New Invention Junior School

"We aim to teach and prepare your child today, for their tomorrow"

CPA Maths Policy

KS2

Power Maths & White Rose aligned

See also New Invention Junior School Visual Calculation Policy, Presentation Policy & Vocabulary Progression

K.McGlynn
Maths Lead
2023-2024

Our **aims** agree with those set out in the National Curriculum:

- become **fluent** in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately
- **reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- can **solve problems** by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

Intent

To build confidence, resilience and enjoyment of mathematics; becoming **fluent** in the fundamentals of mathematics, through varied and frequent practice so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately. To **reason** mathematically and **solve problems** by applying their mathematics to a variety of problems across the curriculum.

Implementation

- Ready to Progress criteria and prioritisation document used alongside White Rose and Power Maths for medium term planning;
- Fluent in Five arithmetic for daily practice;
- I see reasoning resources used in all content domains;
- Weekly problem solving skills lessons timetabled;
- Daily times tables practice.
- CPA resources used in all content domains in all year groups.
- Whole school calculation policy updated

Impact

Essential and fundamental skills prioritised so as pupils are prepared to transition to the next year group – pupils at ARE for Ready to Progress criteria.
CPA resources regularly used to help pupils achieve such skills.
Calculation policy embedded across the school
Pupils enjoy mathematics. – pupil voice

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Contents

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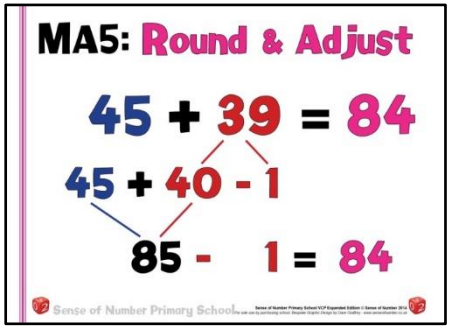
Mental Calculations

Most mental calculations can be solved using the strategies of Rapa Coda Numbo. This is an acronym for five different strategies. *(please refer to our visual calculation policy)*

RA – Round & Adjust
PA – Partitioning
CO – count on/back
DA – double & adjust
Numbo – Number Bonds

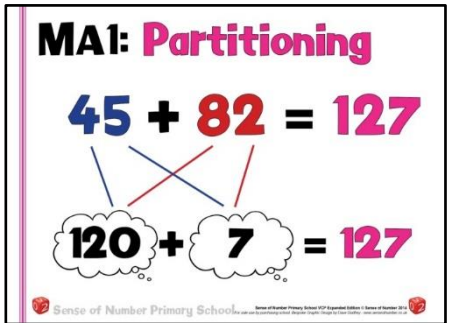
RA

Round and adjust can be used when a number is close to a multiple of 10, 100 or 1000, in order to make it quicker to add, subtract or multiply. The answer will then have to be adjusted to compensate for rounding.



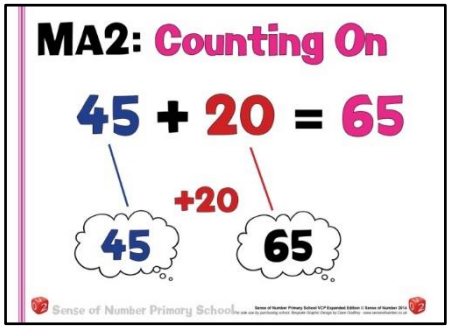
PA

Partitioning a number means to split it in to its place value, and calculate each digit separately before recombining. This can be used for addition, subtraction and multiplication.



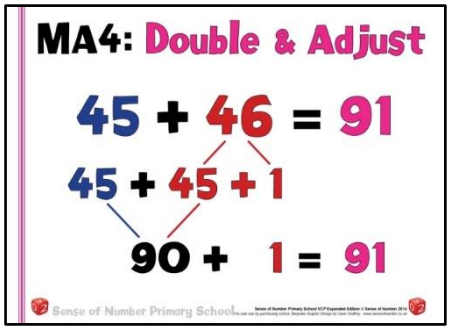
CO

Count on or back can be used for both addition and subtraction. It is simply starting at one of the numbers and counting in 1's, 2's 10 etc. till the final number is reached.



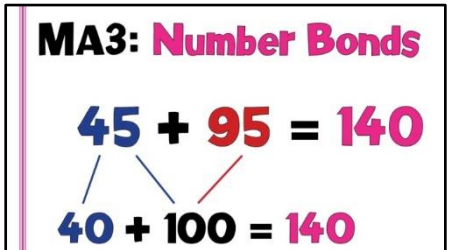
DA

Double and adjust is ideally suited to addition, subtraction and multiplication. When a pair of numbers are close to being equal, the calculation can be carried out as if they were the same and then the answer adjusted accordingly.



Numbo

Number bonds are essential for quick mental calculation, with known number bonds to and within 10, these can then be used to derive a range of addition and subtraction calculations.



Instant Recall of Facts

Pupils are taught instant recall of a range of facts to go alongside the deeper understanding of number. The following facts and year group expectation should be followed.

Whole school resources to be used:

- Times Tables booklets A-K
- Number Bonds booklets
- Times Tables Rockstars
- NumBots
- WhiteRose Minute Maths
- Daily 10

Year Group	Instant Recall Facts
2	• Number bonds to 10 and 20 at speed • Number bonds **within** 10 and 20 • Doubles to 10 and 20 • Times tables and revision facts of 2s, 5s and 10s by heart
3	• Number bonds to 10 and 20 at speed • Number bonds **within** 10 and 20 • Doubles to 50 (without bridging 10) • Half even numbers to 50 • Number bonds to 100 (multiples of 10) by heart • Times tables and revision facts of 2s, 5s, 10s, 4s, 8s and 3s by heart
4	• Number bonds to and **within** 10 and 20 at speed • Times tables and related division facts to 12X12 • Doubles to 50 (bridging 10) • Half even numbers to 100
5	• Number bonds to and within 10 and 20 at speed • Number bonds to and within 100 • Times tables and related division facts to 12X12 • Doubles and halves to 100
6	• Fast instant recall of all above bonds to be revised and applied

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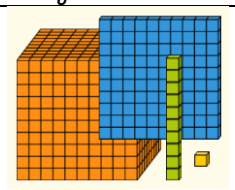
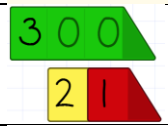
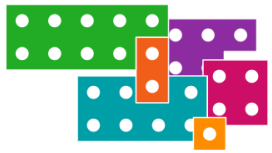
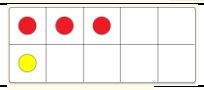
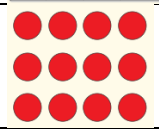
CPA Approach

Throughout KS2 all year groups to use a combination of concrete, pictorial & abstract representations when teaching calculations, with the aim pupils use and explain abstract techniques.

The following concrete resources & pictorial representations.

Concrete – pupils should use physical objects and manipulate accordingly	
Base 10	
Place Value Coins	
Place Value Cards / Arrow Cards	
Numicon	
Number Rods / Cuisenaire	
Tens Frame	
Counters	

