (Development Matters) and the Key Stage 1 and Key Stage 2 National Curriculum to ensure that children have the necessary mathematical understanding that will underpin future learning

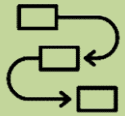
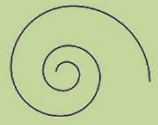
Why do we have a long-term sequence? What is its purpose?

- There is a coherent and comprehensive conceptual pathway through the mathematics.
- Learning is broken down into small, connected steps, building from what pupils already know.
- Difficult points and potential misconceptions are identified in advance and strategies to address them planned.
- Our spiral curriculum is designed on the principles of instruction and is influenced by our understanding of how the memory works and cognitive load theory.
- Research shows that this will ensure knowledge is transferred to long term memory and making links with new learning is more accessible.

EYFS:
Mastering Number forms the basis of our learning in Early Years. Through daily whole class teaching with an emphasis on modelling language, gestures and representations pupils develop number sense, confidence and flexibility with number. Guided teaching activities deepen pupils' understanding and teachers expertly guide, scaffold and stretch learners. A stimulating learning environment with well-chosen high quality resources enable children to continue to develop their understanding independently.

KS1/KS2:
Learning is carefully sequenced following the National Curriculum objectives for each year group. Learning is broken down into small steps and lessons offer opportunities to revisit and connect to prior learning through the lesson design.

Intent: Long Term Sequence Features

Sequencing	Small Steps	Spiral	Long Term Memory
			
Our curriculum design deliberately sequences units of learning from EYFS to Year 6 to ensure children deepen their mathematical understanding through exposure to a progression of substantive and disciplinary knowledge.	Learning is chunked into small steps that allow children to build knowledge and deepen understanding lesson to lesson, unit to unit and year to year.	The spiral design of our curriculum means children will return to key learning points and concepts. For example, the Part Whole model is introduced in EYFS and developed in KS1 to support knowledge of number bonds to 100. By the end of KS2 pupils use the same model to explore parts and wholes with decimals.	The progression of knowledge in maths has been clearly mapped across each year group to ensure children will transfer new learning to long term memory. The ultimate goal is to make the learning stick!

Intent: Long Term Sequence Features

Making New Links	Cognitive Load	Key Concepts	Knowledge
			
The acquisition of knowledge into long term memory means that children are able to make links with new learning more easily. Our curriculum overview shows how new learning is carefully imparted over time.	Our long-term sequence for maths reduces cognitive load by mapping out opportunities for children to review previous years and units learning. All staff are aware of the units and lessons covered in previous years in order to refer back.	Children develop knowledge about key concepts through our CPA (concrete, pictorial, abstract) approach.	Substantive Knowledge: The subject knowledge and explicit vocabulary used to learn about the content. Disciplinary Knowledge: The knowledge about how mathematicians investigate, explore and reason.

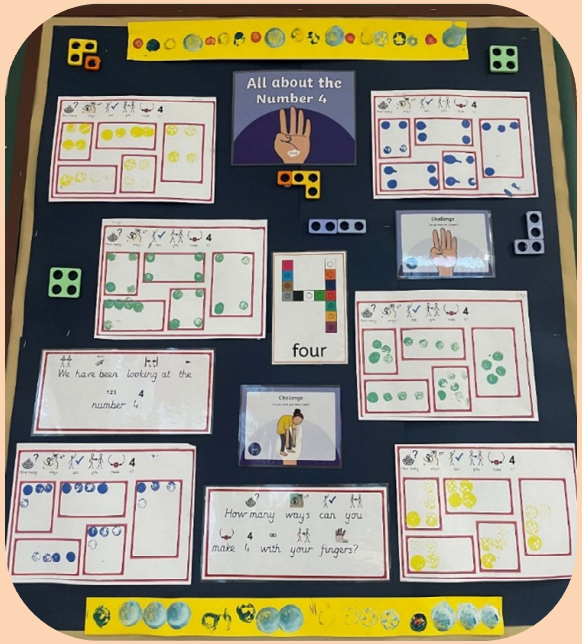
Intent: 5 Big Ideas – Teaching for Mastery

The National Centre for Excellence in the Teaching of Mathematics (NCETM) have defined 5 substantive concepts that are the suggested vehicle to teach mathematics through a mastery approach. These **5 Big Ideas** are informed by current research evidence and classroom experience and underpin every maths lesson at Hove Learning Federation.

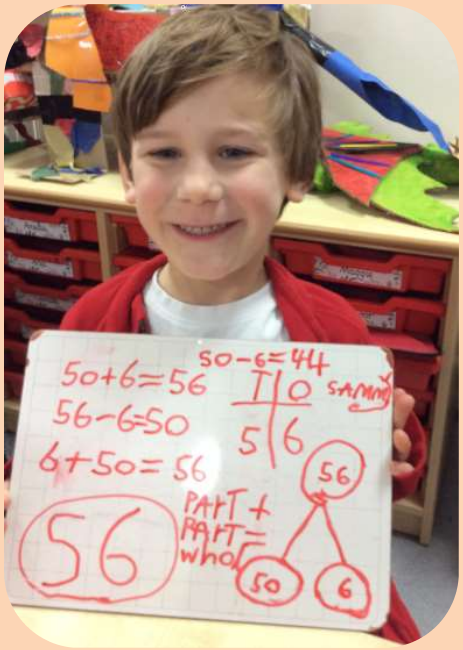
	**Fluency**	Efficient, accurate recall of key number facts and procedures is essential, freeing pupils' minds to think deeply about concepts and problems. Pupils who are fluent can flexibly move between different contexts and representations of mathematics, recognise relationships and make connections to choose appropriate methods and strategies to solve problems.
	**Mathematical Thinking**	This includes looking for patterns and relationships, making connections, conjecturing, reasoning, and generalising. Pupils actively engage in mathematical thinking in all lessons, discussing and communicating their ideas using precise mathematical language.
	**Representation and Structure**	Adults carefully select representations of mathematics to expose mathematical structure allowing pupils to 'see' the mathematics. These representations become mental images that students can use to think about and discuss mathematics, supporting them to achieve a deep understanding of mathematical structures and connections.
	**Variation**	Examples are chosen to draw closer attention to a key feature of a mathematical concept or structure through varying some elements while keeping others constant. Through variation the teacher focuses pupils thinking.
	**Coherence**	A coherent learning sequence which progresses in small steps, provides access for all pupils to develop a deep and connected understanding of mathematics that they can apply and communicate in a range of contexts.

Implementation: High Expectations

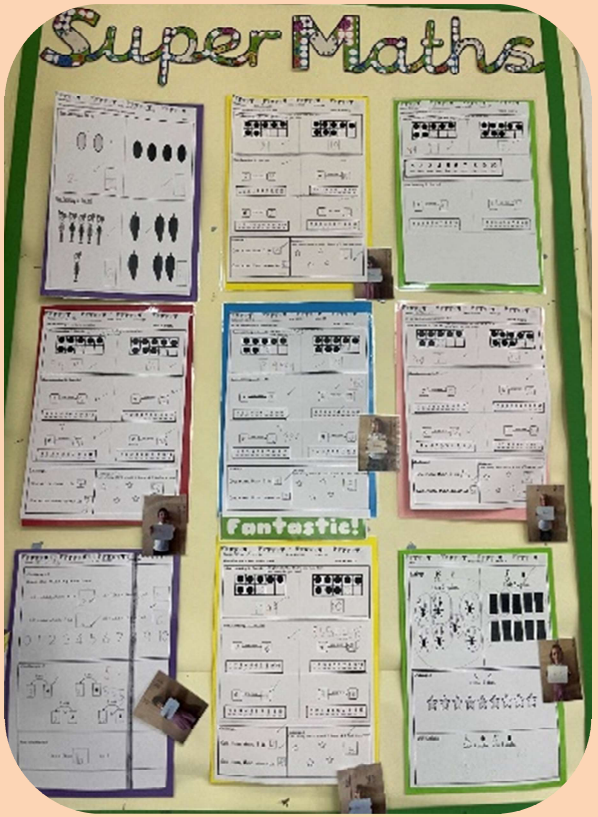
EYFS



Year 1



Year 2

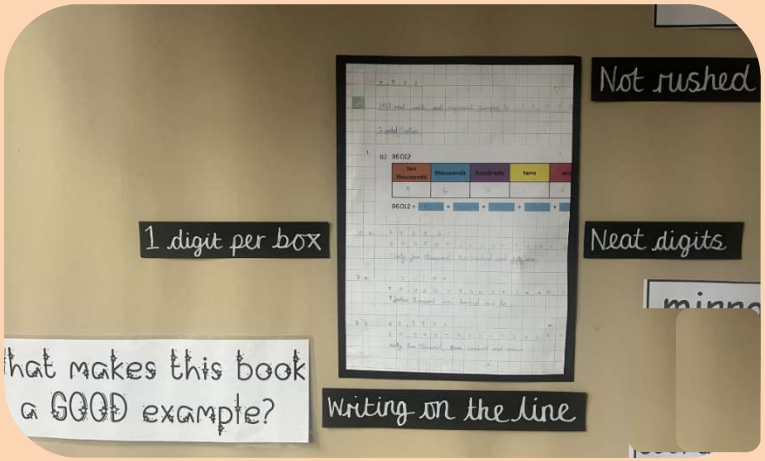


Our children are proud mathematicians! Their wonderful work is celebrated on displays across the school.

