



Mathematics at Astwood Bank Primary

Vision Statement

Astwood Bank Primary School is an innovative learning community committed to excellence.

Mission Statement

We will endeavour to achieve this by:

- Constantly striving to find and create better ways of pursuing our goals.
- Providing happy supportive and safe environment in which everyone can achieve their full potential.
- Being truly inclusive and giving every child the opportunity to develop talents.
- Encouraging everyone to become creative, motivated and life-long learners. prepared for an ever-changing global community.
- Recognising and celebrate success.

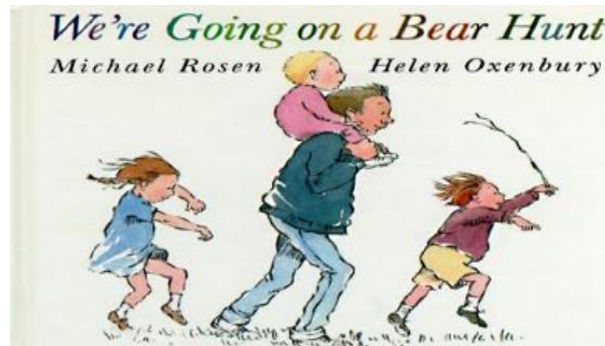
Aims for our pupils

- To develop a growth mindset and positive attitude towards mathematics.
- To become confident and proficient with number, including fluency with mental calculation and look for **connections** between numbers.
- To become problem solvers, who can **reason, think logically, work systematically** and apply their knowledge of mathematics.
- To develop their use of **mathematical language**.
- To become **independent** learners and to work **co-operatively** with others.
- To appreciate real life contexts to learning in mathematic

As a teaching for Mastery School, we strive to achieve the following principles in our lessons:

- Achievable for all
- Deep and sustainable learning
- The ability to build on something that has already been sufficiently mastered by spending longer time on topics.
- The ability to reason about a concept and make connections.

The image below exemplifies both this notion and our aims for provision in maths perfectly as it shows everyone on the same journey, broadly going at the same pace but with some out in front exploring new challenges and some needing support to keep up.



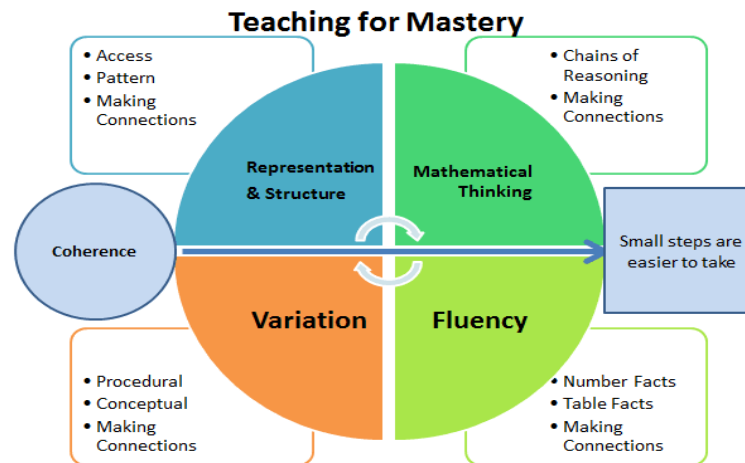
Maths lessons are taught in whole class groups with lessons designed to promote our inclusive ethos as well as the three aims of the National Curriculum: fluency, reasoning and problem solving.

When planning and designing our Maths curriculum we ensure all staff have good understanding of the three key aims of the National Curriculum and the 'Five Big Ideas' which underpin teaching for mastery:

FLUENCY - REASONING – PROBLEM SOLVING

These three key aims of the National Curriculum should be addressed in each sequence of learning.

5 Big ideas of Mastery



Intent

Our new **progression in calculation policy** has been created to reflect the methods we use to teach for Maths Mastery **Progression**.

Our teaching for mastery is underpinned by NCETM's 5 Big ideas.

- Opportunities for Mathematical thinking allow children to make chains of reasoning connected with the other areas of their mathematics.
- A focus on Representation and Structure ensures concepts are explored using **concrete, pictorial** and abstract representation, the children actively look for patterns and generalise whilst problem solving.
- Coherence is achieved through the planning of small, connected steps to link every question and lesson within a topic.
- Teachers use both procedural and conceptual **Variation** within their lessons and there remains an emphasis on **Fluency** with relentless focus on number and times table facts.

Classroom Norms to Establish

- Everyone can learn mathematics to the highest levels.
- If you can't do it, 'you can't do it **yet**'.
- Mistakes are valuable.
- Questions are important.
- Mathematics is about creativity and problem solving.
- Mathematics is about making connections and communicating what we think.
- Depth is much more important than speed.

Teaching for Mastery Principles

- **It is achievable for all** - we have high expectations and encourage a positive 'can do' mindset towards mathematics in **all** pupils, creating learning experiences which develop children's resilience in the face of a challenge and carefully scaffolding learning so everyone can make progress.
- **Deep and sustainable learning** – lessons are designed with careful small steps, questions and tasks in place to ensure the learning is not superficial.
- **The ability to build on something that has already been sufficiently mastered** – Pupils' learning of concepts is seen a continuum across the school.
- **The ability to reason about a concept and make connections** – Pupils are encouraged to make connections and spot patterns between different concepts (e.g the link between ratio, division and fractions) and use precise mathematical language which frees up working memory and deepen conceptual understanding.
- **Conceptual and procedural fluency** – Teachers move mathematics from one context to another (using objects, pictorial representations, equations and word problems). There are high expectations for pupils to learn times tables, key number facts (so they are automatic) and have a true sense of a number. Pupils are also encouraged to think whether their method for tackling a given calculation or problem is Appropriate, Reliable and Efficient.

- **Problem solving is central** – this develops pupils’ understanding of why something works so that they truly have an appreciation of what they are doing rather than just learning to repeat routines without grasping what is happening.
- **Challenge through greater depth** – rather than accelerated content, (moving onto next year’s concept) teachers set tasks to deepen knowledge and improve reasoning skills within the objectives of their year group.

Curriculum design and planning

- To support us in delivering a mastery curriculum we use resources from the NCETM to support staff development alongside materials from **White Rose Maths, I See Maths, Nrich, Third Space Learning** and **TT Rockstars** to support teaching and learning.
- Staff use **White Rose Maths Schemes of Learning** as a starting point to develop a coherent and comprehensive conceptual pathway through the mathematics. The focus is on the **whole class progressing together**. Collaborative planning is encouraged to ensure **consistency**.
- Learning is broken down into small, connected steps building from what pupils already know. The lesson journey should be detailed and evident on Smart Notebook
- Learning is broken down into small, connected steps building from what pupils already know. The lesson journey should be detailed and evident on Smart Notebook or power point as there is no requirement for teachers to produce detailed **paper plans**.
- Difficult points and potential misconceptions are identified in advance and strategies to address them planned.
- Key questions are planned, to challenge thinking and develop learning for all pupils.
- Contexts and representations are carefully chosen to develop reasoning skills and to help pupils’ link concrete ideas to abstract mathematical concepts.
- The use of high-quality materials and tasks to support learning and provide access to the mathematics is integrated into lessons. These may include **White Rose Maths Schemes of Learning and Assessment Material, NCETM Mastery PD Materials and Assessment materials, Nrich**, visual images and concrete resources.

Freedom to pick and choose what’s best



- Opportunities for extra fluency practice (instant recall of key facts (KIRF), such as number bonds, times tables, division facts, addition and subtraction facts) should be provided during and outside of mathematics lessons.

Lesson Structure:

- Lessons begin with flashbacks and KIRF – 5 minutes of flashbacks and 5 minutes of KIRFs.
- Followed by a sharply focused, crafted lesson.
- **Do it:** whole class working together (ping ponging between teacher and pupils).
- **Secure it:** independent work to show security in the objectives of the lesson (interventions for pupils needing support take part during this section of the lesson).
- **Deepen it:** using and applying across various problem solving and reasoning contexts.

Variation theory is at the heart of lesson design. This involves the **careful selection of tasks and activities that are varied slightly to develop and deepen pupils' understanding of the procedures or concepts being studied.**

- Key new learning points are identified explicitly.
- There is a regular interchange between concrete/contextual ideas, pictorial representations and their abstract/symbolic representations.
- Mathematical generalisations are emphasised as they emerge from underlying mathematics.
- Making comparison is an important feature of developing deep knowledge. The questions, “What is same, what is different?” are often used to draw attention to essential features of concept.
- Repetition of key ideas for example in the form of whole class recitation or repeating to talk partner is used frequently. This helps to verbalise, embed mathematical ideas, and provide pupils shared language to think and communicate mathematics.
- Formative assessment is carried out throughout the lesson, the teacher checks pupils' understanding and adjust the lesson accordingly.
- Gaps in pupils' knowledge and understanding are identified early and are addressed through individual or small group intervention, either on the same day or on the next day.

The Role of the teaching assistant

Learning Support Assistants (LSAs) support pupils in lessons by enabling them to access the curriculum and become independent. Sometimes, under direction of the teacher, this will involve a LSA working directly with an individual or group of pupils. At other times, the LSA will take on a 'helicopter' role: observing and monitoring pupils for signs, they need support and then providing timely intervention at the point of need.

Inclusion and Special Needs

Astwood Bank aims to meet the needs of all, considering gender, ethnicity, culture, religion, language, disability, age and social circumstances. The provision

for children with special needs is detailed in the SEND Policy. SEN pupils may be supported by additional adults, different resources, differentiated activities. They may also complete additional activities outside of the mathematics lesson or be taught in a smaller class size (Y4-6). We have high expectations of all children and strongly believe that all children can achieve in mathematics. Some may take longer to grasp concepts and may need careful scaffolding or extra time/support.

Early Years Foundation Stage (EYFS)

Our reception team use the NCETM Mastering Number Scheme to teach children the basics of number. Children in EYFS explore mathematical concepts through active exploration and their everyday play-based learning. Children are taught key concepts and develop number sense using a hands-on practical approach. EYFS practitioners provide opportunities for children to manipulate a variety of objects, which supports their understanding of quantity and number. Pupils explore the 'story' of numbers to ten and the development of models and images for numbers as a solid foundation for further progress. The CPA approach is used when teaching children key mathematical skills. Practitioners allow children time for exploration and the use of concrete objects helps to support children's mathematical understanding. Mathematics in the early years provides children with a solid foundation that will enable them to develop skills as they progress through their schooling and ensures children are ready for the National Curriculum.

Marking

At Astwood Bank Primary, we recognise the importance of feedback as an integral part of the teaching and learning cycle and aim to maximize the effectiveness of its use in practice. We are mindful also of the research surrounding effective feedback and the workload implications of written marking, as well as research from cognitive science regarding the fragility of new learning.

Our policy is underpinned by the evidence of best practice from the Education Endowment Foundation (EEF) and other expert organisations. The Education Endowment Foundation research shows that effective feedback should:

- Redirect or refocus either the teachers' or the learner's actions to achieve a goal.
- Be specific, accurate and clearer.
- Encourage and support further effort.
- Be given sparingly so that it is meaningful.
- Put the onus on students to correct their own mistakes, rather than providing correct answers for them.
- Alert the teachers to misconceptions, so that the teacher can address these in subsequent lessons.

Notably, the department for Education's research into teacher workload has highlighted written marking as a key contributing factor to workload. As such we have investigated alternatives to written marking which can provide effective feedback in line with the EEF's recommendations, and those of the DFE's expert group which emphasises that marking should be: **Meaningful, manageable, and motivating**. We have also taken note of the advice provided by the NCETM (National Centre for Excellence in Teaching Mathematics) that the most **important activity** for **teachers** is **the teaching itself**, supported by the **design and preparation of lessons**.

Key Principles

Our policy on feedback has at its core several principles:

- The sole focus of feedback should be to **further children's learning**.
- Children should receive feedback **within the lesson** (live marking) itself or in the next appropriate lesson. **The next step' is usually the next lesson.**
- Feedback should empower children to take responsibility for improving their own work; it should not take away from this responsibility by adults doing the hard thinking work for the pupil.
- Feedback is a part of the school's wider assessment processes, which aim to provide an appropriate level of challenge to pupils in lessons, allowing them to make good progress.

Feedback and Marking in Practice

Feedback occurs at one of four common stages in the learning process:

1. Immediate feedback – at the point of teaching
2. Summary feedback – at the end of a lesson/task
3. Next lesson feedforward – further teaching enabling the children to identify and improve for themselves areas for development identified by teachers upon review of work after a previous lesson had finished.
4. Summative feedback – tasks planned to give teachers definitive feedback about whether a child has securely mastered the material under study.