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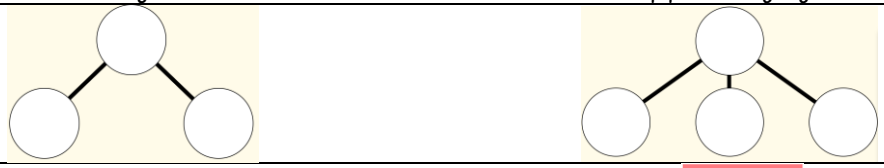
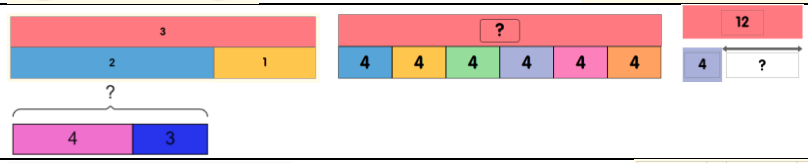
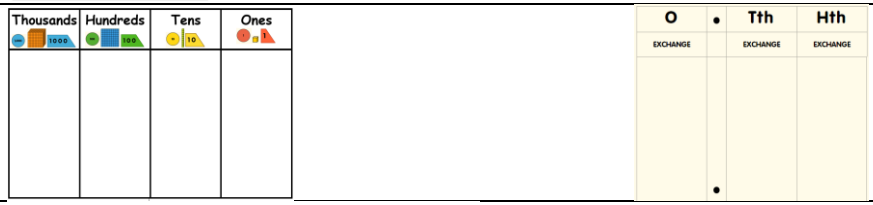
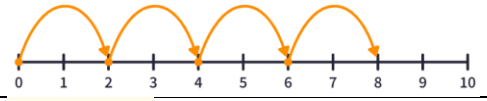
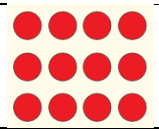
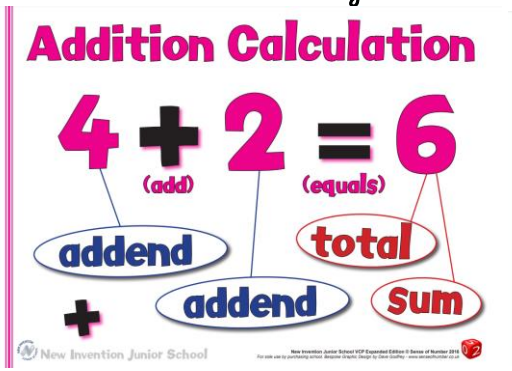
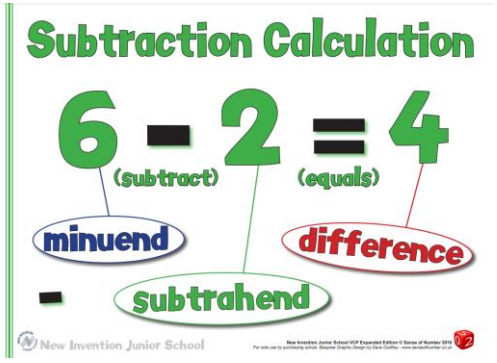
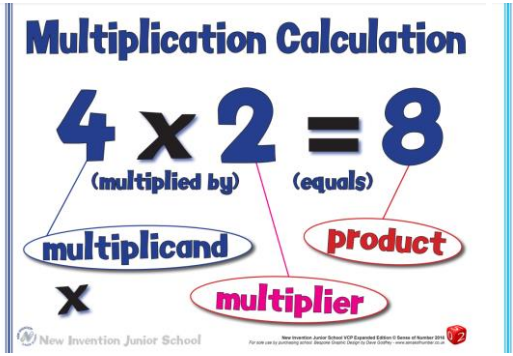
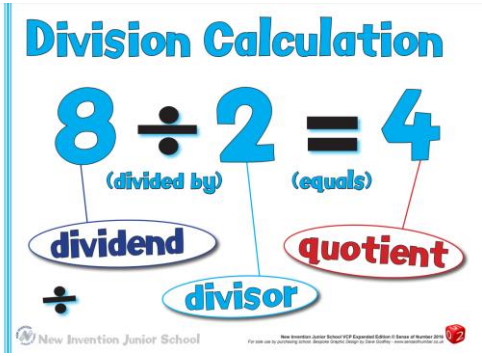
Pictorial – Pupils should use ***images*** of the above practical objects or numeric values and supporting grids	
Part Whole	
Bar Model	
Place Value Grids	
Number Line	
Arrays	

Calculation Vocabulary









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LOWER 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.

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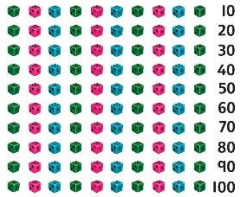
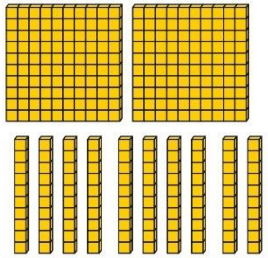
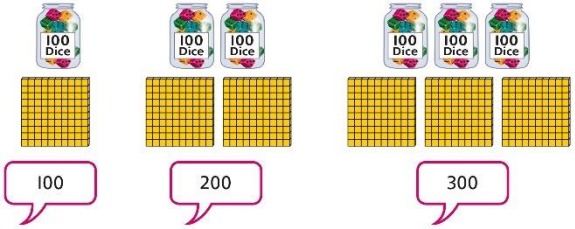
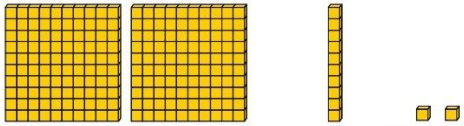
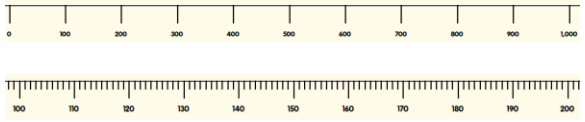
Year 3			
Year 3 Addition	**Concrete**	**Pictorial**	**Abstract**
Understanding 100s	Understand the cardinality of 100, and the link with 10 tens. Use cubes / counters to place into groups of 10 tens.  Use physical base ten equipment to investigate grouping tens in to 100s and groups of 100 	Unitise 100 and count in steps of 100.  	Represent steps of 100 on a number line and a number track and count up to 1,000 and back to 0. 
Understanding place value to 1,000	Use equipment to represent numbers to 1,000. Unitise 100s, 10s and 1s in the base 10 equipment to build 3-digit numbers. 	Use a place value grid to support the structure of numbers to 1,000.	Recognise numbers to 1,000 represented on a number line, including those between intervals. 

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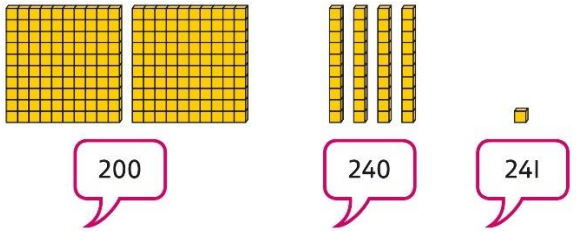
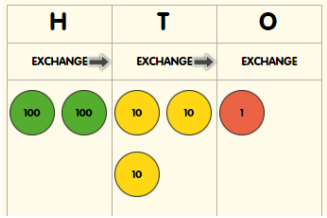
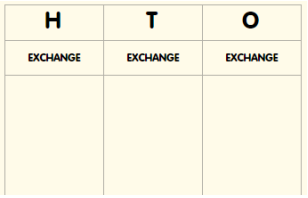
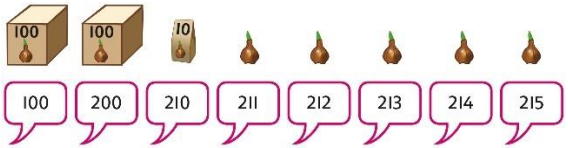
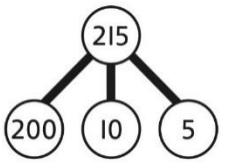
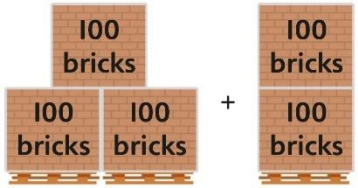
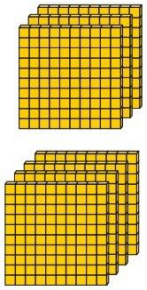
	 *Place value counters are used alongside place value grid children should understand how each counter represents a different unitised amount.* 	 *Use images of objects to represent 100s, 10s and 1s* 	*Represent the parts of numbers to 1,000 using a part-whole model.*  *215 = 200 + 10 + 5*
Adding 100s	*Use known facts and unitising to add multiples of 100.*  *3 + 2 = 5* *3 hundreds + 2 hundreds = 5 hundreds* *300 + 200 = 500* *Practical place value coins in part whole templates*	*Use known facts and unitising to add multiples of 100.*  *3 + 4 = 7* *3 hundreds + 4 hundreds = 7 hundreds* *300 + 400 = 700*	*Use known facts and unitising to add multiples of 100.* *Represent the addition on a number line.* 200 + 300 = 500  *Use a part-whole model to support unitising.*

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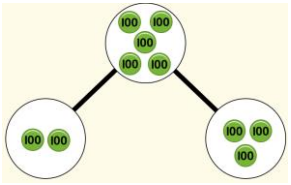
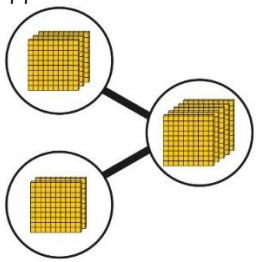
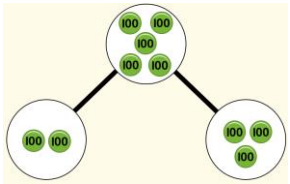
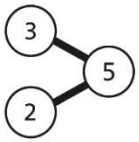
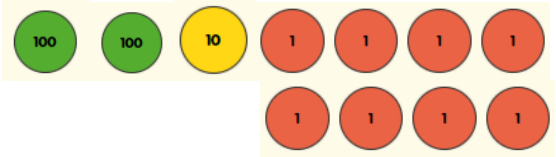
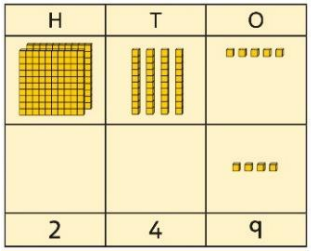
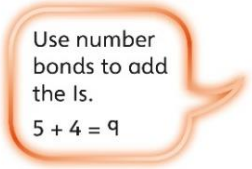
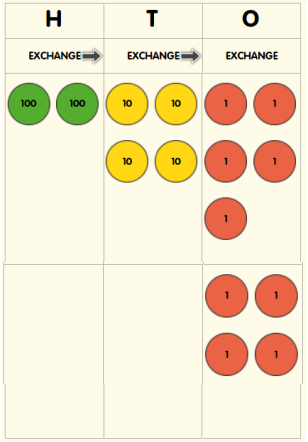
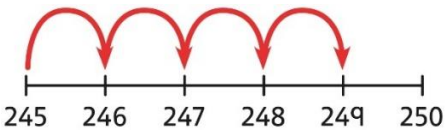
		Part whole models with images of concrete apparatus  	 3 + 2 = 5 300 + 200 = 500
3-digit number + 1s, no exchange or bridging	Use number bonds to add the 1s.  214 + 4 = ? Now there are 4 + 4 ones in total. 4 + 4 = 8 214 + 4 = 218 	Use number bonds to add the 1s.    245 + 4 5 + 4 = 9 245 + 4 = 249	Understand the link with counting on. 245 + 4  Use number bonds to add the 1s and understand that this is more efficient and less prone to error. 245 + 4 = ? I will add the 1s. 5 + 4 = 9 So, 245 + 4 = 249