'Maths is fun because you get to draw groups or you can use counters and that helps you. People feel proud of you and it makes me feel good. That's why I like maths!' Y2 pupil.

Implementation: High Expectations

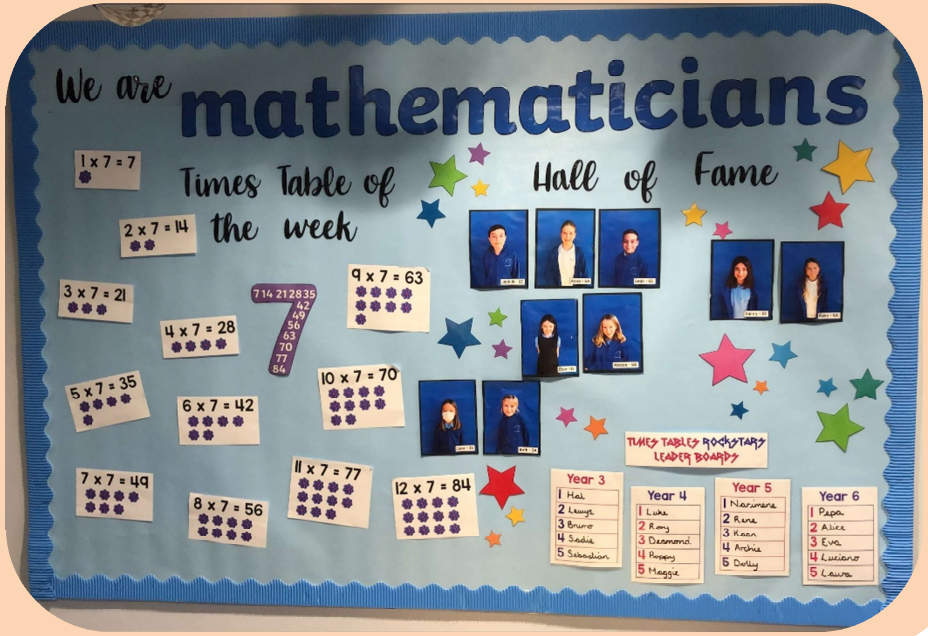
Year 3



Year 4

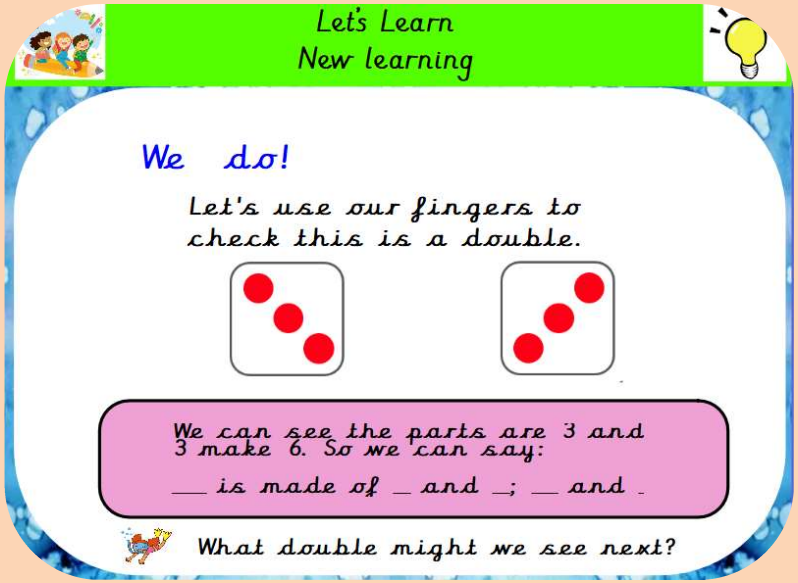
In Key Stage 2, children receive maths awards for their effort in lessons and their photos are displayed on our Hall of Fame.

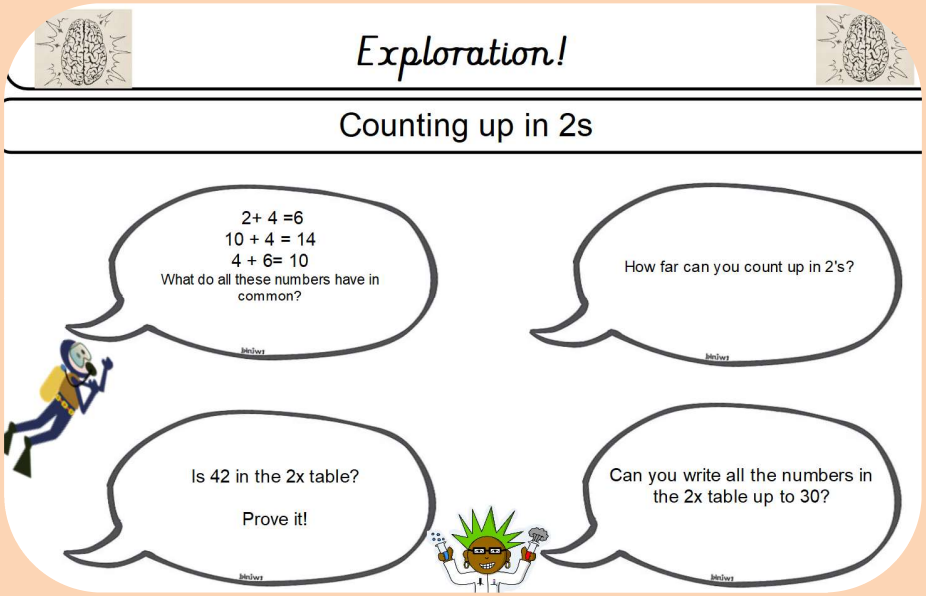
'I used to find maths a bit tricky, but now I get it. I'm really proud of myself!' – Y5 pupil.



Implementation: Challenge

Challenge is included in every lesson through scuba diver and submarine questions.



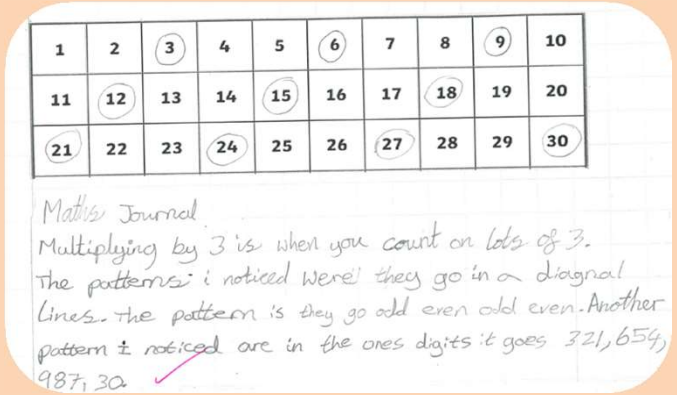


'On our maths sheet we have a scuba diver question and that lets you know it is a challenge question. Today I had to describe.' Y1 pupil.

Implementation: Challenge

Children explain their mathematical thinking through maths journaling in Key Stage 2.

