

# Mathematics Policy

April 2024



## **VISION STATEMENT**

At Coppice Academy we value all members of our school community, encourage and inspire an attitude to fulfil high aspirations for all. We are committed to providing a caring, secure and vibrant learning environment, which develops their sense of responsibility as tolerant citizens of the wider world. We encourage pupils to uphold the school values of respect, creativity, curiosity, compassion, independence, co-operation and perseverance.

## **SCHOOL AIMS**

- To create an enjoyable and healthy environment where individuals can achieve their potential.
- To provide a broad, balanced and challenging curriculum.
- To sustain a caring and supportive atmosphere in which all individual voices are listened to and valued.
- To encourage respect for others' beliefs, culture and moral values.
- To work as a team to develop responsibility for our actions.
- To encourage initiative and independent learning.
- To nurture a positive partnership between home and school.
- To develop creative and enquiring minds.
- To help pupils to develop skills needed for reflection in their lives and in their learning.
- To foster a sense of belonging to a school and wider community.
- To help pupils make a positive contribution in school life and beyond.

### **Coppice Values**

Co-operation	Independence	Compassion
Respect	Perseverance	Creativity

*Inspiring Excellence*

## Introduction

Mathematics is a creative and highly inter-connected discipline that has been developed over centuries, providing the solution to some of history's most intriguing problems. It is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject. (National Curriculum 2014)

To create this policy we collected the views of all children, parents, teachers and governors about what they wanted for children at Coppice Academy.

'I want them to enjoy Maths and feel excited about it'

"I think children should have a clear understanding of money and financial skills"

"To have resilience, troubleshooting and problem solving skills"

'To have an understand of how maths is so important in everyday day life and not something to be frightened of'

'I want my child to have a I can do attitude'

## Aims

At Coppice Academy we feel it is vital that our pupils foster a positive attitude towards mathematics. Through high quality teaching, we aim to produce individuals who are numerate, creative, independent, inquisitive, enquiring and confident.

- To develop the ability to think clearly and logically, with confidence, flexibility and independence of thought.
- To develop a deeper understanding of mathematics through a process of enquiry and investigation.
- To develop an understanding of the connectivity of patterns and relationships within mathematics.
- To develop the ability to apply knowledge, skills and ideas in real life contexts outside the classroom, and become aware of the uses of mathematics in the wider world.
- To develop the ability to use mathematics as a means of communicating ideas.
- To develop an ability and inclination to work both alone and cooperatively to solve mathematical problems.
- To develop personal qualities such as perseverance, independent thinking, cooperation and self-confidence through a sense of achievement and success.
- To develop an appreciation of the creative aspects of mathematics and an awareness of its aesthetic appeal.
- To encourage an ethos of perseverance and resilience in mathematics.

## Roles and Responsibilities

### Associate Headteacher

- Overall responsibility for all curriculum areas.
- Provided adequate mathematical resources through the school budget
- Liaises with the Maths Lead to monitor maths provision

### 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.
- Prepares, organises and leads CPD and joint professional development.
- Works with the SENCO to improve provision for pupils with special needs.
- Plans CPD with colleagues with a view to identifying the support they need.
- Discusses regularly with the Associate Headteacher the progress of implementing the National Curriculum for Mathematics in school.
- Monitors and evaluates mathematics provision in the school by conducting regular work scrutiny, learning walks and lesson observations.
- Advise colleagues and offer expertise
- Analysis of test data and teacher assessment and monitoring the progress of all children. Ensuring the accurate recording of progress and making sure targets are aspirational

## Intent

Maths is a core subject in the National Curriculum and, at Coppice Academy we use the objectives from this to support planning and to assess children's progress. Members of staff at Coppice use long term planning to ensure coverage of all areas of the National Curriculum and medium term planning to differentiate objectives according to the needs and abilities of their class. Members of staff are aware of the endpoints from each topic and year group, with staff regularly checking an endpoints spreadsheet.

The curriculum is ambitious for all where the vast majority are working to the same point, following a teaching for mastery approach. We do not want to cap learning; this is why we are using a teaching for mastery approach. For children with special educational needs, there is appropriate scaffolding by knowing children's needs. The curriculum is broad and balanced with all staff having high expectations and ambitions.

At Coppice we use and adapt the White Rose Schemes of Learning and Power Maths, which is written by mastery specialists and accredited by the Department of Education. Power Maths provides a logical way to structure the curriculum which is adapted to in

relation to the needs of the children. It builds on prior knowledge and builds upon it.

*'Together, we're building a whole new culture of deep understanding, confidence and competence in maths – a culture that produces strong, secure learning and real progress. No matter what their starting points, we help teachers and learners everywhere to achieve excellence.'* White Rose

## **Implementation**

Maths is taught using a mixture of Power Maths and White Rose, both accredited by the Department of Education and providing high-level planning.

In classrooms, you will see:

- Active learning
- High level questioning
- Same objective being taught but scaffolding for some
- Manipulatives (when appropriate)
- Key concepts, stem sentences and vocabulary on working wall to support learning, stem sentences bookmarks
- In books, you will see the stem sentences being used when appropriate.
- Adaptive teaching.

All children are taught in line with the school calculation policy (See appendix 1) to ensure a consistent approach. Practitioners are aware of the variety of learning styles and the impact of the learning environment on accelerating and consolidating understanding. A stimulating maths environment should form part of any Coppice Academy classroom where maths is taught and consist of: working walls, interactive resources, readily accessible vocabulary and conceptual displays to promote independent learning.

## **Learning Activities**

Members of staff are advised to provide children with opportunities to explore and develop and apply their knowledge, skills and understanding in a variety of ways using a range of resources. For example: number lines, squares, digit cards, number tracks, dice, spinners, bar modelling, whole-part-part method and other small apparatus to complete mathematical tasks and investigations as well as with written work. The purpose of this is to appeal to the different learning styles of children. Concepts are presented using concrete apparatus, pictorial and abstract images.

## **Online resources**

Technology provides a medium through which teachers can model strategies and methods, simulate physical mathematical concepts, manipulate shapes, model measurement techniques and display the various ways in which information can be presented. There are a number of programs available for use by each year groups. Programmes are available for pupils at home such as Time Tables Rock Stars as well as within school, which children of all years can use to help practise their maths through fun interactive programmes. Maths homework is set through the online Century platform which uses AI to generate personalised mathematical learning for the pupils. Calculators should not be used as a substitute for good written and mental arithmetic. They only introduced near the end of Key Stage 2 to support pupils' conceptual understanding and exploration of more complex number problems, if written and mental arithmetic are secure.

## **Adaptive Teaching**

At Coppice Academy, we are aware of the different learning needs of pupils. This may take the form of alternative activities or organising children in pairings or groups to suit the purpose of a particular activity. Team teaching may take place and classroom assistants may be used to support designated groups of learners. According to the National Curriculum, "The expectation is that the majority of pupils will move through the programmes of study at broadly the same pace. However, decisions about when to progress should always be based on the security of pupils' understanding and their readiness to progress to the next stage. Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content. Those who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice, before moving on."

SHINE Maths interventions identify areas of focus and plan lessons accordingly to support those pupils. Pupils who are achieving above their Year Group expectations are invited to participate in GT Extra events and Maths Challenge events which are held at various locations and designed to further challenge the pupils beyond the classroom.

## **Recording learning**

Children are required to write or stick in a pre-prepared learning objective for that lesson followed by the short date at the top of their work for that day. All written work in maths should be done in pencil. Children are encouraged to be taught to work neatly and systematically, using margins to separate their work. We encourage children to show their thinking process in how they got to their final answer, recording their calculations in their books. We hope that this will give the children freedom in their learning and develop their perseverance skills.

Children start each lesson with a series of fluency questions which recap previous learning and prepare the pupils for the lesson. There is then a 'Discover Task' linked to the days Learning objective. Children are encouraged to explore answers to the Discover Task by using a journaling technique.

The lesson then continues with whiteboards and then the pupils have an opportunity to complete tasks in their books.

The lesson ends with a challenge linked to their learning. All pupils are expected to access the challenge.

## Assessment

### Formative Assessment (AfL)

Assessment is an integral and continuous part of the teaching and learning process at Coppice Academy and much of it is done informally as part of each teacher's day to day work. Teachers integrate the use of formative assessment strategies such as: effective questioning, clear learning objectives, the use of success criteria, effective feedback and response in their teaching and marking and observing children participating in activities. Findings from these types of assessment are used to inform future planning.

### Summative Assessment

Formal methods are used to determine the levels of achievement of children at various times during the school year:

**Standardised Testing:** We use termly NTS assessments as a way of recording children's progress in objectives covered across that specific term. Data is inputted into MARK – the online tracking tool available to the staff at Coppice and then analysed by the class teachers, Maths Lead and SLT. The results are used to monitor individual's progress year on year, and to identify those children who are not making expected progress. These pupils are then placed in appropriate intervention groups to support their learning.

**White Rose End of Unit Assessments:** Each class completes a White Rose Assessment at the end of every unit. These results are recorded on a spreadsheet in the Assessment folder and analysed by SLT and the Maths Lead. Class teachers use these results to inform interventions and plan support for specific children as well as being used to inform class teaching future planning.

**Year 4 Multiplication Check :** The Multiplication Tables Check (MTC) is a statutory Key Stage 2 assessment to be taken by pupils at the end of Year 4. The MTC is focused on the fluent recall of multiplication facts from the 2 to 12 times tables up to 12 x 12. There will be particular focus on the 6, 7, 8, 9 and 12 multiplication tables as these are determined to be the most difficult.

**Statutory End of Key Stage Assessment:** The National Curriculum requires that each child is assessed, and assigned a Level of attainment for each of the 5 Attainment Targets in Mathematics. This is to be carried out at the end of Key Stage Two.

### Impact

When the curriculum content is learned and the above being effectively implemented, learners will meet expectations. The Subject Lead will monitor this and address it through book scrutinies, lesson observations, learning walks and feedback with SLT and class teachers. Learners will have a positive attitude to Maths as an interesting part of the curriculum. They will develop a deeper understanding of mathematics through a process of enquiry and investigation. Learners will continue to develop personal qualities such as perseverance, independent thinking, cooperation and self-confidence through a sense of achievement and success.

The teaching for mastery approach ensures that teachers adopt strategies so that all children can access the whole curriculum. At Coppice Academy teachers and children emphasise number facts, precise mathematical language and full sentences. Supplementing Maths lessons with Power Maths will help children use the correct vocabulary and use full sentences. Maths lessons will develop children's fluency and reasoning together. Through identifying key learning points and endpoints, lessons will follow a coherent journey.

### **Rewarding Achievement**

Times Table Rockstars is encouraged throughout the school and pupils compete against themselves to increase their speed. Rock Hero Badges and certificates are awarded to pupils who achieve this level and their success celebrated in assembly, on the Rock Heroes Notice Board and on the Weekly Newsletter.

Classes are also rewarded for being the fastest or achieving the most TT Rockstars points in a week.

### **Parent Involvement**

Workshops are held regularly to inform parents about maths teaching and learning at Coppice Academy. Parents are invited to work alongside their children to gain a deeper understanding about their learning. They are encouraged to support their children at home through the Century online platform to complete Maths 'nuggets' homework set each week.

Parents are encouraged to support their children for community maths events. Number Day is celebrated each year in February.

### **Equality**

The curriculum offers a range of contexts within reasoning tasks, to ensure protected characteristics are represented throughout the Maths curriculum in all year groups outlined on the whole school curriculum map.



## KEY STAGE 2

In Years 3 and 4, children develop the basis of written methods by building their skills alongside a deep understanding of place value. They should use known addition/subtraction and multiplication/division facts to calculate efficiently and accurately, rather than relying on counting. Children use place value equipment to support their understanding, but not as a substitute for thinking

**Key language:** partition, place value, tens, hundreds, thousands, column method, whole, part, equal groups, sharing, grouping, bar model

**Addition and subtraction:** In Year 3 especially, the column methods are built up gradually. Children will develop their understanding of how each stage of the calculation, including any exchanges, relates to place value. The example calculations chosen to introduce the stages of each method may often be more suited to a mental method. However, the examples and the progression of the steps have been chosen to help children develop their fluency in the process, alongside a deep understanding of the concepts and the numbers involved, so that they can apply these skills accurately and efficiently to later calculations. The class should be encouraged to compare mental and written methods for specific calculations, and children should be encouraged at every stage to make choices about which methods to apply.

In Year 4, the steps are shown without such fine detail, although children should continue to build their understanding with a secure basis in place value. In subtraction, children will need to develop their understanding of exchange as they may need to exchange across one or two columns.

By the end of Year 4, children should have developed fluency in column methods alongside a deep understanding, which will allow them to progress confidently in upper Key Stage 2.

**Multiplication and division:** Children build a solid grounding in times-tables, understanding the multiplication and division facts in tandem. As such, they should be as confident knowing that 35 divided by 7 is 5 as knowing that 5 times 7 is 35.

Children develop key skills to support multiplication methods: unitising, commutativity, and how to use partitioning effectively.

Unitising allows children to use known facts to multiply and divide multiples of 10 and 100 efficiently. Commutativity gives children flexibility in applying known facts to calculations and problem solving. An understanding of partitioning allows children to extend their skills to multiplying and dividing 2- and 3-digit numbers by a single digit.

Children develop column methods to support multiplications in these cases.

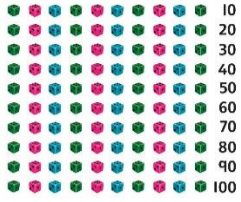
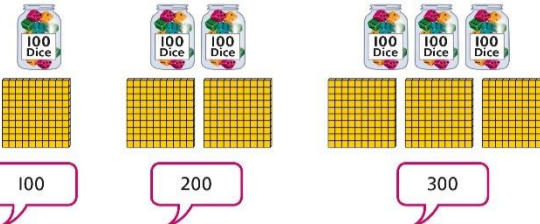
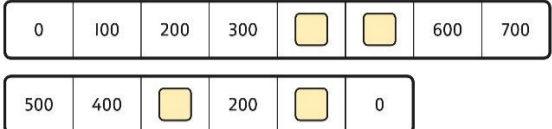

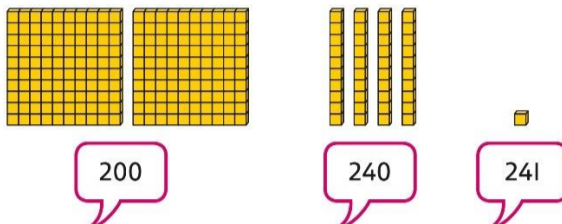
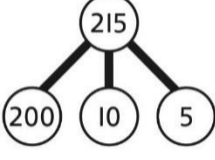
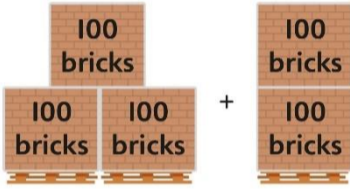
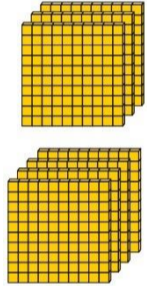
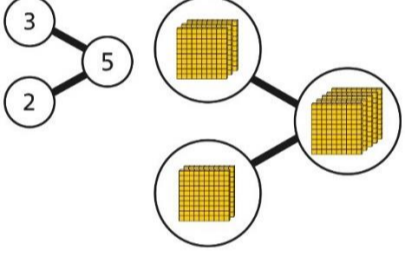


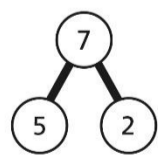
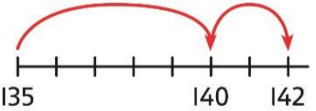
For successful division, children will need to make choices about how to partition. For example, to divide 423 by 3, it is effective to partition 423 into 300, 120 and 3, as these can be divided by 3 using known facts.

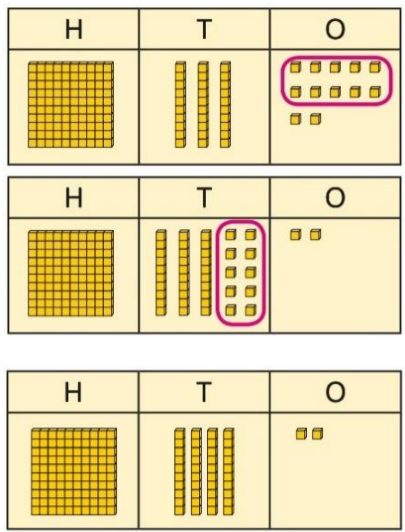
Children will also need to understand the concept of remainder, in terms of a given calculation and in terms of the context of the problem.

**Fractions:** Children develop the key concept of equivalent fractions, and link this with multiplying and dividing the numerators and denominators, as well as exploring the visual concept through fractions of shapes. Children learn how to find a fraction of an amount, and develop this with the aid of a bar model and other representations alongside.

in Year 3, children develop an understanding of how to add and subtract fractions with the same denominator and find complements to the whole. This is developed alongside an understanding of fractions as numbers, including fractions greater than 1. In Year 4, children begin to work with fractions greater than 1.