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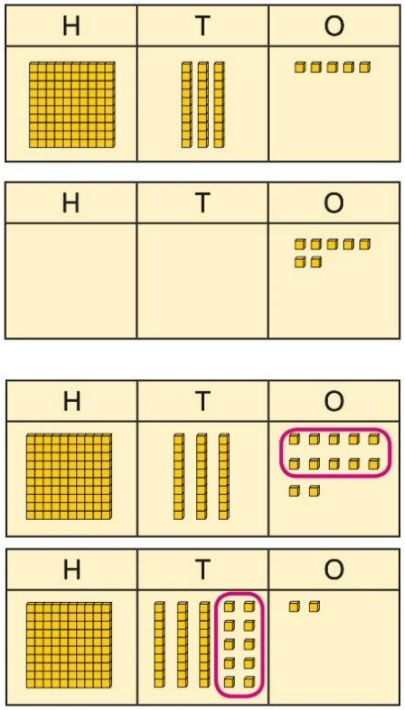
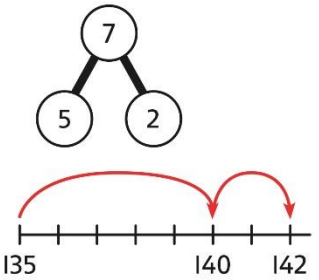
3-digit number + 1s with exchange	Understand that when the 1s sum to 10 or more, this requires an exchange of 10 ones for 1 ten. Children should explore this using unitised objects or physical apparatus.	Exchange 10 ones for 1 ten where needed. Use a place value grid to support the understanding. 	Understand how to bridge by partitioning to the 1s to make the next 10.  *135 + 7 = ?* *135 + 5 + 2 = 142* Ensure that children understand how to add 1s bridging a 100. *198 + 5 = ?* *198 + 2 + 3 = 203*

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		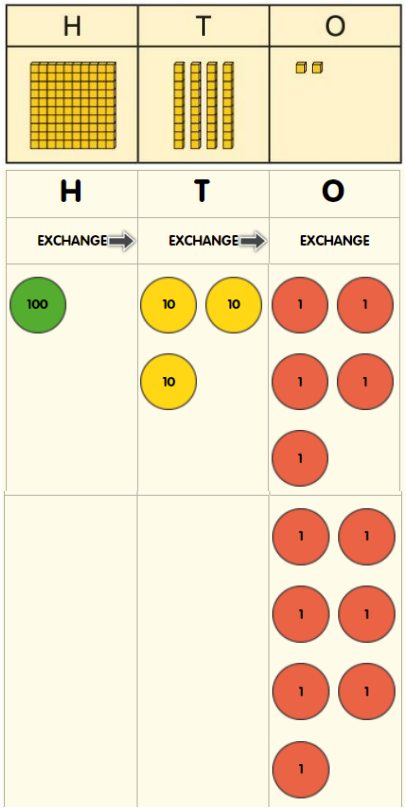	

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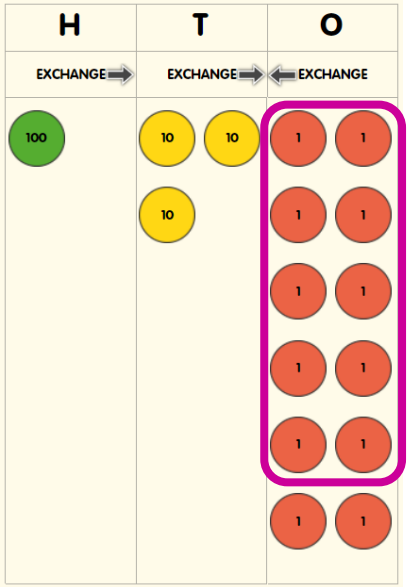
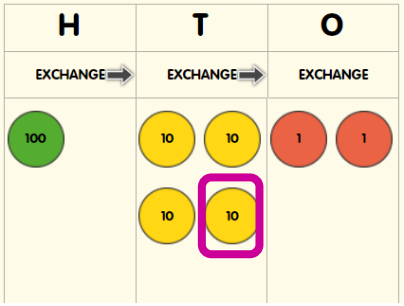
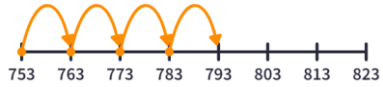
		  *135 + 7 = 142*	
3-digit number + 10s, no exchange	*Calculate mentally by forming the number bond for the 10s.*	*Calculate mentally by forming the number bond for the 10s.* *351 + 30 = ?*	*Counting on in 10s on a number line*  *I can count in 10s, 123, 133, 143, 153...*

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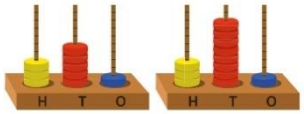
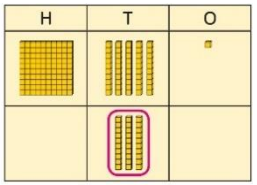
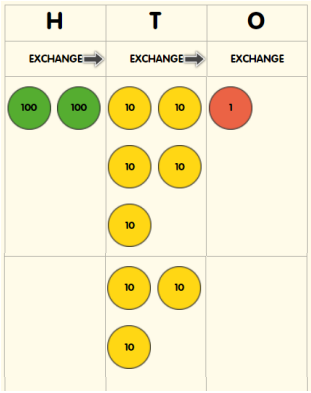
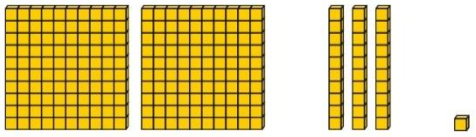
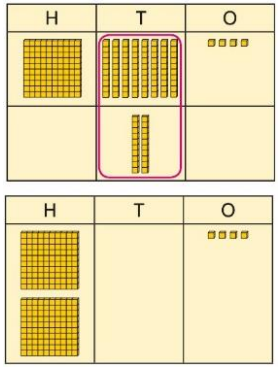
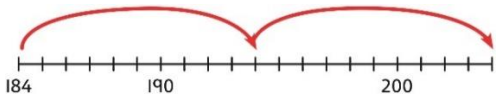
	 *234 + 50* *There are 3 tens and 5 tens altogether.* *3 + 5 = 8* *In total there are 8 tens.* *234 + 50 = 284*	   *5 tens + 3 tens = 8 tens* *351 + 30 = 381*	*Calculate mentally by forming the number bond for the 10s.* *753 + 40* *I know that 5 + 4 = 9* *So, 50 + 40 = 90* *753 + 40 = 793*
2 or 3-digit number + 10s, with exchange	*Understand the exchange of 10 tens for 1 hundred.* 	*Add by exchanging 10 tens for 1 hundred.* *184 + 20 = ?* 	*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.*

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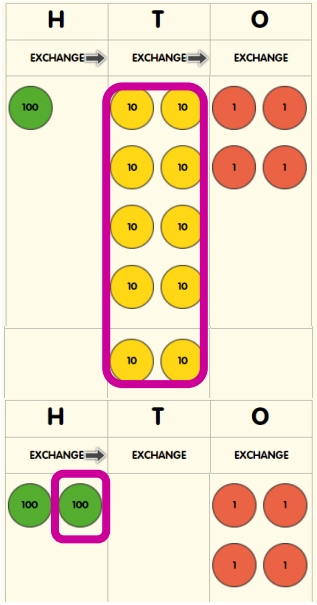
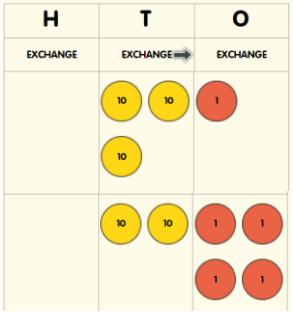
		 184 + 20 = 204	385 + 50 = 300 + 130 + 5 385 + 50 = 435
2 or 3-digit number + 2-digit number	Use place value equipment to make and combine groups to model addition. 	Use a place value grid to organise thinking and adding of 1s, then 10s.  50 5 31 + 24 = 55	Record metal working out, partitioning in to tens and ones, adding the two values separately. Using expanded column method. **31 + 24** 30 + 1 20 + 4 50 + 5 = 55 **47 + 76** 40 + 7 70 + 6 110 + 13 = 123 **138 + 64** 100 + 30 + 8 60 + 4 100 + 90 + 12 = 202