These practices can be seen in the following:

Type	What it looks like	Evidence (for observer)
Immediate	<ul style="list-style-type: none">• Includes teacher-gathering feedback from teaching within the course of the lesson, including mini-whiteboards, bookwork, etc.• Takes place in lessons with individuals or small groups.• Often given verbally to pupils for immediate actions• May involve use of teaching assistant to provide support of further challenge.• May redirect the focus of teaching or the task.	Lesson – Live marking using pink for think and blue for brill, observations/learning walks

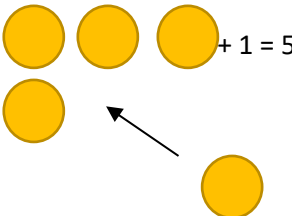
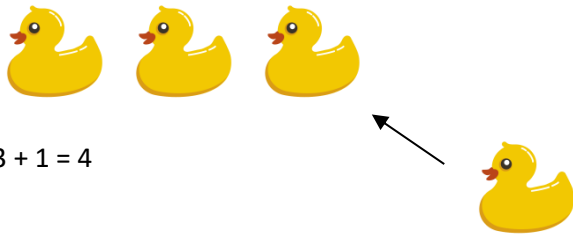
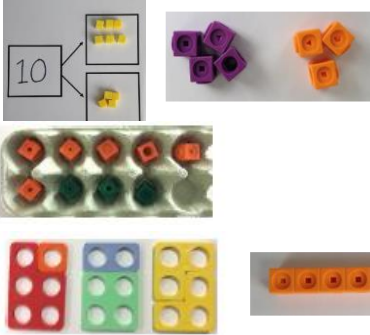

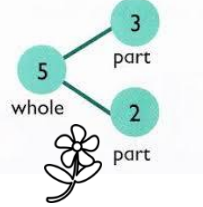
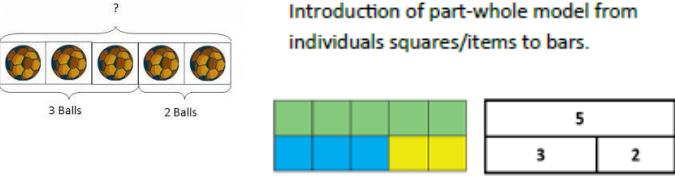
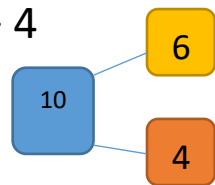

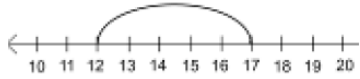
Summary	<ul style="list-style-type: none"> • Takes place at the end of a lesson of activity. • Often involves whole groups or classes. • Provides an opportunity for evaluation of learning in the lesson. • may take the form of a quiz, test or score on a game. 	Lesson observations/learning walks Recorded in books or logged separately by the teacher.
Next step is the next lesson	<ul style="list-style-type: none"> • Errors and misconceptions addressed in subsequent lessons. 	Pink for think and blue for brill in books.
Summative	<ul style="list-style-type: none"> • End of topic and, End of termly summative assessment provided by White Rose Maths Scheme to inform teacher judgement, provide further opportunities to identify gaps in pupils' learning and design future tasks. • In Year 6 these tests will usually be in the form of practice SATs papers. 	

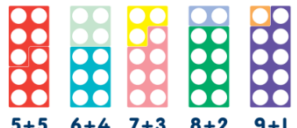

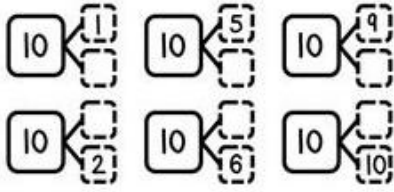
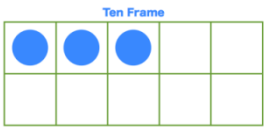

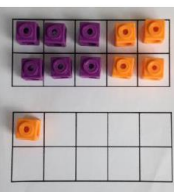
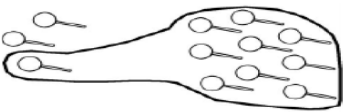
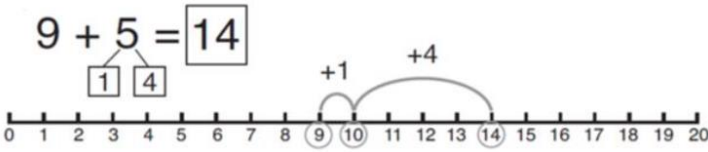
Role of the Subject Leader

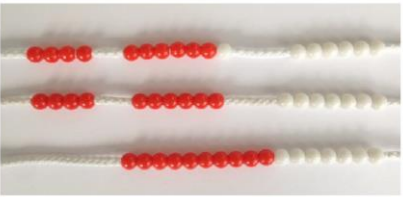
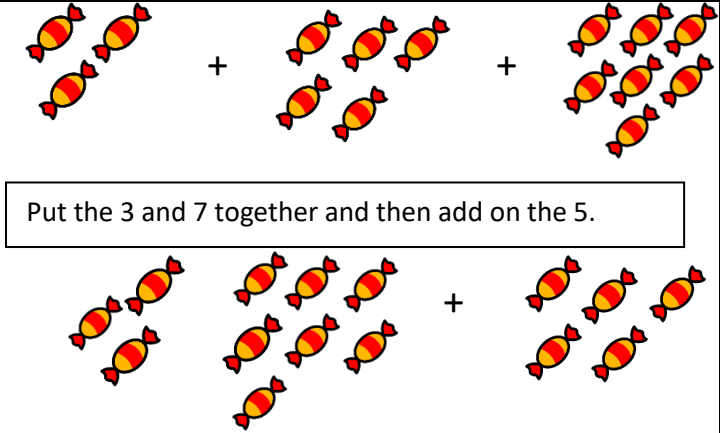


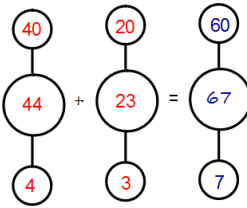
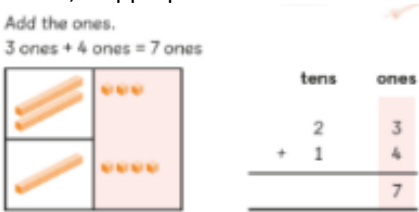
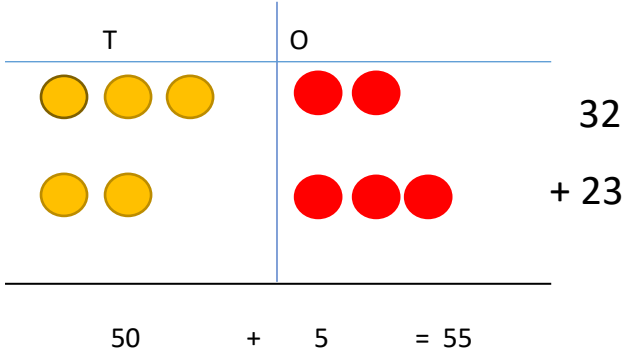
- Ensures teachers understand the requirements of the National Curriculum and supports them to plan lessons.
- Leads by example by setting high standards in their own teaching.
- Leads continuing professional development; facilitates joint professional development – especially Lesson Study; provides coaching and feedback for teachers to improve pupil learning.
- Leads the whole-school monitoring and evaluation of teaching and learning in mathematics by observing teaching and learning in mathematics regularly; analysing assessment data to plan whole school Improvement in mathematics; conducting work scrutiny to inform evaluation of progress; conducting pupil interviews.
- Takes responsibility for managing own professional development by participating in external training, independent private study, engaging in educational research and scholarly reading and keeping up to date with Teaching for Mastery developments.
- Keeps parents informed about mathematics issues.
- Ensures that the school's senior leaders and governors are kept informed about the quality of teaching and learning in mathematics.
- Works in close partnership with the school's senior leaders to ensure the learning needs of all pupils in mathematics are met effectively.
- Keeps the school's policy for mathematics under regular review.

Astwood Bank Primary Calculation Policy


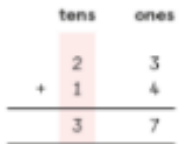
Addition

Year group	Objective and Strategies	Concrete	Pictorial	Abstract
Reception	Adding one/ one more	Use concrete resources to show how 1 object can be added. 	Draw more objects to show what has been added. 	$2 + 1 = \underline{\quad}$ $3 + 1 = \underline{\quad}$ Use number fans to show 1 more/1 less.
Reception and Y1	Combining two parts to make a whole	 Use cubes to add two numbers together as a group or in a bar.  When using counters/cubes in a part whole model, combine the 2 amounts to put into the whole.	 Use pictures to add two numbers together as a group or in a bar.  Introduction of part-whole model from individual squares/items to bars.	$4 + 3 = 7$ (say: 4 plus 3 is the same as 7) $10 = 6 + 4$ (say: 10 is the same as 6 add 4)  Use the part-part whole diagram as shown above to move into the abstract.
Reception and Y1	Starting at the bigger number and counting on	 $12 + 5 = ?$ Start with the larger number on the bead string and then count on the smaller number 1 by 1 to find the answer.	$12 + 5 = 17$ 	$5 + 12 = 17$ Place the larger number in your head and count on the smaller number to find your answer.

<p>Reception and Y1</p>	<p>Knowing numberbonds to 10 from memory.</p>	 <p>5+5 6+4 7+3 8+2 9+1</p> <p>Use numicon to show pairs of numbers to make 10. Use this knowledge to make numberbonds to 20.</p> <p>Use dienes and cuisenaire to show numberbonds to 10.</p> <p>Use unifix to make towers of 10:</p>  <p>Record number sentence as: 9+1 = 10 8+2 = 10 etc</p>	 <p>Use a part-part whole diagram to complete the missing number.</p> <p>Use ten frames: $3 + \underline{\quad} = 10$, if you have 3, how many more to make 10?</p> 	<table border="1"> <tr> <td>$0 + \underline{\quad} = 10$</td> <td>$1 + \underline{\quad} = 10$</td> </tr> <tr> <td>$2 + \underline{\quad} = 10$</td> <td>$3 + \underline{\quad} = 10$</td> </tr> <tr> <td>$4 + \underline{\quad} = 10$</td> <td>$5 + \underline{\quad} = 10$</td> </tr> <tr> <td>$6 + \underline{\quad} = 10$</td> <td>$7 + \underline{\quad} = 10$</td> </tr> </table>	$0 + \underline{\quad} = 10$	$1 + \underline{\quad} = 10$	$2 + \underline{\quad} = 10$	$3 + \underline{\quad} = 10$	$4 + \underline{\quad} = 10$	$5 + \underline{\quad} = 10$	$6 + \underline{\quad} = 10$	$7 + \underline{\quad} = 10$
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$6 + \underline{\quad} = 10$	$7 + \underline{\quad} = 10$											
<p>2</p>	<p>Regrouping to make 10.</p>	 <p>$6 + 5 = 11$</p>  <p>Start with the bigger number and use the smaller number to make 10. Then add the rest to 10.</p>	 <p>Use pictures or a number line. Regroup or partition the smaller number to make 10.</p> <p>$3 + 9 =$</p> <p>$9 + 5 = 14$</p> 	<p>$7 + 4 = 11$</p> <p>If I am at seven, how many more do I need to make 10?</p> <p>$7 + 3 = 10$</p> <p>How many more do I need to add on now?</p> <p>$10 + 1 = 11$</p>								

<p>2</p>	<p>Adding three single digits</p>	<p>$4 + 7 + 6 = 17$ Put 4 and 6 together to make 10. Then add on 7.</p>  <p>Or....spot doubles to add first, then add on the third number. Or....start with the largest number and add on the next largest number and then the third number.</p>	 <p>Put the 3 and 7 together and then add on the 5.</p>	<p>$4 + 7 + 6 = 10 + 7 = 17$</p> <p>Combine the two numbers that make 10 and then add on the remainder.</p>
<p>2</p>	<p>Adding two, 2-digit numbers by partitioning</p>	<p>$44 + 23 =$ Make the numbers using Dienes. Add together the tens and then add on the ones.</p> 	<p>$44 + 23 =$ Draw the tens and ones. Count the tens and then add on the ones.</p> 	<p>Partition each 2 digit number into tens and ones using the part-part whole model. Add together the tens, add together the ones and then recombine.</p> 
<p>2</p>	<p>Adding two, 2-digit numbers using the column method- no exchanging</p>	<p>$24 + 15 =$ Add together the ones first then add the tens. Use the Dienes first before moving onto Place Value counters, if appropriate.</p> <p>Step 1 Add the ones. $3 \text{ ones} + 4 \text{ ones} = 7 \text{ ones}$</p> 	<p>After practically using the Dienes and place value counters, children can draw the counters to help them to solve additions.</p> 	<p><u>Calculations</u></p> <p>$21 + 42 =$</p> <p>21 + 42</p> <p>Add the ones first and then the tens.</p>

Step 2 Add the tens.
2 tens + 1 ten = 3 tens

$23 + 14 = 37$

Column addition method- with exchanging

Y2 –
2 digit + 2 digit

Y3 – up to
3 digit + 3 digit

Y4 – up to
4 digit + 4 digit
(formal written method)

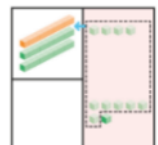
2,3,4,
5,6

Y5/6 – beyond
4 digit + 4 digit
(formal written method) plus
adding decimals


Make both numbers on a place value grid using Dienes or PV counters

Add 24 and 7.

Step 1 Add the ones.
4 ones + 7 ones = 11 ones
Regroup the ones.
11 ones = 1 ten and 1 one

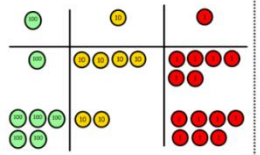


Step 2 Add the tens.
1 ten + 2 tens = 3 tens

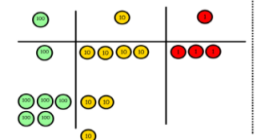


$24 + 7 = 31$

Add up the ones and exchange 10 ones for a ten.



$146 + 527$

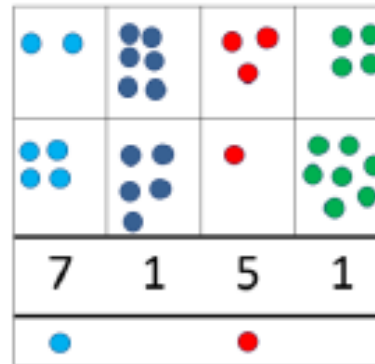


$146 + 527$

Add up the rest of the columns, exchanging the 10 counters from one column for the next place value column until every column has been added.

This can also be done with Dienes to help children clearly see those 10 ones equal 1 ten and 10 tens equal 100.

Children can draw a pictorial representation of the columns and place value counters to further support their learning and understanding.



$$\begin{array}{r} 2634 \\ + 4517 \\ \hline 7151 \end{array}$$

This can also be done with Dienes.