Decimals are introduced, as tenths in Year 3 and then as hundredths in Year 4. Children develop an understanding of decimals in terms of the relationship with fractions, with dividing by 10 and 100, and also with place value.

	Concrete	Pictorial	Abstract												
<b>Year 3 Addition</b>															
<b>Understanding 100s</b>	<p>Understand the cardinality of 100, and the link with 10 tens.</p> <p>Use cubes to place into groups of 10 tens.</p> 	<p>Unitise 100 and count in steps of 100.</p> 	<p>Represent steps of 100 on a number line and a number track and count up to 1,000 and back to 0.</p> 												
<b>Understanding place value to 1,000</b>	<p>Unitise 100s, 10s and 1s to build 3-digit numbers.</p> 	<p>Use equipment to represent numbers to 1,000.</p>  <p>Use a place value grid to support the structure of numbers to 1,000.</p> <p>Place value counters are used alongside other equipment. Children should understand how each counter represents a different unitised amount.</p>	<p>Represent the parts of numbers to 1,000 using a part-whole model.</p>  <p><math>215 = 200 + 10 + 5</math></p> <p>Recognise numbers to 1,000 represented on a number line, including those between intervals.</p>												
<b>Adding 100s</b>	<p>Use known facts and unitising to add multiples of 100.</p>  <p><math>3 + 2 = 5</math>  <math>3 \text{ hundreds} + 2 \text{ hundreds} = 5 \text{ hundreds}</math>  <math>300 + 200 = 500</math></p>	<p>Use known facts and unitising to add multiples of 100.</p>  <p><math>3 + 4 = 7</math>  <math>3 \text{ hundreds} + 4 \text{ hundreds} = 7 \text{ hundreds}</math>  <math>300 + 400 = 700</math></p>	<p>Use known facts and unitising to add multiples of 100.</p> <p>Represent the addition on a number line.</p> <p>Use a part-whole model to support unitising.</p>  <p><math>3 + 2 = 5</math>  <math>300 + 200 = 500</math></p>												
<b>3-digit number + 1s, no exchange or bridging</b>	<p>Use number bonds to add the 1s.</p>  <p><math>214 + 4 = ?</math></p> <p>Now there are 4 + 4 ones in total.  <math>4 + 4 = 8</math></p> <p><math>214 + 4 = 218</math></p>	<p>Use number bonds to add the 1s.</p> <table border="1" data-bbox="892 1676 1176 1914"> <thead> <tr> <th>H</th> <th>T</th> <th>O</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>4</td> <td>9</td> </tr> </tbody> </table> <p>Use number bonds to add the 1s.  <math>5 + 4 = 9</math></p> <p><math>245 + 4</math>  <math>5 + 4 = 9</math></p> <p><math>245 + 4 = 249</math></p>	H	T	O							2	4	9	<p>Understand the link with counting on.</p> <p><math>245 + 4</math></p>  <p>Use number bonds to add the 1s and understand that this is more efficient and less prone to error.</p> <p><math>245 + 4 = ?</math></p> <p>I will add the 1s.  <math>5 + 4 = 9</math>          So, <math>245 + 4 = 249</math></p>
H	T	O													
2	4	9													
<b>3-digit number + 1s with exchange</b>	<p>Understand that when the 1s sum to 10 or more, this requires an exchange of 10 ones for 1 ten.</p> <p>Children should explore this using unitised objects or physical apparatus.</p>	<p>Exchange 10 ones for 1 ten where needed. Use a place value grid to support the understanding.</p> <table border="1" data-bbox="892 2240 1270 2567"> <thead> <tr> <th>H</th> <th>T</th> <th>O</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>5</td> <td>0</td> </tr> </tbody> </table>	H	T	O								5	0	<p>Understand how to bridge by partitioning to the 1s to make the next 10.</p>   <p><math>135 + 7 = ?</math>  <math>135 + 5 + 2 = 142</math></p> <p>Ensure that children understand how to add 1s bridging a 100.</p> <p><math>198 + 5 = ?</math></p>
H	T	O													
	5	0													

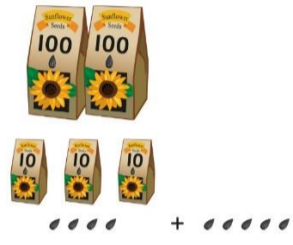


$$135 + 7 = 142$$

$$198 + 2 + 3 = 203$$

**3-digit number + 10s, no exchange**

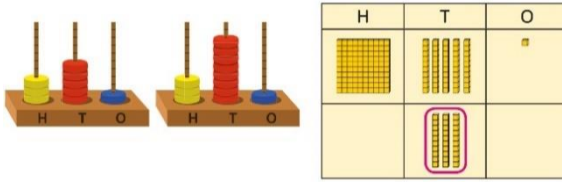
Calculate mentally by forming the number bond for the 10s.



$234 + 50$   
 There are 3 tens and 5 tens altogether.  
 $3 + 5 = 8$   
 In total there are 8 tens.  
 $234 + 50 = 284$

Calculate mentally by forming the number bond for the 10s.

$$351 + 30 = ?$$



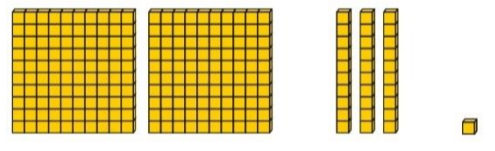
$5 \text{ tens} + 3 \text{ tens} = 8 \text{ tens}$   
 $351 + 30 = 381$

Calculate mentally by forming the number bond for the 10s.

$753 + 40$   
 I know that  $5 + 4 = 9$   
 So,  $50 + 40 = 90$   
 $753 + 40 = 793$

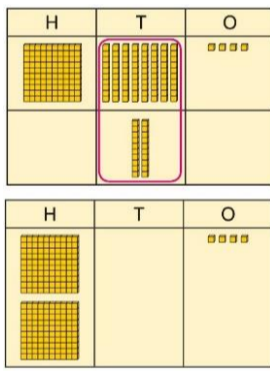
**3-digit number + 10s, with exchange**

Understand the exchange of 10 tens for 1 hundred.



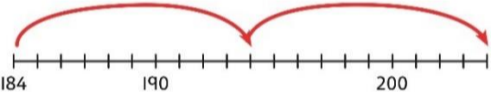
Add by exchanging 10 tens for 1 hundred.

$$184 + 20 = ?$$



$$184 + 20 = 204$$

Understand how the addition relates to counting on in 10s across 100.



$184 + 20 = ?$   
 I can count in 10s ... 194 ... 204  
 $184 + 20 = 204$

Use number bonds within 20 to support efficient mental calculations.

$385 + 50$   
 There are 8 tens and 5 tens.  
 That is 13 tens.  
 $385 + 50 = 300 + 130 + 5$   
 $385 + 50 = 435$

**3-digit number + 2-digit number**

Use place value equipment to make and combine groups to model addition.



Use a place value grid to organise thinking and adding of 1s, then 10s.

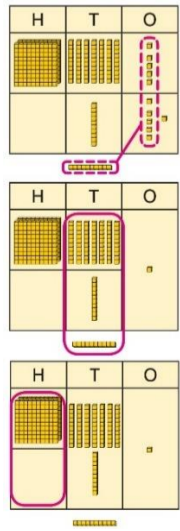
**3-digit number + 2-digit number, exchange required**

Use place value equipment to model addition and understand where exchange is required.

Use place value counters to represent  $154 + 72$ .  
 Use this to decide if any exchange is required.  
 There are 5 tens and 7 tens. That is 12 tens so I will exchange.

Represent the required exchange on a place value grid using equipment.

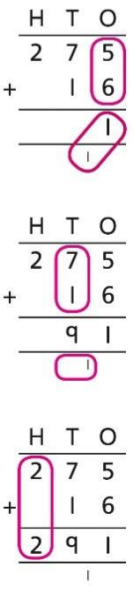
$$275 + 16 = ?$$

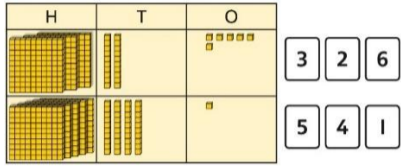
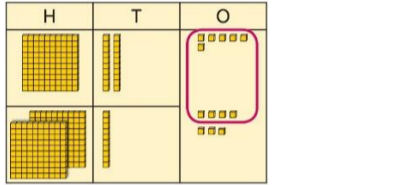
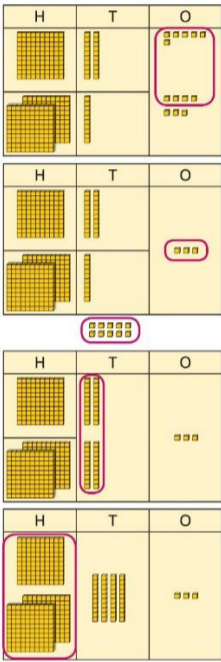

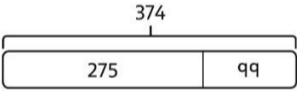
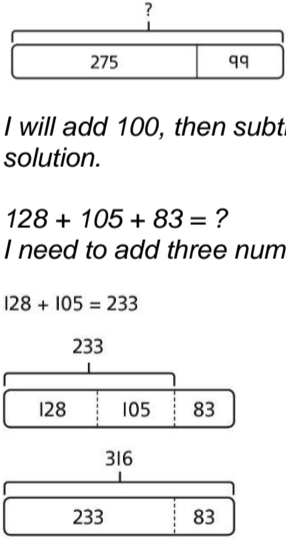
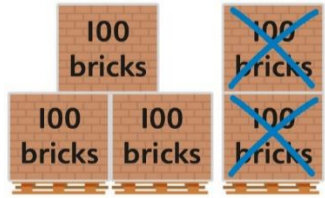
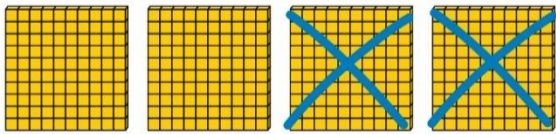
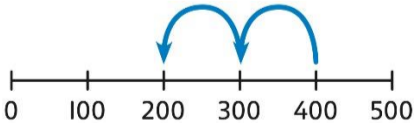


$$275 + 16 = 291$$

Use the vertical column method to represent the addition. Children must understand how this relates to place value at each stage of the calculation.

Use a column method with exchange. Children must understand how the method relates to place value at each stage of the calculation.



		Note: In this example, a mental method may be more efficient. The numbers for the example calculation have been chosen to allow children to visualise the concept and see how the method relates to place value. Children should be encouraged at every stage to select methods that are accurate and efficient.	$275 + 16 = 291$
<b>3-digit number + 3-digit number, no exchange</b>	Use place value equipment to make a representation of a calculation. This may or may not be structured in a place value grid.  <i>326 + 541 is represented as:</i>	Represent the place value grid with equipment to model the stages of column addition.	Use a column method to solve efficiently, using known bonds. Children must understand how this relates to place value at every stage of the calculation.
			
<b>3-digit number + 3-digit number, exchange required</b>	Use place value equipment to enact the exchange required.  <i>There are 13 ones. I will exchange 10 ones for 1 ten.</i>	Model the stages of column addition using place value equipment on a place value grid.	Use column addition, ensuring understanding of place value at every stage of the calculation.
			 $126 + 217 = 343$ Note: Children should also study examples where exchange is required in more than one column, for example $185 + 318 = ?$
<b>Representing addition problems, and selecting appropriate methods</b>	Encourage children to use their own drawings and choices of place value equipment to represent problems with one or more steps. These representations will help them to select appropriate methods.	Children understand and create bar models to represent addition problems.	Use representations to support choices of appropriate methods.
		$275 + 99 = ?$  $275 + 99 = 374$	 $128 + 105 + 83 = 316$
<b>Year 3 Subtraction</b>			
<b>Subtracting 100s</b>	Use known facts and unitising to subtract multiples of 100.    $5 - 2 = 3$ $500 - 200 = 300$	Use known facts and unitising to subtract multiples of 100.    $4 - 2 = 2$ $400 - 200 = 200$	Understand the link with counting back in 100s.    $400 - 200 = 200$  Use known facts and unitising as efficient and accurate methods. <i>I know that <math>7 - 4 = 3</math>. Therefore, I know that <math>700 - 400 = 300</math>.</i>
<b>3-digit number - 1s, no exchange</b>	Use number bonds to subtract the 1s.	Use number bonds to subtract the 1s.	Understand the link with counting back using a number line.  Use known number bonds to calculate mentally.  $476 - 4 = ?$



$$214 - 3 = ?$$



$$4 - 3 = 1$$

$$214 - 3 = 211$$

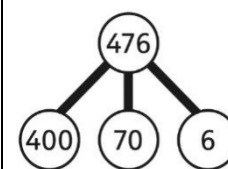
H	T	O
3	1	9

$$319 - 4 = ?$$

H	T	O
3	1	9

$$9 - 4 = 5$$

$$319 - 4 = 315$$



$$6 - 4 = 2$$

$$476 - 4 = 472$$

**3-digit number - 1s, exchange or bridging required**

Understand why an exchange is necessary by exploring why 1 ten must be exchanged.

Use place value equipment.

Represent the required exchange on a place value grid.

$$151 - 6 = ?$$

H	T	O

H	T	O

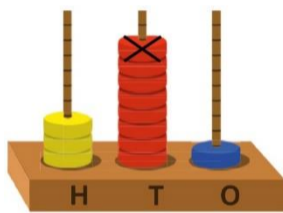
Calculate mentally by using known bonds.

$$151 - 6 = ?$$

$$151 - 1 - 5 = 145$$

**3-digit number - 10s, no exchange**

Subtract the 10s using known bonds.



$$381 - 10 = ?$$

8 tens with 1 removed is 7 tens.

$$381 - 10 = 371$$

Subtract the 10s using known bonds.

H	T	O

$$8 \text{ tens} - 1 \text{ ten} = 7 \text{ tens}$$

$$381 - 10 = 371$$

Use known bonds to subtract the 10s mentally.

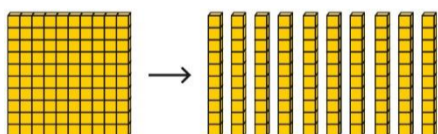
$$372 - 50 = ?$$

$$70 - 50 = 20$$

$$\text{So, } 372 - 50 = 322$$

**3-digit number - 10s, exchange or bridging required**

Use equipment to understand the exchange of 1 hundred for 10 tens.



Represent the exchange on a place value grid using equipment.

$$210 - 20 = ?$$

H	T	O

I need to exchange 1 hundred for 10 tens, to help subtract 2 tens.

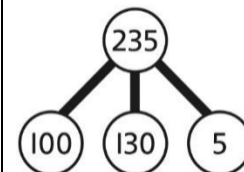
H	T	O

$$210 - 20 = 190$$

Understand the link with counting back on a number line.

Use flexible partitioning to support the calculation.

$$235 - 60 = ?$$



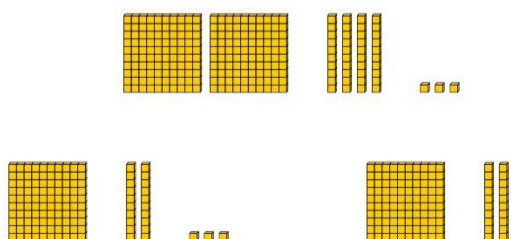
$$235 = 100 + 130 + 5$$

$$235 - 60 = 100 + 70 + 5$$

$$= 175$$

**3-digit number - up to 3-digit number**

Use place value equipment to explore the effect of splitting a whole into two parts, and understand the link with taking away.



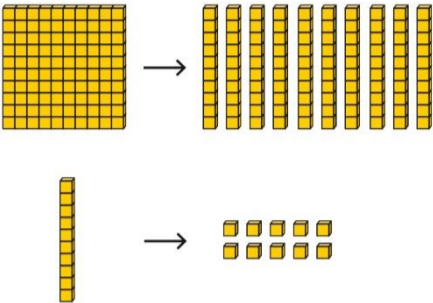
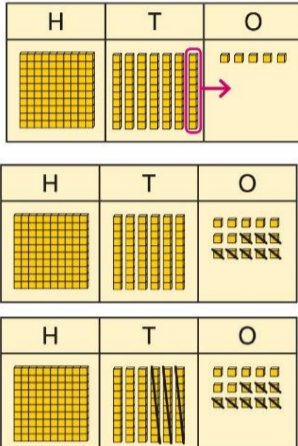

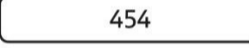

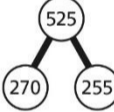
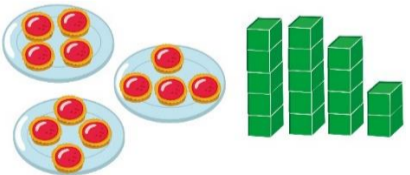

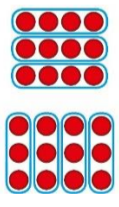
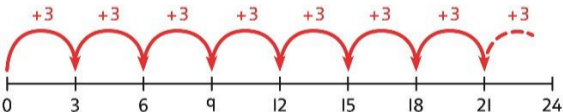
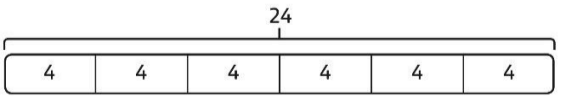
Represent the calculation on a place value grid.