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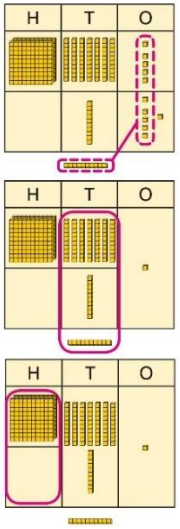
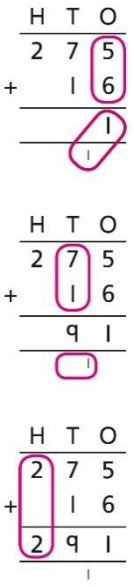
2 or 3-digit number + 2-digit number Expanded method	Practical representations as above with abstract alongside	Pictorial representations as above with abstract alongside	Use the expanded vertical column method to represent the addition. Children must understand how this relates to place value at each stage of the calculation. *31 + 24* 31 +24 5 +50 55 *47 + 76* 47 + 76 13 + 110 123
2 or 3-digit number + 2-digit number, exchange required Compact method	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 = ?  	Use a column method with exchange. Children must understand how the method relates to place value at each stage of the calculation.  275 + 16 = 291

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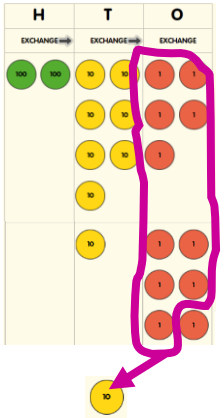
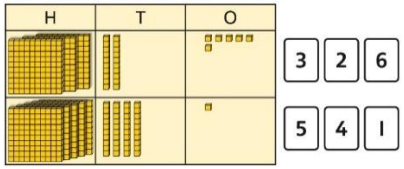
		 *275 + 16 = 291* *Note: In this example, a mental method may be more efficient. The numbers for the example calculation have been chosen to allow children to visualise the concept and see how the method relates to place value. Children should be encouraged at every stage to select methods that are accurate and efficient.*	
3-digit number + 3-digit number, no exchange	*Use place value equipment to make a representation of a calculation. This may or may not be structured in a place value grid.* *326 + 541 is represented as:* 	*Represent the place value grid with equipment to model the stages of column addition. (As above)*	*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.*

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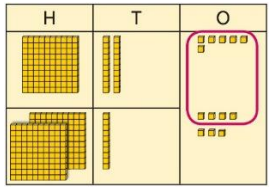
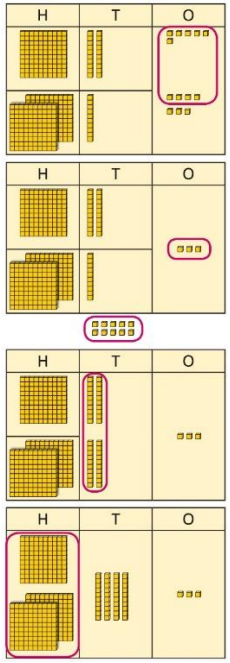
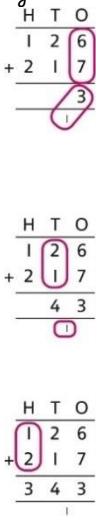
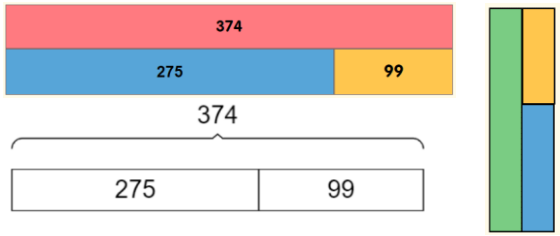
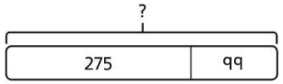
2 or 3 -digit number + 3-digit number, exchange required	Use place value equipment to enact the exchange required.  There are 13 ones. I will exchange 10 ones for 1 ten.	Model the stages of column addition using place value equipment on a place value grid.  	Use column addition, ensuring understanding 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 = ?
Representing addition problems, and selecting appropriate methods	Use of number rods / Cusinaire to model addition calculations with rods of relative sizes 	Children understand and create horizontal & vertical bar models to represent addition calculations. 275 + 99 = ?  275 + 99 = 374	Use representations to support choices of appropriate methods.  I will add 100, then subtract 1 to find the solution. 128 + 105 + 83 = ? I need to add three numbers.

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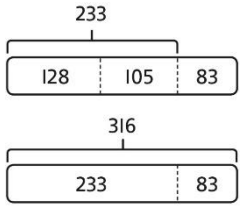
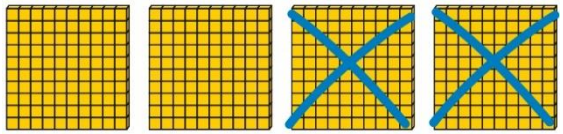
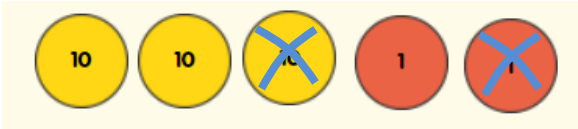
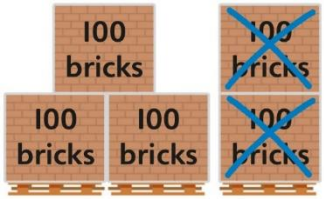
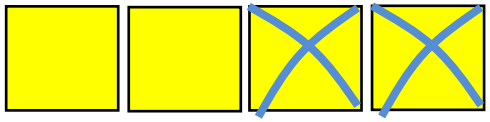
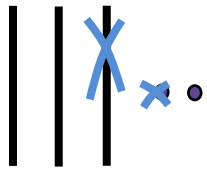
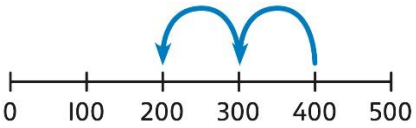
			128 + 105 = 233 
Year 3 Subtraction			
Subtracting 100s	Use known facts and **unitising** to subtract multiples of 100 using base 10 or place value counters.  4 – 2 = 2 400 – 200 = 200  32 – 11 =	Use known facts and **unitising** to subtract multiples of 100. Represent using simple images of concrete equipment.  5 – 2 = 3 500 – 200 = 300  4 – 2 = 2 400 – 200 = 200  32 – 11 =	Understand the link with counting back in 100s.  400 – 200 = 200 Use known facts and unitising as efficient and accurate methods. I know that 7 – 4 = 3. Therefore, I know that 700 – 400 = 300.

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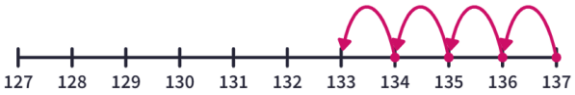
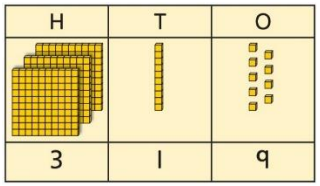
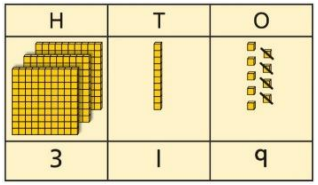
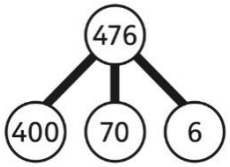
2 & 3-digit number – 1s, no exchange	Use number bonds to subtract the 1s.  214 – 3 = ?  4 – 3 = 1 214 – 3 = 211	Draw number lines to count backwards  137 – 4 = 133 Use number bonds to subtract the 1s.  319 – 4 = ?  9 – 4 = 5 319 – 4 = 315 Use known number bonds to calculate mentally, showing partitioning pictorially  6 – 4 = 2 476 – 4 = 472	Understand the link with counting back using a number line. Use known number bonds to calculate mentally. 476 – 4 = ? 6 – 4 = 2 476 – 4 = 472

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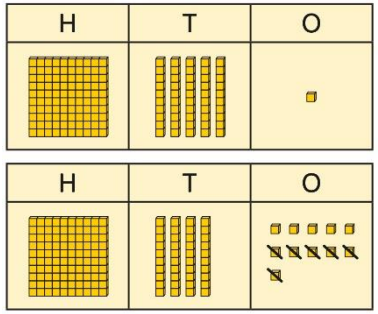
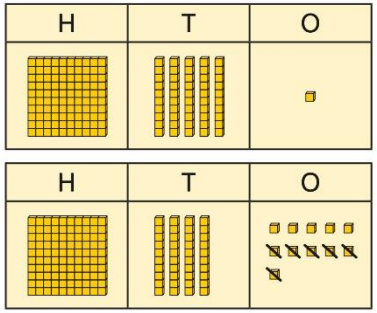
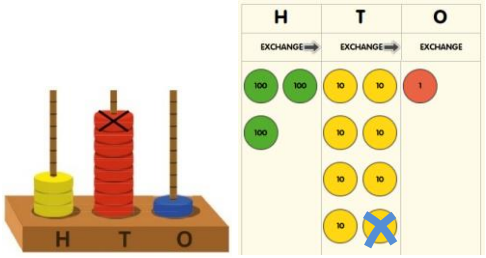
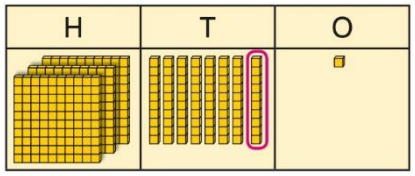
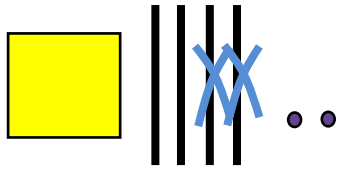
2 & 3-digit number – 1s, exchange or bridging required	*Understand why an exchange is necessary by exploring why 1 ten must be exchanged.* *Use place value equipment & modelling on board (PowerMaths / PolyPad / Maths Bot)* 	*Represent the required exchange on a place value grid with simple representations of concrete equipment.* *151 – 6 = ?* 	*Calculate mentally by using known bonds.* *151 – 6 = ?* *151 – 1 – 5 = 145* *Show exchange in the partitioned number sentences.* *Record exchange as separate number sentences* 151-6=**145** 150 – 0 = 40 1 – 6 = 5
2 & 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.*  *8 tens – 1 ten = 7 tens* *381 – 10 = 371*  *142 – 20 = 122*	*Use known bonds to subtract the 10s mentally.* *372 – 50 = ?* *300 – 0 = 300* ***70 – 50 = 20*** *2 – 0 = 2* *So, 372 – 50 = 322*
3-digit number – 10s, exchange	*Use equipment to understand the exchange of 1 hundred for 10 tens.*	*Represent the exchange on a place value grid using equipment.*	*Understand the link with counting back on a number line.*