Start by partitioning the numbers before moving on to clearly show the exchange below the addition.

$$\begin{array}{r} 20 + 5 \\ 40 + 8 \\ 60 + 13 = 73 \end{array}$$

tens	ones
2	7
1	5
4	2
1	

$$\begin{array}{r} 536 \\ + 85 \\ \hline 621 \\ 11 \end{array}$$

$$\begin{array}{r} 72.8 \\ + 54.6 \\ \hline 127.4 \\ 11 \end{array}$$

£	2	3	.	5	9	
+	£	7	.	5	5	
	£	3	1	.	1	4
		1	1		1	

		As children move on to decimals, money and decimal place value counters can be used to support learning.		
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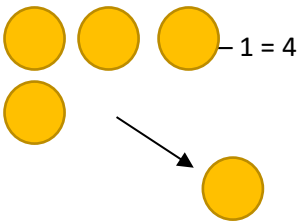
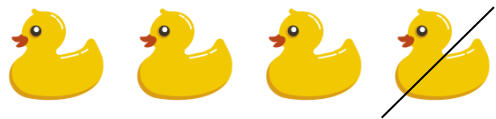
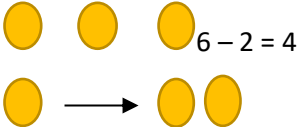
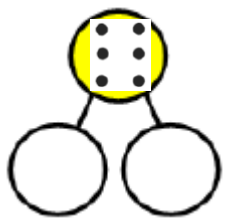
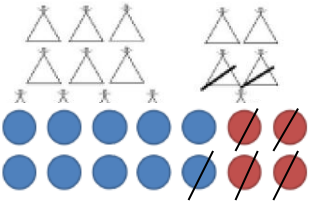


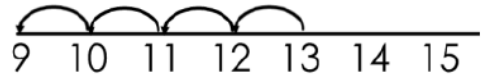
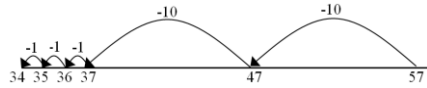
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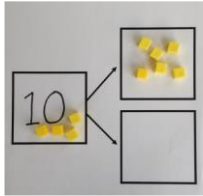
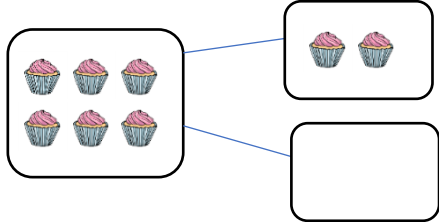
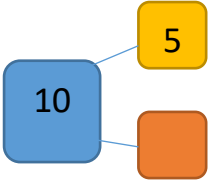
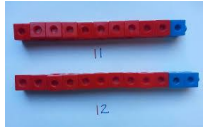
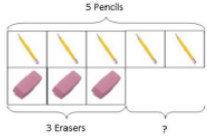
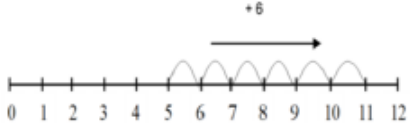
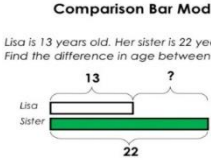
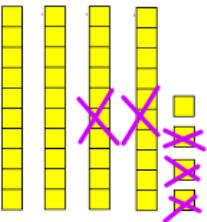

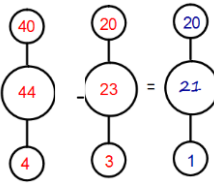
Each year group should build on and consolidate previous year groups

ADDITION

<p><u>Rec</u> Part – several parts added together makes a whole. Whole – a whole is made up of a number of parts. Equal – symbol (=) read ‘equals’ or ‘is the same as’</p>	<p><u>Year 1</u> Numeral – how to write a number using digits. Digit – 24 is a 2-digit number. The 2 represents the tens, the 4 represents the ones. Sum – the total of one or more additions Total – the sum found by adding</p>	<p><u>Year 2</u> Addend – a number to be added to another. Commutative – addition is commutative so $8 + 2 = 2 + 8$ Inverse – addition and subtraction are inverse operations so $7 + 3 = 10$ and $10 - 3 = 7$ Exchange – when adding the ones in column addition if the total is greater than 10, we exchange 10 ones for a ten Bridging 10 – adding 2 numbers to make ten and then add on the rest</p>	<p><u>Year 3</u> Compensation – a mental strategy where one number is rounded to make the calculation easier and then adjusted. e.g. $56 + 38$ is treated as $56 + 40$ and then 2 is subtracted to compensate</p>	<p><u>Year 4</u> Consolidation of terms learnt in previous year groups</p>	<p><u>Year 5</u> Integer – any of the positive or negative whole numbers Positive – any number larger than zero Negative – any number smaller than zero</p>	<p><u>Year 6</u> Consolidation of terms learnt in all previous year groups.</p>
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Subtraction

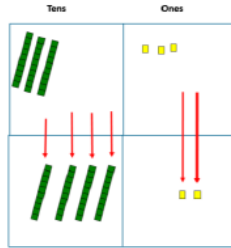
Year group	Objective and Strategies	Concrete	Pictorial	Abstract
Reception	Taking away one/one less	Use concrete resources to show how 1 object can be taken away. 	Cross out drawn objects to show what has been taken away.  $4 - 1 = 3$	$5 - 1 = \underline{\quad}$ $3 - 1 = \underline{\quad}$
1	Taking away ones	Use concrete resources to show how objects can be taken away.  $6 - 2 = 4$  $6 - 2 = 4$ <div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>When using counters/cubes in a part whole model, put in the whole number and then move the number to take away into one of the parts.</p> </div>	Cross out drawn objects to show what has been taken away.  $14 - 5 = 9$	$18 - 3 = \underline{\quad}$ $8 - 2 = \underline{\quad}$
1&2	Counting back	Make the larger number in your subtraction. Move the beads along your bead string as you count backwards in ones. $13 - 4$   Use counters and move them away from the group as you take them away counting backwards as you go.	Count back on a number line or number track.  $9 \quad 10 \quad 11 \quad 12 \quad 13 \quad 14 \quad 15$ Start at the bigger number and count back the smaller number showing the jumps on the number line.  $57 - 23 = \underline{\quad}$ This can progress all the way to counting back using two 2-digit numbers.	Put 13 in your head, count back 4. What number are you on? Use your fingers to help.

<p>1 & 2</p>	<p>Part-part Whole Model</p>	 <p>Link to addition- use the part-part whole model to help explain the inverse between addition and subtraction.</p> <p>If 10 is the whole and 6 is one of the parts. What is the other part?</p> <p>$10 - 6 = \underline{\quad}$</p>	<p>Use a pictorial representation of objects to show the part-part whole model.</p> 	 <p>Move to using numbers within the part whole model.</p>
<p>2</p>	<p>Find the difference</p>	<p>Compare amounts and objects to find the difference.</p>  <p>Use cubes to build towers or make bars to find the difference</p>  <p>Use basic bar models with items to find the difference</p>	 <p>Count on to find the difference.</p> <p>Draw bars to find the difference between 2 numbers.</p> <p>Comparison Bar Models</p> <p>Lisa is 13 years old. Her sister is 22 years old. Find the difference in age between them.</p> 	<p>Hannah has 23 sandwiches, Helen has 15 sandwiches. Find the difference between the number of sandwiches.</p>
<p>2</p>	<p>Subtracting two, 2-digit numbers by partitioning</p>	<p>$44 - 23 =$</p> <p>Make the first number using Dienes. Take away the second number. Count what is left.</p> 	<p>$44 - 23 =$</p> <p>Draw the tens and ones. Cross out the second number. Count what is left.</p> 	<p>Partition each 2 digit number into tens and ones using the part-part whole model. Subtract the tens, Subtract the ones and then recombine.</p> 

2

Column method
-no exchanging

$75 - 42 = ?$



Use Dienes to make the bigger number then take the smaller number away.

What's left? 32



Draw the Dienes or place value counters alongside the written calculation to help show the working out.

$$\begin{array}{r} 47 - 24 = 23 \\ - 20 + 7 \\ \hline 20 + 3 \end{array}$$

This will lead to a clear written column subtraction.

$$\begin{array}{r} 32 \\ - 12 \\ \hline 20 \end{array}$$

Column subtraction method- with exchanging

Y2 –
2 digit - 2 digit

Y3 – up to
3 digit - 3 digit

Y4 – up to
4 digit - 4 digit
(formal written method)

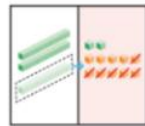
2,3,4,
5,6

Y5/6 – beyond
4 digit - 4 digit
(formal written method) plus subtracting decimals

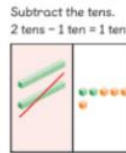
Use Dienes to start with before moving on to place value counters. Start with one exchange before moving onto subtractions with 2 exchanges.

Subtract 16 from 32.

Step 1 Regroup 1 ten into 10 ones.
Subtract the ones.
12 ones - 6 ones = 6 ones



$$\begin{array}{r} \text{tens} \quad \text{ones} \\ 3 \quad 2 \\ - 1 \quad 6 \\ \hline 2 \quad 6 \end{array}$$

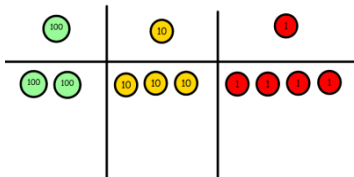


Subtract the tens.
2 tens - 1 ten = 1 ten

$$\begin{array}{r} \text{tens} \quad \text{ones} \\ 2 \quad 2 \\ - 1 \quad 6 \\ \hline 1 \quad 6 \end{array}$$

$32 - 16 = 16$

Make the larger number with the place value counters



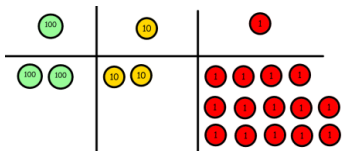
Calculations

$$\begin{array}{r} 234 \\ - 88 \\ \hline \end{array}$$

Start with the ones, can I take away 8 from 4? I need to exchange a

ten for 10

ones.



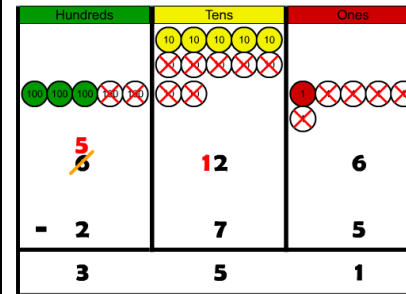
Calculations

$$\begin{array}{r} 234 \\ - 88 \\ \hline \end{array}$$



When confident, children can find their own way to record the exchange.

Just writing the numbers as shown here shows that the child understands the method and knows when to exchange/regroup.

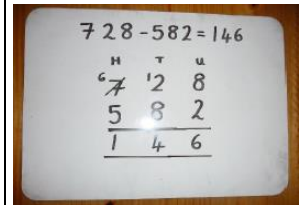


Draw the counters onto a place value grid and show what you have taken away by crossing the counters out as well as clearly showing the exchanges you

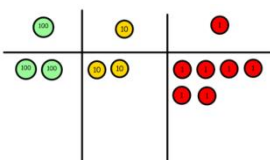


make.

tens	ones
8 9	2 12
3	8
5	4

Children can start their formal written method by partitioning the number into clear place value columns.



Moving forward the children use a more compact method.

		<p>Now I can subtract my ones.</p> <div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <p>Calculations</p> $\begin{array}{r} 234 \\ - 88 \\ \hline \end{array}$ </div> </div> <p>Now look at the tens, can I take away 8 tens? I need to exchange a hundred for 10 tens.</p> <div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <p>Calculations</p> $\begin{array}{r} 234 \\ - 88 \\ \hline \end{array}$ </div> </div> <p>Now I can take away eight tens and complete my subtraction</p> <div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <p>Calculations</p> $\begin{array}{r} 234 \\ - 88 \\ \hline 146 \end{array}$ </div> </div> <p>Show children how the concrete method links to the written method alongside your working. Cross out the numbers when exchanging and show where we write our new amount.</p>	<p>This will lead to an understanding of subtracting any number including decimals.</p> $\begin{array}{r} 5 12 1 \\ 2 \cancel{6} \cancel{3} . 0 \\ - 2 6 . 5 \\ \hline 2 3 6 . 5 \end{array}$
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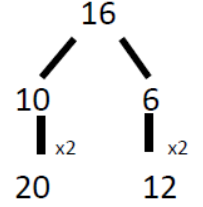


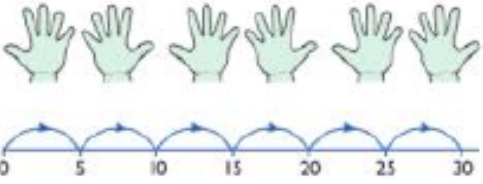
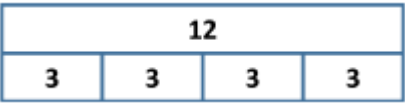
Vocabulary per year group:
Each year group should build on and consolidate previous year groups

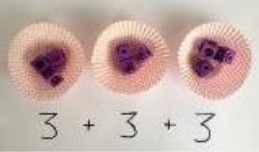


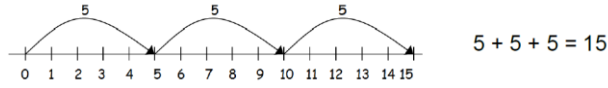


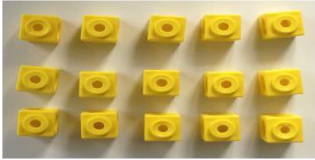

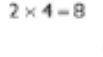





SUBTRACTION

<p><u>Rec</u> Whole – a whole subtract any number of parts equals a part. Take away – to remove a number of items from a group.</p>	<p><u>Year 1</u> Subtract – to carry out the process of subtraction. Minus – a name for the symbol ‘-’</p>	<p><u>Year 2</u> Inverse – addition and subtraction are inverse operations so $10 - 4 = 6$ and $6 + 4 = 10$ (it is NOT commutative) Exchange – when the number to subtract is smaller than the</p>	<p><u>Year 3</u> Subtrahend – a number to be subtracted from another. Minuend – a number from which another is to be subtracted. <small>Minuend – Subtrahend = Difference</small> Compensation – a mental strategy where one number is rounded to make the calculation easier and then adjusted.</p>	<p><u>Year 4, 5 & 6</u> Consolidation of terms learnt in previous year groups.</p>
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		number we are subtracting from we exchange a ten into ten ones.	e.g. 56 - 38 is treated as 56 - 40 and then 2 is added to compensate	
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Multiplication