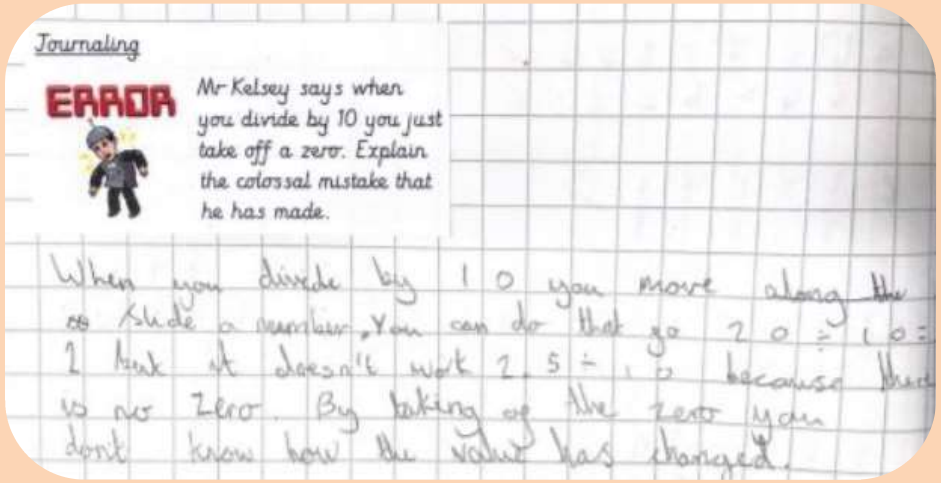
Year 3



1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30

Maths Journal
Multiplying by 3 is when you count on lots of 3.
The patterns i noticed were they go in a diagnal lines. The pattern is they go odd even odd even. Another pattern I noticed are in the ones digits it goes 321, 654, 987, 30

Year 5



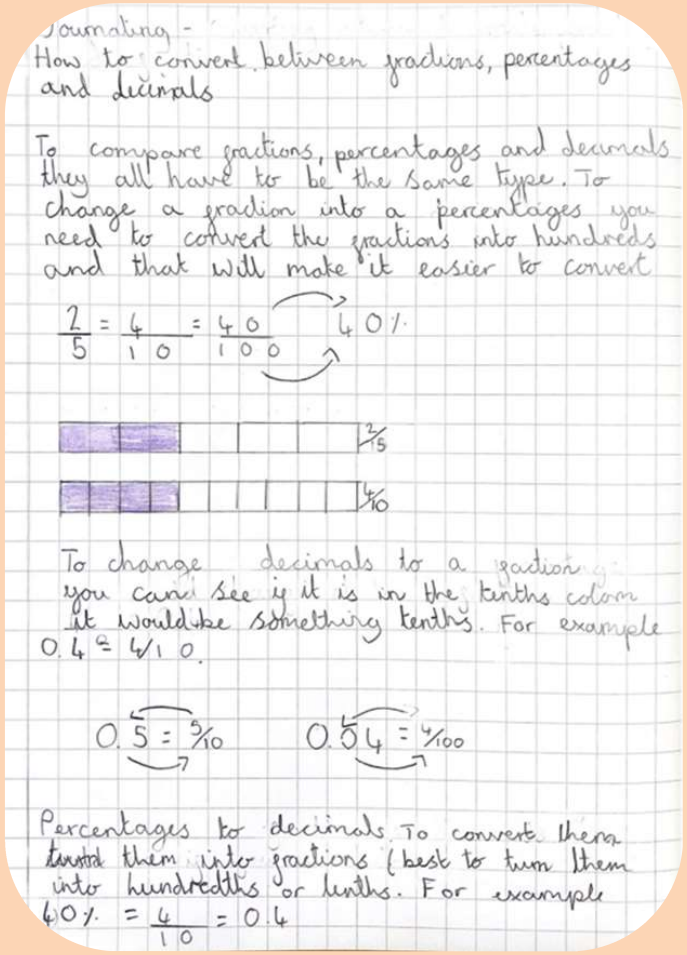
Journaling

ERROR

Mr Kelsey says when you divide by 10 you just take off a zero. Explain the colossal mistake that he has made.

When you divide by 10 you move along the place value chart. You can do that go 20 ÷ 10 = 2 but it doesn't work 2.5 ÷ 10 because there is no zero. By taking off the zero you don't know how the value has changed.

Year 6



Journaling -
How to convert between fractions, percentages and decimals

To compare fractions, percentages and decimals they all have to be the same type. To change a fraction into a percentages you need to convert the fractions into hundreds and that will make it easier to convert

$\frac{2}{5} = \frac{4}{10} = \frac{40}{100}$ 40%

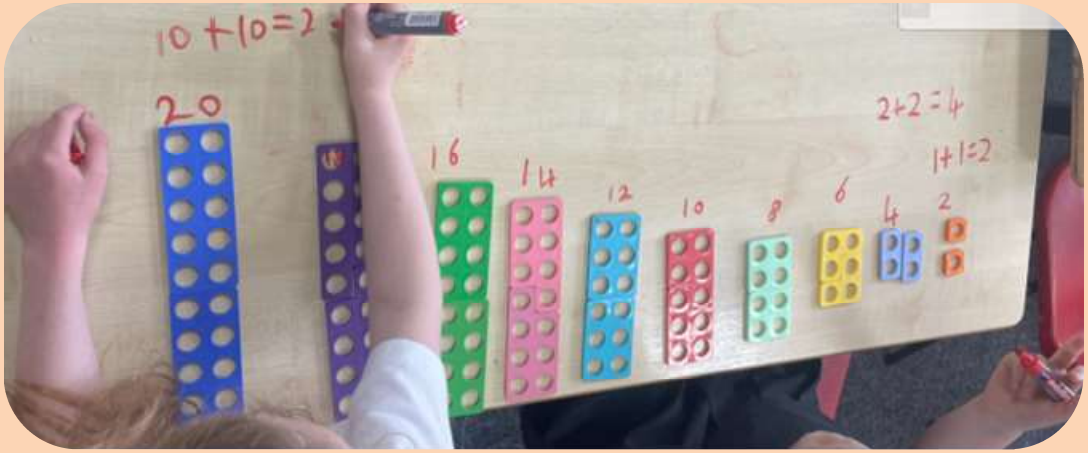
To change decimals to a fraction you can see if it is in the tenths colom it would be something tenths. For example 0.4 = 4/10.

0.5 = 5/10 0.54 = 54/100

Percentages to decimals To convert them turned them into fractions (best to turn them into hundredths or tenths. For example 40% = $\frac{4}{10}$ = 0.4

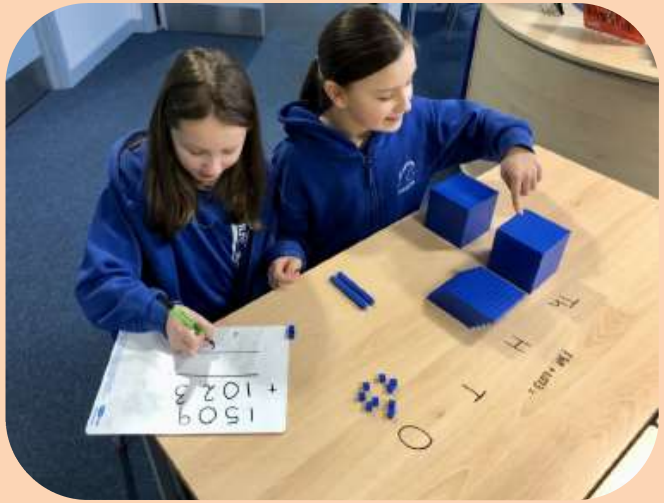
Implementation: Structured Discussions & Challenge Partner Talk

From Reception, our children learn how to build on and challenge each others ideas through structured partner talk. In our maths lessons, collaboration is key with pupils exploring resources together, working on whiteboards to solve a problem or playing maths games!



Implementation: Structured Discussions & Challenge Partner Talk

This continues into Key Stage 2, where maths challenge partners are introduced and pupils highly value the support and challenge from their peers to deepen their mathematical thinking.



'I like the challenges where you really don't understand at first but then you get to talk to your partner and work it out together and it all makes sense.' Y5 pupil.

"It's been transformational sitting next to my maths partner this year. I don't think I would be where I am without him." Y6 pupil.

Implementation: Thinking Questions (concept questions)

At the start of the new learning, children work with their partner to **explore** a concept question. In Key Stage 1, practical resources are often used to support the exploration.

Explore

Order the coins in front of you from smallest to greatest value.

Smallest Greatest

Explore

With your partner, use unifix cubes to create a block diagram to show:

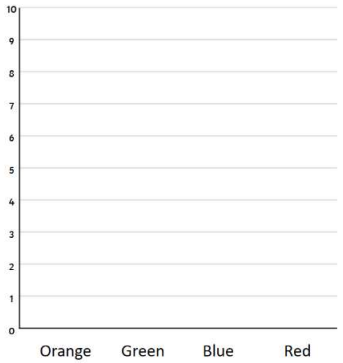


Table	Tally
Orange	III
Green	II
Blue	𝍸
Red	I

Implementation: Thinking Questions (concept questions)

At the start of the new learning, children work with their partner to **explore** a concept question. They use their prior knowledge and have 'lightbulb moments'.

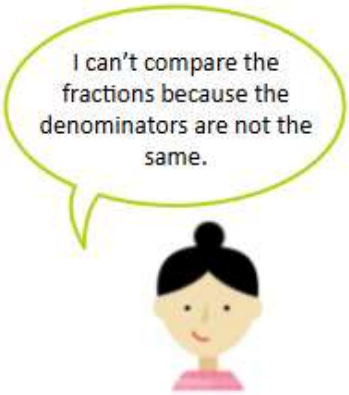
Explore

A lorry driver travels 156 km per day.

How many kilometres will the lorry driver have travelled after 3 days?