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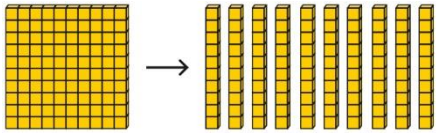
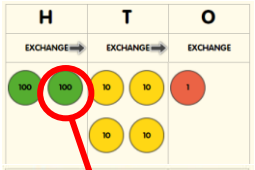
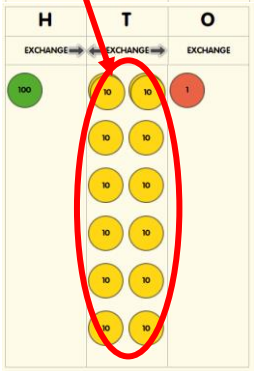
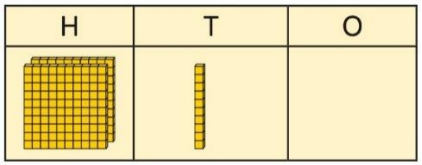
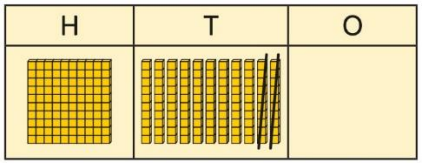
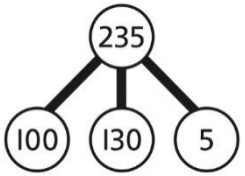
or bridging required	  	*210 – 20 = ?*  *I need to exchange 1 hundred for 10 tens, to help subtract 2 tens.*  *210 – 20 = 190* *Use flexible partitioning to support the calculation.* *235 – 60 = ?*  *235 = 100 + 130 + 5* *235 – 60 = 100 + 70 + 5* *= 175*	*Use flexible partitioning to support the calculation.* *235 – 60 = ?* *235 = 100 + 130 + 5* *235 – 60 = 100 + 70 + 5* *= 175* *Show exchange in the partitioned number sentences.* *Record exchange as separate number sentences* 217-30=**187** 200 – 0 = 100 110 – 30 = 80 7 – 0 = 7
3-digit number – up to 3-digit	*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.*	*Partition the digits according to place value and subtract each place value & re-combine*

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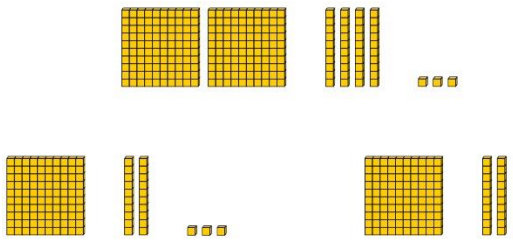
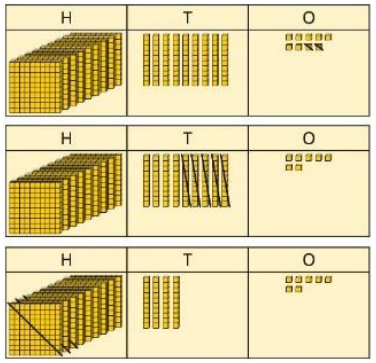
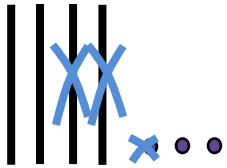
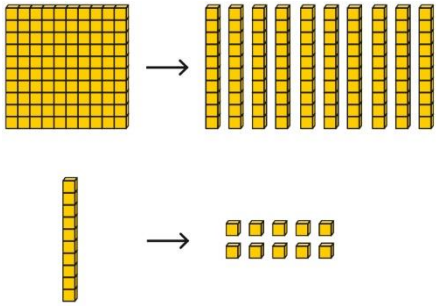
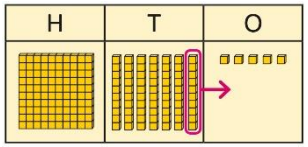
number, no exchange	 Partition the digits according to place value and subtract each place value & re-combine 43 - 21 = **22**  40 - 20 = 20 3 - 1 = 2	 Partition the digits according to place value and subtract each place value & re-combine 43 - 21 = **22**  40 - 20 = 20 3 - 1 = 2	43 - 21 = **22** 40 - 20 = 20 3 - 1 = 2 Use column subtraction to calculate accurately and efficiently. H T O 9 9 9 - 3 5 2 7 H T O 9 9 9 - 3 5 2 4 7 H T O 9 9 9 - 3 5 2 6 4 7
3-digit number – up to 3-digit number, exchange required	Use equipment to enact the exchange of 1 hundred for 10 tens, and 1 ten for 10 ones, using a range of concrete equipment as above. 	Model the required exchange on a place value grid. 175 - 38 = ? I need to subtract 8 ones, so I will exchange a ten for 10 ones. 	Show exchange in the partitioned number sentences. Record exchange as separate number sentences 175-38= 100 - 0 = 100 ~~70~~ 60 - 30 = 30 15 - 8 = 7 Use column subtraction to work accurately and efficiently.

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		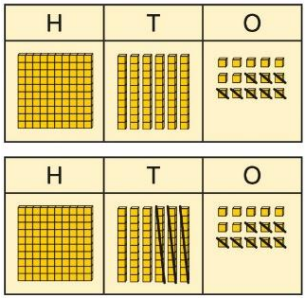	H T O 1 6 15 – 3 8 1 3 7 175 – 38 = 137 *If the subtraction is a 3-digit number subtract a 2-digit number, children should understand how the recording relates to the place value, and so how to line up the digits correctly.* *Children should also understand how to exchange in calculations where there is a zero in the 10s column.* 
Representing subtraction problems		*Use bar models to represent subtractions.* *'Find the difference' is represented as two bars for comparison.*  *Bar models can also be used to show that a part must be taken away from the whole.*	*Children use alternative representations to check calculations and choose efficient methods.* *Children use inverse operations to check additions and subtractions.* *The part-whole model supports understanding.* *I have completed this subtraction.* *525 – 270 = 255* *I will check using addition.*

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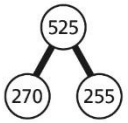
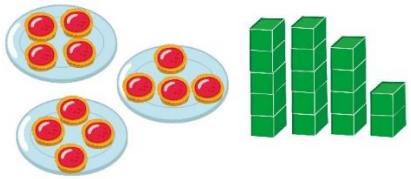
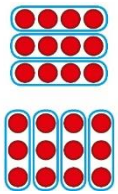
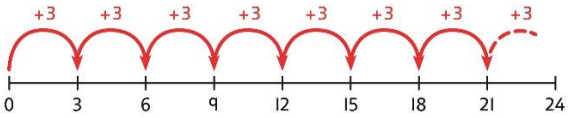
			 H T O 2 7 0 + 2 5 5 5 2 5
Year 3 Multiplication			
Understanding equal grouping and repeated addition	Children continue to build understanding of equal groups and the relationship with repeated addition. They recognise both examples and non-examples using objects.  Children recognise that arrays can be used to model commutative multiplications.  *I can see 3 groups of 8.* *I can see 8 groups of 3.*	Children recognise that arrays demonstrate commutativity.  *This is 3 groups of 4.* *This is 4 groups of 3.* Children understand the link between repeated addition and multiplication.  *8 groups of 3 is 24.* A bar model may represent multiplications as equal groups.	Children understand the link between repeated addition and multiplication. *3 + 3 + 3 + 3 + 3 + 3 + 3 + 3 = 24* *8 × 3 = 24*