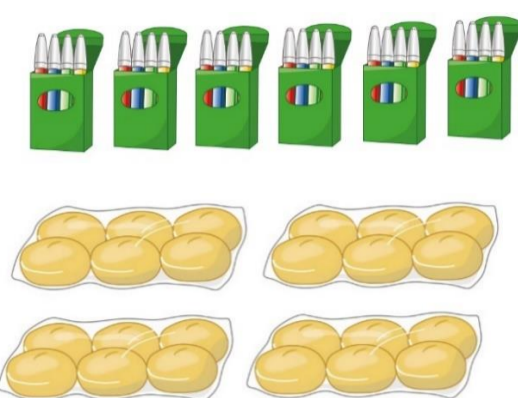
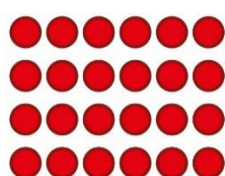

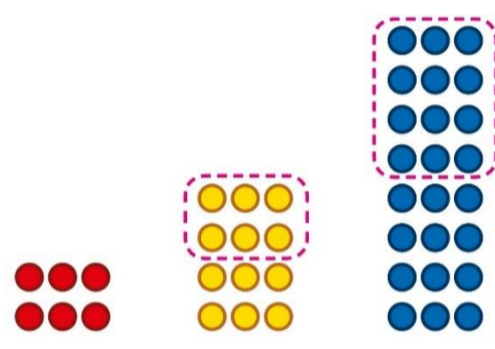
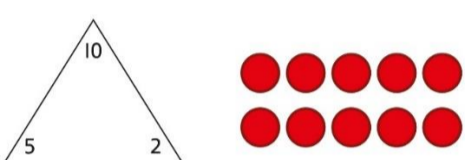

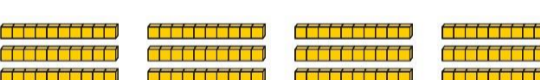
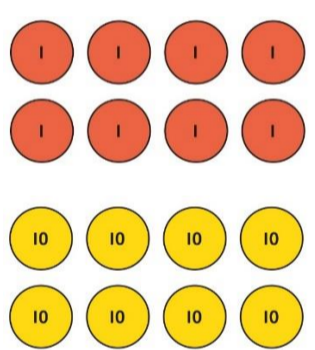
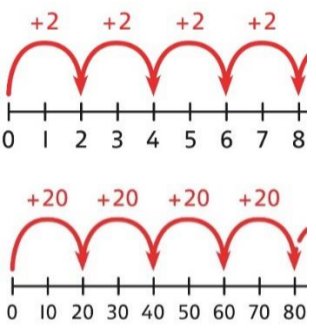
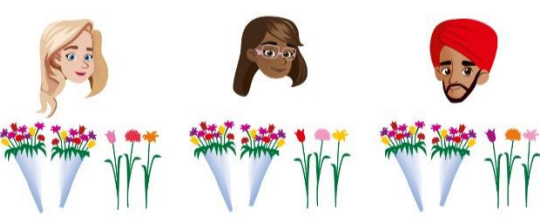
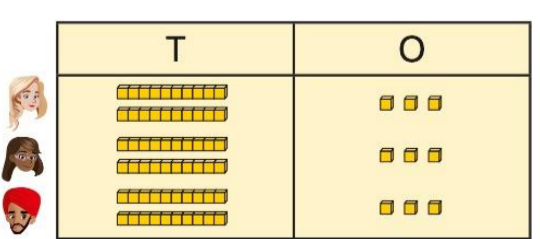
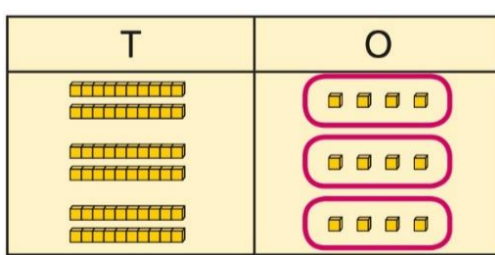
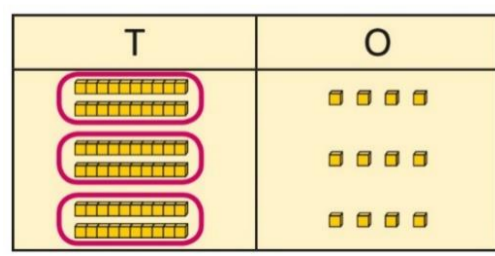
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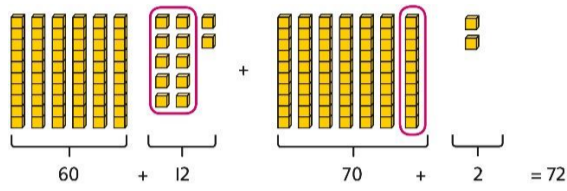
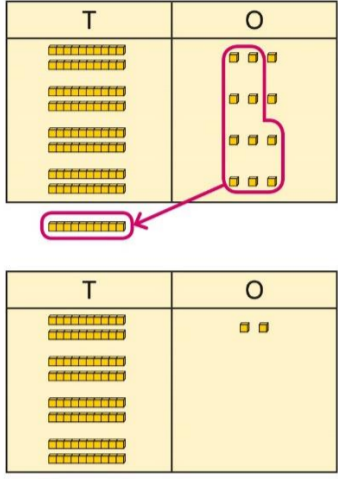
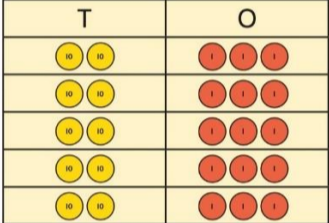
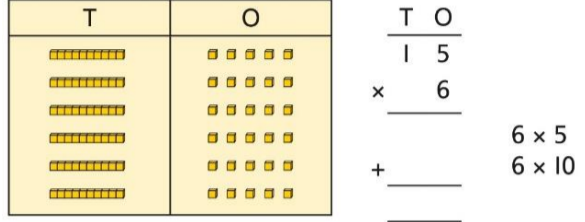
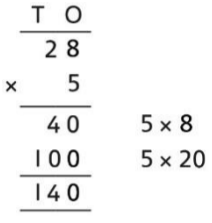

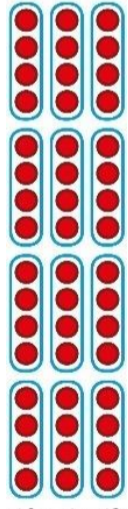
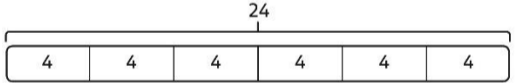
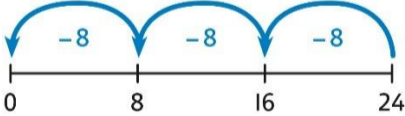
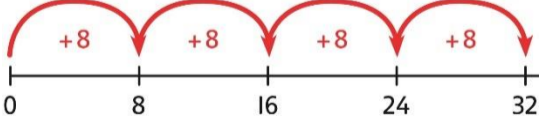

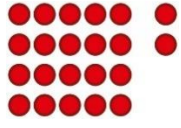
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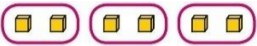
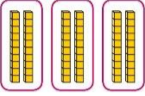
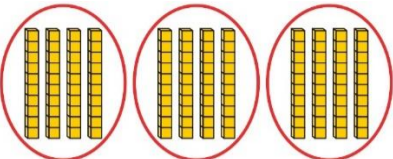
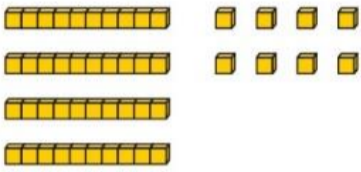
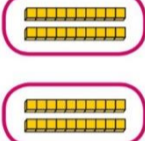

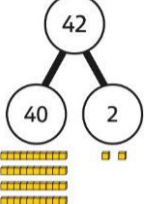
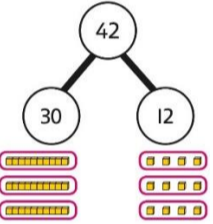
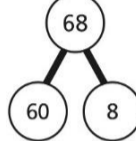


H	T	O

Use column subtraction to calculate accurately and efficiently.

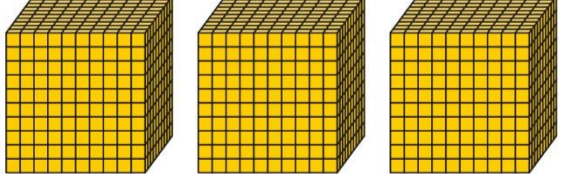
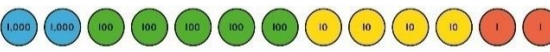
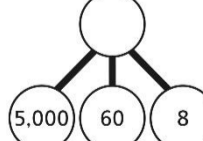
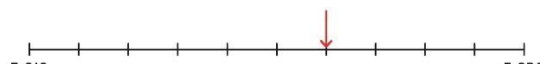
			$\begin{array}{r} \text{H T O} \\ 999 \\ - 352 \\ \hline 7 \end{array}$ $\begin{array}{r} \text{H T O} \\ 999 \\ - 352 \\ \hline 47 \end{array}$ $\begin{array}{r} \text{H T O} \\ 999 \\ - 352 \\ \hline 647 \end{array}$
<b>3-digit number – up to 3-digit number, exchange required</b>	<p>Use equipment to enact the exchange of 1 hundred for 10 tens, and 1 ten for 10 ones.</p> 	<p>Model the required exchange on a place value grid.</p> <p><math>175 - 38 = ?</math> I need to subtract 8 ones, so I will exchange a ten for 10 ones.</p> 	<p>Use column subtraction to work accurately and efficiently.</p> $\begin{array}{r} \text{H T O} \\ 175 \\ - 38 \\ \hline 137 \end{array}$ <p><math>175 - 38 = 137</math></p> <p>If the subtraction is a 3-digit number subtract a 2-digit number, children should understand how the recording relates to the place value, and so how to line up the digits correctly. Children should also understand how to exchange in calculations where there is a zero in the 10s column.</p> 
<b>Representing subtraction problems</b>		<p>Use bar models to represent subtractions.</p> <p>'Find the difference' is represented as two bars for comparison.</p> <p>Team A  454</p> <p>Team B  128 ← ? →</p> <p>Bar models can also be used to show that a part must be taken away from the whole.</p>	<p>Children use alternative representations to check calculations and choose efficient methods.</p> <p>Children use inverse operations to check additions and subtractions. The part-whole model supports understanding.</p> <p><i>I have completed this subtraction.</i> <math>525 - 270 = 255</math> <i>I will check using addition.</i></p>  $\begin{array}{r} \text{H T O} \\ 270 \\ + 255 \\ \hline 525 \end{array}$
<b>Year 3 Multiplication</b>			
<b>Understanding equal grouping and repeated addition</b>	<p>Children continue to build understanding of equal groups and the relationship with repeated addition. They recognise both examples and non-examples using objects.</p>  <p>Children recognise that arrays can be used to model commutative multiplications.</p>  <p><i>I can see 3 groups of 8.</i> <i>I can see 8 groups of 3.</i></p>	<p>Children recognise that arrays demonstrate commutativity.</p>  <p><i>This is 3 groups of 4.</i> <i>This is 4 groups of 3.</i></p>	<p>Children understand the link between repeated addition and multiplication.</p>  <p><i>8 groups of 3 is 24.</i></p> <p><math>3 + 3 + 3 + 3 + 3 + 3 + 3 + 3 = 24</math> <math>8 \times 3 = 24</math></p> <p>A bar model may represent multiplications as equal groups.</p>  <p><math>6 \times 4 = 24</math></p>

<p><b>Using commutativity to support understanding of the times-tables</b></p>	<p>Understand how to use times-tables facts flexibly.</p>  <p>There are 6 groups of 4 pens. There are 4 groups of 6 bread rolls.</p> <p>I can use <math>6 \times 4 = 24</math> to work out both totals.</p>	<p>Understand how times-table facts relate to commutativity.</p>  <p><math>6 \times 4 = 24</math> <math>4 \times 6 = 24</math></p>	<p>Understand how times-table facts relate to commutativity.</p> <p>I need to work out 4 groups of 7.</p> <p>I know that <math>7 \times 4 = 28</math></p> <p>so, I know that</p> <p>4 groups of 7 = 28 and 7 groups of 4 = 28.</p>
<p><b>Understanding and using <math>\times 3</math>, <math>\times 2</math>, <math>\times 4</math> and <math>\times 8</math> tables.</b></p>	<p>Children learn the times-tables as 'groups of', but apply their knowledge of commutativity.</p>  <p>I can use the <math>\times 3</math> table to work out how many keys. I can also use the <math>\times 3</math> table to work out how many batteries.</p>	<p>Children understand how the <math>\times 2</math>, <math>\times 4</math> and <math>\times 8</math> tables are related through repeated doubling.</p>  <p><math>3 \times 2 = 6</math>    <math>3 \times 4 = 12</math>    <math>3 \times 8 = 24</math></p>	<p>Children understand the relationship between related multiplication and division facts in known times-tables.</p>  <p><math>2 \times 5 = 10</math> <math>5 \times 2 = 10</math> <math>10 \div 5 = 2</math> <math>10 \div 2 = 5</math></p>
<p><b>Using known facts to multiply 10s, for example <math>3 \times 40</math></b></p>	<p>Explore the relationship between known times-tables and multiples of 10 using place value equipment.</p> <p>Make 4 groups of 3 ones.</p>  <p>Make 4 groups of 3 tens.</p>  <p>What is the same? What is different?</p>	<p>Understand how unitising 10s supports multiplying by multiples of 10.</p>  <p>4 groups of 2 ones is 8 ones. 4 groups of 2 tens is 8 tens.</p> <p><math>4 \times 2 = 8</math> <math>4 \times 20 = 80</math></p>	<p>Understand how to use known times-tables to multiply multiples of 10.</p>  <p><math>4 \times 2 = 8</math> <math>4 \times 20 = 80</math></p>
<p><b>Multiplying a 2-digit number by a 1-digit number</b></p>	<p>Understand how to link partitioning a 2-digit number with multiplying.</p> <p>Each person has 23 flowers.</p> <p>Each person has 2 tens and 3 ones.</p>  <p>There are 3 groups of 2 tens. There are 3 groups of 3 ones.</p> <p>Use place value equipment to model the multiplication context.</p> 	<p>Use place value to support how partitioning is linked with multiplying by a 2-digit number.</p> <p><math>3 \times 24 = ?</math></p>  <p><math>3 \times 4 = 12</math></p>  <p><math>3 \times 20 = 60</math> <math>60 + 12 = 72</math></p>	<p>Use addition to complete multiplications of 2-digit numbers by a 1-digit number.</p> <p><math>4 \times 13 = ?</math></p> <p><math>4 \times 3 = 12</math>      <math>4 \times 10 = 40</math></p> <p><math>12 + 40 = 52</math></p> <p><math>4 \times 13 = 52</math></p>

	<p>There are 3 groups of 3 ones.</p> <p>There are 3 groups of 2 tens.</p>	$3 \times 24 = 72$	
<p><b>Multiplying a 2-digit number by a 1-digit number, expanded column method</b></p>	<p>Use place value equipment to model how 10 ones are exchanged for a 10 in some multiplications.</p> <p><math>3 \times 24 = ?</math></p> <p><math>3 \times 20 = 60</math> <math>3 \times 4 = 12</math></p>  <p><math>3 \times 24 = 60 + 12</math> <math>3 \times 24 = 70 + 2</math> <math>3 \times 24 = 72</math></p>	<p>Understand that multiplications may require an exchange of 1s for 10s, and also 10s for 100s.</p> <p><math>4 \times 23 = ?</math></p>  <p><math>4 \times 23 = 92</math></p>  <p><math>5 \times 23 = ?</math> <math>5 \times 3 = 15</math> <math>5 \times 20 = 100</math> <math>5 \times 23 = 115</math></p>	<p>Children may write calculations in expanded column form, but must understand the link with place value and exchange.</p> <p>Children are encouraged to write the expanded parts of the calculation separately.</p>  <p><math>5 \times 28 = ?</math></p> 
<p><b>Year 3 Division</b></p>			
<p><b>Using times-tables knowledge to divide</b></p>	<p>Use knowledge of known times-tables to calculate divisions.</p>  <p>24 divided into groups of 8. There are 3 groups of 8.</p>	<p>Use knowledge of known times-tables to calculate divisions.</p>  <p><math>48 \div 4 = 12</math></p> <p>48 divided into groups of 4. There are 12 groups.</p> <p><math>4 \times 12 = 48</math> <math>48 \div 4 = 12</math></p>	<p>Use knowledge of known times-tables to calculate divisions.</p> <p>I need to work out 30 shared between 5.</p> <p>I know that <math>6 \times 5 = 30</math> so I know that <math>30 \div 5 = 6</math>.</p> <p>A bar model may represent the relationship between sharing and grouping.</p>  <p><math>24 \div 4 = 6</math> <math>24 \div 6 = 4</math></p> <p>Children understand how division is related to both repeated subtraction and repeated addition.</p>  <p><math>24 \div 8 = 3</math></p>  <p><math>32 \div 8 = 4</math></p>
<p><b>Understanding remainders</b></p>	<p>Use equipment to understand that a remainder occurs when a set of objects cannot be divided equally any further.</p> 	<p>Use images to explain remainders.</p> 	<p>Understand that the remainder is what cannot be shared equally from a set.</p> <p><math>22 \div 5 = ?</math></p> <p><math>3 \times 5 = 15</math> <math>4 \times 5 = 20</math></p>