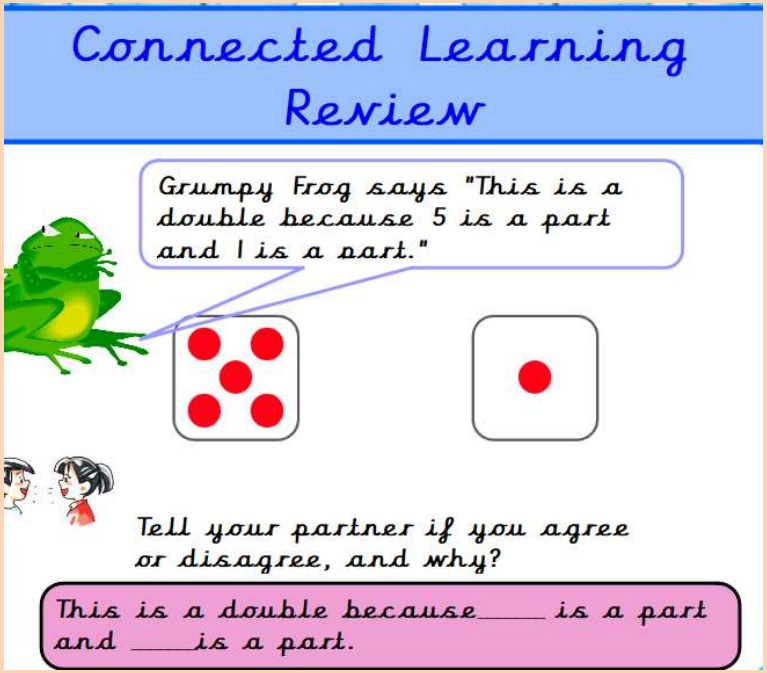
Explore

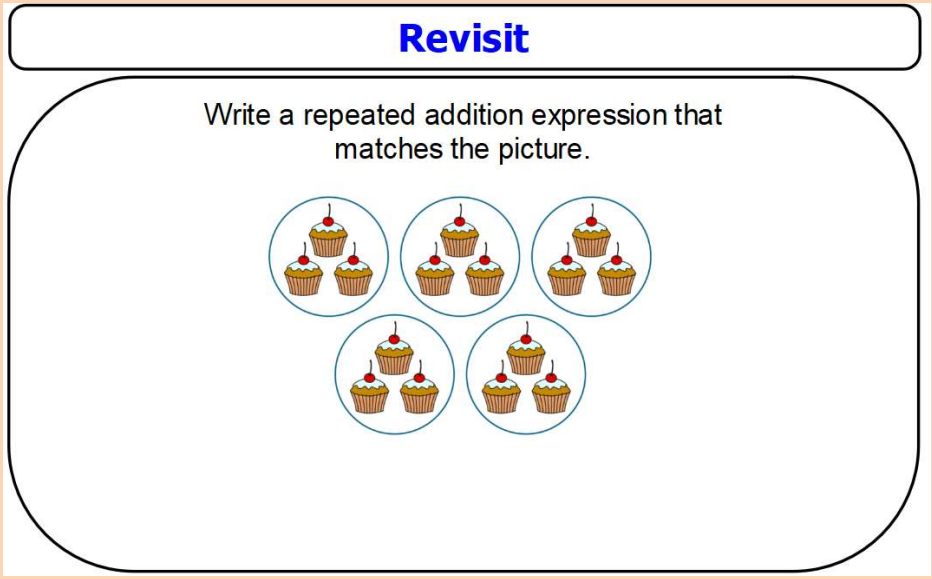
$\frac{7}{12} \bigcirc \frac{4}{6}$



Implementation: Making links and connections

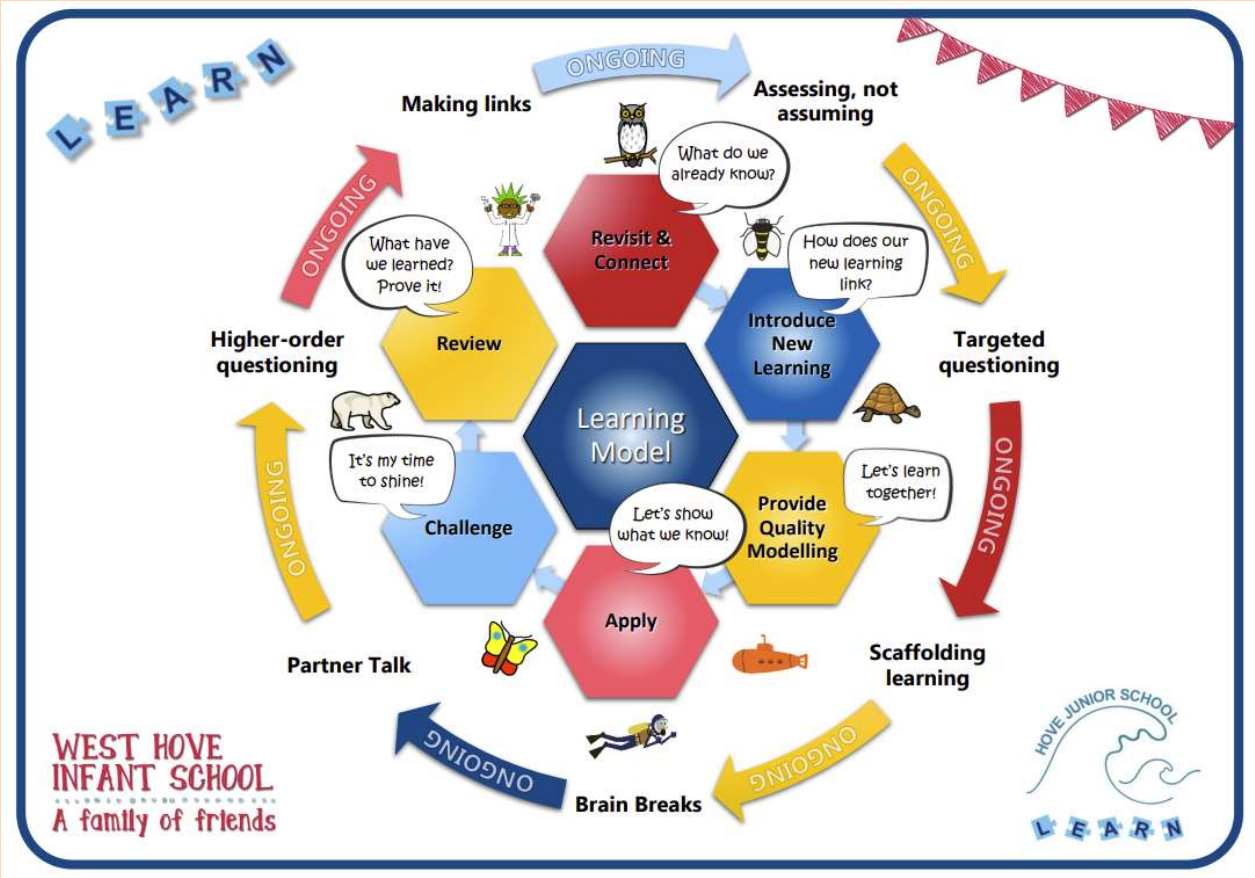
Learning input always includes opportunities for children to make links with previous learning. This happens through our review/revisit slide and ensures that the learning progresses coherently in small steps through each sequence.





Implementation: Learning Model

At the Hove Learning Federation we have developed a learning model, based on the most up to date neuro-scientific research which we use to structure each lesson.



Implementation: Lessons

In order to guarantee our pupils have the best opportunity to progress mathematically, we have agreed to ensure our lessons include these key components and approaches. Planning will focus on a "small steps" approach: identifying the next step the children need to take in order to progress, scaffolding support to ensure this happens.
Each lesson will include:

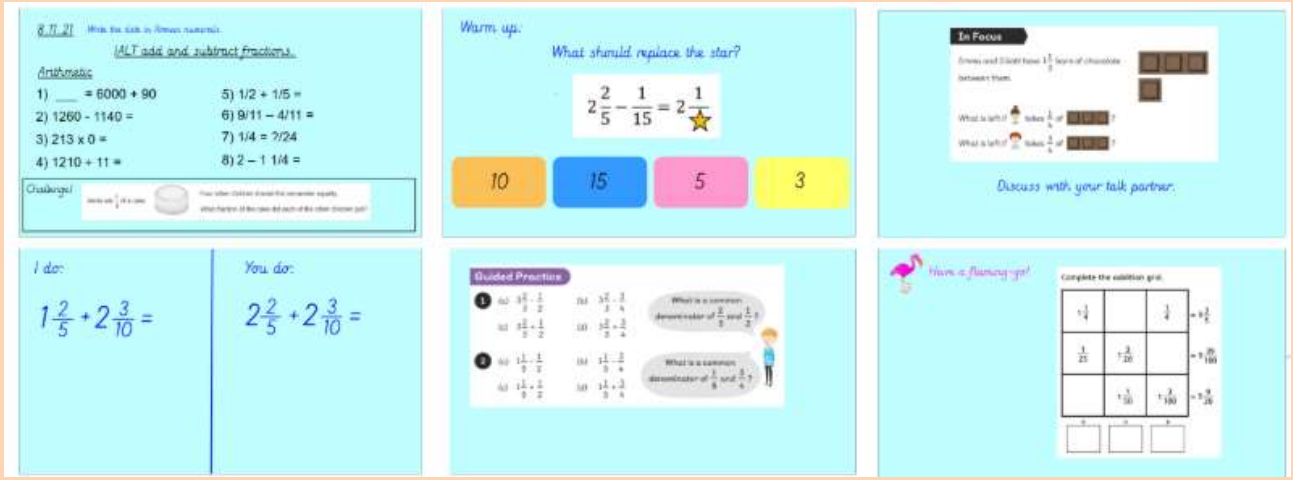
- Opportunities for fluency through an **Arithmetic** starter activity.
- A **Review** or recap of the previous lesson (this could be through diagnostic questioning).
- An **Explore** task which will include opportunities for children to discuss their *mathematical thinking*.
- A focused teaching section**: Let's Learn,** where pupils will:
  - make *connections* and explore different *representations*
  - use concrete and pictorial resources
  - develop their understanding of key mathematical vocabulary
  - use approaches such as "I do, you do" to build procedural confidence
  - reveal and explore misconceptions
  - use stem sentences and develop generalisations (this will not necessarily be in every lesson, but where appropriate for a new concept)

Implementation: Lessons

- Opportunities to work with a partner on carefully chosen questions through a **Guided Practice** approach.
  Rehearsal time with a partner/small group/teacher
  Procedural and *operational variation* will feature in the questions chosen.

- Opportunities to complete work independently through **Independent Practice.**
  This will include challenge and extension tasks which deepen understanding (for example, reasoning activities, or open-ended tasks.)
  SEND support tasks where pupils are working below the Program of Study.

- A **Challenge** activity with planned in opportunities to discuss with the whole class.



Implementation: SEND & Inclusive Learning

We adapt the curriculum to meet the needs of all our children so that everyone can access the learning, build on their prior knowledge, and understand the skills needed to become mathematicians.

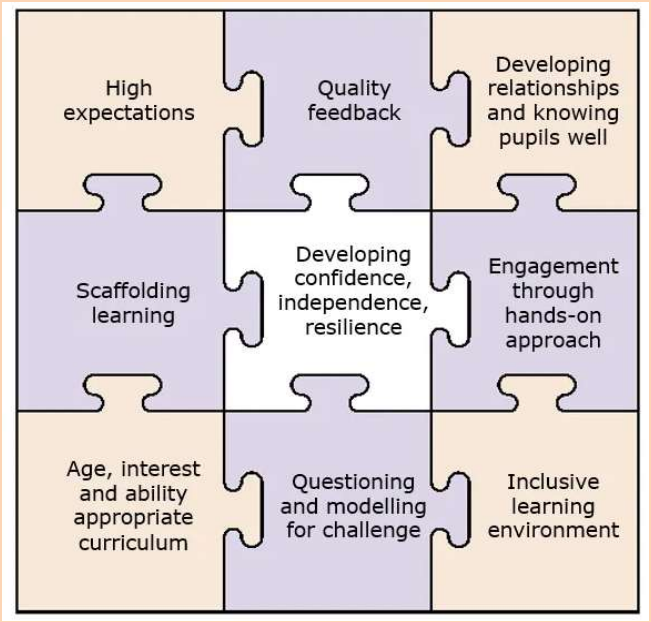
We do this by:

- Identifying the **critical core content** that pupils with SEND need to know and use.
- **Chunking** knowledge and knowledge notes/models in manageable sections.
- Teachers use structured **responsive frameworks** (including the use of stem sentences and sentence stems) to promote hard thinking
- Teachers use structured **deliberate practice** to increase attention and retention.
- Pupils with SEND are entitled to think hard. We use structured **challenge frameworks** to promote hard thinking, drawing on the content, including explain the word connections and sequenced thinking paths
- Dual coding (images) is used to **pre-teach tier 2 and 3 vocabulary**.
- Higher level **challenge partners** and talking trios are used to ensure children with SEN and or EAL are provided with high quality talk and modelled language of history skills.

Implementation: SEND & Inclusive Learning

- **Differentiation and scaffolds** are included where appropriate to enable access to learning and ensure children make at least expected progress.
- Lessons include **brain breaks** and key learning is chunked to avoid overload.

The Maths No Problem SEND jigsaw is a driver for our provision:

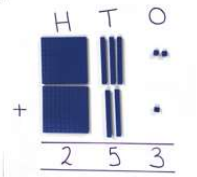
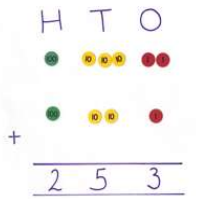
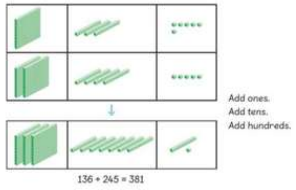
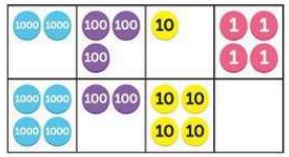
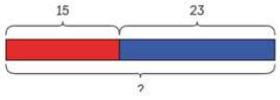


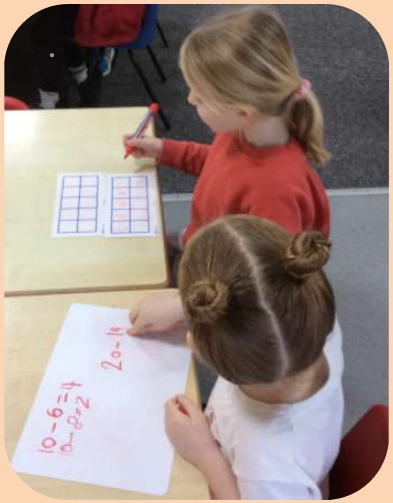
'It is good to have brain breaks in the middle of maths because when you are being challenged and working really hard it is good to have a break. It is like a car going to the garage. It is like pumping petrol in your brain to keep it working.' Y3 pupil.

Implementation: Resources

The concrete, pictorial, abstract (CPA) approach means that pupils at all stages of their primary education use practical resources to build their understanding of mathematical structure. The school's in depth calculation policy guides teachers, learning support assistants and parents/carers to the resources used in each year group.

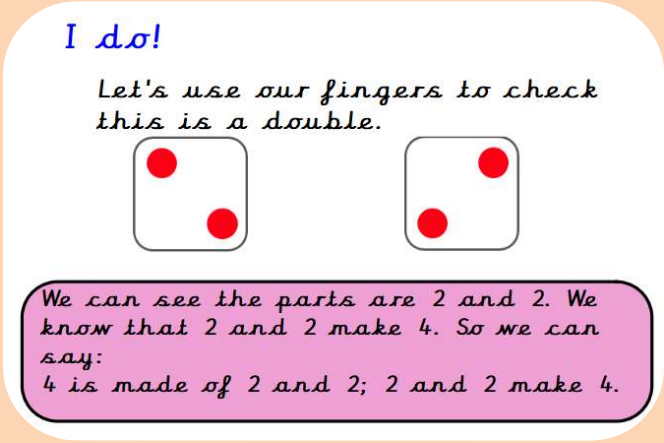
Addition KS2

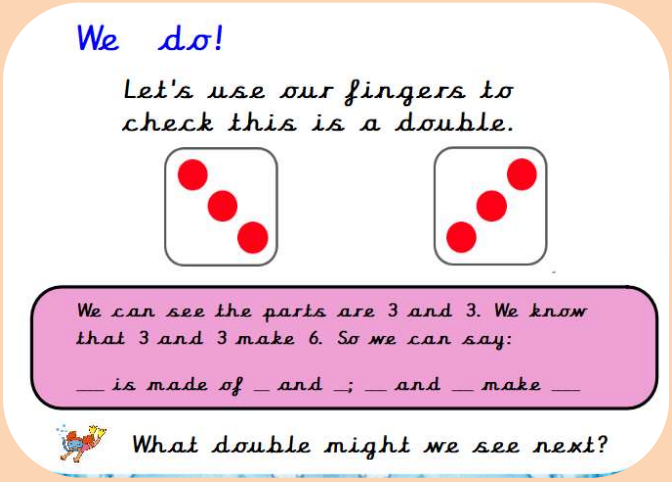
Objective & Strategy	Concrete	Pictorial	Abstract
Column method without regrouping Year 3	Using manipulatives children are to line up according to the place value columns and move the manipulatives into place to solve. Children to start with the ones column. Dienes:  Place value counters:  	The calculations are shown alongside the models (Dienes or place value counters) to show the connection.  Find the sum of 2314 and 4240.  Pictorial bar models are used to represent word problems.  	Children move on to the formal written method in the expanded form. Add the ones first in preparation for the compact method. h t o 6 9 2 + 7 0 2 1 6 0 + 6 0 0 7 6 2 Children are shown this alongside the compact method before moving to only using the compact method. h t o 4 3 2 + 5 2 1 9 5 3