Year group	Objective and Strategies	Concrete	Pictorial	Abstract
1	<p>Doubling</p>	<p>Use practical activities to show how to double a number.</p>  <p>Halves and doubles identified in a range of contexts, with a focus on equal halves. Shown on 10-frames and with Numicon.</p>  <p>$4 \times 2 = 8$</p>	<p>Draw pictures to show how to double a number.</p> <p>Double 4 is 8</p> 	 <p>Partition a number and then double each part before recombining it back together.</p>
1&2	<p>Counting in multiples/ grouping</p> <p>Y1 – count in 2s, 5s and 10s</p> <p>Y2 – count in 2s, 3s, 5s from 0 and 10s from any number</p>	  <p>Count in multiples supported by concrete objects in equal groups.</p>	 <p>Use a number line or pictures to continue support in counting in multiples.</p>  <p>4 groups of 3 = 12</p>	<p>Count in multiples of a number aloud.</p> <p>Write sequences with multiples of numbers.</p> <p>2, 4, 6, 8, 10</p> <p>5, 10, 15, 20, 25, 30</p>

<p>2</p>	<p>Repeated addition</p>	 <p>$3 + 3 + 3 = 9$</p>  <p>$5 + 5 + 5 = 15$</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin-left: auto; margin-right: auto;"> <p>Use different concrete resources to add equal groups.</p> </div>	<p>There are 3 plates. Each plate has 2 star biscuits on. How many biscuits are there?</p>  <p>$2 + 2 + 2 = 6$</p>  <p>$5 + 5 + 5 = 15$</p>	<p>Write addition sentences to describe objects and pictures.</p>  <p>$2 + 2 + 2 + 2 + 2 = 10$</p>
<p>2</p>	<p>Arrays- showing commutative multiplication</p> <p>Y2 – 2,5 and 10 times tables</p> <p>Y3 – 3,4 and 8 times tables</p> <p>Y4 – all tables up to 12x12</p>	<p>Create arrays using counters/ cubes to show multiplication sentences.</p>  <p>$2 \times 3 = 6$</p>  <p>$3 \times 5 = \underline{\quad}$</p>	<p>Draw arrays in different rotations to find commutative multiplication sentences.</p>  <p>$4 \times 2 = 8$</p>  <p>$2 \times 4 = 8$</p>  <p>$2 \times 4 = 8$</p>  <p>$4 \times 2 = 8$</p>   <p>$4 \times 3 = 12$ and $3 \times 4 = 12$</p>	<p>Use an array to write multiplication sentences and reinforce repeated addition.</p>  <p>$5 + 5 + 5 = 15$</p> <p>$3 + 3 + 3 + 3 + 3 = 15$</p> <p>$5 \times 3 = 15$</p> <p>$3 \times 5 = 15$</p>

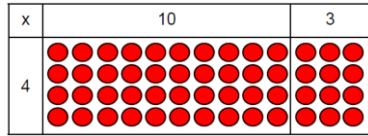
3,4

Partitioning

Y3 –
2 digit x 1 digit
(mental and formal)

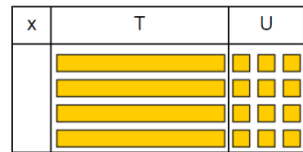
Y4 –
2 digit x 1 digit
3 digit x 1 digit
(formal)

Show the link with arrays to first introduce this method.



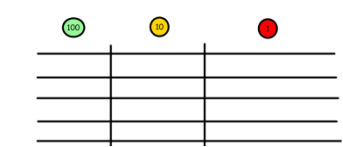
4 rows of 10
4 rows of 3

Move on to using Dienes to move towards a more compact method.



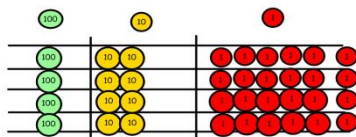
4 rows of 13

Move on to place value counters to show how we are finding groups of a number. We are multiplying by 4 so we need 4 rows.



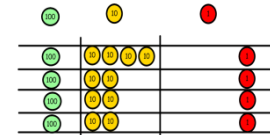
Calculations
4 x 126

Fill each row with 126.



Calculations
4 x 126

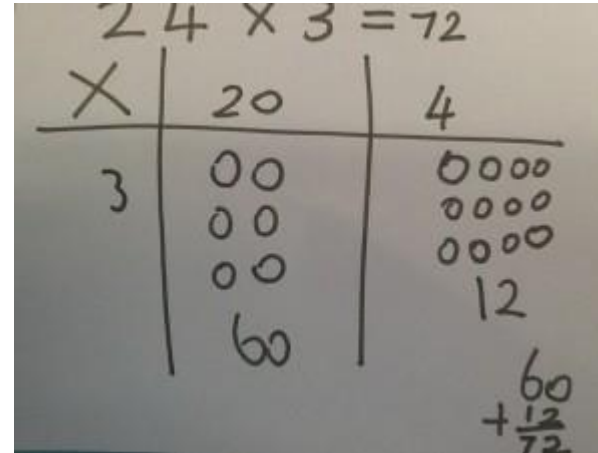
Add up each column, starting with the ones making any exchanges.



Then you have your answer.
4 x 126 = 504

Children can represent the work they have done with place value counters in a way that they understand.

They can draw the counters, using colours to show different amounts or just use circles in the different columns to show their thinking as shown below.



Also :

31 x 4 =

tens	ones
30	1
x	4
<hr/>	
120	+ 4
<hr/>	
124	

x	30	5
7	210	35

210 + 35 = 245

Start with multiplying by one digit numbers and showing the clear addition alongside the grid.

4,5,6

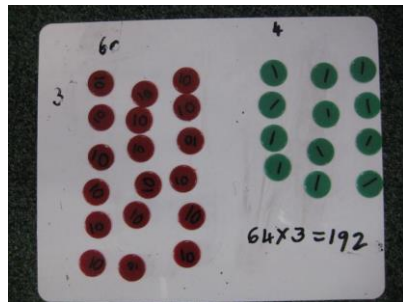
Column multiplication

Y4 –
2 digit x 1 digit
3 digit x 1 digit
(formal)

Y5 –
4 digit x 1 digit
4 digit x 2 digit
(formal)

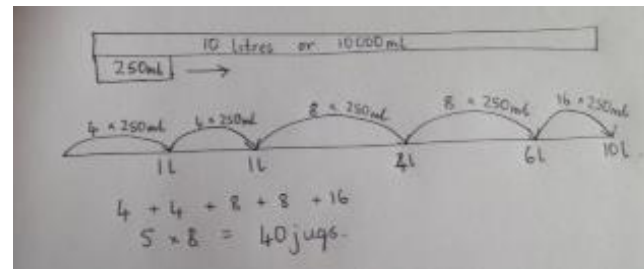
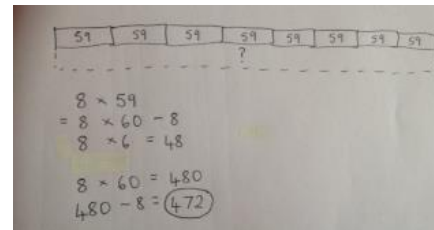
Y6 –
4 digit x 2 digit
(formal) including
decimals

Children can continue to be supported by place value counters at the stage of multiplication.



It is important at this stage that they always multiply the ones first and note down their answer followed by the tens which they note below.

Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods.



Start with long multiplication, reminding the children about lining up their numbers clearly in

$$\begin{array}{r}
 32 \\
 \times 24 \\
 \hline
 128 \quad (4 \times 2) \\
 640 \quad (4 \times 30) \\
 \hline
 768
 \end{array}$$

columns. If it helps, children can write out what they are solving next to their answer.

This moves to the more compact method.



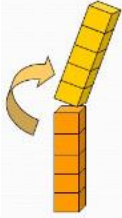
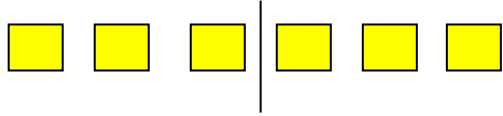



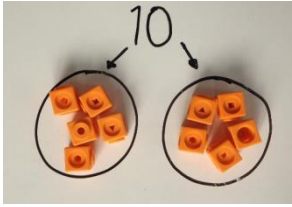


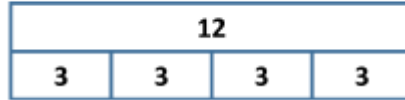
Vocabulary per year group:

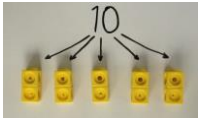


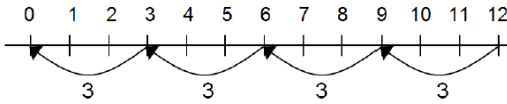
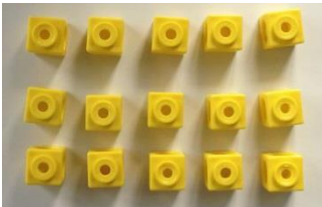
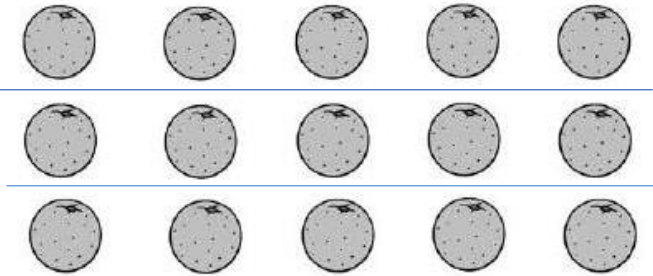
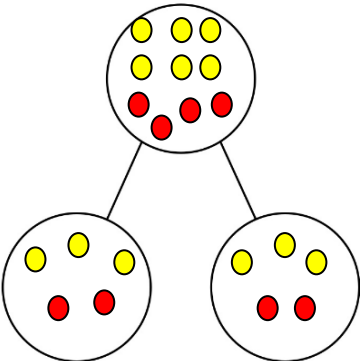
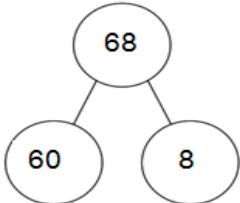
Each year group should build on and consolidate previous year groups

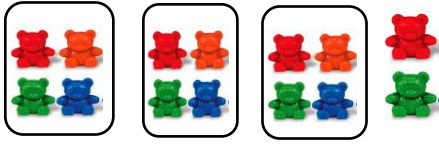

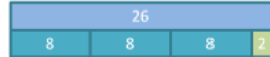

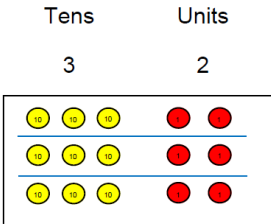
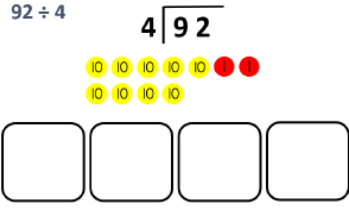
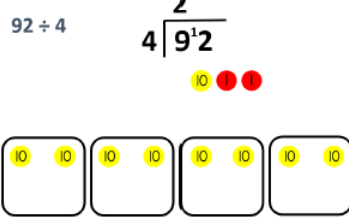
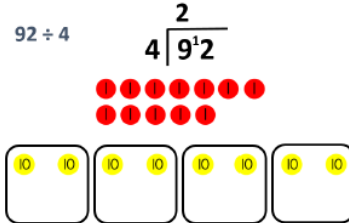


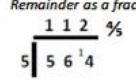
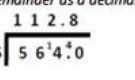
MULTIPLICATION

<u>Rec</u>	<u>Year 1</u> Groups of, sets of, lots of	<u>Year 2</u> Multiply – to carry out the process of multiplication Multiple – a number in a times table e.g. the multiples of 2 are 2,4,6 etc. Groups of, lots of, sets of, times, multiplied by – different ways to say the symbol “x”	<u>Year 3</u> Factor – factor x factor = product Product – the result of multiplying 2 numbers	<u>Year 4</u> Factor – factor x factor = product e.g. 1,2,3,4,6,12 are factors of 12 Factor pairs - A <u>factor pair</u> is 2 factors multiplied together to make a given product	<u>Year 5 & 6</u> Prime number – A whole number greater than 1 that only has two factors, itself and 1. Composite – a non-prime number. Common factor – a number which is a factor of 2 or more other numbers e.g. 3 is a common factor of 9 and 30, 7 is a common factor of 14 and 21. Prime factor – the factors of a number that are prime e.g. 2 and 3 are the prime factors of 12. Common multiple – the smallest positive number that is a multiple of two or more numbers e.g. 24 is a common multiple of 4,6,8 etc.
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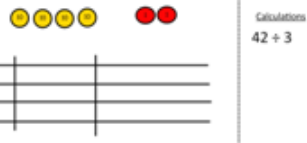
Division

Year group	Objective and Strategies	Concrete	Pictorial	Abstract								
1	Halving	 <p>Halves are introduced through splitting shapes in to two equal parts. This can then be done with cubes to introduce the concept of halving numbers.</p> <p>It also provides a practical example of how halves and doubles operate as inverse calculations.</p>	<p>Draw pictures to show how to halve a number.</p>  <p>Half of 6 is 3</p>	<p>Halve 28 = Halve 20 + 8</p>  <p>Partition a number and then halve each part before recombining it back together.</p>								
2,3,4	Sharing objects into groups	  <p>I have 10 cubes, can you share them equally in 2 groups?</p>  <p>$96 \div 3 = 32$</p> 	<p>Children use pictures or shapes to share quantities.</p>  <div style="border: 1px solid black; padding: 5px; display: inline-block;"> $8 \div 2 = 4$ </div> <p>Think of the bar as a whole. Split it into the number of groups you are dividing into and work out how many would be within each group. Draw dots to represent initially.</p> <p>Bar model shows relationship between whole/parts and makes links to division.</p>  <p>$12 \div 4 = 3$</p>	<p>Share 9 buns between three people.</p> <p>$9 \div 3 = 3$</p> <p>$60 \div 4 = 15$</p> <table border="1" data-bbox="1881 885 2139 957"> <tr> <td colspan="4">60</td> </tr> <tr> <td>15</td> <td>15</td> <td>15</td> <td>15</td> </tr> </table> <p>'60 in four equal parts'</p>	60				15	15	15	15
60												
15	15	15	15									