	There are 13 sticks in total. There are 3 groups of 4, with 1 remainder.	$22 \div 5 = 4$ remainder 2	$5 \times 5 = 25$ ... this is larger than 22 So, $22 \div 5 = 4$ remainder 2
<b>Using known facts to divide multiples of 10</b>	Use place value equipment to understand how to divide by unitising.  Make 6 ones divided by 3.   Now make 6 tens divided by 3.   What is the same? What is different?	Divide multiples of 10 by unitising.   12 tens shared into 3 equal groups. 4 tens in each group.	Divide multiples of 10 by a single digit using known times-tables. $180 \div 3 = ?$  180 is 18 tens.  18 divided by 3 is 6. 18 tens divided by 3 is 6 tens.  $18 \div 3 = 6$ $180 \div 3 = 60$
<b>2-digit number divided by 1-digit number, no remainders</b>	Children explore dividing 2-digit numbers by using place value equipment.   $48 \div 2 = ?$  First divide the 10s.   Then divide the 1s. 	Children explore which partitions support particular divisions.   I need to partition 42 differently to divide by 3.   $42 = 30 + 12$ $42 \div 3 = 14$	Children partition a number into 10s and 1s to divide where appropriate.   $60 \div 2 = 30$ $8 \div 2 = 4$ $30 + 4 = 34$ $68 \div 2 = 34$ Children partition flexibly to divide where appropriate.  $42 \div 3 = ?$ $42 = 40 + 2$  I need to partition 42 differently to divide by 3.  $42 = 30 + 12$  $30 \div 3 = 10$ $12 \div 3 = 4$  $10 + 4 = 14$ $42 \div 3 = 14$
<b>2-digit number divided by 1-digit number, with remainders</b>	Use place value equipment to understand the concept of remainder.  Make 29 from place value equipment. Share it into 2 equal groups.   There are two groups of 14 and 1 remainder.	Use place value equipment to understand the concept of remainder in division.  $29 \div 2 = ?$   $29 \div 2 = 14$ remainder 1	Partition to divide, understanding the remainder in context.  67 children try to make 5 equal lines.  $67 = 50 + 17$ $50 \div 5 = 10$  $17 \div 5 = 3$ remainder 2 $67 \div 5 = 13$ remainder 2  There are 13 children in each line and 2 children left out.

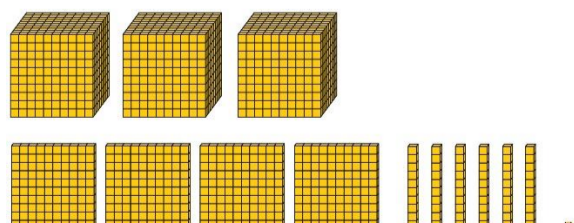
**Year 4**

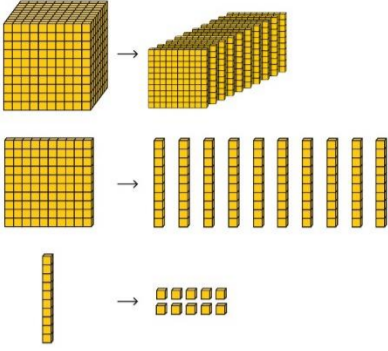
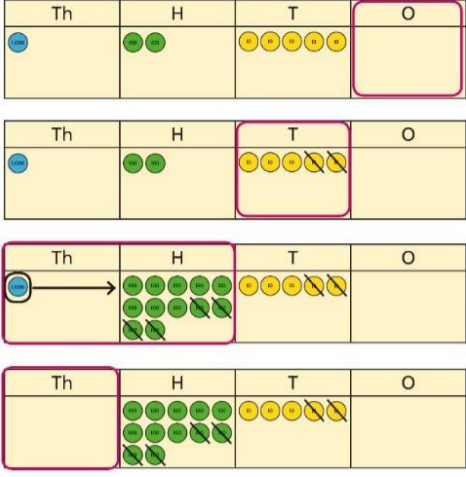
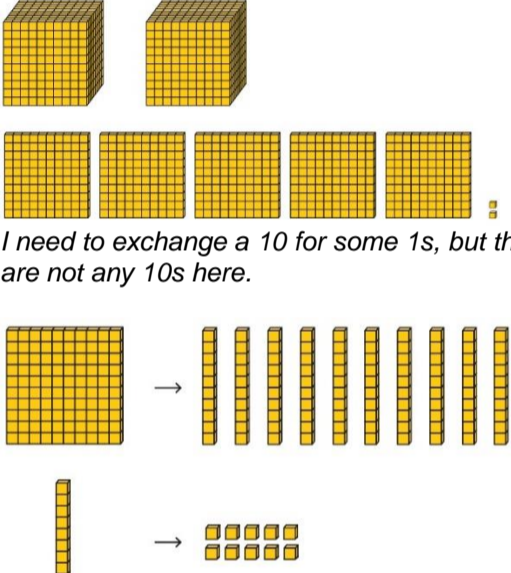
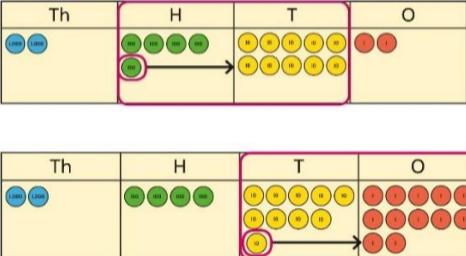
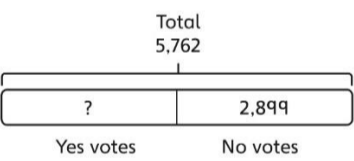
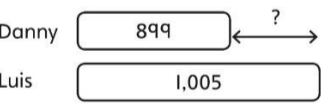
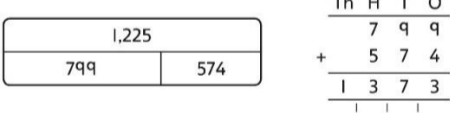
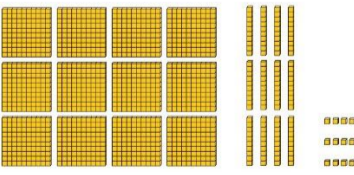
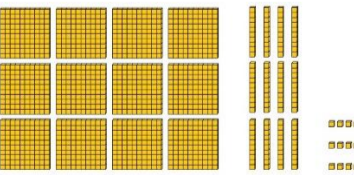
	Concrete	Pictorial	Abstract
<b>Year 4 Addition</b>			
<b>Understanding numbers to 10,000</b>	Use place value equipment to understand the place value of 4-digit numbers.   4 thousands equal 4,000.  1 thousand is 10 hundreds.	Represent numbers using place value counters once children understand the relationship between 1,000s and 100s.   $2,000 + 500 + 40 + 2 = 2,542$	Understand partitioning of 4-digit numbers, including numbers with digits of 0.   $5,000 + 60 + 8 = 5,068$  Understand and read 4-digit numbers on a number line. 


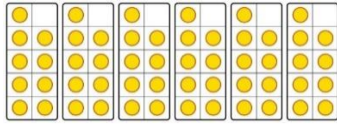
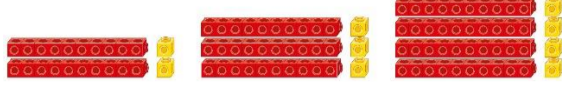

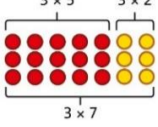
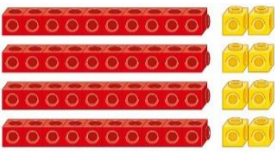
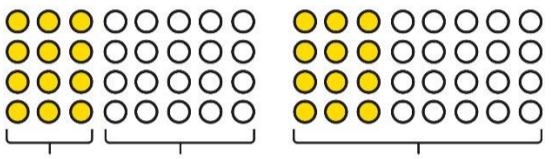
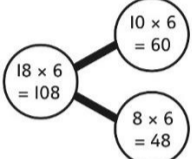
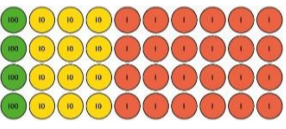
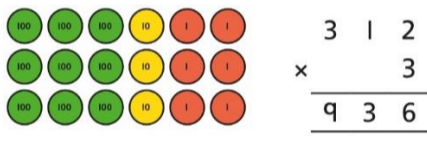

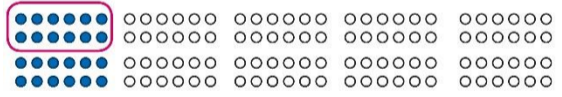
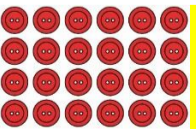
<p><b>Choosing mental methods where appropriate</b></p>	<p>Use unitising and known facts to support mental calculations.</p> <p>Make 1,405 from place value equipment.</p> <p>Add 2,000.</p> <p>Now add the 1,000s.</p> <p>1 thousand + 2 thousands = 3 thousands</p> <p>1,405 + 2,000 = 3,405</p>	<p>Use unitising and known facts to support mental calculations.</p> <table border="1" data-bbox="892 281 1417 430"> <tr> <th>Th</th> <th>H</th> <th>T</th> <th>O</th> </tr> <tr> <td>●●●●●</td> <td>●●</td> <td>●●●●●</td> <td>●●●●●</td> </tr> <tr> <td></td> <td>●●●●●</td> <td></td> <td></td> </tr> </table> <p>I can add the 100s mentally.</p> <p>200 + 300 = 500</p> <p>So, 4,256 + 300 = 4,556</p>	Th	H	T	O	●●●●●	●●	●●●●●	●●●●●		●●●●●			<p>Use unitising and known facts to support mental calculations.</p> <p>4,256 + 300 = ?</p> <p>2 + 3 = 5      200 + 300 = 500</p> <p>4,256 + 300 = 4,556</p>
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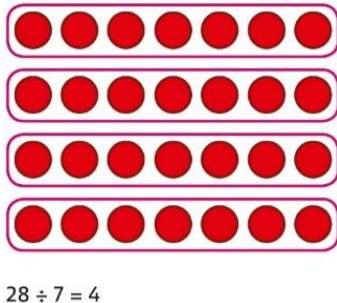
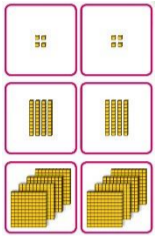

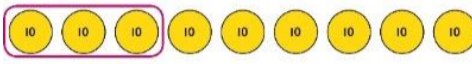

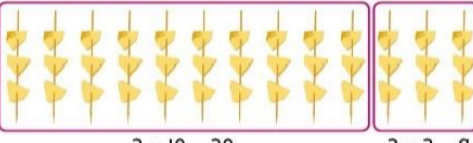
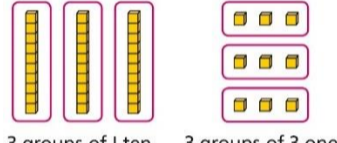
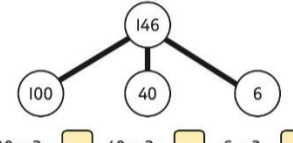
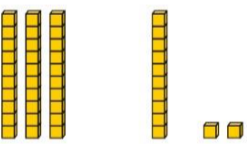
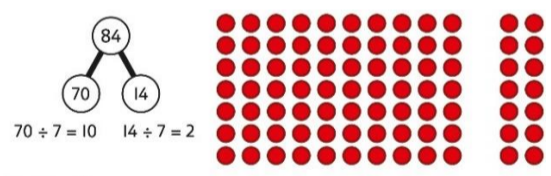
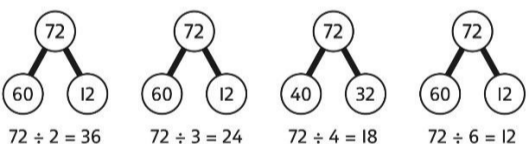
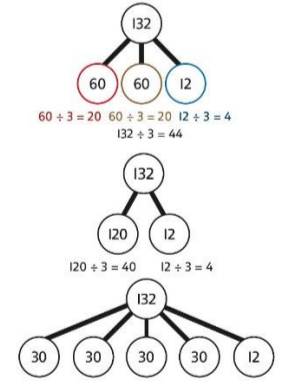
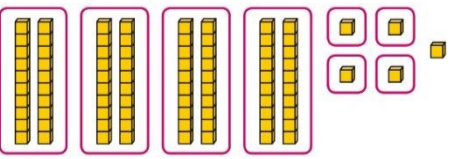
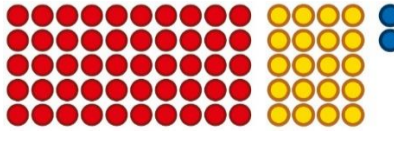
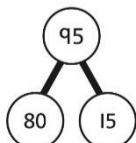
<p><b>Column addition with exchange</b></p>	<p>Use place value equipment on a place value grid to organise thinking.</p> <p>Ensure that children understand how the columns relate to place value and what to do if the numbers are not all 4-digit numbers.</p> <p>Use equipment to show 1,905 + 775.</p> <table border="1" data-bbox="325 875 850 1023"> <tr> <th>Th</th> <th>H</th> <th>T</th> <th>O</th> </tr> <tr> <td>●</td> <td>●●●●●</td> <td></td> <td>●●●●●</td> </tr> <tr> <td></td> <td>●●●●●</td> <td>●●●●●</td> <td>●●●●●</td> </tr> </table> <p>Why have only three columns been used for the second row? Why is the Thousands box empty?</p> <p>Which columns will total 10 or more?</p>	Th	H	T	O	●	●●●●●		●●●●●		●●●●●	●●●●●	●●●●●	<p>Use place value equipment to model required exchanges.</p> <table border="1" data-bbox="892 712 1417 860"> <tr> <th>Th</th> <th>H</th> <th>T</th> <th>O</th> </tr> <tr> <td>●</td> <td>●●●●●</td> <td>●●●●●</td> <td>●●●●●</td> </tr> <tr> <td>●●●●●</td> <td>●●</td> <td>●●●●●</td> <td>●●●●●</td> </tr> </table> <table border="1" data-bbox="892 890 1417 1038"> <tr> <th>Th</th> <th>H</th> <th>T</th> <th>O</th> </tr> <tr> <td>●</td> <td>●●●●●</td> <td>●●●●●</td> <td></td> </tr> <tr> <td>●●●●●</td> <td>●●</td> <td>●●●●●</td> <td>●</td> </tr> </table> <table border="1" data-bbox="892 1068 1417 1216"> <tr> <th>Th</th> <th>H</th> <th>T</th> <th>O</th> </tr> <tr> <td>●</td> <td>●●●●●</td> <td>●●●●●</td> <td></td> </tr> <tr> <td>●●●●●</td> <td>●●</td> <td>●●●●●</td> <td>●</td> </tr> </table> <table border="1" data-bbox="892 1246 1417 1394"> <tr> <th>Th</th> <th>H</th> <th>T</th> <th>O</th> </tr> <tr> <td>●</td> <td>●●●●●</td> <td>●●●●●</td> <td></td> </tr> <tr> <td>●●●●●</td> <td>●●</td> <td>●●●●●</td> <td>●</td> </tr> </table> <p>Include examples that exchange in more than one column.</p>	Th	H	T	O	●	●●●●●	●●●●●	●●●●●	●●●●●	●●	●●●●●	●●●●●	Th	H	T	O	●	●●●●●	●●●●●		●●●●●	●●	●●●●●	●	Th	H	T	O	●	●●●●●	●●●●●		●●●●●	●●	●●●●●	●	Th	H	T	O	●	●●●●●	●●●●●		●●●●●	●●	●●●●●	●	<p>Use a column method to add, including exchanges.</p> <table border="1" data-bbox="1459 712 1669 875"> <tr> <th>Th</th> <th>H</th> <th>T</th> <th>O</th> </tr> <tr> <td>1</td> <td>5</td> <td>5</td> <td>4</td> </tr> <tr> <td>+</td> <td>4</td> <td>2</td> <td>3</td> </tr> <tr> <td></td> <td></td> <td></td> <td>7</td> </tr> <tr> <td></td> <td></td> <td></td> <td>1</td> </tr> </table> <table border="1" data-bbox="1459 934 1669 1113"> <tr> <th>Th</th> <th>H</th> <th>T</th> <th>O</th> </tr> <tr> <td>1</td> <td>5</td> <td>5</td> <td>4</td> </tr> <tr> <td>+</td> <td>4</td> <td>2</td> <td>3</td> </tr> <tr> <td></td> <td></td> <td>9</td> <td>1</td> </tr> </table> <table border="1" data-bbox="1459 1172 1669 1350"> <tr> <th>Th</th> <th>H</th> <th>T</th> <th>O</th> </tr> <tr> <td>1</td> <td>5</td> <td>5</td> <td>4</td> </tr> <tr> <td>+</td> <td>4</td> <td>2</td> <td>3</td> </tr> <tr> <td></td> <td>7</td> <td>9</td> <td>1</td> </tr> </table> <table border="1" data-bbox="1459 1409 1669 1587"> <tr> <th>Th</th> <th>H</th> <th>T</th> <th>O</th> </tr> <tr> <td>1</td> <td>5</td> <td>5</td> <td>4</td> </tr> <tr> <td>+</td> <td>4</td> <td>2</td> <td>3</td> </tr> <tr> <td>5</td> <td>7</td> <td>9</td> <td>1</td> </tr> </table> <p>Include examples that exchange in more than one column.</p>	Th	H	T	O	1	5	5	4	+	4	2	3				7				1	Th	H	T	O	1	5	5	4	+	4	2	3			9	1	Th	H	T	O	1	5	5	4	+	4	2	3		7	9	1	Th	H	T	O	1	5	5	4	+	4	2	3	5	7	9	1
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<p><b>Representing additions and checking strategies</b></p>	<p>Bar models may be used to represent additions in problem contexts, and to justify mental methods where appropriate.</p> <table border="1" data-bbox="892 1855 1197 1944"> <tr> <td>1,373</td> <td></td> </tr> <tr> <td>799</td> <td>574</td> </tr> </table> <table border="1" data-bbox="1249 1825 1417 1973"> <tr> <th>Th</th> <th>H</th> <th>T</th> <th>O</th> </tr> <tr> <td></td> <td>7</td> <td>9</td> <td>9</td> </tr> <tr> <td></td> <td>5</td> <td>7</td> <td>4</td> </tr> <tr> <td>1</td> <td>3</td> <td>7</td> <td>3</td> </tr> </table> <p>I chose to work out 574 + 800, then subtract 1.</p> <table border="1" data-bbox="892 2107 1333 2211"> <tr> <td>2,999</td> <td>3,001</td> </tr> </table> <p>This is equivalent to 3,000 + 3,000.</p>	1,373		799	574	Th	H	T	O		7	9	9		5	7	4	1	3	7	3	2,999	3,001	<p>Use rounding and estimating on a number line to check the reasonableness of an addition.</p> <p>0 1,000 2,000 3,000 4,000 5,000 6,000 7,000 8,000 9,000 10,000</p> <p>912 + 6,149 = ?</p> <p>I used rounding to work out that the answer should be approximately 1,000 + 6,000 = 7,000.</p>
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799	574																							
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	7	9	9																					
	5	7	4																					
1	3	7	3																					
2,999	3,001																							