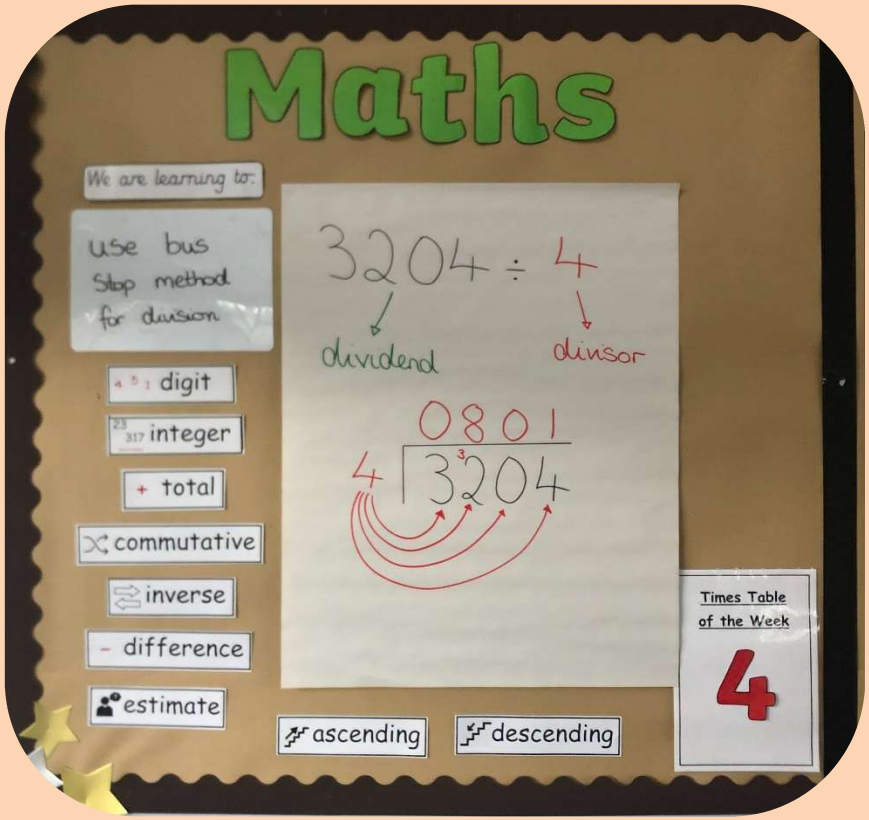


Implementation: Cognitive Load

Cognitive load is reduced through up-to-date maths working walls with dual coded vocabulary displayed. Slides that only have key learning and use the 'I do, We do, You do gradual release of responsibility model.

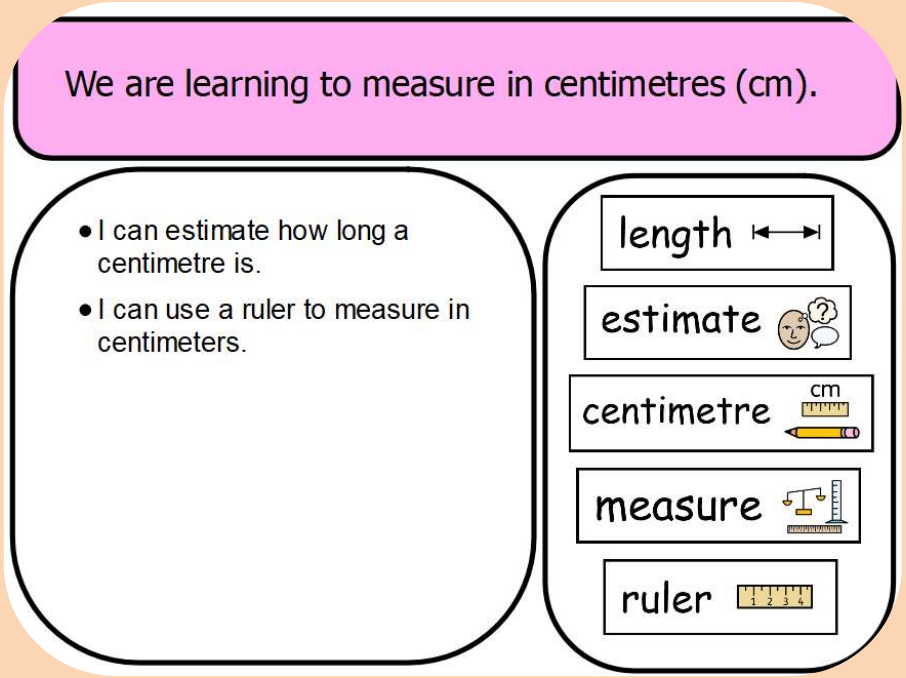


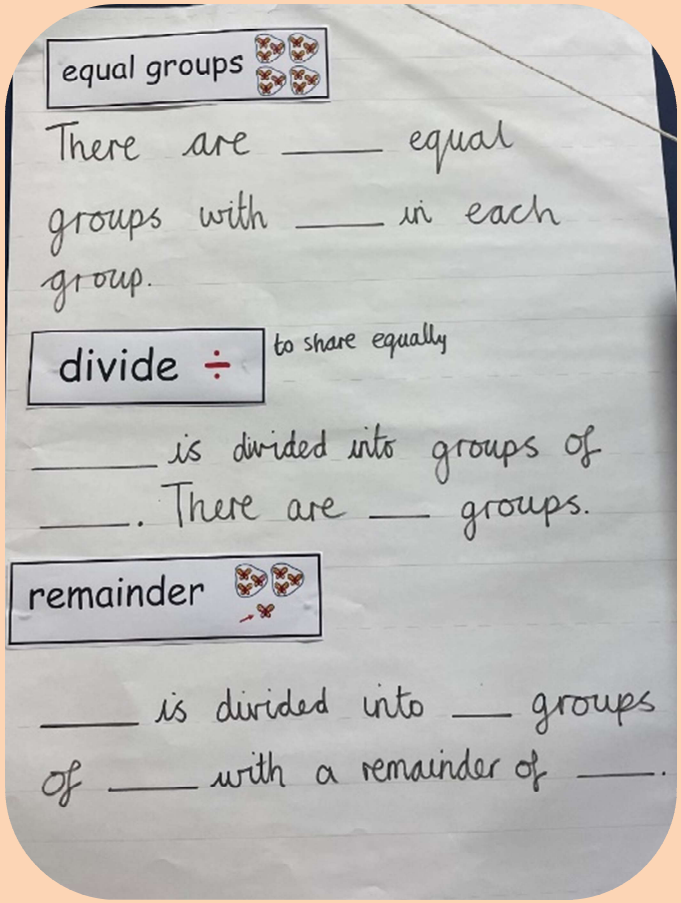




Implementation: Dual coded vocabulary

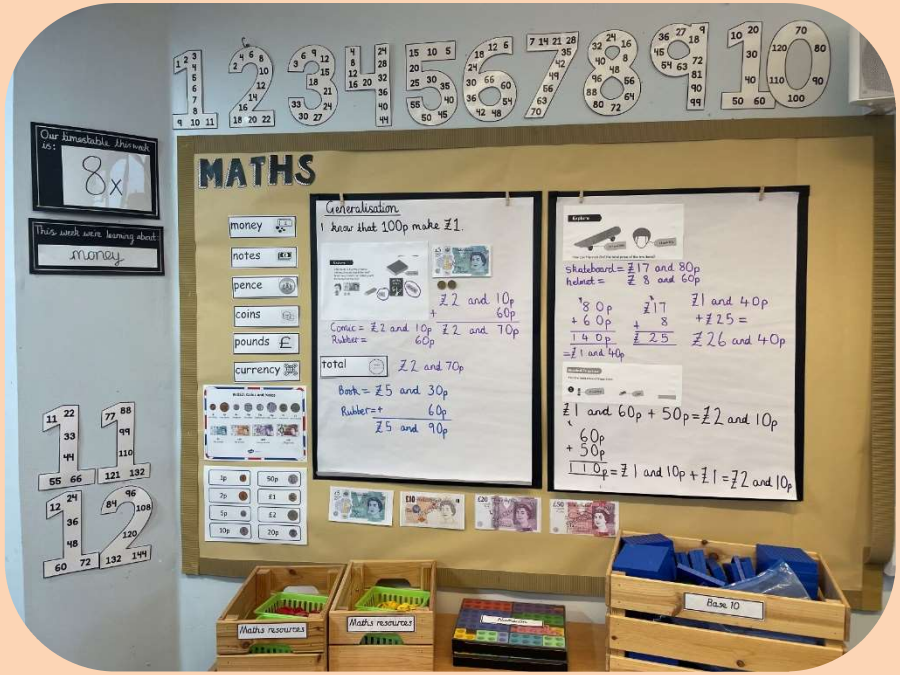
New learning is carefully introduced with dual coded vocabulary displayed on slides and working walls.