<p>2,3,4</p>	<p>Division as grouping</p>	<p>Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding.</p> <p>10 shared into groups of 2 = 5 groups $10 \div 2 = 5$ groups</p>  <p>$12 \div 4 = 3$</p>  <p>Grouping strategy modelled with covered arrays and Numicon: how many [divisors] in [dividend]?</p>  <p>$20 \div 5 = 4$</p> <p>20 dots. How many rows?</p>	<p>Use a number line to show jumps in groups. The number of jumps equals the number of groups.</p>  <p>12 divided into groups of 3 = 4 groups.</p>	<p>$30 \div 5 = \underline{\quad}$</p> <p>How many 5s make 30?</p> <p>$14 \div 2 = \underline{\quad}$</p> <p>How many 2s make 14?</p> <p>$28 \div 7 = 4$</p> <table border="1" data-bbox="1883 389 2141 469"> <tr> <td colspan="4">28</td> </tr> <tr> <td>7</td> <td>7</td> <td>7</td> <td>7</td> </tr> </table> <p>'How many 7s in 28?'</p>	28				7	7	7	7
28												
7	7	7	7									
<p>2</p>	<p>Division as the inverse of multiplication</p>	<p>Link division to multiplication by creating an array and thinking about the number sentences that can be created.</p>  <p>Eg $15 \div 3 = 5$ $5 \times 3 = 15$ $15 \div 5 = 3$ $3 \times 5 = 15$</p>	 <p>Draw an array and use lines to split the array into groups to make multiplication and division sentences.</p>	<p>Find the inverse of multiplication and division sentences by creating four linking number sentences.</p> <p>$7 \times 2 = 14$ $2 \times 7 = 14$ $14 \div 7 = 2$ $14 \div 2 = 7$</p>								
<p>3</p>	<p>Division by partitioning</p>	 <p>$64 \div 2 = ?$</p> <p>Partition the 2 digit number into tens and ones. Divide 60 by 2 and then 4 by 2.</p> <p>$60 \div 2 = 30$, $4 \div 2 = 2$ and $30 + 2 = 32$</p>	 <p>$68 \div 2 = ?$</p> <p>Partition the 2 digit number into tens and ones. Divide 60 by 2 and then 8 by 2. Recombine. $60 \div 2 = 30$ $8 \div 2 = 4$ and $30 + 4 = 34$</p>	<p>$56 \div 4 = ?$</p> <p>Partition into 40 and 16 to divide each number by 4.</p>								

<p>3/4</p>	<p>Division with a remainder</p>	<p>$14 \div 3 =$ Divide objects between groups and see how many are left</p>  <p>So $14 \div 3 = 4$ remainder 2 which can be written as $4r2$.</p> <p>$20 \div 3 = 6 r 2$ whereas $20 \div 5 = 4$</p>	<p>Draw dots and group them to divide an amount and clearly show a remainder.</p>  <p>So $14 \div 3 = 4r2$.</p> <p>Draw a bar model: $26 \div 8 = 3 r 2$</p> 	<p>Complete written divisions and show the remainder using r.</p> 
<p>3,4, 5,6</p>	<p>Short division</p> <p>Y3 – 2 digit \div 1 digit</p> <p>Y4 – 3 digit \div 1 digit</p> <p>Y5 – 4 digit \div 1 digit, including remainders as fractions or decimals according to the context</p> <p>Y6 – 4 digit \div 2 digit, including remainders as fractions or decimals according to the context</p>	<p>$96 \div 3 = 32$ Use place value counters to divide using the bus stop method.</p> 	<p>$92 \div 4$</p>  <p>$92 \div 4$</p>  <p>$92 \div 4$</p> 	<p>Begin with divisions that divide equally with no remainder. Move onto divisions with remainder. Move onto divisions with fraction or decimal remainders.</p> <p>SHORT DIVISION:</p> <p>No remainder: $560 \div 4$</p>  <p>Remainder as a whole number: $564 \div 5$</p>  <p>Remainder as a fraction: $564 \div 5$</p>  <p>Remainder as a decimal: $564 \div 5$</p>  <p>Written Division</p> <p><u>1</u> 8 8,192 How many 8s in 8? 8÷8=1</p> <p><u>1,0</u> 8 8,192 How many 8s in 19? 19÷8=0 r1</p> <p><u>1,02</u> 8 8,192 How many 8s in 192? 192÷8=2 r3</p> <p><u>1,024</u> 8 8,192 How many 8s in 32? 32÷8=4</p>

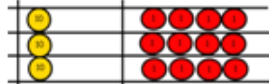
Use place value counters to divide using the bus stop method alongside



$42 \div 3 =$
Start with the biggest place value, we are sharing 40 into three groups. We can put 1 ten in each group and we have 1 ten left over.



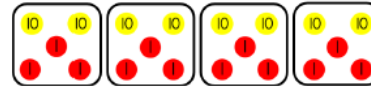
We exchange this ten for ten ones and then share the ones equally among the groups.



We look how much in 1 group so the answer is 14.

$$92 \div 4$$

$$\begin{array}{r} 23 \\ 4 \overline{)92} \end{array}$$

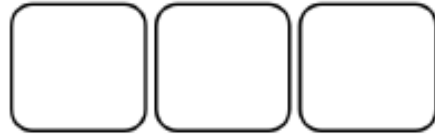


Formal written method of division – short division and long division

Y6 –
4 digit ÷ 2 digit, including remainders as fractions or decimals according to the context

Division modelled with place value counters.

$$641 \div 3 \quad 3 \overline{) 641}$$



$$641 \div 3 \quad 3 \overline{) 641} \begin{matrix} 21 \\ \end{matrix}$$



$$641 \div 3 \quad 3 \overline{) 641} \begin{matrix} 2 \\ \end{matrix}$$



$$641 \div 3 \quad 3 \overline{) 641} \begin{matrix} 213 \\ r 2 \end{matrix}$$



Long division
4 digit divided by a 2 digit number

Method 1-

create a skeleton tables to help

$$\begin{array}{r} 205 \\ 24 \overline{) 4920} \\ \underline{-48} \\ 120 \\ \underline{-120} \\ 0 \end{array} \quad \begin{array}{l} 1x \ 24 \\ 2x \ 48 \\ 3x \ 72 \\ 4x \ 96 \\ 5x \ 120 \\ 10x \ 240 \end{array}$$

Method 2-

use factors of the divisor

$$\begin{array}{r} 24 \overline{) 4920} \\ 0820 \\ \underline{ 6} 4920 \end{array}$$

6 and 4 are factors of 24

Divide the number by 6,
then that answer by 4

$$\begin{array}{r} 205 \\ 4 \overline{) 820} \end{array}$$

Vocabulary per year group:

Each year group should build on and consolidate previous year groups

DIVISION

Rec & Year 1

Sharing – share equally several objects into a specified number of groups.

Divide – to carry out the process of division

Year 2

Sharing – sharing equally between

Grouping - put into groups of

Divided by – sharing or grouping.

Inverse – multiplication and division are inverse operations so $10 \div 2 = 5$ and $5 \times 2 = 10$

(it is NOT commutative)

Year 3, 4, 5 and 6

Dividend – the number that is being divided into equal parts.

Divisor – for sharing: the number that it is being shared between. For grouping: the number in each group In $15 \div 3$, 15 is the dividend and 3 is the divisor

Quotient – the result of a division

$\text{dividend} \div \text{divisor} = \text{quotient}$

Divisible – A whole number is divisible by another if there is no remainder after division.



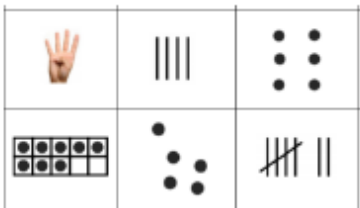



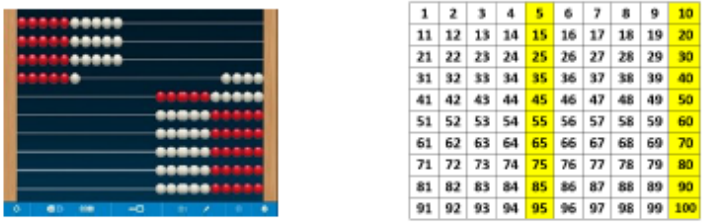
Remainder – the amount remaining after division.







e.g. $29 \div 7 = 4 \text{ r}1$

Visual Representations



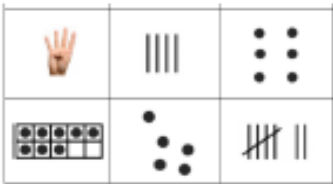
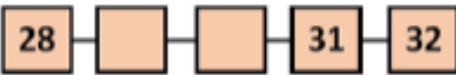











Reception

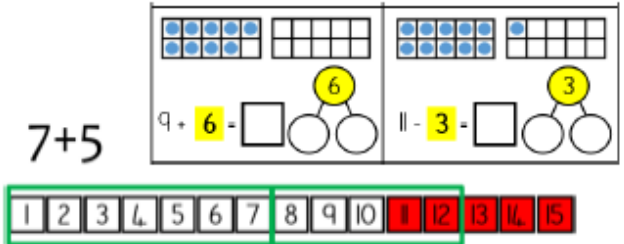
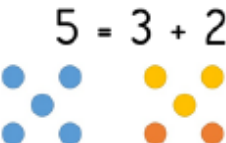
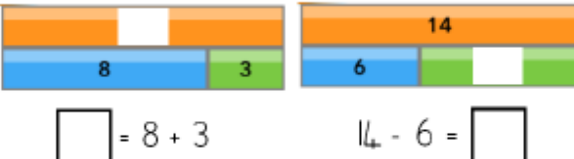

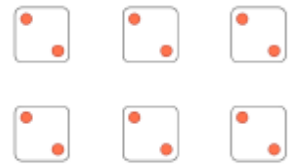






Objective	Visual representations																																																																																																					
<p>Count reliably with numbers from 1-20</p>	<p>For 1:1 counting, number sounds are clearly separated and items counted with exaggerated movements. Counted objects are rearranged in regular patterns to support quantity recognition.</p> <p style="text-align: center;">Rearrange to dice pattern</p> 	<p>Children learn that each object is counted once and the last number is the total for the set—count small sets in irregular arrangements. Progress by counting out items from larger set; objects that can't be moved; make objects not visible once counted; count movements and sounds. Counting on taught by counting two sets, then screening one of the counted sets.</p> 																																																																																																				
<p>Identify and use numerals</p>	<p>Children match numerals to different representations of number for quantities 1-10 (see 'knowledge of numbers as quantities') e.g. making and finding 5 in different ways. Children learn that 'teen' represents 10 and match teen/ten visual cards. Place value arrow cards used for partitioning and combining tens and units.</p>  <p style="text-align: center;"><i>Different representations matched to numerals</i></p>	 																																																																																																				
<p>Understand 10 as a unit</p>	<p>Items are counted into groups of 10, for example pipe cleaners bundled into 10s or items counted into 10-frames. Children recognise quantities in multiple 10-frames as 'how many tens, how many ones'.</p> 	<p>Children count tens/ones on Slavonic Abacus. Coloured 100-square supports counting in tens.</p>  <table border="1" data-bbox="1713 1157 2016 1380"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr> <tr><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td></tr> <tr><td>21</td><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td><td>27</td><td>28</td><td>29</td><td>30</td></tr> <tr><td>31</td><td>32</td><td>33</td><td>34</td><td>35</td><td>36</td><td>37</td><td>38</td><td>39</td><td>40</td></tr> <tr><td>41</td><td>42</td><td>43</td><td>44</td><td>45</td><td>46</td><td>47</td><td>48</td><td>49</td><td>50</td></tr> <tr><td>51</td><td>52</td><td>53</td><td>54</td><td>55</td><td>56</td><td>57</td><td>58</td><td>59</td><td>60</td></tr> <tr><td>61</td><td>62</td><td>63</td><td>64</td><td>65</td><td>66</td><td>67</td><td>68</td><td>69</td><td>70</td></tr> <tr><td>71</td><td>72</td><td>73</td><td>74</td><td>75</td><td>76</td><td>77</td><td>78</td><td>79</td><td>80</td></tr> <tr><td>81</td><td>82</td><td>83</td><td>84</td><td>85</td><td>86</td><td>87</td><td>88</td><td>89</td><td>90</td></tr> <tr><td>91</td><td>92</td><td>93</td><td>94</td><td>95</td><td>96</td><td>97</td><td>98</td><td>99</td><td>100</td></tr> </table>	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	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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Objective	Visual representations																																																																																																					
Secure knowledge of numbers as quantities	<p>Children instantly subitize 1-3 items through dot pattern games and everyday experiences. Items may be unrelated.</p>  <p><i>Image shown briefly. How many toys?</i></p>	<p>A range of representations used for quantities 1-10. Children show numbers in different ways on fingers; games used to improve finger discrimination. Quick recognition of regular and irregular dot patterns, with larger quantities visualised in two parts (e.g. see 5 as 3 and 2). Children are taught to recognise quantities on 10-frame and base-5 number track.</p>  <p><i>'Circle 7 on the number track'</i></p>																																																																																																				
To recite forwards and backwards number word sequences	<p>Forwards and backwards number word sequences supported using songs and rhymes. Children continue number sequences starting from different numbers with some prior words in appropriate range e.g. 3, 4, 5, 6... or 24, 23... The transition over 10s boundaries supported by visuals. Number tracks used, with numbers hidden to add challenge as appropriate.</p> 																																																																																																					
Add and subtract single-digit numbers	<p>Addition built on experience of counting two groups. Opportunities provided for comparing quantities, using language more/less. Combining quantities in 10-frames and using Numicon encourage non-counting-in-ones strategies. Arrangement of sets counted also encourage counting on and calculation strategies.</p>  <p><i>Representation of 4+3 encourages counting on from 4</i></p> <p><i>Representation of 4+3 to help visualise 3+3+1</i></p>																																																																																																					
Develop pre-multiplication and division concepts	<p>Halves and doubles identified in a range of contexts, with a focus on equal halves. Shown on 10-frames and with Numicon.</p> 	<p>Counting in 2s supported by colouring of 100-square</p> <table border="1" data-bbox="963 1133 1288 1372"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr> <tr><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td></tr> <tr><td>21</td><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td><td>27</td><td>28</td><td>29</td><td>30</td></tr> <tr><td>31</td><td>32</td><td>33</td><td>34</td><td>35</td><td>36</td><td>37</td><td>38</td><td>39</td><td>40</td></tr> <tr><td>41</td><td>42</td><td>43</td><td>44</td><td>45</td><td>46</td><td>47</td><td>48</td><td>49</td><td>50</td></tr> <tr><td>51</td><td>52</td><td>53</td><td>54</td><td>55</td><td>56</td><td>57</td><td>58</td><td>59</td><td>60</td></tr> <tr><td>61</td><td>62</td><td>63</td><td>64</td><td>65</td><td>66</td><td>67</td><td>68</td><td>69</td><td>70</td></tr> <tr><td>71</td><td>72</td><td>73</td><td>74</td><td>75</td><td>76</td><td>77</td><td>78</td><td>79</td><td>80</td></tr> <tr><td>81</td><td>82</td><td>83</td><td>84</td><td>85</td><td>86</td><td>87</td><td>88</td><td>89</td><td>90</td></tr> <tr><td>91</td><td>92</td><td>93</td><td>94</td><td>95</td><td>96</td><td>97</td><td>98</td><td>99</td><td>100</td></tr> </table> <p>Opportunities for 'repeat add' counting in context e.g. counting socks. Repeated addition shown with dice patterns. Grouping and sharing context tasks provided.</p>  <p>5 people in each tent</p>	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	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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Year 1