<p><b>Year 4 Subtraction</b></p>	<p><b>Choosing mental methods where appropriate</b></p> <p>Use place value equipment to justify mental methods.</p>  <p>What number will be left if we take away 300?</p>	<p>Use place value grids to support mental methods where appropriate.</p> <table border="1" data-bbox="892 2448 1417 2537"> <tr> <th>Th</th> <th>H</th> <th>T</th> <th>O</th> </tr> <tr> <td>●●●●●</td> <td>●●●●●</td> <td>●●●●●</td> <td>●●●●●</td> </tr> <tr> <td>●●●●●</td> <td>●</td> <td>●●●●●</td> <td>●</td> </tr> </table> <p>7,646 - 40 = 7,606</p>	Th	H	T	O	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●	●	●●●●●	●	<p>Use knowledge of place value and unitising to subtract mentally where appropriate.</p> <p>3,501 - 2,000</p> <p>3 thousands - 2 thousands = 1 thousand</p> <p>3,501 - 2,000 = 1,501</p>
Th	H	T	O												
●●●●●	●●●●●	●●●●●	●●●●●												
●●●●●	●	●●●●●	●												

<p><b>Column subtraction with exchange</b></p>	<p>Understand why exchange of a 1,000 for 100s, a 100 for 10s, or a 10 for 1s may be necessary.</p> 	<p>Represent place value equipment on a place value grid to subtract, including exchanges where needed.</p> 	<p>Use column subtraction, with understanding of the place value of any exchange required.</p> $\begin{array}{r} \text{Th} \quad \text{H} \quad \text{T} \quad \text{O} \\ 1 \quad 2 \quad 5 \quad 0 \\ - \quad 4 \quad 2 \quad 0 \\ \hline \quad \quad \quad 0 \end{array}$ $\begin{array}{r} \text{Th} \quad \text{H} \quad \text{T} \quad \text{O} \\ 1 \quad 2 \quad 5 \quad 0 \\ - \quad 4 \quad 2 \quad 0 \\ \hline \quad 3 \quad 0 \end{array}$ $\begin{array}{r} \text{Th} \quad \text{H} \quad \text{T} \quad \text{O} \\ \cancel{1} \quad 2 \quad 5 \quad 0 \\ - \quad 4 \quad 2 \quad 0 \\ \hline \quad 8 \quad 3 \quad 0 \end{array}$ $\begin{array}{r} \text{Th} \quad \text{H} \quad \text{T} \quad \text{O} \\ \cancel{1} \quad 2 \quad 5 \quad 0 \\ - \quad 4 \quad 2 \quad 0 \\ \hline \quad 8 \quad 3 \quad 0 \end{array}$
<p><b>Column subtraction with exchange across more than one column</b></p>	<p>Understand why two exchanges may be necessary.</p> <p><math>2,502 - 243 = ?</math></p> 	<p>Make exchanges across more than one column where there is a zero as a place holder.</p> <p><math>2,502 - 243 = ?</math></p> 	<p>Make exchanges across more than one column where there is a zero as a place holder.</p> <p><math>2,502 - 243 = ?</math></p> $\begin{array}{r} \text{Th} \quad \text{H} \quad \text{T} \quad \text{O} \\ 2 \quad 4 \quad 0 \quad 2 \\ - \quad 2 \quad 4 \quad 3 \\ \hline \quad \quad \quad 0 \end{array}$ $\begin{array}{r} \text{Th} \quad \text{H} \quad \text{T} \quad \text{O} \\ 2 \quad 4 \quad 9 \quad 1 \quad 2 \\ - \quad 2 \quad 4 \quad 3 \\ \hline \quad \quad \quad 0 \end{array}$ $\begin{array}{r} \text{Th} \quad \text{H} \quad \text{T} \quad \text{O} \\ 2 \quad 4 \quad 9 \quad 1 \quad 2 \\ - \quad 2 \quad 4 \quad 3 \\ \hline 2 \quad 2 \quad 5 \quad 9 \end{array}$
<p><b>Representing subtractions and checking strategies</b></p>		<p>Use bar models to represent subtractions where a part needs to be calculated.</p>  <p><i>I can work out the total number of Yes votes using <math>5,762 - 2,899</math>.</i></p> <p>Bar models can also represent 'find the difference' as a subtraction problem.</p> 	<p>Use inverse operations to check subtractions.</p> <p><i>I calculated <math>1,225 - 799 = 574</math>. I will check by adding the parts.</i></p>  <p><i>The parts do not add to make 1,225. I must have made a mistake.</i></p>
<p><b>Year 4 Multiplication</b></p>			
<p><b>Multiplying by multiples of 10 and 100</b></p>	<p>Use unitising and place value equipment to understand how to multiply by multiples of 1, 10 and 100.</p>  <p>3 groups of 4 ones is 12 ones. 3 groups of 4 tens is 12 tens. 3 groups of 4 hundreds is 12 hundreds.</p>	<p>Use unitising and place value equipment to understand how to multiply by multiples of 1, 10 and 100.</p>  <p><math>3 \times 4 = 12</math> <math>3 \times 40 = 120</math> <math>3 \times 400 = 1,200</math></p>	<p>Use known facts and understanding of place value and commutativity to multiply mentally.</p> <p><math>4 \times 7 = 28</math> <math>4 \times 70 = 280</math> <math>40 \times 7 = 280</math> <math>4 \times 700 = 2,800</math> <math>400 \times 7 = 2,800</math></p>
<p><b>Understanding times-tables up to <math>12 \times 12</math></b></p>	<p>Understand the special cases of multiplying by 1 and 0.</p>	<p>Represent the relationship between the <math>\times 9</math> table and the <math>\times 10</math> table.</p>	<p>Understand how times-tables relate to counting patterns.</p> <p>Understand links between the</p>

	 <p><math>5 \times 1 = 5</math>      <math>5 \times 0 = 0</math></p>	 <p>Represent the <math>\times 11</math> table and <math>\times 12</math> tables in relation to the <math>\times 10</math> table.</p>  <p><math>2 \times 11 = 20 + 2</math>  <math>3 \times 11 = 30 + 3</math>  <math>4 \times 11 = 40 + 4</math></p>  <p><math>4 \times 12 = 40 + 8</math></p>	<p><math>\times 3</math> table, <math>\times 6</math> table and <math>\times 9</math> table  <math>5 \times 6</math> is double <math>5 \times 3</math></p> <p><math>\times 5</math> table and <math>\times 6</math> table  <i>I know that <math>7 \times 5 = 35</math></i>  <i>so I know that <math>7 \times 6 = 35 + 7</math>.</i></p> <p><math>\times 5</math> table and <math>\times 7</math> table  <math>3 \times 7 = 3 \times 5 + 3 \times 2</math></p>  <p><math>\times 9</math> table and <math>\times 10</math> table  <math>6 \times 10 = 60</math>  <math>6 \times 9 = 60 - 6</math></p>
<p><b>Understanding and using partitioning in multiplication</b></p>	<p>Make multiplications by partitioning.  <math>4 \times 12</math> is 4 groups of 10 and 4 groups of 2.</p>  <p><math>4 \times 12 = 40 + 8</math></p>	<p>Understand how multiplication and partitioning are related through addition.</p>  <p><math>4 \times 3 = 12</math>    <math>4 \times 5 = 20</math>      <math>4 \times 8 = 32</math></p> <p><math>4 \times 3 = 12</math>  <math>4 \times 5 = 20</math>  <math>12 + 20 = 32</math></p> <p><math>4 \times 8 = 32</math></p>	<p>Use partitioning to multiply 2-digit numbers by a single digit.</p> <p><math>18 \times 6 = ?</math></p>  <p><math>18 \times 6 = 10 \times 6 + 8 \times 6</math>  <math>= 60 + 48</math>  <math>= 108</math></p> <p><math>18 \times 6 = 10 \times 6 + 8 \times 6</math>  <math>= 60 + 48</math>  <math>= 108</math></p>
<p><b>Column multiplication for 2- and 3-digit numbers multiplied by a single digit</b></p>	<p>Use place value equipment to make multiplications.  <i>Make <math>4 \times 136</math> using equipment.</i></p>  <p><i>I can work out how many 1s, 10s and 100s.</i></p> <p><i>There are <math>4 \times 6</math> ones... 24 ones</i>  <i>There are <math>4 \times 3</math> tens ... 12 tens</i>  <i>There are <math>4 \times 1</math> hundreds ... 4 hundreds</i></p> <p><math>24 + 120 + 400 = 544</math></p>	<p>Use place value equipment alongside a column method for multiplication of up to 3-digit numbers by a single digit.</p>  <p><math>312</math>  <math>\times 3</math>  <math>\hline 936</math></p>	<p>Use the formal column method for up to 3-digit numbers multiplied by a single digit.</p> <p><math>312</math>  <math>\times 3</math>  <math>\hline 936</math></p> <p>Understand how the expanded column method is related to the formal column method and understand how any exchanges are related to place value at each stage of the calculation.</p> <p><math>23</math>  <math>\times 5</math>  <math>\hline 115</math></p> <p><math>23</math>  <math>\times 5</math>  <math>\hline 115</math></p>
<p><b>Multiplying more than two numbers</b></p>	<p>Represent situations by multiplying three numbers together.</p>  <p><i>Each sheet has <math>2 \times 5</math> stickers.</i>  <i>There are 3 sheets.</i></p> <p><i>There are <math>5 \times 2 \times 3</math> stickers in total.</i></p> <p><math>5 \times 2 \times 3 = 30</math></p> <p><math>10 \times 3 = 30</math></p>	<p>Understand that commutativity can be used to multiply in different orders.</p>  <p><math>2 \times 6 \times 10 = 120</math>  <math>12 \times 10 = 120</math></p> <p><math>10 \times 6 \times 2 = 120</math>  <math>60 \times 2 = 120</math></p>	<p>Use knowledge of factors to simplify some multiplications.</p> <p><math>24 \times 5 = 12 \times 2 \times 5</math></p> <p><math>12 \times 2 \times 5 =</math>  <math>12 \times 10 = 120</math></p> <p>So, <math>24 \times 5 = 120</math></p>
<p><b>Year 4 Division</b></p>			
<p><b>Understanding the relationship between multiplication and division, including times-tables</b></p>	<p>Use objects to explore families of multiplication and division facts.</p>  <p><math>4 \times 6 = 24</math>  <math>24</math> is 6 groups of 4.  <math>24</math> is 4 groups of 6.</p>	<p>Represent divisions using an array.</p>	<p>Understand families of related multiplication and division facts.</p> <p><i>I know that <math>5 \times 7 = 35</math></i></p> <p><i>so I know all these facts:</i></p> <p><math>5 \times 7 = 35</math>  <math>7 \times 5 = 35</math>  <math>35 = 5 \times 7</math>  <math>35 = 7 \times 5</math></p>

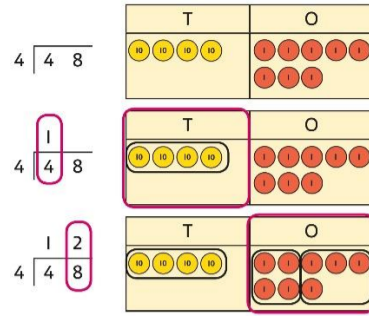
	<p>24 divided by 6 is 4. 24 divided by 4 is 6.</p>	 <p><math>28 \div 7 = 4</math></p>	<p><math>35 \div 5 = 7</math> <math>35 \div 7 = 5</math> <math>7 = 35 \div 5</math> <math>5 = 35 \div 7</math></p>
<p><b>Dividing multiples of 10 and 100 by a single digit</b></p>	<p>Use place value equipment to understand how to use unitising to divide.</p>  <p>8 ones divided into 2 equal groups 4 ones in each group</p> <p>8 tens divided into 2 equal groups 4 tens in each group</p> <p>8 hundreds divided into 2 equal groups 4 hundreds in each group</p>	<p>Represent divisions using place value equipment.</p> <p><math>9 \div 3 = \square</math></p>  <p><math>90 \div 3 = \square</math></p>  <p><math>900 \div 3 = \square</math></p>  <p><math>9 \div 3 = 3</math></p> <p>9 tens divided by 3 is 3 tens. 9 hundreds divided by 3 is 3 hundreds.</p>	<p>Use known facts to divide 10s and 100s by a single digit.</p> <p><math>15 \div 3 = 5</math></p> <p><math>150 \div 3 = 50</math></p> <p><math>1500 \div 3 = 500</math></p>
<p><b>Dividing 2-digit and 3-digit numbers by a single digit by partitioning into 100s, 10s and 1s</b></p>	<p>Partition into 10s and 1s to divide where appropriate.</p> <p><math>39 \div 3 = ?</math></p>  <p><math>3 \times 10 = 30</math>      <math>3 \times 3 = 9</math></p> <p><math>39 = 30 + 9</math></p> <p><math>30 \div 3 = 10</math> <math>9 \div 3 = 3</math> <math>39 \div 3 = 13</math></p>	<p>Partition into 100s, 10s and 1s using Base 10 equipment to divide where appropriate.</p> <p><math>39 \div 3 = ?</math></p>  <p>3 groups of 1 ten      3 groups of 3 ones</p> <p><math>39 = 30 + 9</math></p> <p><math>30 \div 3 = 10</math> <math>9 \div 3 = 3</math> <math>39 \div 3 = 13</math></p>	<p>Partition into 100s, 10s and 1s using a part-whole model to divide where appropriate.</p> <p><math>142 \div 2 = ?</math></p>  <p><math>100 \div 2 = \square</math>    <math>40 \div 2 = \square</math>    <math>6 \div 2 = \square</math></p> <p><math>100 \div 2 = 50</math> <math>40 \div 2 = 20</math> <math>6 \div 2 = 3</math> <math>50 + 20 + 3 = 73</math> <math>142 \div 2 = 73</math></p>
<p><b>Dividing 2-digit and 3-digit numbers by a single digit, using flexible partitioning</b></p>	<p>Use place value equipment to explore why different partitions are needed.</p> <p><math>42 \div 3 = ?</math></p> <p><i>I will split it into 30 and 12, so that I can divide by 3 more easily.</i></p> 	<p>Represent how to partition flexibly where needed.</p> <p><math>84 \div 7 = ?</math></p> <p><i>I will partition into 70 and 14 because I am dividing by 7.</i></p>  <p><math>70 \div 7 = 10</math>    <math>14 \div 7 = 2</math></p> <p><math>84 \div 7 = 12</math></p>	<p>Make decisions about appropriate partitioning based on the division required.</p>  <p><math>72 \div 2 = 36</math>    <math>72 \div 3 = 24</math>    <math>72 \div 4 = 18</math>    <math>72 \div 6 = 12</math></p> <p>Understand that different partitions can be used to complete the same division.</p>  <p><math>60 \div 3 = 20</math>    <math>60 \div 3 = 20</math>    <math>12 \div 3 = 4</math> <math>132 \div 3 = 44</math></p> <p><math>120 \div 3 = 40</math>    <math>12 \div 3 = 4</math></p> <p><math>30 \div 3 = 10</math>    <math>30 \div 3 = 10</math>    <math>30 \div 3 = 10</math>    <math>30 \div 3 = 10</math>    <math>12 \div 3 = 4</math></p>
<p><b>Understanding remainders</b></p>	<p>Use place value equipment to find remainders.</p> <p>85 shared into 4 equal groups</p> <p><i>There are 24, and 1 that cannot be shared.</i></p> 	<p>Represent the remainder as the part that cannot be shared equally.</p>  <p><math>72 \div 5 = 14 \text{ remainder } 2</math></p>	<p>Understand how partitioning can reveal remainders of divisions.</p>  <p><math>80 \div 4 = 20</math> <math>12 \div 4 = 3</math></p> <p><math>95 \div 4 = 23 \text{ remainder } 3</math></p>
<p><b>Dividing up to three digits by a single digit</b></p>	<p>Explore grouping using place value equipment.</p> <p><math>268 \div 2 = ?</math></p>	<p>Use place value equipment on a place value grid alongside short division. The model uses grouping.</p>	<p>Use short division for up to 4-digit numbers divided by a single digit.</p>