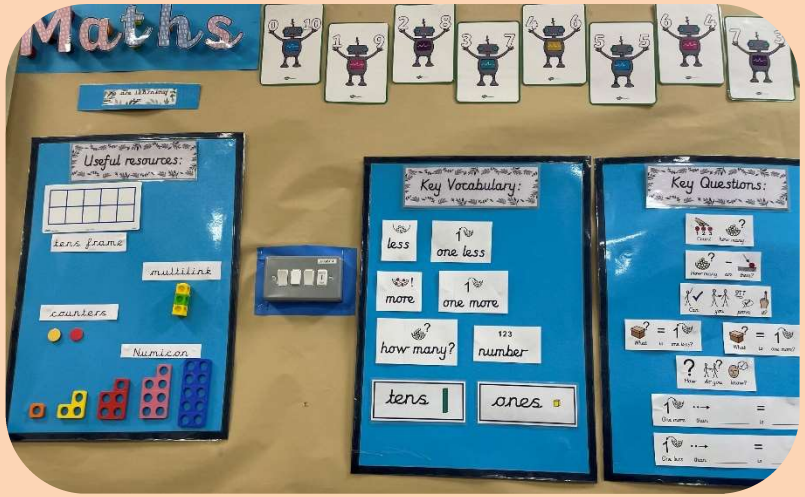




Implementation: Environment

We utilise a wide range of high-quality images and diagrams within the teaching resources we provide for our children. These are carefully designed and dual coded to minimise cognitive overload and allow each child access to their learning in the most inclusive way. Wherever possible we use inspiring images, that can be zoomed in on to explain difficult concepts and images that spark discussion and challenge thinking. The use of all resources is modelled carefully by teachers so that every child knows how to succeed in each lesson.





Implementation: Diversity and Identity

Throughout our planning and curriculum mapping, we celebrate the diversity within our community and the wider world and develop confidence in individual identity. We promote equality through the use of images and names of characters that reflect the nature of the school's pupils. Additionally, we ensure that there is a balance of gender representation within our slides and that no one gender is depicted as solving mathematical problems more effectively than another.

Impact: Hove Learning Federation Impact

Children leave Hove Learning Federation as deeply knowledgeable and skilful learners who can set targets and believe in themselves to achieve them. They understand how to be socially, morally, spiritually and culturally responsible and aware. They are able to make positive contributions to the local and wider community and strive to be the best that they can be.

Learning Behaviours	**Emotional** 	Names and expresses emotions Manages impulses of personal behaviour	Shows pride in successes	**Social** 	Focuses on learning in class Attentive to directions, listening to the teacher	Shows empathy and appreciates diversity	**Cognitive** 	Organises time and space for own learning Sets goals and monitors own progress	Talks purposefully with peers, valuing other opinions
Attitudes to Learning	Love of Learning and lifelong learners	Positive	Curious and inquisitive	Independent	Able to work in teams	Motivated and hardworking	Resilient	Proud	Ready for secondary school
Quality of Education	Evidence of learning	Attainment	Progress	Skills, knowledge and understanding	Personal Development	Relationships between pupils and staff	Learning atmosphere and environment	Professional Development	School Improvement

Impact: **EYFS**

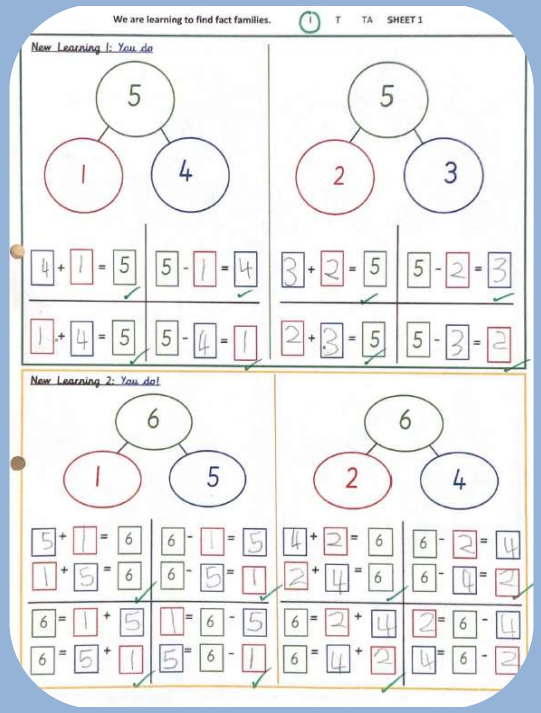
The whole class daily maths sessions, based on the Mastering Number program, support all pupils to be successful. They learn to subitise (recognise a number of objects without having to count), understand numerical concepts and recall addition facts. Our reception children enjoy maths, use mathematical language confidently and consolidate their learning in a stimulating learning environment.

'I like learning about adding and thinking of all the different ways I can make 5 or 6 or 7' - YR pupil.

'I like maths because I can use my 'fast fingers' to make numbers easily.' - YR pupil.

Impact: Year 1

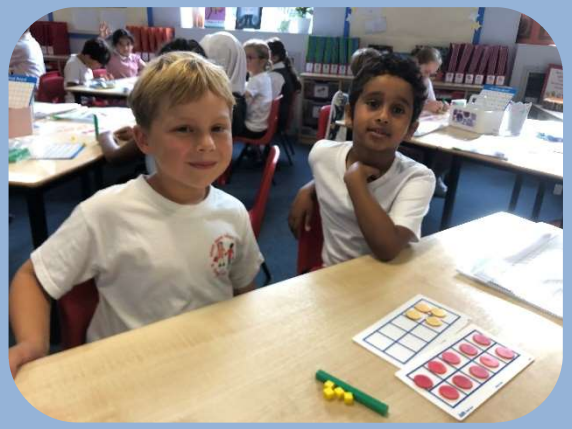
Our Year 1 pupils, are enthused and engaged mathematicians. They learn practically using manipulatives and resources one day and apply that learning to a maths worksheet the next. Pupils orally rehearse their mathematical thinking with their challenge partner before explaining on whiteboards.

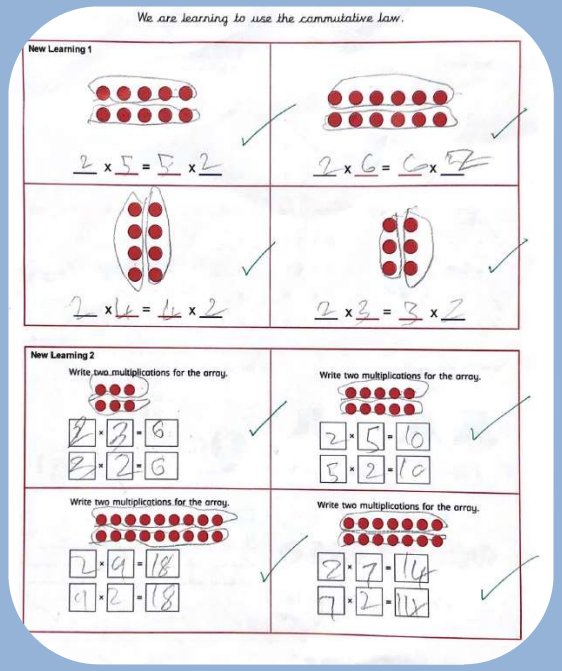


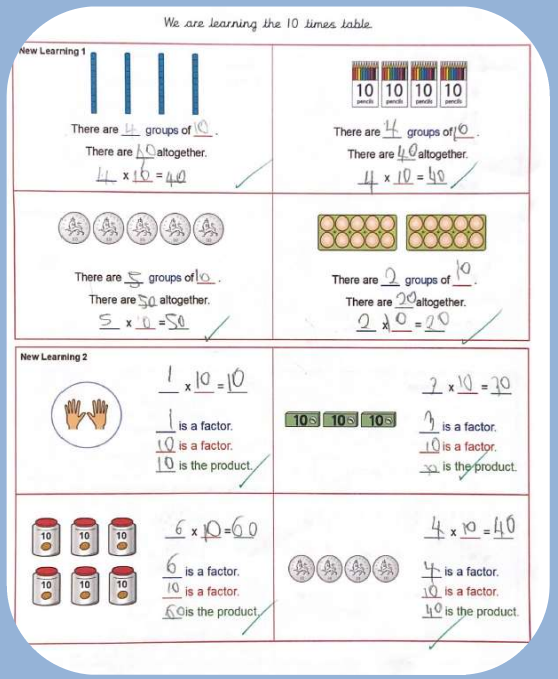
'I use a 100 square or a numberline if I get stuck. I sometimes count in my head and use my fingers to count.' Y1 pupil.