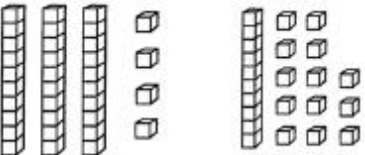


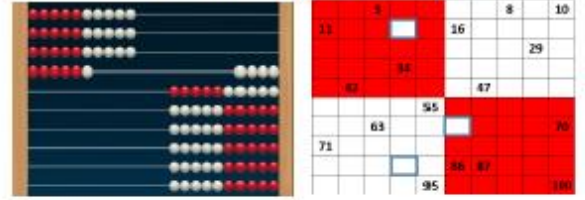

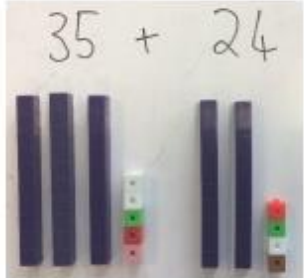
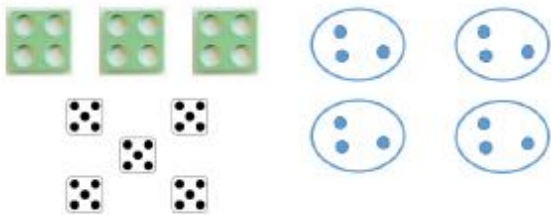

Objective	Visual representations			
<p>Know 1 more/less in the range 1-100, focusing on bordering tens boundaries</p>	<p>Identify and show one more/less in different ways. Example game: one more/less bingo.</p> 	<p>Find missing numbers on number track, focusing on tens boundaries.</p> 	<p>Slavonic Abacus to show quantities 1-100 (iPad app 'Number Rack').</p> 	
<p>With visuals, discern teens from tens</p>	<p>Organise large quantities in groups of 10 e.g. with egg boxes or pipe cleaners.</p> 	<p>Use teens/tens matching cards.</p> 	<p>Identify and make 2-digit numbers with dienes, showing in different ways.</p>  <p>Is it 34?</p>	<p>Partition 2-digits numbers using place-value cards</p> 
<p>Able to represent 1-10 in a range of ways, working out small quantities without counting all items</p>	<p>Immediate recognition of Numicon, 10-frame images, tally charts, dot patterns and finger patterns.</p> 	<p>Represent numbers on fingers in different ways.</p> 	<p>Estimate position of numbers on blank number lines with different start/end numbers.</p> 	
<p>Break down 1-10 in all possible ways, write number sentences using +, - and =</p>	<p>Subitizing games for regular and irregular dot patterns, with children visualising quantities in two parts.</p> 	<p>Arrangement of 2 colours of items e.g. in egg box 10-frame or with Numicon.</p> 	<p>Introduction of part-whole model from individuals squares/items to bars.</p> 	

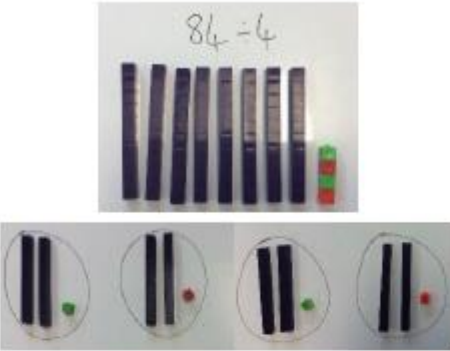
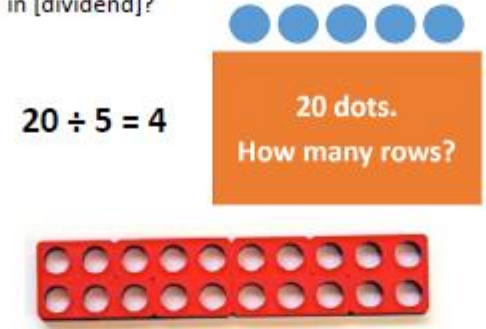

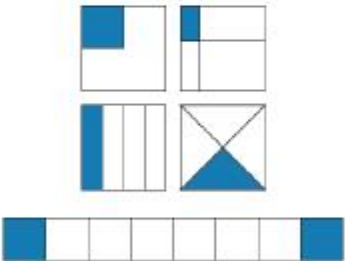

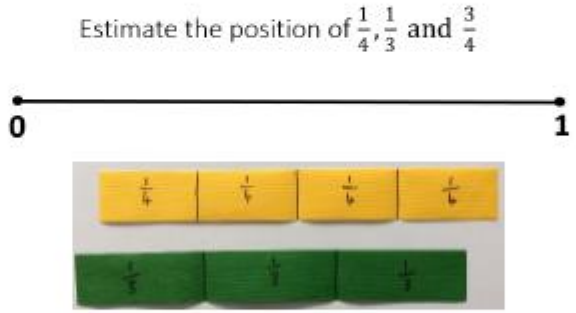

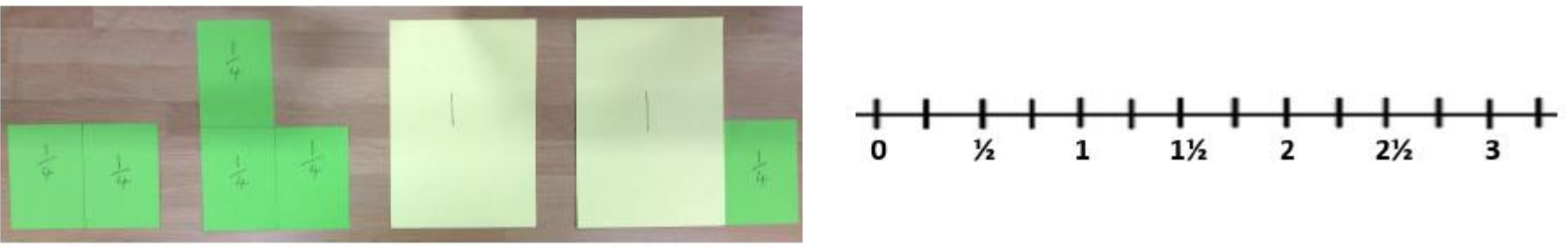
Objective	Visual representations		
<p>Represent and use number bonds and related subtraction facts within 20</p>	<p>10-frames and 2-colour number tracks show calculations bordering 10: 'how many to 10, how many more?' Lead to use of blank number line.</p> 	<p>Equivalence shown with balance scales and dice patterns.</p> 	<p>Bar models used to show relationship between addition and subtraction.</p> 
<p>Count in multiples of 2, 5 and 10</p>	<p>100-square with columns highlighted used to support counting. The Slavonic Abacus (iPad app) 'Number Rack' used to visualise quantity when counting.</p> 	<p>Count in visual then hidden groups of 2, 5 and 10.</p> 	<p>Count in visual then hidden groups of 2, 5 and 10.</p> 
<p>Recognise and make one-half in a range of ways (discern examples from non-examples); identify one-quarter</p>	<p>Half of a shape/capacity, number of objects, 10-frame half/double, half of length, half of an amount of money.</p>  <p>Colour half of each whole shape:</p>  <p>Circle half of this group of strawberries.</p>  <p>What is half of this amount?</p> 		
<p>Link the value of coins to a matching visual</p>	<p>Match value of coins to Numicon pieces, use Numicon to support calculations involving money.</p> 		

VISUAL REPRESENTATIONS

Year 2

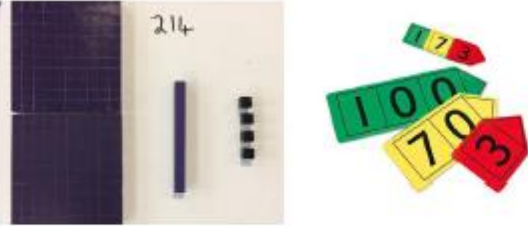
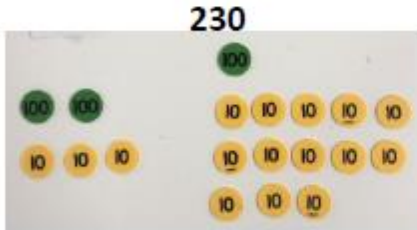
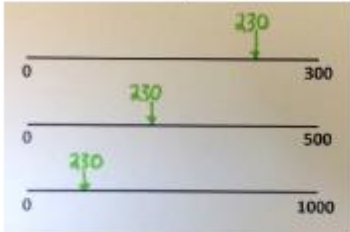
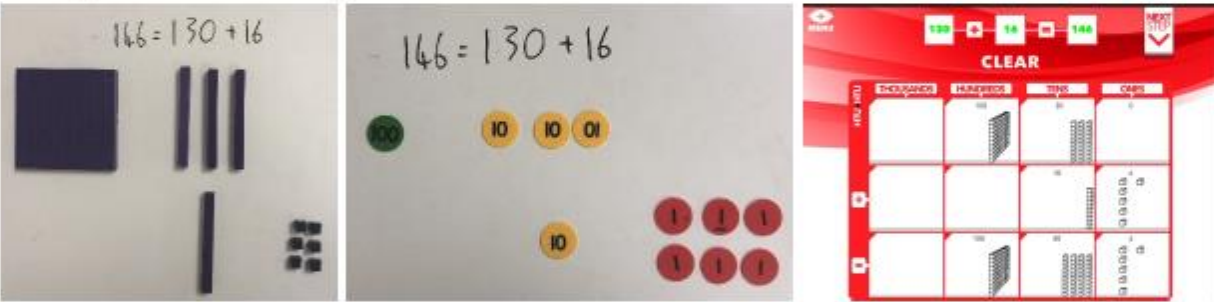
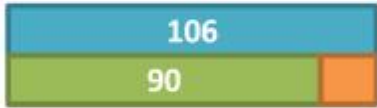
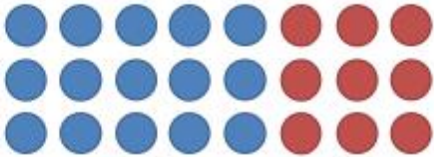
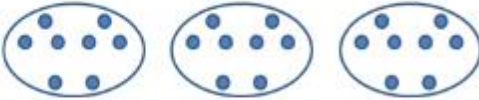

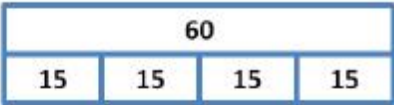



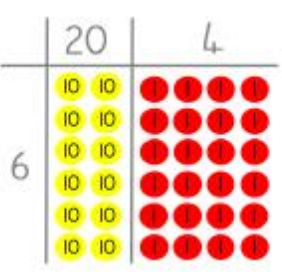





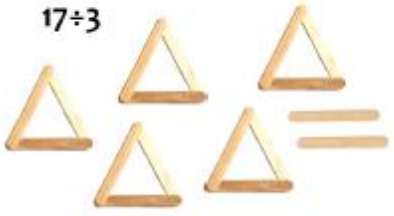
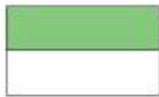
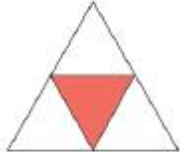