**using short division**

*There is 1 group of 2 hundreds.  
There are 3 groups of 2 tens.  
There are 4 groups of 2 ones.*

$$264 \div 2 = 132$$

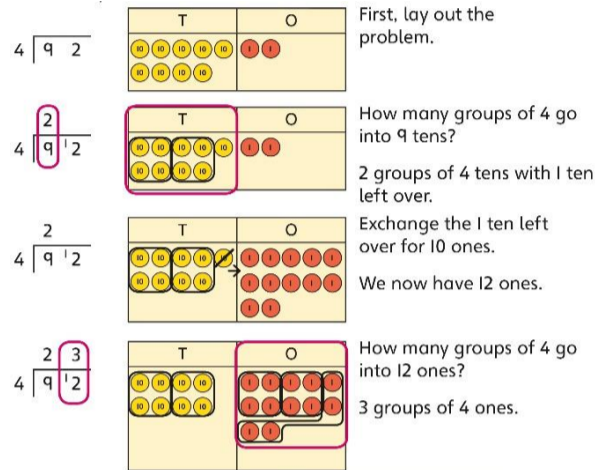
A sharing model can also be used, although the model would need adapting.



Lay out the problem as a short division.

*There is 1 group of 4 in 4 tens.  
There are 2 groups of 4 in 8 ones.*

Work with divisions that require exchange.



$$\begin{array}{r} 0556 \\ 7 \overline{) 3894} \end{array}$$

$$3,892 \div 7 = 556$$

## KEY STAGE 2

### **Power Maths calculation policy, UPPER KS2**

In upper Key Stage 2, children build on secure foundations in calculation, and develop fluency, accuracy and flexibility in their approach to the four operations. They work with whole numbers and adapt their skills to work with decimals, and they continue to develop their ability to select appropriate, accurate and efficient operations.

**Key language:** decimal, column methods, exchange, partition, mental method, ten thousand, hundred thousand, million, factor, multiple, prime number, square number, cube number

**Addition and subtraction:** Children build on their column methods to add and subtract numbers with up to seven digits, and they adapt the methods to calculate efficiently and effectively with decimals, ensuring understanding of place value at every stage.

Children compare and contrast methods, and they select mental methods or jottings where appropriate and where these are more likely to be efficient or accurate when compared with formal column methods.

Bar models are used to represent the calculations required to solve problems and may indicate where efficient methods can be chosen.

**Multiplication and division:** Building on their understanding, children develop methods to multiply up to 4-digit numbers by single-digit and 2-digit numbers.

Children develop column methods with an understanding of place value, and they continue to use the key skill of unitising to multiply and divide by 10, 100 and 1,000.

Written division methods are introduced and adapted for division by single-digit and 2-digit numbers and are understood alongside the area model and place value. In Year 6, children develop a secure understanding of how division is related to fractions.

Multiplication and division of decimals are also introduced and refined in Year 6.

**Fractions:** Children find fractions of amounts, multiply a fraction by a whole number and by another fraction, divide a fraction by a whole number, and add and subtract fractions with different denominators. Children become more confident working with improper fractions and mixed numbers and can calculate with them.

Understanding of decimals with up to 3 decimal places is built through place value and as fractions, and children calculate with decimals in the context of measure as well as in pure arithmetic.

Children develop an understanding of percentages in relation to hundredths, and they understand how to work with common percentages: 50%, 25%, 10% and 1%.

	Concrete	Pictorial	Abstract
<b>Year 5 Addition</b>			
<b>Column addition with whole numbers</b>	<p>Use place value equipment to represent additions.</p> <p>Add a row of counters onto the place value grid to show <math>15,735 + 4,012</math>.</p>	<p>Represent additions, using place value equipment on a place value grid alongside written methods.</p> <p>I need to exchange 10 tens for a 100.</p> $\begin{array}{r} \text{TTh Th H T O} \\ 2 \ 0 \ 1 \ 5 \ 3 \\ + 1 \ 9 \ 1 \ 7 \ 5 \\ \hline 3 \ 9 \ 3 \ 2 \ 8 \end{array}$	<p>Use column addition, including exchanges.</p> $\begin{array}{r} \text{TTh Th H T O} \\ 1 \ 9 \ 1 \ 7 \ 5 \\ + 1 \ 8 \ 4 \ 1 \ 7 \\ \hline 3 \ 7 \ 5 \ 9 \ 2 \end{array}$
<b>Representing additions</b>		<p>Bar models represent addition of two or more numbers in the context of problem solving.</p> $\begin{array}{r} \text{Th H T O} \\ 2 \ 6 \ 0 \ 0 \\ + 1 \ 4 \ 5 \ 0 \\ \hline 4 \ 0 \ 5 \ 0 \end{array} \quad \begin{array}{r} \text{Th H T O} \\ 2 \ 6 \ 0 \ 0 \\ + 4 \ 0 \ 5 \ 0 \\ \hline 6 \ 6 \ 5 \ 0 \end{array}$	<p>Use approximation to check whether answers are reasonable.</p> $\begin{array}{r} \text{TTh Th H T O} \\ 2 \ 3 \ 4 \ 0 \ 5 \\ + \quad 7 \ 8 \ 9 \ 2 \\ \hline 2 \ 0 \ 2 \ 9 \ 7 \end{array} \quad \begin{array}{r} \text{TTh Th H T O} \\ 2 \ 3 \ 4 \ 0 \ 5 \\ + \quad 7 \ 8 \ 9 \ 2 \\ \hline 3 \ 1 \ 2 \ 9 \ 7 \end{array}$ <p>I will use <math>23,000 + 8,000</math> to check.</p>
<b>Adding tenths</b>	<p>Link measure with addition of decimals.</p> <p>Two lengths of fencing are 0.6 m and 0.2 m. How long are they when added together?</p>	<p>Use a bar model with a number line to add tenths.</p> <p><math>0.6 + 0.2 = 0.8</math> 6 tenths + 2 tenths = 8 tenths</p>	<p>Understand the link with adding fractions.</p> $\frac{6}{10} + \frac{2}{10} = \frac{8}{10}$ <p>6 tenths + 2 tenths = 8 tenths <math>0.6 + 0.2 = 0.8</math></p>
<b>Adding decimals using column addition</b>	<p>Use place value equipment to represent additions.</p> <p>Show <math>0.23 + 0.45</math> using place value counters.</p>	<p>Use place value equipment on a place value grid to represent additions.</p> <p>Represent exchange where necessary.</p> <p>Include examples where the numbers of decimal places are different.</p>	<p>Add using a column method, ensuring that children understand the link with place value.</p> $\begin{array}{r} \text{O} \cdot \text{Tth Hth} \\ 0 \cdot 2 \ 3 \\ + 0 \cdot 4 \ 5 \\ \hline 0 \cdot 6 \ 8 \end{array}$ <p>Include exchange where required, alongside an understanding of place value.</p> $\begin{array}{r} \text{O} \cdot \text{Tth Hth} \\ 0 \cdot 9 \ 2 \\ + 0 \cdot 3 \ 3 \\ \hline 1 \cdot 2 \ 5 \end{array}$ <p>Include additions where the numbers of decimal places are different.</p> <p><math>3.4 + 0.65 = ?</math></p> $\begin{array}{r} \text{O} \cdot \text{Tth Hth} \\ 3 \cdot 4 \ 0 \\ + 0 \cdot 6 \ 5 \\ \hline \end{array}$
<b>Year 5 Subtraction</b>			
<b>Column subtraction with whole numbers</b>	<p>Use place value equipment to understand where exchanges are required.</p> <p><math>2,250 - 1,070</math></p>	<p>Represent the stages of the calculation using place value equipment on a grid alongside the calculation, including exchanges where required.</p> <p><math>15,735 - 2,582 = 13,153</math></p>	<p>Use column subtraction methods with exchange where required.</p> $\begin{array}{r} \text{TTh Th H T O} \\ 15 \ 735 \\ - 2 \ 582 \\ \hline 13 \ 153 \end{array}$ <p><math>62,097 - 18,534 = 43,563</math></p>

TTh	Th	H	T	O	TTh	Th	H	T	O
•	•••••	•••••	•••••	•••••	1	5	7	3	5
					-	2	5	8	2
									3

Now subtract the 10s. Exchange 1 hundred for 10 tens.

TTh	Th	H	T	O	TTh	Th	H	T	O	
•	•••••	•••••	•••••	•••••	1	5	<sup>1</sup> 3	5		
					-	2	5	8	2	
									5	3

Subtract the 100s, 1,000s and 10,000s.

TTh	Th	H	T	O	TTh	Th	H	T	O	
•	•••••	•••••	•••••	•••••	1	5	<sup>1</sup> 3	5		
					-	2	5	8	2	
						1	3	1	5	3

**Checking strategies and representing subtractions**

Bar models represent subtractions in problem contexts, including 'find the difference'.

Athletics Stadium 75,450

Hockey Centre 42,300

Velodrome 15,735 ← ?

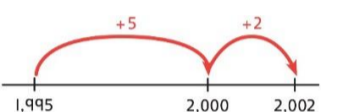
Children can explain the mistake made when the columns have not been ordered correctly.

Bella's working					Correct method				
TTh	Th	H	T	O	TTh	Th	H	T	O
1	7	8	7	7	1	7	8	7	7
+	4	0	1	2	+	4	0	1	2
5	7	9	9	7	2	1	8	8	9

Use approximation to check calculations.  
*I calculated 18,000 + 4,000 mentally to check my subtraction.*

**Choosing efficient methods**

To subtract two large numbers that are close, children find the difference by counting on.  
 $2,002 - 1,995 = ?$



Use addition to check subtractions.  
*I calculated 7,546 - 2,355 = 5,191. I will check using the inverse.*

**Subtracting decimals**

Explore complements to a whole number by working in the context of length.

0.49 m

1 m -     m =     m

$1 - 0.49 = ?$

Use a place value grid to represent the stages of column subtraction, including exchanges where required.

$5.74 - 2.25 = ?$

O	•	Tth	Hth	O	•	Tth	Hth
•••••	•	•••••	•••••	5	•	7	4
				-	2	•	5

Exchange 1 tenth for 10 hundredths.

O	•	Tth	Hth	O	•	Tth	Hth
•••••	•	•••••	•••••	5	•	<sup>1</sup> 4	•
				-	2	•	5

Now subtract the 5 hundredths.

O	•	Tth	Hth	O	•	Tth	Hth
•••••	•	•••••	•••••	5	•	<sup>1</sup> 4	•
				-	2	•	5
							9

Now subtract the 2 tenths, then the 2 ones.

O	•	Tth	Hth	O	•	Tth	Hth	
•••••	•	•••••	•••••	5	•	<sup>1</sup> 4	•	
				-	2	•	5	
					3	•	4	9

Use column subtraction, with an understanding of place value, including subtracting numbers with different numbers of decimal places.

$3.921 - 3.75 = ?$

O	•	Tth	Hth	Thth	
3	•	9	2	1	
-	3	•	7	5	0

**Year 5 Multiplication**

**Understanding factors**

Use cubes or counters to explore the meaning of 'square numbers'.

*25 is a square number because it is made from 5 rows of 5.*

Use cubes to explore cube numbers.

*8 is a cube number.*

Use images to explore examples and non-examples of square numbers.

$8 \times 8 = 64$   
 $8^2 = 64$

*12 is not a square number, because you cannot multiply a whole number by itself to make 12.*

Understand the pattern of square numbers in the multiplication tables.

Use a multiplication grid to circle each square number. Can children spot a pattern?

**Multiplying by 10, 100 and 1,000**

Use place value equipment to multiply by 10, 100 and 1,000 by unitising.

Understand the effect of repeated multiplication by 10.

Understand how exchange relates to the digits when multiplying by 10, 100 and 1,000.



$$\begin{array}{r} 1\ 2\ 7\ 4 \\ \times \quad 3\ 2 \\ \hline 2\ 5\ 4\ 8 \end{array} \quad 1,274 \times 2$$

Then multiply 1,274 by 30.

$$\begin{array}{r} 1\ 2\ 7\ 4 \\ \times \quad 3\ 2 \\ \hline 2\ 5\ 4\ 8 \quad 1,274 \times 2 \\ 3\ 8\ 2\ 2\ 0 \quad 1,274 \times 30 \\ \hline \end{array}$$

Finally, find the total.

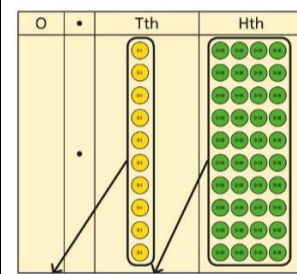
$$\begin{array}{r} 1\ 2\ 7\ 4 \\ \times \quad 3\ 2 \\ \hline 2\ 5\ 4\ 8 \quad 1,274 \times 2 \\ 3\ 8\ 2\ 2\ 0 \quad 1,274 \times 30 \\ \hline 4\ 0\ 7\ 6\ 8 \quad 1,274 \times 32 \end{array}$$

$$1,274 \times 32 = 40,768$$

### Multiplying decimals by 10, 100 and 1,000

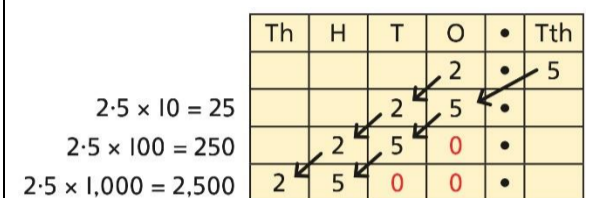
Use place value equipment to explore and understand the exchange of 10 tenths, 10 hundredths or 10 thousandths.

Represent multiplication by 10 as exchange on a place value grid.



$$0.14 \times 10 = 1.4$$

Understand how this exchange is represented on a place value chart.



$$2.5 \times 10 = 25$$

$$2.5 \times 100 = 250$$

$$2.5 \times 1,000 = 2,500$$

### Year 5 Division

#### Understanding factors and prime numbers

Use equipment to explore the factors of a given number.

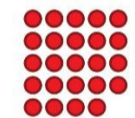


$$24 \div 3 = 8$$

$$24 \div 8 = 3$$

8 and 3 are factors of 24 because they divide 24 exactly.

$$24 \div 5 = 4 \text{ remainder } 4.$$



5 is not a factor of 24 because there is a remainder.

Understand that prime numbers are numbers with exactly two factors.

$$13 \div 1 = 13$$

$$13 \div 2 = 6 \text{ r } 1$$

$$13 \div 4 = 4 \text{ r } 1$$

1 and 13 are the only factors of 13. 13 is a prime number.