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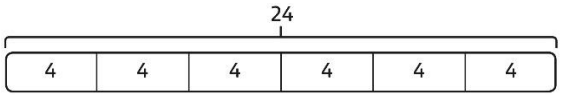
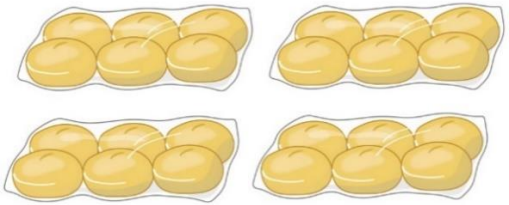
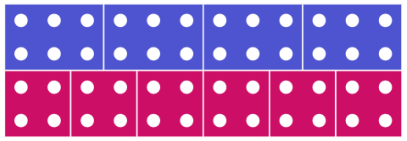
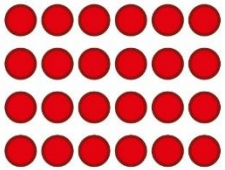
		 *6 x 4 = 24*	
Using commutativity to support understanding of the times-tables	*Understand how to use times-tables facts flexibly.*   *There are 6 groups of 4 pens.* *There are 4 groups of 6 bread rolls.* *I can use 6 x 4 = 24 to work out both totals.* *Understand how times-table facts relate to commutativity. And show with equipment.* 	*Understand how times-table facts relate to commutativity by drawing arrays.*  *6 x 4 = 24* *4 x 6 = 24*	*Understand how times-table facts relate to commutativity.* *I need to work out 4 groups of 7.* *I know that 7 x 4 = 28* *so, I know that* *4 groups of 7 = 28* *and* *7 groups of 4 = 28.*

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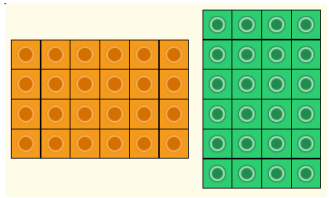
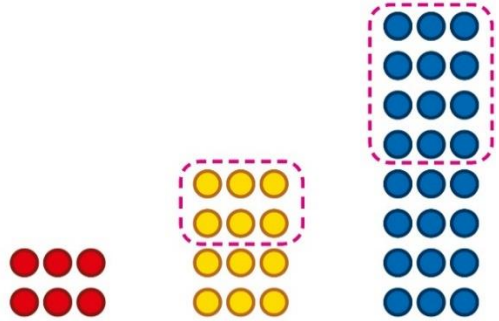
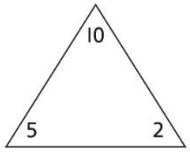
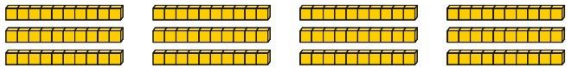
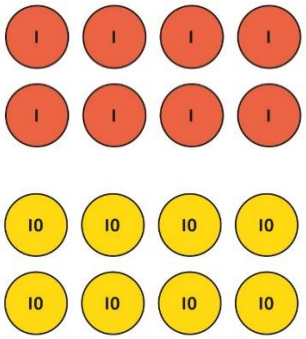
			
Understanding and using ×3, ×2, ×4 and ×8 tables.	Children learn the times-tables as '**groups of**', but apply their knowledge of commutativity.  *I can use the ×3 table to work out how many keys.* *I can also use the ×3 table to work out how many batteries.*	Children understand how the ×2, ×4 and ×8 tables are related through repeated doubling.  3 × 2 = 6 3 × 4 = 12 3 × 8 = 24	Children understand the relationship between related multiplication and division facts in known times-tables.  *2 × 5 = 10* *5 × 2 = 10* *10 ÷ 5 = 2* *10 ÷ 2 = 5*
Using known facts to multiply 10s, for example 3 × 40	Explore the relationship between known times-tables and multiples of 10 using place value equipment. *Make 4 groups of 3 ones.*  *Make 4 groups of 3 tens.* 	Understand how unitising 10s supports multiplying by multiples of 10. 	Understand how to use known times-tables to multiply multiples of 10. *4 × 2 = 8* *4 × 20 = 80*

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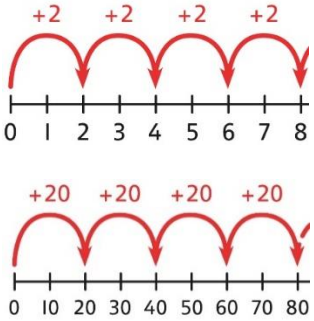
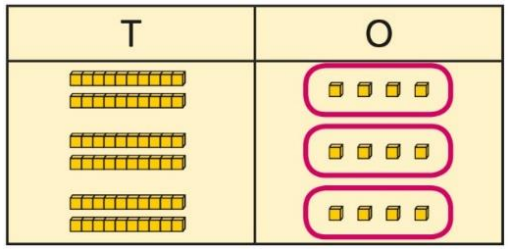
	What is the same? *What is different?*	*Understand how to use known times-tables to multiply multiples of 10.*  *4 groups of 2 ones is 8 ones.* *4 groups of 2 tens is 8 tens.* *4 × 2 = 8* *4 × 20 = 80*	
Multiplying a 2-digit number by a 1-digit number, grid method	*Understand how to link partitioning a 2-digit number with multiplying.* *Each person has 23 flowers.* *Each person has 2 tens and 3 ones.*  *There are 3 groups of 2 tens.* *There are 3 groups of 3 ones.*	*Use place value to support how partitioning is linked with multiplying by a 2-digit number.* *3 × 24 = ?*  *3 × 4 = 12*	*Children should initially work on partitioning two digits into grid method to multiply.* *Use addition to complete multiplications of 2-digit numbers by a 1-digit number.* X | 20 | 3 4 | 80 | 12 80 + 12 = 92

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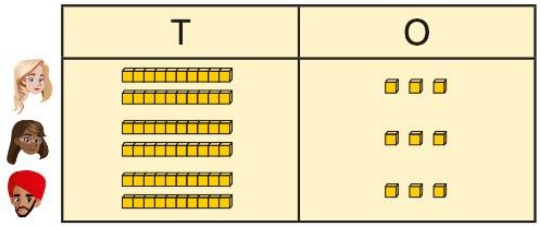
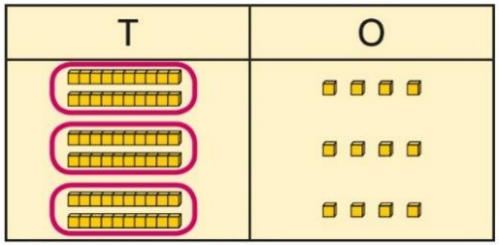
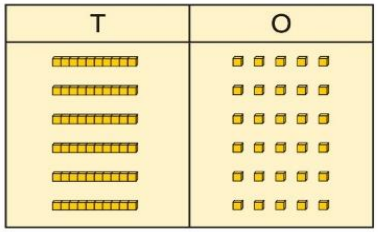
	Use place value equipment to model the multiplication context.  There are 3 groups of 3 ones. There are 3 groups of 2 tens.	 3 × 20 = 60 60 + 12 = 72 3 × 24 = 72	
Multiplying a 2-digit number by a 1-digit number, grid method followed by expanded column method	 		Children may write calculations in expanded column form, but must understand the link with place value and exchange. Children are encouraged to write the expanded parts of the calculation at the same time as grid method. X | 10 | 5 6 | | T O 1 5 × 6 + ____ ____ 6 × 5 6 × 10 T O 2 8 × 5 40 5 × 8 100 5 × 20 140

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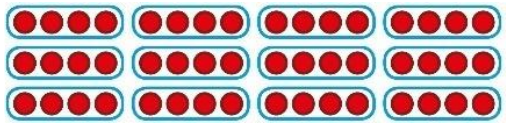
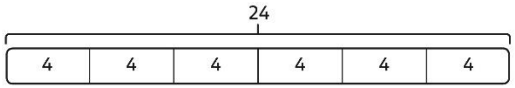
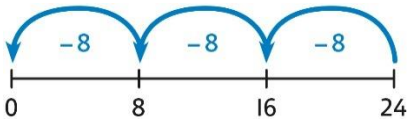
Year 3 Division			
Using times-tables knowledge to divide	Use knowledge of known times-tables to calculate divisions.  24 divided into groups of 8. There are 3 groups of 8.  There are 20 divided in to groups of 5 Or 20 divided in to 4 groups	Use knowledge of known times-tables to calculate divisions.  48 ÷ 4 = 12 48 divided into groups of 4. There are 12 groups. 4 x 12 = 48 48 ÷ 4 = 12 A bar model may represent the relationship between sharing and grouping.  24 ÷ 4 = 6 24 ÷ 6 = 4 Children understand how division is related to both repeated subtraction and repeated addition.  24 ÷ 8 = 3	Use knowledge of known times-tables to calculate divisions. I need to work out 30 shared between 5. I know that 6 x 5 = 30 so I know that 30 ÷ 5 = 6. Children understand how division is related to both repeated subtraction and repeated addition. 24 - 8 - 8 - 8 = 0 8 + 8 + 8 = 24

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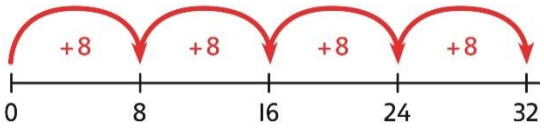
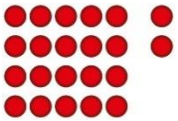
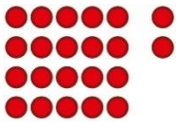
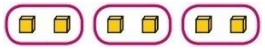
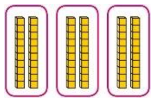
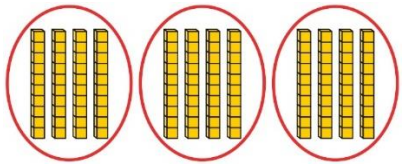
		 32 ÷ 8 = 4	
Understanding remainders	Use equipment to understand that a remainder occurs when a set of objects cannot be divided equally any further.  There are 13 sticks in total. There are 3 groups of 4, with 1 remainder. Use counters to explain remainders.  22 ÷ 5 = 4 remainder 2	Use images to explain remainders.  22 ÷ 5 = 4 remainder 2	Understand that the remainder is what cannot be shared equally from a set. 22 ÷ 5 = ? 3 × 5 = 15 4 × 5 = 20 5 × 5 = 25 ... this is larger than 22 So, 22 ÷ 5 = 4 remainder 2
Using known facts to divide multiples of 10	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 ÷ 3 = ? 180 is 18 tens. 18 divided by 3 is 6. 18 tens divided by 3 is 6 tens. 18 ÷ 3 = 6 180 ÷ 3 = 60