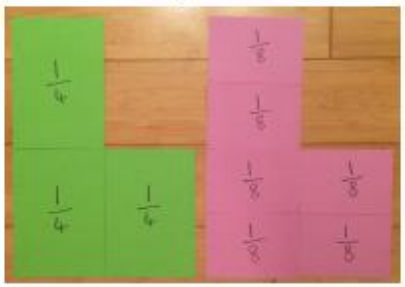
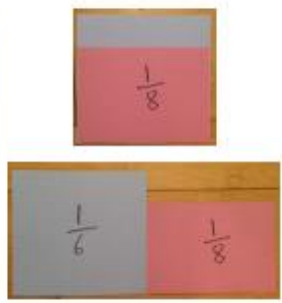
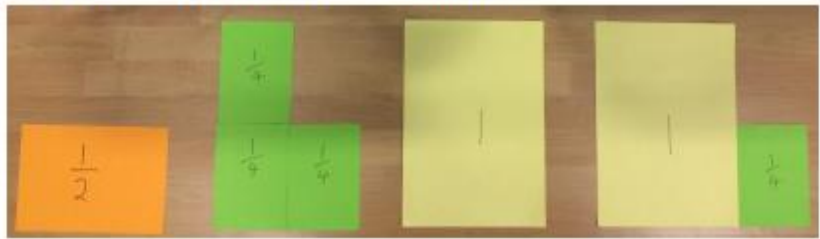
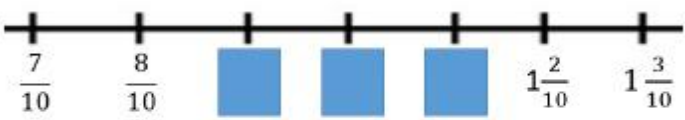
Objective	Visual representations														
<p>Represent numbers 1-100 in a range of ways, showing understanding of place value</p>	<p>Represent tens/teens using dienes, showing numbers in different ways.</p> 	<p>Partition 2-digits numbers using place-value cards.</p> 	<p>Estimate position of numbers on blank number lines with different start/end.</p> 	<p>Recognise amount on Slavonic Abacus, seeing tens and ones; find missing numbers on 100-square.</p> 											
<p>Use different calculation strategies for adding and subtracting one and two-digit numbers</p>	<p>Calculation within 30 using 10-frames, lead to use of number line, e.g. use egg-box 10-frames and app 'I See Addition and Subtraction'.</p> 	<p>Model calculation using partitioning with dienes.</p> 	<p>Bar modelling to show relationship between + and - (using words 'whole/parts'). Include spatial reasoning estimates.</p> <table border="1" data-bbox="1579 790 2072 901"> <tr> <td colspan="2">27</td> <td>12</td> <td>15</td> </tr> <tr> <td>15</td> <td>?</td> <td colspan="2">?</td> </tr> </table> <table border="1" data-bbox="1702 933 1937 1037"> <tr> <td colspan="2">?</td> </tr> <tr> <td>15</td> <td>?</td> </tr> </table>	27		12	15	15	?	?		?		15	?
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<p>Understand x as repeated adding, find related x and ÷ facts from a number sentence</p>	<p>Numicon and images of repeated quantities show multiplication as repeated addition.</p> 	<p>Arrays show commutativity of multiplication. Columns/rows circled to link to division.</p> 	<p>Bar model shows relationship between whole/parts and makes links to division.</p> <table border="1" data-bbox="1579 1197 2049 1316"> <tr> <td colspan="4">12</td> </tr> <tr> <td>3</td> <td>3</td> <td>3</td> <td>3</td> </tr> </table>	12				3	3	3	3				
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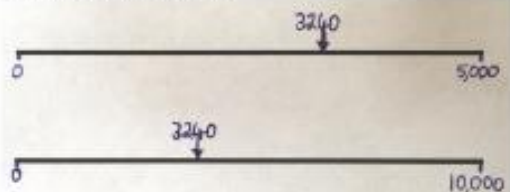

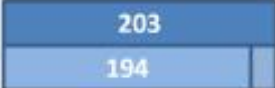
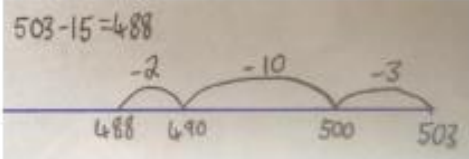
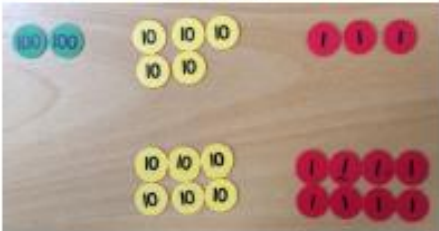




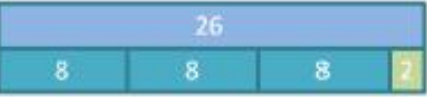
Objective	Visual representations		
<p>Use sharing and grouping strategies for division, relate division to finding unit fractions of quantities</p>	<p>Sharing supported by appropriate visuals, used where a large total is shared into few groups:</p> 	<p>Grouping strategy modelled with covered arrays and Numicon: how many [divisors] in [dividend]?</p> <p>$20 \div 5 = 4$</p> 	<p>Grouping context questions with supporting visuals.</p> <p>How many cars are needed to take 18 children to the match? 4 children per car.</p> 
<p>Represent fractions $\frac{1}{3}$, $\frac{1}{4}$, $\frac{2}{4}$ and $\frac{3}{4}$ in a range of ways; order and recognise equivalence.</p>	<p>Fractions of areas/objects (and non-examples):</p> <p>Which of these diagrams are $\frac{1}{4}$ blue?</p>  <p><i>Include fractions of containers</i></p> 	<p>Fractions of a length/number line:</p> <p>Estimate the position of $\frac{1}{4}$, $\frac{1}{3}$ and $\frac{3}{4}$</p> 	<p>Fractions of quantity:</p> <p>The children can have $\frac{3}{4}$ of the cupcakes.</p> 
<p>Use halves and quarters as counting numbers, going over 1</p>	<p>Modelled with fraction cards and on a number line.</p> 		

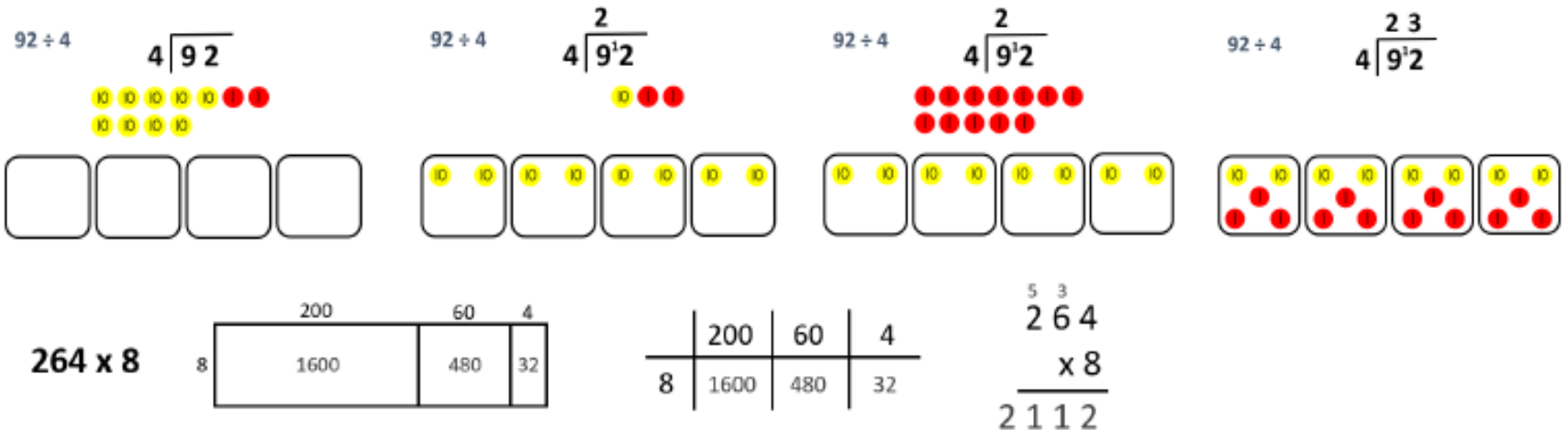
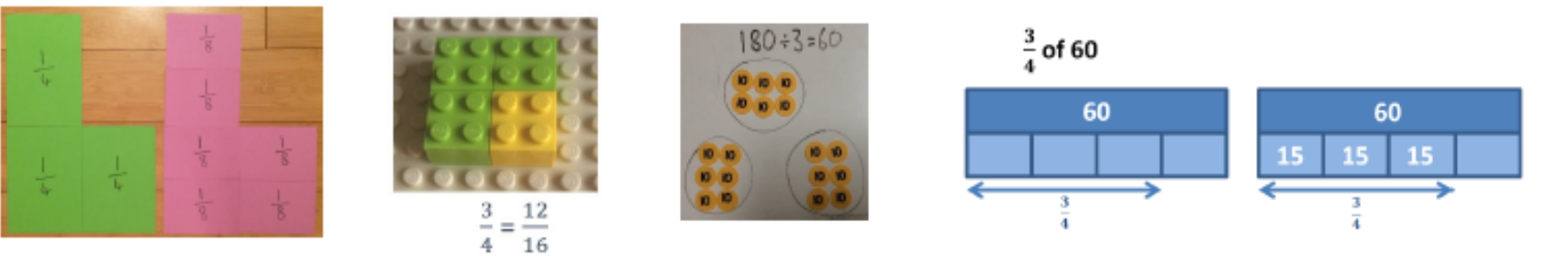

Year 3



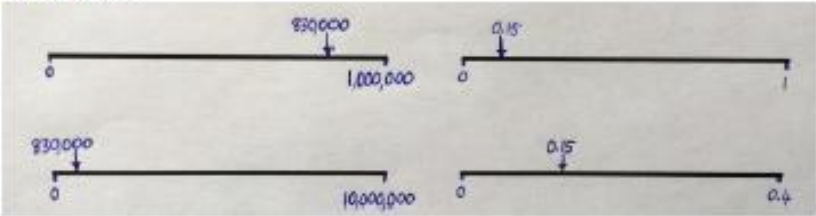


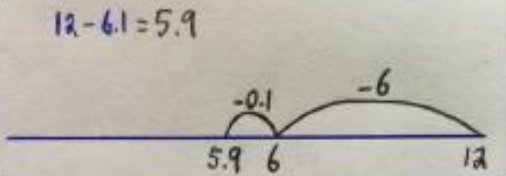
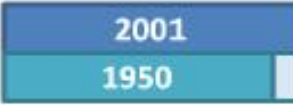
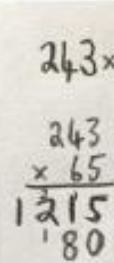
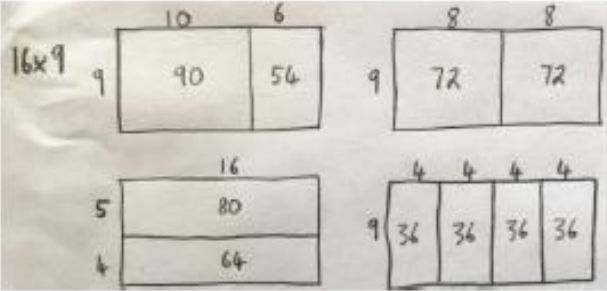






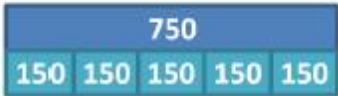




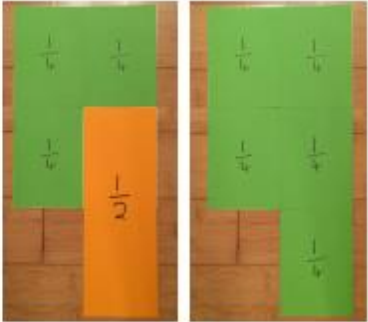

Objective	Visual representations		
<p>Represent 3-digit numbers in a range of ways, showing an understanding of place value</p>	<p>Make 3-digit numbers using dienes and place value cards, showing how they can be partitioned.</p> 	<p>Make the same number in different ways with place value coins.</p> 	<p>Estimate position of numbers on blank number lines with different start/end numbers.</p> 
<p>Add and subtract ones, tens and hundreds to HTU, making realistic estimates</p>	<p>Dienes, place value coins and app 'I See Addition and Subtraction' model written addition and subtraction. Bar model shows subtraction as difference.</p>  <div style="text-align: right; margin-top: 20px;"> <p>106 - 90 =</p>  </div>		
<p>Understand the inverse relationship between \times and \div; know \times as repeated adding, use to derive related multiplication facts.</p>	<p>A range of images show multiplication as repeated addition. 2-colour arrays show distributive law.</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>8x3</p>  <p>5x3 + 3x3</p> </div> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> <div style="text-align: center;"> <p>60 ÷ 4 = 15</p>  <p><i>'60 in four equal parts'</i></p> </div> <div style="text-align: center;"> <p>28 ÷ 7 = 4</p>  <p><i>'How many 7s in 28?'</i></p> </div> </div>		