Understand how to recognise prime and composite numbers.

I know that 31 is a prime number because it can be divided by only 1 and itself without leaving a remainder.

I know that 33 is not a prime number as it can be divided by 1, 3, 11 and 33.

I know that 1 is not a prime number, as it has only 1 factor.

#### Understanding inverse operations and the link with multiplication, grouping and sharing

Use equipment to group and share and to explore the calculations that are present.

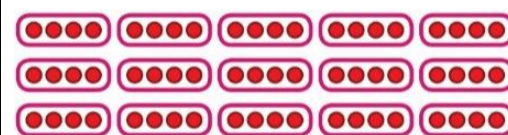
I have 28 counters.

I made 7 groups of 4. There are 28 in total.

I have 28 in total. I shared them equally into 7 groups. There are 4 in each group.

I have 28 in total. I made groups of 4. There are 7 equal groups.

Represent multiplicative relationships and explore the families of division facts.



$$60 \div 4 = 15$$

$$60 \div 15 = 4$$

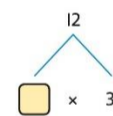
Represent the different multiplicative relationships to solve problems requiring inverse operations.

$$12 \div 3 = \square$$

$$12 \div \square = 3$$

$$\square \times 3 = 12$$

$$\square \div 3 = 12$$



Understand missing number problems for division calculations and know how to solve them using inverse operations.

$$22 \div ? = 2$$

$$22 \div 2 = ?$$

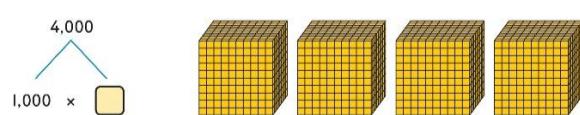
$$? \div 2 = 22$$

$$? \div 22 = 2$$

#### Dividing whole numbers by 10, 100 and 1,000

Use place value equipment to support unitising for division.

$$4,000 \div 1,000$$



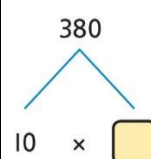
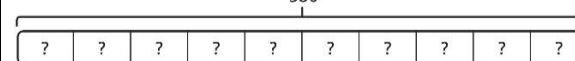
4,000 is 4 thousands.

$$4 \times 1,000 = 4,000$$

$$\text{So, } 4,000 \div 1,000 = 4$$

Use a bar model to support dividing by unitising.

$$380 \div 10 = 38$$



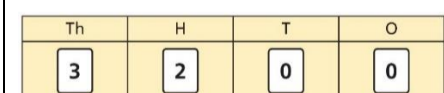
380 is 38 tens.

$$38 \times 10 = 380$$

$$10 \times 38 = 380$$

$$\text{So, } 380 \div 10 = 38$$

Understand how and why the digits change on a place value grid when dividing by 10, 100 or 1,000.



$$3,200 \div 100 = ?$$

3,200 is 3 thousands and 2 hundreds.

$$200 \div 100 = 2$$

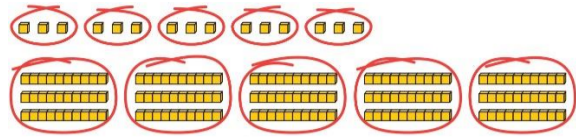
$$3,000 \div 100 = 30$$

$$3,200 \div 100 = 32$$

So, the digits will move two places to the right.

**Dividing by multiples of 10, 100 and 1,000**

Use place value equipment to represent known facts and unitising.

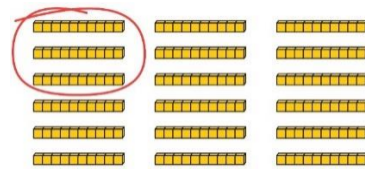


15 ones put into groups of 3 ones. There are 5 groups.  
 $15 \div 3 = 5$

15 tens put into groups of 3 tens. There are 5 groups.

$150 \div 30 = 5$

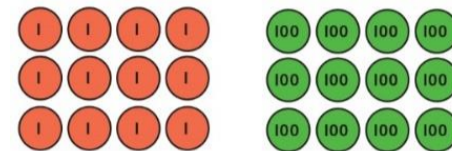
Represent related facts with place value equipment when dividing by unitising.



180 is 18 tens.

18 tens divided into groups of 3 tens. There are 6 groups.

$180 \div 30 = 6$



12 ones divided into groups of 4. There are 3 groups.

12 hundreds divided into groups of 4 hundreds. There are 3 groups.

$1200 \div 400 = 3$

Reason from known facts, based on understanding of unitising. Use knowledge of the inverse relationship to check.

$3,000 \div 5 = 600$   
 $3,000 \div 50 = 60$   
 $3,000 \div 500 = 6$

$5 \times 600 = 3,000$   
 $50 \times 60 = 3,000$   
 $500 \times 6 = 3,000$

**Dividing up to four digits by a single digit using short division**

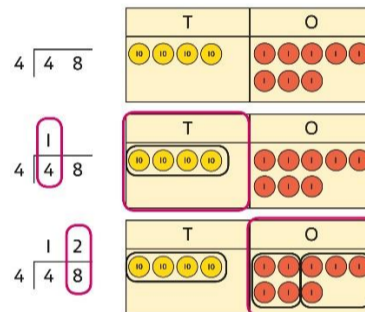
Explore grouping using place value equipment.

$268 \div 2 = ?$

There is 1 group of 2 hundreds.  
 There are 3 groups of 2 tens.  
 There are 4 groups of 2 ones.

$264 \div 2 = 134$

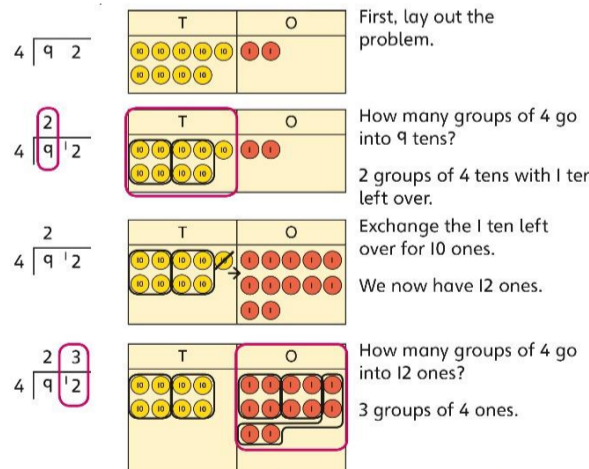
Use place value equipment on a place value grid alongside short division. The model uses grouping. A sharing model can also be used, although the model would need adapting.



Lay out the problem as a short division.

There is 1 group of 4 in 4 tens.  
 There are 2 groups of 4 in 8 ones.

Work with divisions that require exchange.



Use short division for up to 4-digit numbers divided by a single digit.

$$\begin{array}{r} 0556 \\ 7 \overline{) 3892} \end{array}$$

$3,892 \div 7 = 556$

Use multiplication to check.

$556 \times 7 = ?$

$6 \times 7 = 42$   
 $50 \times 7 = 350$   
 $500 \times 7 = 3500$

$3,500 + 350 + 42 = 3,892$

**Understanding remainders**

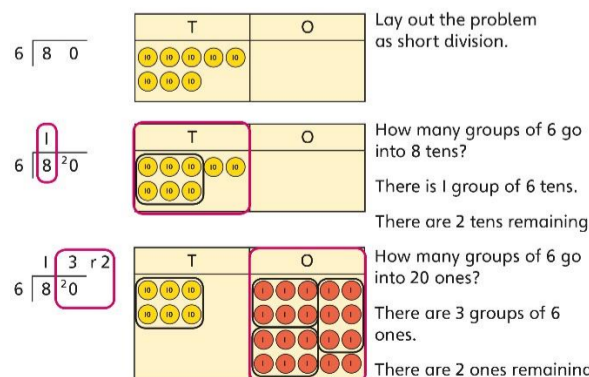
Understand remainders using concrete versions of a problem.

80 cakes divided into trays of 6.

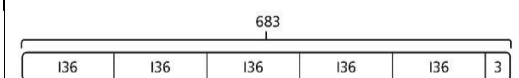


80 cakes in total. They make 13 groups of 6, with 2 remaining.

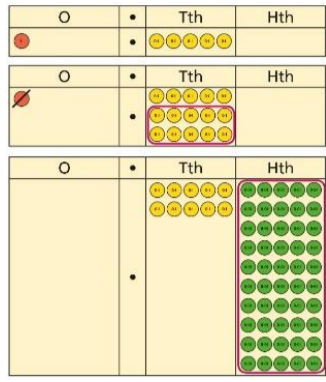
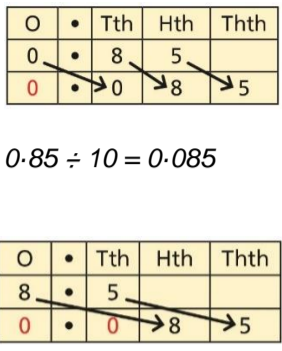
Use short division and understand remainders as the last remaining 1s.

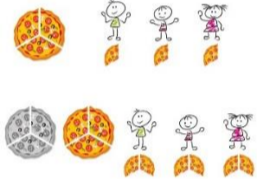



In problem solving contexts, represent divisions including remainders with a bar model.

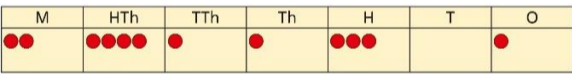
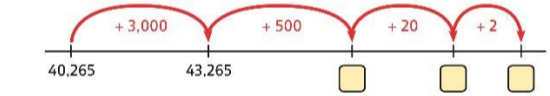
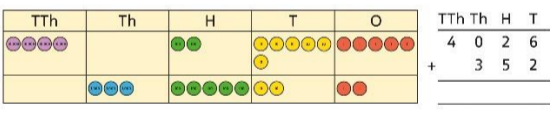
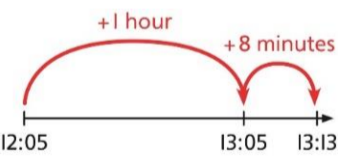
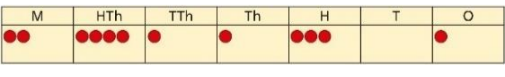
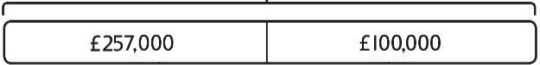


$683 = 136 \times 5 + 3$   
 $683 \div 5 = 136 \text{ r } 3$

<p><b>Dividing decimals by 10, 100 and 1,000</b></p>	<p>Understand division by 10 using exchange.</p> <p>2 ones are 20 tenths.</p> <p>20 tenths divided by 10 is 2 tenths.</p>	<p>Represent division using exchange on a place value grid.</p>  <p>1.5 is 1 one and 5 tenths. This is equivalent to 10 tenths and 50 hundredths. 10 tenths divided by 10 is 1 tenth. 50 hundredths divided by 10 is 5 hundredths. 1.5 divided by 10 is 1 tenth and 5 hundredths. <math>1.5 \div 10 = 0.15</math></p>	<p>Understand the movement of digits on a place value grid.</p>  <p><math>0.85 \div 10 = 0.085</math></p> <p><math>8.5 \div 100 = 0.085</math></p>
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<p><b>Understanding the relationship between fractions and division</b></p>	<p>Use sharing to explore the link between fractions and division.</p> <p>1 whole shared between 3 people. Each person receives one-third.</p> 	<p>Use a bar model and other fraction representations to show the link between fractions and division.</p>  <p><math>1 \div 3 = \frac{1}{3}</math></p>	<p>Use the link between division and fractions to calculate divisions.</p> <p><math>5 \div 4 = \frac{5}{4} = 1\frac{1}{4}</math></p> <p><math>11 \div 4 = \frac{11}{4} = 2\frac{3}{4}</math></p>
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Year 6

	Concrete	Pictorial	Abstract																																																																
<p><b>Year 6 Addition</b></p>																																																																			
<p><b>Comparing and selecting efficient methods</b></p>	<p>Represent 7-digit numbers on a place value grid, and use this to support thinking and mental methods.</p> 	<p>Discuss similarities and differences between methods, and choose efficient methods based on the specific calculation. Compare written and mental methods alongside place value representations.</p>   <p>Use bar model and number line representations to model addition in problem-solving and measure contexts.</p> 	<p>Use column addition where mental methods are not efficient. Recognise common errors with column addition.</p> <p><math>32,145 + 4,302 = ?</math></p> <table style="display: inline-table; margin-right: 20px;"> <tr><td>TTh</td><td>Th</td><td>H</td><td>T</td><td>O</td></tr> <tr><td>3</td><td>2</td><td>1</td><td>4</td><td>5</td></tr> <tr><td>+</td><td>4</td><td>3</td><td>0</td><td>2</td></tr> <tr><td>3</td><td>6</td><td>4</td><td>4</td><td>7</td></tr> </table> <table style="display: inline-table;"> <tr><td>TTh</td><td>Th</td><td>H</td><td>T</td><td>O</td></tr> <tr><td>3</td><td>2</td><td>1</td><td>4</td><td>5</td></tr> <tr><td>+</td><td>4</td><td>3</td><td>0</td><td>2</td></tr> <tr><td>7</td><td>5</td><td>1</td><td>6</td><td>5</td></tr> </table> <p>Which method has been completed accurately? What mistake has been made?</p> <p>Column methods are also used for decimal additions where mental methods are not efficient.</p> <table style="display: inline-table;"> <tr><td>H</td><td>T</td><td>O</td><td>·</td><td>Tth</td><td>Hth</td></tr> <tr><td>1</td><td>4</td><td>0</td><td>·</td><td>0</td><td>9</td></tr> <tr><td>+</td><td>4</td><td>9</td><td>·</td><td>8</td><td>9</td></tr> <tr><td>1</td><td>8</td><td>9</td><td>·</td><td>9</td><td>8</td></tr> </table>	TTh	Th	H	T	O	3	2	1	4	5	+	4	3	0	2	3	6	4	4	7	TTh	Th	H	T	O	3	2	1	4	5	+	4	3	0	2	7	5	1	6	5	H	T	O	·	Tth	Hth	1	4	0	·	0	9	+	4	9	·	8	9	1	8	9	·	9	8
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<p><b>Selecting mental methods for larger numbers where appropriate</b></p>	<p>Represent 7-digit numbers on a place value grid, and use this to support thinking and mental methods.</p>  <p><math>2,411,301 + 500,000 = ?</math></p> <p>This would be 5 more counters in the HTh place. So, the total is 2,911,301.</p> <p><math>2,411,301 + 500,000 = 2,911,301</math></p>	<p>Use a bar model to support thinking in addition problems.</p> <p><math>257,000 + 99,000 = ?</math></p>  <p>I added 100 thousands then subtracted 1 thousand.</p> <p>257 thousands + 100 thousands = 357 thousands</p> <p><math>257,000 + 100,000 = 357,000</math> <math>357,000 - 1,000 = 356,000</math></p>	<p>Use place value and unitising to support mental calculations with larger numbers.</p> <p><math>195,000 + 6,000 = ?</math></p> <p><math>195 + 5 + 1 = 201</math></p> <p>195 thousands + 6 thousands = 201 thousands</p> <p>So, <math>195,000 + 6,000 = 201,000</math></p>																																																																

So,  $257,000 + 99,000 = 356,000$

**Understanding order of operations in calculations**

Use equipment to model different interpretations of a calculation with more than one operation. Explore different results.

$3 \times 5 - 2 = ?$

$3 \times (5 - 2)$   
 $3 \times 3 = 9$

$(3 \times 5) - 2$   
 $15 - 2 = 13$

Model calculations using a bar model to demonstrate the correct order of operations in multi-step calculations.

This can be written as:  $16 \times 4 + 16 \times 6$   
 $64 + 96 = 160$

Understand the correct order of operations in calculations without brackets.

Understand how brackets affect the order of operations in a calculation.

$4 + 6 \times 16$   
 $4 + 96 = 100$

$(4 + 6) \times 16$   
 $10 \times 16 = 160$

**Year 6 Subtraction**

**Comparing and selecting efficient methods**

Use counters on a place value grid to represent subtractions of larger numbers.

Th	H	T	O
2	1	4	5
1	5	3	4

Compare subtraction methods alongside place value representations.

Th	H	T	O
2	6	7	9
2	1	4	5

Use a bar model to represent calculations, including 'find the difference' with two bars as comparison.

Compare and select methods. Use column subtraction when mental methods are not efficient. Use two different methods for one calculation as a checking strategy.

Th	H	T	O
1	5	5	8
3	9	4	

$1,552 - 1,558 = -6$

$1,552 - 1,952 = -400$

Use column subtraction for decimal problems, including in the context of measure.

H	T	O	Tth	Hth
3	0	9	6	0
2	0	6	4	0
1	0	3	2	0

**Subtracting mentally with larger numbers**

Use a bar model to show how unitising can support mental calculations.

$950,000 - 150,000$   
 That is 950 thousands - 150 thousands

So, the difference is 800 thousands.  
 $950,000 - 150,000 = 800,000$

Subtract efficiently from powers of 10.