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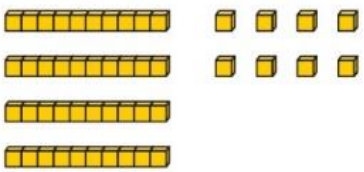
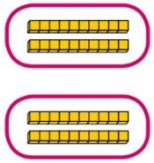
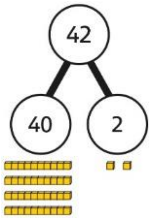
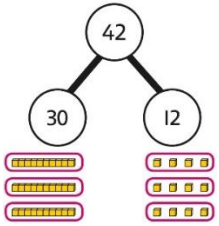
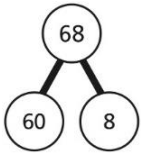
2-digit number divided by 1-digit number, no remainders	Children explore dividing 2-digit numbers by using place value equipment.  48 ÷ 2 = ? First divide the 10s.  Then divide the 1s. 	Children explore which partitions support particular divisions.  I need to partition 42 differently to divide by 3.  42 = 30 + 12 42 ÷ 3 = 14 Children partition a number into 10s and 1s to divide where appropriate.  60 ÷ 2 = 30 8 ÷ 2 = 4	Children partition a number into 10s and 1s to divide where appropriate. 60 ÷ 2 = 30 8 ÷ 2 = 4 30 + 4 = 34 68 ÷ 2 = 34 Children partition flexibly to divide where appropriate. 42 ÷ 3 = ? 42 = 40 + 2 I need to partition 42 differently to divide by 3. 42 = 30 + 12 30 ÷ 3 = 10 12 ÷ 3 = 4 10 + 4 = 14 42 ÷ 3 = 14

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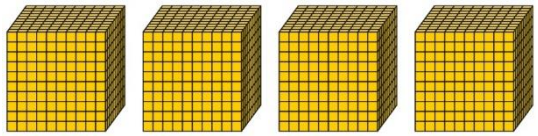
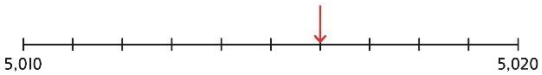
		30 + 4 = 34 68 ÷ 2 = 34	
2-digit number divided by 1-digit number, with remainders	Use place value equipment to understand the concept of remainder. Make 29 from place value equipment. Share it into 2 equal groups.  There are two groups of 14 and 1 remainder.	Use place value equipment to understand the concept of remainder in division. 29 ÷ 2 = ?  29 ÷ 2 = 14 remainder 1	Partition to divide, understanding the remainder in context. 67 children try to make 5 equal lines. 67 = 50 + 17 50 ÷ 5 = 10 17 ÷ 5 = 3 remainder 2 67 ÷ 5 = 13 remainder 2 There are 13 children in each line and 2 children left out.
Year 4			
	Concrete	**Pictorial**	**Abstract**
Year 4 Addition			
Understanding numbers to 10,000	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.	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. 

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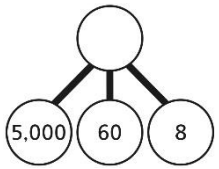
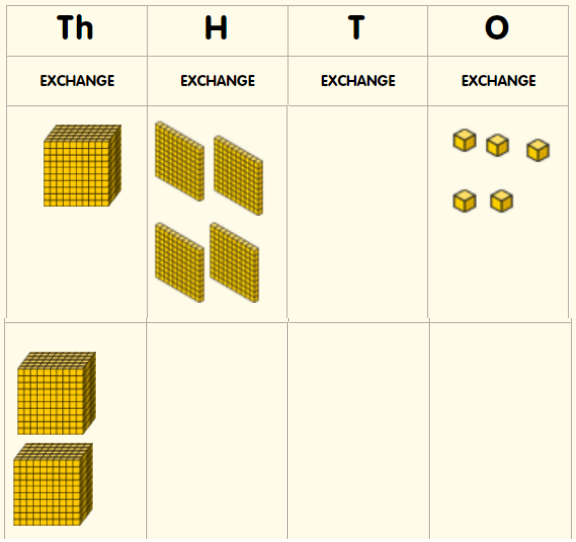
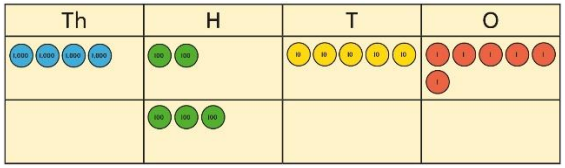
		 5,000 + 60 + 8 = 5,068	
Choosing mental methods where appropriate	Use unitising and known facts to support mental calculations. Make 1,405 from place value equipment. Add 2,000.  Now add the 1,000s. 1 thousand + 2 thousands = 3 thousands 1,405 + 2,000 = 3,405	Use unitising and known facts to support mental calculations.  I can add the 100s mentally. 200 + 300 = 500 So, 4,256 + 300 = 4,556	Use unitising and known facts to support mental calculations. 4,256 + 300 = ? 2 + 3 = 5 200 + 300 = 500 4,256 + 300 = 4,556

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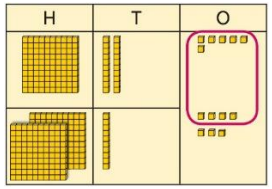
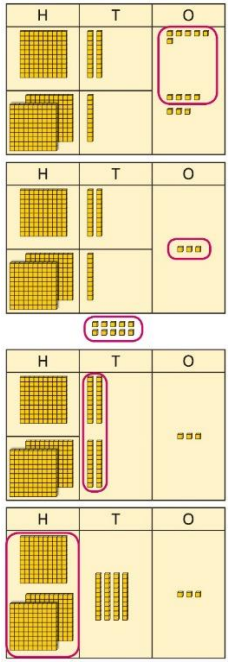
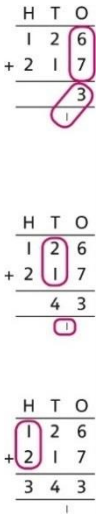
3-digit number + 3-digit number, exchange required	Use place value equipment to enact the exchange required.  There are 13 ones. I will exchange 10 ones for 1 ten.	Model the stages of column addition using place value equipment on a place value grid.  	Use column addition, ensuring understanding of place 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 = ?
3 or 4 digit column addition with exchange	Use place value equipment on a place value grid to organise thinking. Ensure that children understand how the columns relate to place value and what to do if the numbers are not all 4-digit numbers. Use equipment to show 1,905 + 775.	Use place value equipment to model required exchanges.	Use a column method to add, including exchanges.

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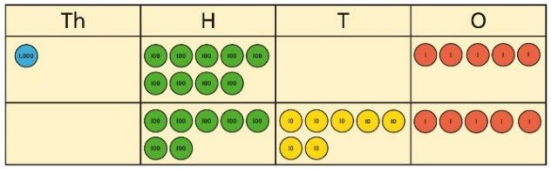
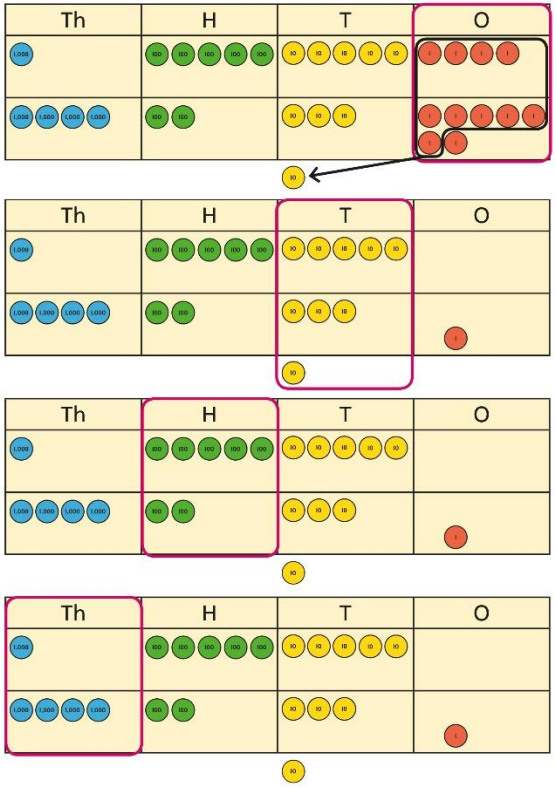
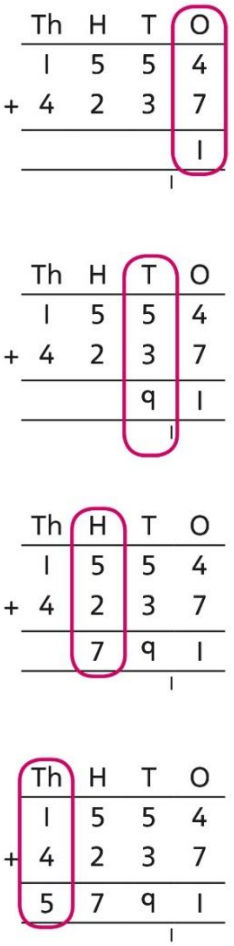
	 *Why have only three columns been used for the second row? Why is the Thousands box empty?* *Which columns will total 10 or more?*	 *Include examples that exchange in more than one column.*	 *Include examples that exchange in more than one column.*
Representing additions and checking strategies		*Bar models may be used to represent additions in problem contexts, and to justify mental methods where appropriate.*	*Use rounding and estimating on a number line to check the reasonableness of an addition.*