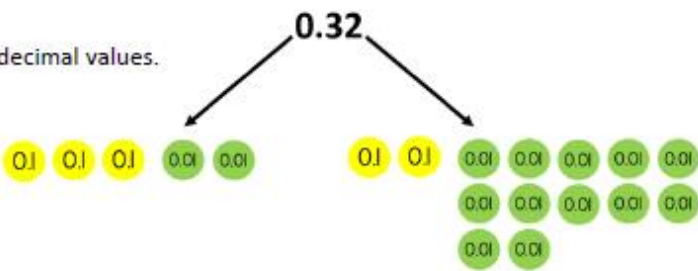
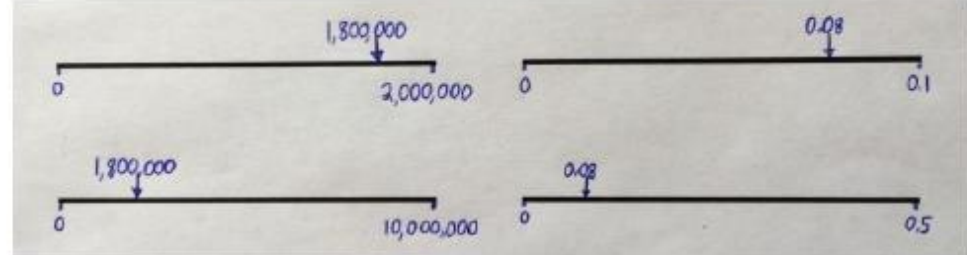
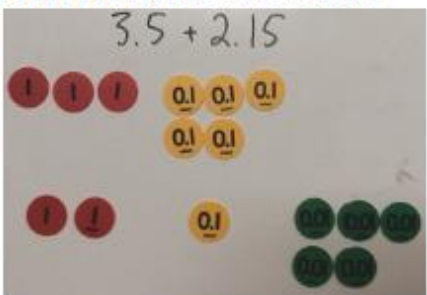
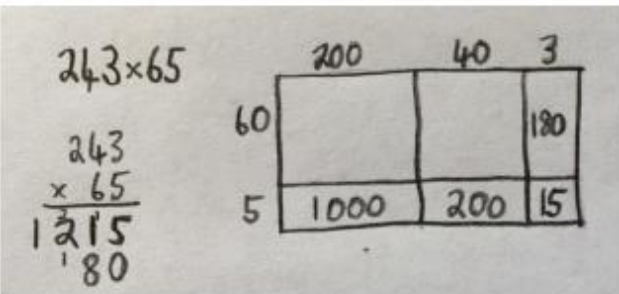
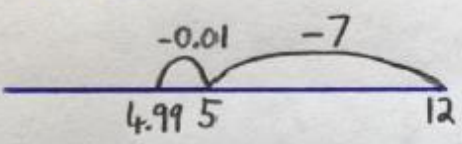
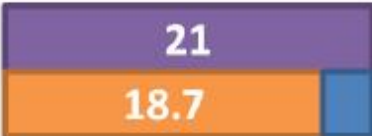
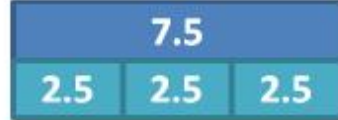
Objective	Visual representations
<p>Use efficient formal written methods for multiplication and division</p>	<p>Multiplication modelled using place value coins, leading to efficient written forms:</p> <p style="text-align: center;">24×6</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div> <p>The concept of 'How many [divisors] in [dividend]' shown using Numicon, part-hidden arrays and by making shapes with matchsticks.</p> <p>$20 \div 3$ (how many 3s in 20?) and $20 \div 5$ (how many 5s in 20?):</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 20px;"> <div style="text-align: center;">  </div> <div style="text-align: center;"> <p>$17 \div 3$</p>  </div> </div>
<p>Simple unit/non-unit fractions represented in a range of ways; different fractions compared including equivalence</p>	<p>Identify fraction of shaded shape; position fractions on a number line; use fraction cards to show equivalence and compare fractions.</p> <p style="text-align: center;">True or false?</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>$\frac{1}{2}$</p> </div> <div style="text-align: center;">  <p>$\frac{1}{3}$</p> </div> <div style="text-align: center;">  <p>$\frac{1}{2}$</p> </div> </div> <p style="text-align: center;">Estimate the position of $\frac{1}{3}$, $\frac{1}{5}$ and $\frac{7}{10}$</p> <div style="display: flex; justify-content: center; align-items: center;">  </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 20px;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div>
<p>Use quarters, halves and tenths as counting numbers going over 1</p>	<p>Modelled with fraction cards and on number lines.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div>

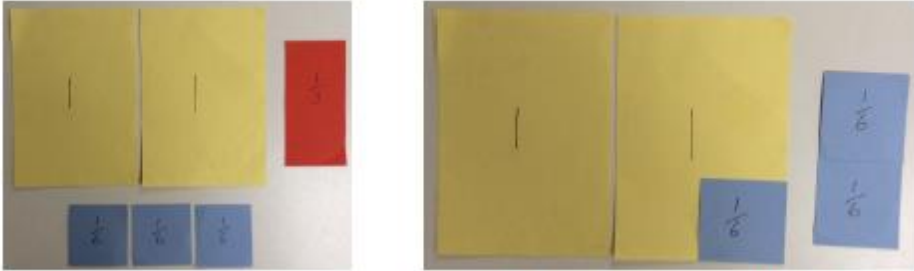

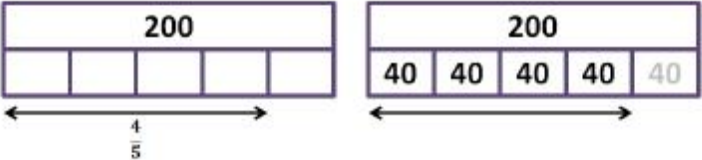



Objective	Visual representations	
<p>Represent 4-digit numbers in a range of ways, showing understanding of place value</p>	<p>Make 4-digit numbers using dienes and place value coins, building numbers in different ways.</p> <p>2,130</p>  <p>420 with three 100s and twelve 10s</p> 	<p>Estimate the position of numbers on blank number lines with different start/end numbers.</p> 
<p>Choose efficient mental strategies for adding and subtracting numbers</p>	<p>Round and adjust to calculate, model with appropriate visual</p> <p>350-198 modelled with place value counters: take away 200, add 2.</p> 	<p>Choose whether to count on or count back, show with number line or bar model.</p> <p>203 - 194</p>  
<p>Become fluent in written methods for addition and subtraction</p>	<p>Model vertical methods for addition and subtraction step-by-step using place value counters and iPad app 'I See Addition and Subtraction'.</p> <p>253 + 68</p> 	
<p>Understand and represent multiplication and division in a range of ways; derive related facts from a given calculation.</p>	<p>Use arrays and bar models to derive related multiplication and division facts</p> <p>This image shows 4 x 6</p>  <p>Change the image to show 4 x 7</p> <p>This image shows 4 x 6</p>  <p>Use the image to calculate 4 x 12</p>	<p>Understand division as 'how many [divisors] in [dividend]' showing remainders using matchsticks to make shapes and bar models.</p> <p>17 ÷ 3</p>  

Objective	Visual Representations
<p>Use efficient formal written methods for multiplication and division of 3-digit numbers</p>	<p>Division modelled with place value counters. Written multiplication represented by area model—links made between grid method and compact method.</p> <p> $92 \div 4$ $4 \overline{) 92}$ $92 \div 4$ $4 \overline{) 92}$ $92 \div 4$ $4 \overline{) 92}$ $92 \div 4$ $4 \overline{) 92}$ </p>  <p> 264×8 $8 \begin{array}{ c c c } \hline 200 & 60 & 4 \\ \hline 1600 & 480 & 32 \\ \hline \end{array}$ $8 \begin{array}{ c c c } \hline 200 & 60 & 4 \\ \hline 1600 & 480 & 32 \\ \hline \end{array}$ $\begin{array}{r} 264 \\ \times 8 \\ \hline 2112 \end{array}$ </p>
<p>Find equivalent fractions, calculate fractions of amounts (unit and non-unit fractions)</p>	<p>Fraction cards and Lego used to show equivalence. Fractions of quantities shown using place value counters and bar models, presented in stages.</p>  <p> $\frac{3}{4} = \frac{12}{16}$ $180 \div 3 = 60$ $\frac{3}{4}$ of 60 </p>
<p>Know decimal equivalents for quarters and halves, relating to division</p>	<p>Dividing length of a metre ruler into two/four equal parts.</p> 

Objective	Visual representations	
<p>Represent the value of digits in numbers of up to 7-digits and decimals to thousandths</p>	<p>Make numbers in the range using place value coins, partitioning decimal values and showing the same number in different ways.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>0.35</p>  </div> <div style="text-align: center;"> <p>430</p>  </div> </div> <p>Estimate the position of numbers on blank number lines with different start/end numbers.</p> 	
<p>Choose efficient strategies and apply knowledge of place value when adding and subtracting</p>	<p>Model vertical methods for addition and subtraction step-by-step using iPad app 'I See Addition and Subtraction' or place value counters.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid red; padding: 5px;">  </div> <div style="text-align: center;"> <p>513 $- 238$</p>  </div> </div> <p>Mental calculation methods modelled using appropriate visual, e.g. rounding and adjusting on a number line, bar model to show subtraction as difference.</p> <div style="text-align: center;"> <p>$12 - 6.1 = 5.9$</p>  <p>2001 - 1950</p>  </div>	
<p>Develop a range of strategies for multiplication including efficient written methods</p>	<p>Compact written method made visual by area model.</p> <div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p>243×65</p>  </div> <div> <p>Area model used to show multiplication where numbers are partitioned in different ways.</p>  </div> </div>	

Objective	Visual representations
Develop a range of strategies for division including efficient written methods	<p>Division modelled with place value counters.</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> $641 \div 3$ $\begin{array}{r} 3 \overline{) 641} \\ \underline{6} \\ 0 \\ \underline{0} \\ 0 \\ \underline{0} \\ 0 \end{array}$  <div style="display: flex; justify-content: space-around; width: 100px;"> <div style="border: 1px solid black; width: 30px; height: 30px;"></div> <div style="border: 1px solid black; width: 30px; height: 30px;"></div> <div style="border: 1px solid black; width: 30px; height: 30px;"></div> </div> </div> <div style="text-align: center;"> $641 \div 3$ $\begin{array}{r} 2 \\ 3 \overline{) 641} \\ \underline{6} \\ 0 \\ \underline{0} \\ 0 \\ \underline{0} \\ 0 \end{array}$  <div style="display: flex; justify-content: space-around; width: 100px;"> <div style="border: 1px solid black; width: 30px; height: 30px; display: flex; flex-direction: column; align-items: center;"> 100 100 </div> <div style="border: 1px solid black; width: 30px; height: 30px; display: flex; flex-direction: column; align-items: center;"> 100 100 </div> <div style="border: 1px solid black; width: 30px; height: 30px; display: flex; flex-direction: column; align-items: center;"> 100 100 </div> </div> </div> <div style="text-align: center;"> $641 \div 3$ $\begin{array}{r} 2 \\ 3 \overline{) 641} \\ \underline{6} \\ 0 \\ \underline{0} \\ 0 \\ \underline{0} \\ 0 \end{array}$  <div style="display: flex; justify-content: space-around; width: 100px;"> <div style="border: 1px solid black; width: 30px; height: 30px; display: flex; flex-direction: column; align-items: center;"> 100 10 100 </div> <div style="border: 1px solid black; width: 30px; height: 30px; display: flex; flex-direction: column; align-items: center;"> 100 10 100 </div> <div style="border: 1px solid black; width: 30px; height: 30px; display: flex; flex-direction: column; align-items: center;"> 100 10 100 </div> </div> </div> <div style="text-align: center;"> $641 \div 3$ $\begin{array}{r} 2 2 \\ 3 \overline{) 641} \\ \underline{6} \\ 0 \\ \underline{0} \\ 0 \\ \underline{0} \\ 0 \end{array}$  <div style="display: flex; justify-content: space-around; width: 100px;"> <div style="border: 1px solid black; width: 30px; height: 30px; display: flex; flex-direction: column; align-items: center;"> 100 10 10 10 </div> <div style="border: 1px solid black; width: 30px; height: 30px; display: flex; flex-direction: column; align-items: center;"> 100 10 10 10 </div> <div style="border: 1px solid black; width: 30px; height: 30px; display: flex; flex-direction: column; align-items: center;"> 100 10 10 10 </div> </div> </div> </div> <p>Bar model used to reinforce 'how many [divisors] in [dividend]?'</p> <div style="text-align: center;"> $750 \div 150$  </div>
Compare and order fractions, find equivalent fractions, add and subtract fractions.	<p>Fraction cards used to compare, show equivalence and model calculations.</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> <div style="text-align: center;"> <p>Example: $\frac{3}{4} + \frac{1}{2}$</p>  </div> <div style="text-align: center;">  </div> </div>
Find decimal equivalents for quarters, fifths and tenths, relating to division	<p>Dividing length of a metre ruler into two/four/five equal parts.</p> 

Objective	Visual representations	
<p>Represent numbers of up to 8-digits and decimals to thousandths in a range of ways</p>	<p>Make numbers in a range of ways using place value coins, partitioning decimal values.</p> 	<p>Estimate the position of numbers on blank number lines with different start/end numbers.</p> 
<p>Carry out formal written methods of calculation for all four operations</p>	<p>Place value of numbers in addition and subtraction modelled using place value counters.</p> 	<p>Multiplication visualised using area model.</p> 
<p>Choose efficient strategies and apply flexible knowledge of number to calculate</p>	<p>Choose appropriate visuals to model structure of calculations, including modelling worded questions.</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div data-bbox="324 1037 873 1268" style="text-align: center;"> <p>$12 - 7.01$</p>  </div> <div data-bbox="985 1045 1355 1244" style="text-align: center;"> <p>$21 - 18.7$</p>  </div> <div data-bbox="1512 1061 1848 1244" style="text-align: center;"> <p>$7.5 \div 2.5$</p>  </div> </div>	

Objective (Y6)	Visual representations
Add and subtract fractions with different denominators	<p>Fraction cards to show conversion into common denominators and calculating over whole-number boundaries.</p> <p>Example: $2\frac{1}{3} - \frac{3}{6}$</p> 
Multiply and divide unit fractions and simple non-unit fractions	<p>Area model diagrams to model a fraction being divided or multiplied by a fraction (modelled in two steps).</p> 
Calculate percentages and fractions of quantities	<p>Bar model visualises finding fraction/percentage of quantity and finding the whole given a percentage/fraction. Shown step-by-step.</p> <div style="display: flex; justify-content: space-around;"> <div data-bbox="349 826 1048 1058"> <p>$\frac{4}{5} \times 200$</p>  </div> <div data-bbox="1249 834 1944 1058"> <p>40% of a number is 60. What's the number?</p>  </div> </div>
Describe linear number sequences, including using formulae in the form $y = mx + c$	<p>Numicon and bar model used to model linear number sequences or equations.</p>  <div style="margin-left: 400px;"> <p>$y = 3x + 5$</p>  </div>