$10,000 - 500 = ?$

**Year 6 Multiplication**

**Multiplying up to a 4-digit number by a single digit number**

Use equipment to explore multiplications.

Th	H	T	O
2	3	4	5

4 groups of 2,345  
 This is a multiplication:  
 $4 \times 2,345$   
 $2,345 \times 4$

Use place value equipment to compare methods.

Method 1

Method 2

$4 \times 3,000 + 4 \times 200 + 4 \times 20 + 4 \times 5$   
 $12,000 + 800 + 80 + 20 = 12,900$

Understand area model and short multiplication.

Compare and select appropriate methods for specific multiplications.

Method 3

	3,000	200	20	5
4	12,000	800	80	20

$12,000 + 800 + 80 + 20 = 12,900$

Method 4

3	2	2	5
4			
1	2	9	0

**Multiplying up to a 4-digit number by a 2-digit number**

Use an area model alongside written multiplication.

Method 1

	1,000	200	30	5
20	20,000	4,000	600	100
1	1,000	200	30	5

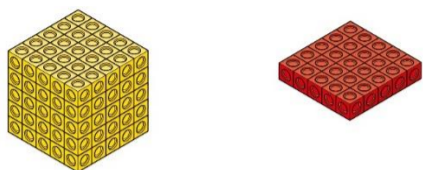
Use compact column multiplication with understanding of place value at all stages.

1	2	3	5	
2	1			
1	2	3	5	$1 \times 1,235$
2	4	7	0	$20 \times 1,235$
2	5	9	3	$21 \times 1,235$

1	2	3	5
x	2	1	
	5		1 × 5
	30		1 × 30
	200		1 × 200
	1000		1 × 1,000
	100		20 × 5
	600		20 × 30
	4000		20 × 200
	20000		20 × 1,000
	25935		21 × 1,235

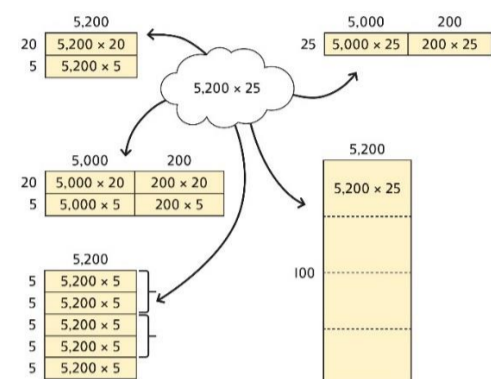
**Using knowledge of factors and partitions to compare methods for multiplications**

Use equipment to understand square numbers and cube numbers.



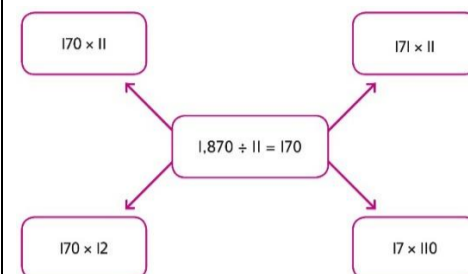
$5 \times 5 = 5^2 = 25$   
 $5 \times 5 \times 5 = 5^3 = 25 \times 5 = 125$

Compare methods visually using an area model. Understand that multiple approaches will produce the same answer if completed accurately.



Represent and compare methods using a bar model.

Use a known fact to generate families of related facts.

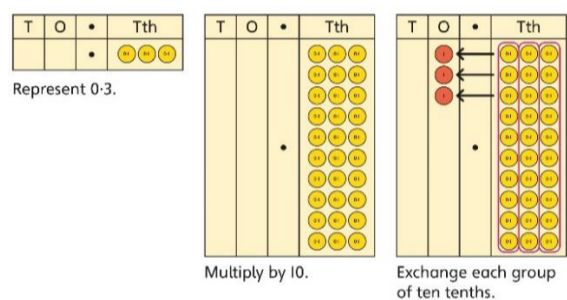


Use factors to calculate efficiently.

$15 \times 16$   
 $= 3 \times 5 \times 2 \times 8$   
 $= 3 \times 8 \times 2 \times 5$   
 $= 24 \times 10$   
 $= 240$

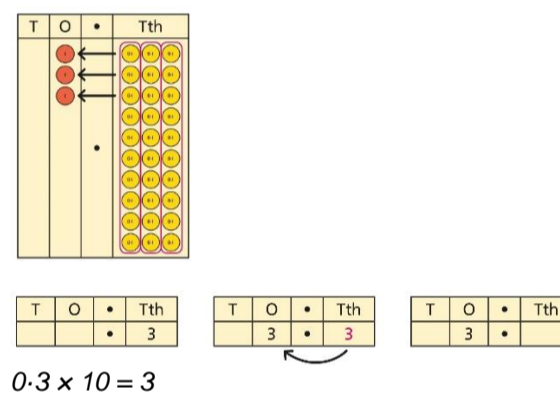
**Multiplying by 10, 100 and 1,000**

Use place value equipment to explore exchange in decimal multiplication.



$0.3 \times 10 = ?$   
 $0.3$  is 3 tenths.  
 $10 \times 3$  tenths are 30 tenths.  
 $30$  tenths are equivalent to 3 ones.

Understand how the exchange affects decimal numbers on a place value grid.

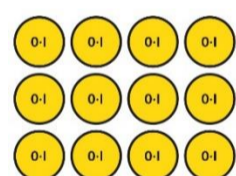


Use knowledge of multiplying by 10, 100 and 1,000 to multiply by multiples of 10, 100 and 1,000.

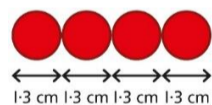
$8 \times 100 = 800$   
 $8 \times 300 = 800 \times 3$   
 $= 2,400$   
 $2.5 \times 10 = 25$   
 $2.5 \times 20 = 2.5 \times 10 \times 2$   
 $= 50$

**Multiplying decimals**

Explore decimal multiplications using place value equipment and in the context of measures.

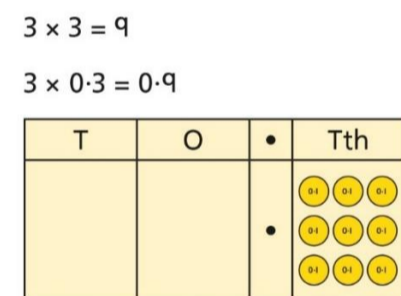


3 groups of 4 tenths is 12 tenths.  
 4 groups of 3 tenths is 12 tenths.

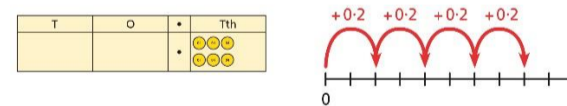


$4 \times 1 \text{ cm} = 4 \text{ cm}$   
 $4 \times 0.3 \text{ cm} = 1.2 \text{ cm}$   
 $4 \times 1.3 = 4 + 1.2 = 5.2 \text{ cm}$

Represent calculations on a place value grid.



Understand the link between multiplying decimals and repeated addition.



Use known facts to multiply decimals.

$4 \times 3 = 12$   
 $4 \times 0.3 = 1.2$   
 $4 \times 0.03 = 0.12$

$20 \times 5 = 100$   
 $20 \times 0.5 = 10$   
 $20 \times 0.05 = 1$

Find families of facts from a known multiplication.

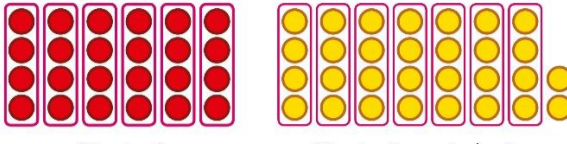
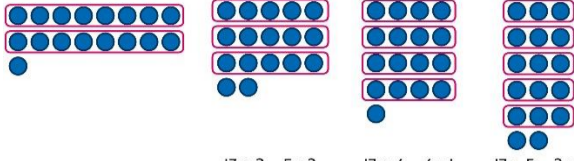
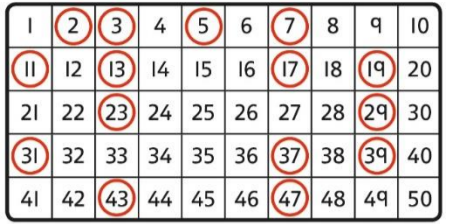
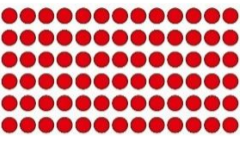
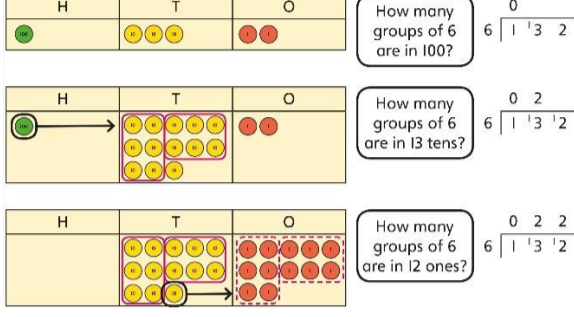
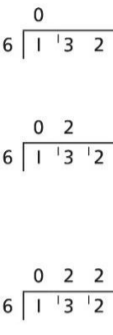
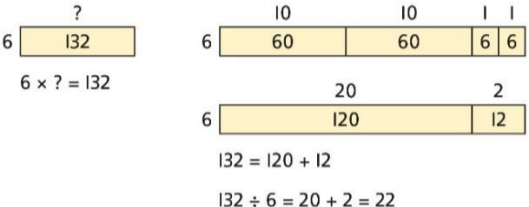

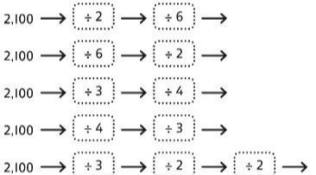
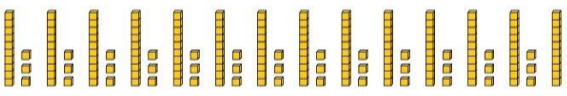
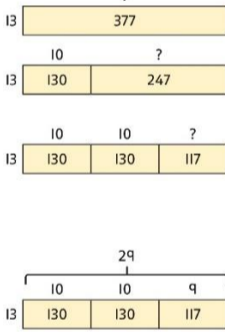
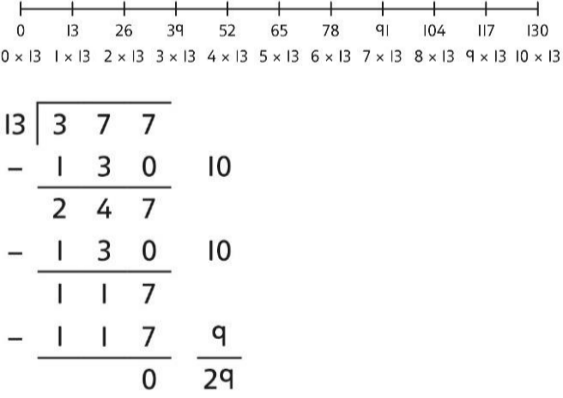
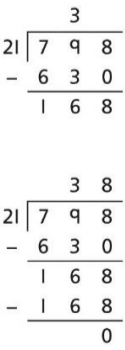
I know that  $18 \times 4 = 72$ .

This can help me work out:

$1.8 \times 4 = ?$   
 $18 \times 0.4 = ?$   
 $180 \times 0.4 = ?$   
 $18 \times 0.04 = ?$

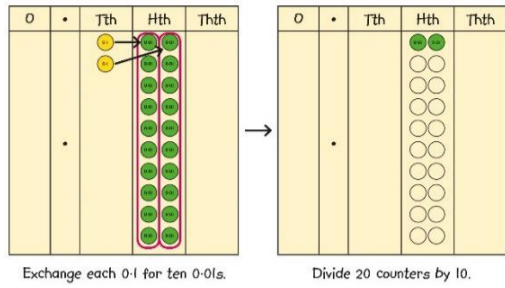
Use a place value grid to understand the effects of multiplying decimals.

	H	T	O	•	Tth	Hth
$2 \times 3$			6	•		
$0.2 \times 3$			0	•	6	
$0.02 \times 3$				•		

<p><b>Understanding factors</b></p>	<p>Use equipment to explore different factors of a number.</p>  <p><math>24 \div 4 = 6</math>      <math>30 \div 4 = 7 \text{ remainder } 2</math></p> <p><i>4 is a factor of 24 but is not a factor of 30.</i></p>	<p>Recognise prime numbers as numbers having exactly two factors. Understand the link with division and remainders.</p>  <p><math>17 \div 2 = 8 \text{ r } 1</math>      <math>17 \div 3 = 5 \text{ r } 2</math>      <math>17 \div 4 = 4 \text{ r } 1</math>      <math>17 \div 5 = 3 \text{ r } 2</math></p>	<p>Recognise and know primes up to 100. Understand that 2 is the only even prime, and that 1 is not a prime number.</p> 
<p><b>Dividing by a single digit</b></p>	<p>Use equipment to make groups from a total.</p>  <p><i>There are 78 in total. There are 6 groups of 13. There are 13 groups of 6.</i></p>	 <p>How many groups of 6 are in 100? <math>6 \overline{) 1002}</math></p> <p>How many groups of 6 are in 13 tens? <math>6 \overline{) 132}</math></p> <p>How many groups of 6 are in 12 ones? <math>6 \overline{) 132}</math></p>	<p>Use short division to divide by a single digit.</p>  <p>Use an area model to link multiplication and division.</p>  <p><math>6 \times ? = 132</math></p> <p><math>132 = 120 + 12</math></p> <p><math>132 \div 6 = 20 + 2 = 22</math></p>
<p><b>Dividing by a 2-digit number using factors</b></p>	<p>Understand that division by factors can be used when dividing by a number that is not prime.</p>	<p>Use factors and repeated division.</p> <p><math>1,260 \div 14 = ?</math></p>  <p><math>1,260 \div 2 = 630</math></p> <p><math>630 \div 7 = 90</math></p> <p><math>1,260 \div 14 = 90</math></p>	<p>Use factors and repeated division where appropriate.</p> <p><math>2,100 \div 12 = ?</math></p> 
<p><b>Dividing by a 2-digit number using long division</b></p>	<p>Use equipment to build numbers from groups.</p>  <p><i>182 divided into groups of 13. There are 14 groups.</i></p>	<p>Use an area model alongside written division to model the process.</p> <p><math>377 \div 13 = ?</math></p>  <p><math>377 \div 13 = 29</math></p>	<p>Use long division where factors are not useful (for example, when dividing by a 2-digit prime number). Write the required multiples to support the division process.</p> <p><math>377 \div 13 = ?</math></p>  <p><math>377 \div 13 = 29</math></p> <p>A slightly different layout may be used, with the division completed above rather than at the side.</p>  <p>Divisions with a remainder explored in problem-solving contexts.</p>

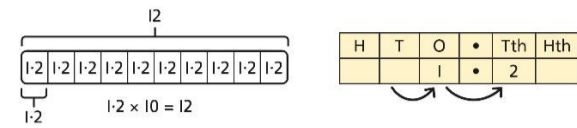
**Dividing by 10, 100 and 1,000**

Use place value equipment to explore division as exchange.

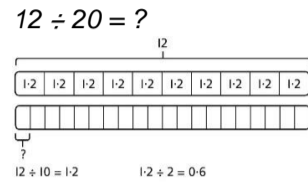


Exchange each 0.1 for ten 0.01s.  
Divide 20 counters by 10.  
 $0.2$  is 2 tenths.  
2 tenths is equivalent to 20 hundredths.  
20 hundredths divided by 10 is 2 hundredths.

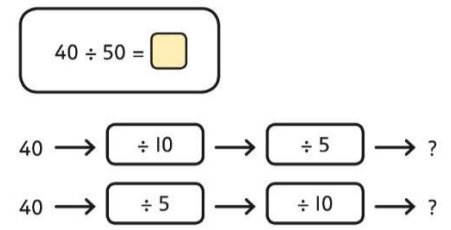
Represent division to show the relationship with multiplication. Understand the effect of dividing by 10, 100 and 1,000 on the digits on a place value grid.



Understand how to divide using division by 10, 100 and 1,000.



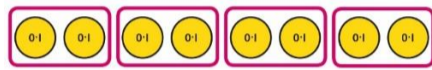
Use knowledge of factors to divide by multiples of 10, 100 and 1,000.



$40 \div 5 = 8$   
 $8 \div 10 = 0.8$   
So,  $40 \div 50 = 0.8$

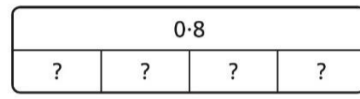
**Dividing decimals**

Use place value equipment to explore division of decimals.



8 tenths divided into 4 groups. 2 tenths in each group.

Use a bar model to represent divisions.



$4 \times 2 = 8$        $8 \div 4 = 2$   
So,  $4 \times 0.2 = 0.8$        $0.8 \div 4 = 0.2$

Use short division to divide decimals with up to 2 decimal places.