Impact: Year 2

In Year 2, our children learn using practical resources alongside written methods. This means that they understand the structures behind the maths. They have plenty of opportunities to practice and consolidate key learning through bespoke worksheets and fun maths games. They build upon and challenge each other's ideas and start to write down their mathematical explanations.

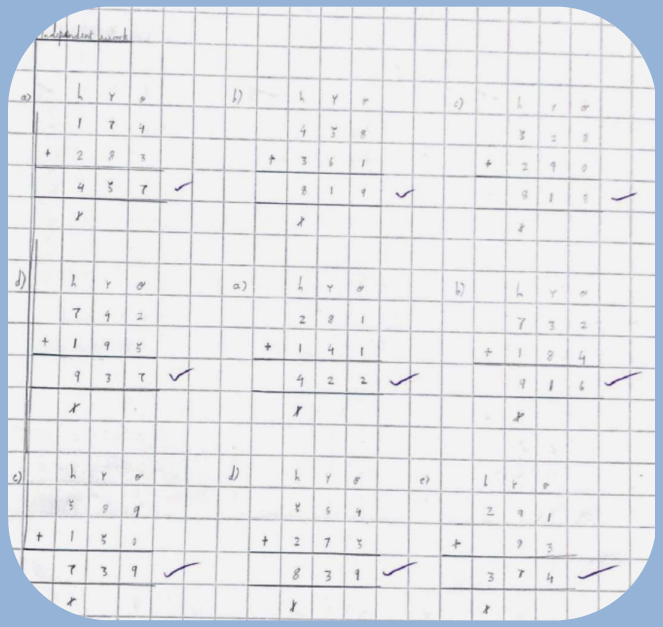


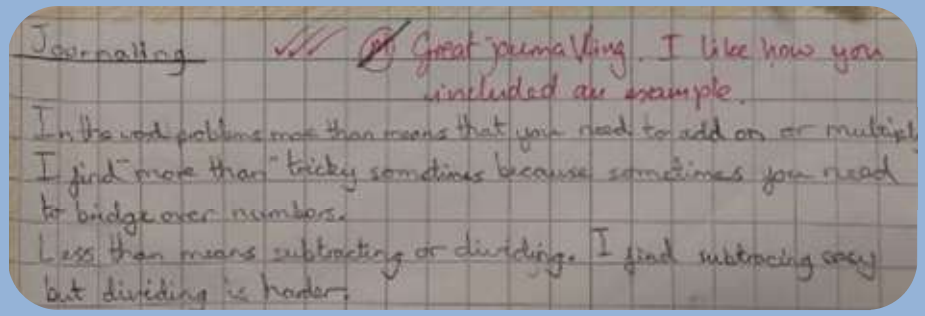




Impact: Year 3

Our Year 3 children are so proud of their wonderful work in maths books. They are introduced to maths 'journaling' and begin to describe methods, spot misconceptions or prove their answers. They are excited to learn their times tables and to take part in Times Table Rock Star day!





'It feels so good when you get a challenge right and if I get it wrong then I'm just proud that I got on to it!' - Y3 pupil.

Impact: Year 4

Year 4 children are the times table champions of the school! Learning fun songs and competing against their friends and teachers to learn their tables to automaticity. They apply their learning in maths lessons with impressive accuracy, flexibility and fluency.

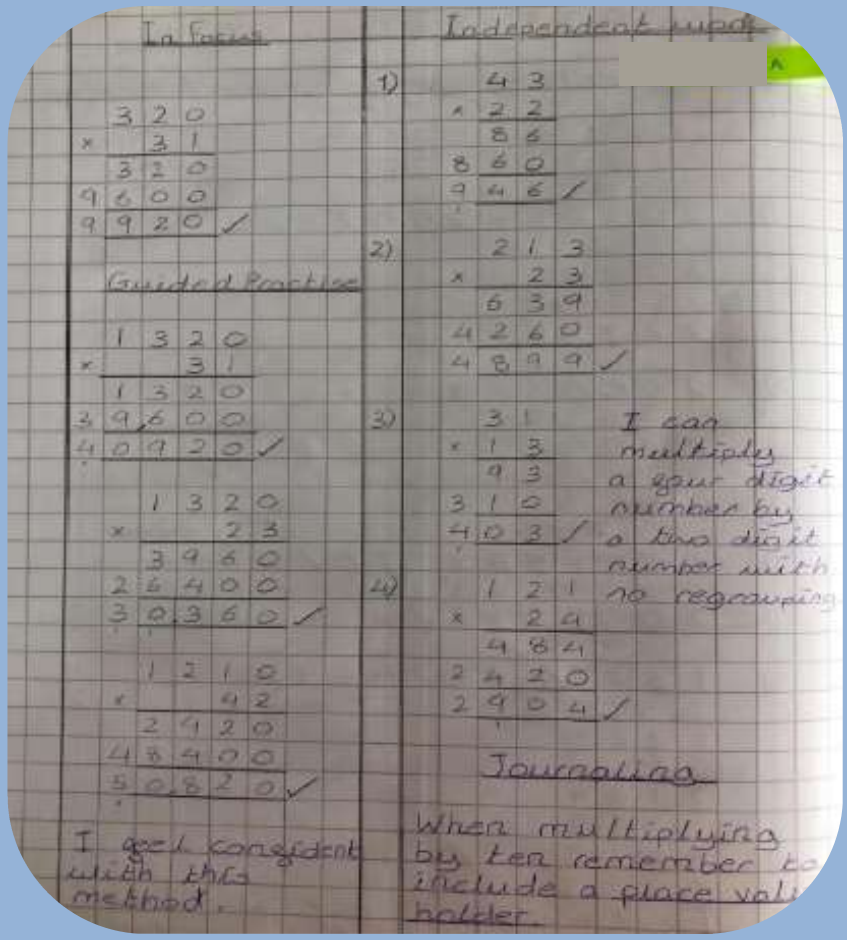
Times Table Rock Star Day

'I used to find column multiplication really tricky, but now I get it. I'm really proud of myself.' - Y4 pupil.

Impact: Year 5

Our Year 5 children are creative and critical thinkers who approach problems in a logical and systematic manner. They are independent learners who know what manipulatives to use or representation to draw to help uncover the maths. They enjoy being challenged and feeling successful in lessons.

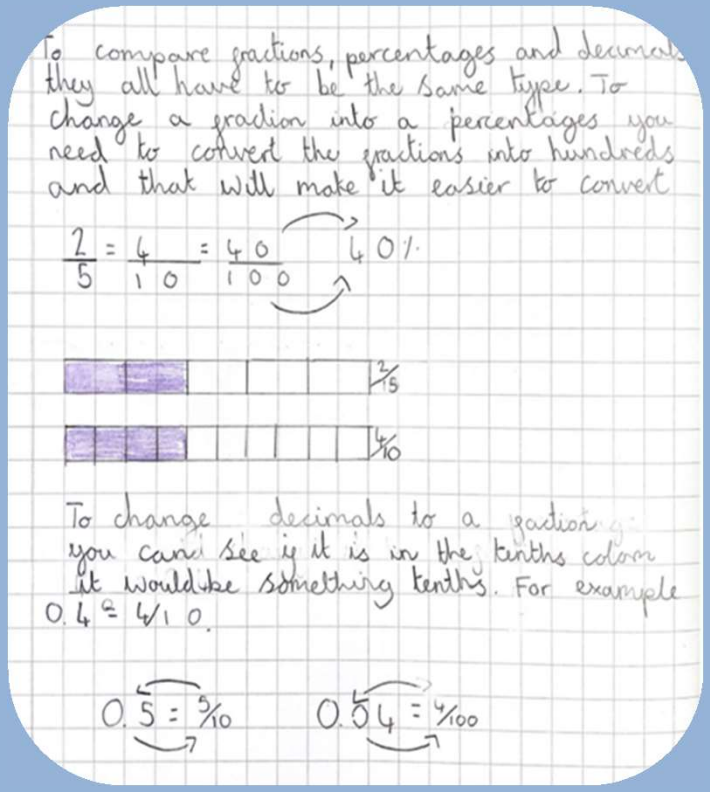
'Fractions are my favourite topic because I now know how to add them, take them away and find equivalent ones which was hard at first.' - Y5 pupil.



Impact: Year 6

Year 6 children are confident, fluent and efficient mathematicians who have strong arithmetic knowledge. They enjoy the challenges of learning new areas of maths such as long division, ratio and algebra.

'I like learning something new that I didn't understand before but know how to do after. Bus stop with two digits was quite hard at first but I enjoyed it!' - Y6 pupil.



"The Peer Tutors explained the maths in a way that we really understood! They were nice and made Year 7 maths sound fun." – Y6 pupil.