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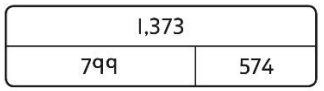
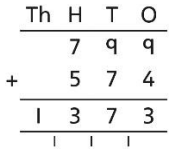
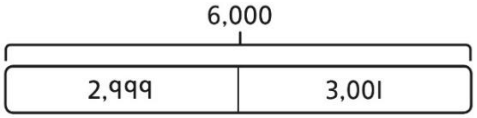
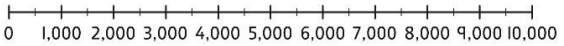
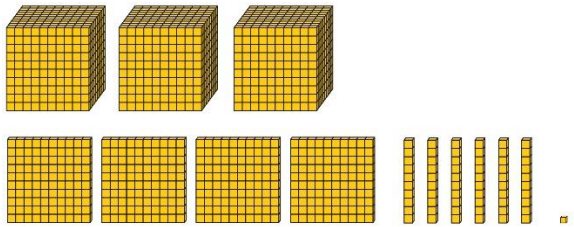
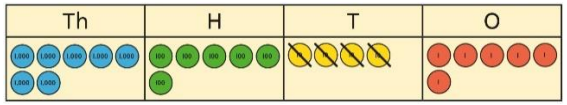
		  *I chose to work out 574 + 800, then subtract 1.*  *This is equivalent to 3,000 + 3,000.*	 *912 + 6,149 = ?* *I used rounding to work out that the answer should be approximately 1,000 + 6,000 = 7,000.*
Year 4 Subtraction			
Choosing mental methods where appropriate	*Use place value equipment to justify mental methods.*  *What number will be left if we take away 300?*	*Use place value grids to support mental methods where appropriate.*  *7,646 – 40 = 7,606*	*Use knowledge of place value and unitising to subtract mentally where appropriate.* *3,501 – 2,000* *3 thousands – 2 thousands = 1 thousand* *3,501 – 2,000 = 1,501*
Column subtraction with exchange	*Understand why exchange of a 1,000 for 100s, a 100 for 10s, or a 10 for 1s may be necessary.*	*Represent place value equipment on a place value grid to subtract, including exchanges where needed.*	*Use column subtraction, with understanding of the place value of any exchange required.*

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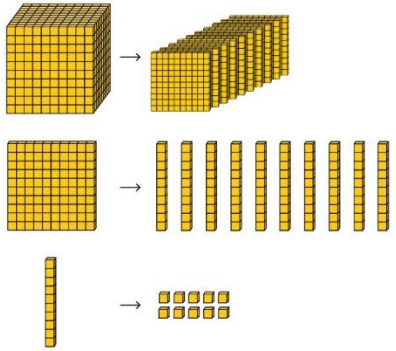
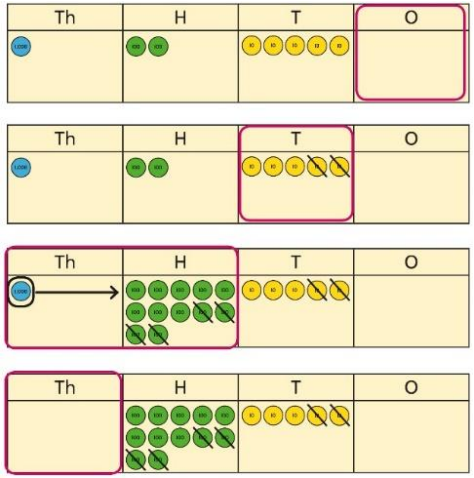
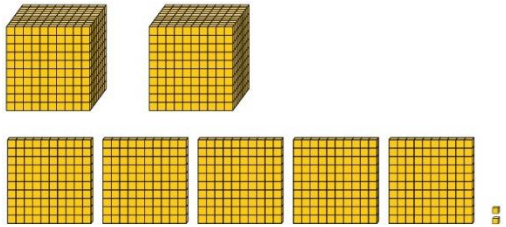
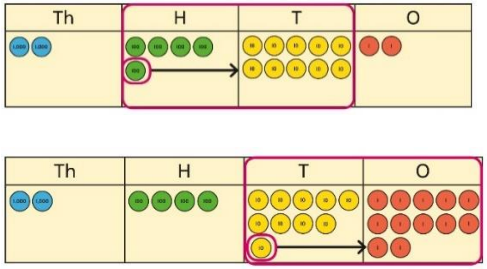
			Th H T O 1 2 5 0 − 4 2 0 0 Th H T O 1 2 5 0 − 4 2 0 3 0 Th H T O ✗ 1 2 5 0 − 4 2 0 8 3 0 Th H T O ✗ 1 2 5 0 − 4 2 0 8 3 0
Column subtraction with exchange across more than one column	Understand why two exchanges may be necessary. 2,502 − 243 = ?  I need to exchange a 10 for some 1s, but there are not any 10s here.	Make exchanges across more than one column where there is a zero as a place holder. 2,502 − 243 = ? 	Make exchanges across more than one column where there is a zero as a place holder. 2,502 − 243 = ?

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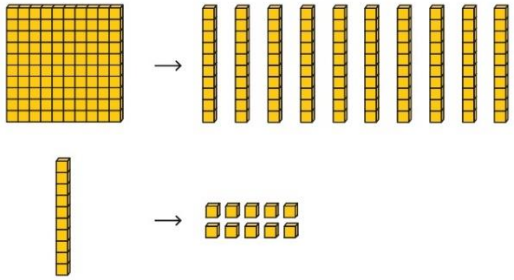
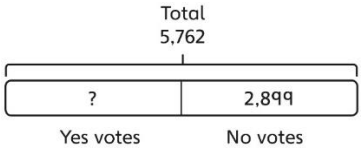
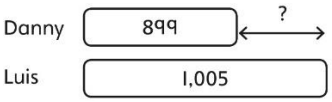
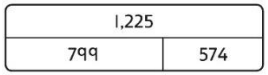
			Th H T O 2 4 ~~8~~ ¹0 2 − 2 4 3 Th H T O 2 4 ~~8~~ ~~9~~ ¹~~0~~ ¹2 − 2 4 3 Th H T O 2 4 ~~8~~ ~~9~~ ¹~~0~~ ¹2 − 2 4 3 2 2 5 9
Representing subtractions and checking strategies		*Use bar models to represent subtractions where a part needs to be calculated.*  *I can work out the total number of Yes votes using 5,762 − 2,899.* *Bar models can also represent 'find the difference' as a subtraction problem.* 	*Use inverse operations to check subtractions.* *I calculated 1,225 − 799 = 574.* *I will check by adding the parts.*  Th H T O 7 9 9 + 5 7 4 1 3 7 3 *The parts do not add to make 1,225.* *I must have made a mistake.*
Year 4 Multiplication			

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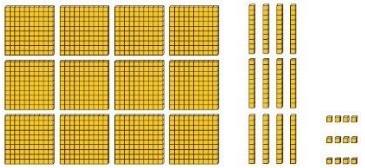
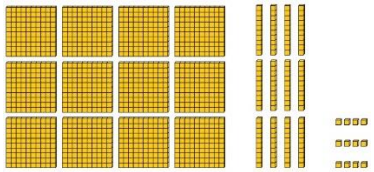
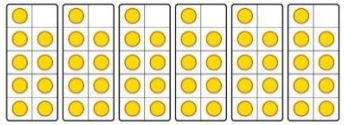
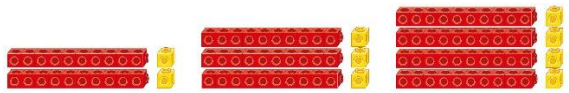
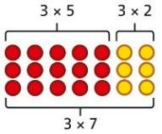
Multiplying by multiples of 10 and 100	Use unitising and place value equipment to understand how to multiply by multiples of 1, 10 and 100.  3 groups of 4 ones is 12 ones. 3 groups of 4 tens is 12 tens. 3 groups of 4 hundreds is 12 hundreds.	Use unitising and place value equipment to understand how to multiply by multiples of 1, 10 and 100.  3 x 4 = 12 3 x 40 = 120 3 x 400 = 1,200	Use known facts and understanding of place value and commutativity to multiply mentally. 4 x 7 = 28 4 x 70 = 280 40 x 7 = 280 4 x 700 = 2,800 400 x 7 = 2,800
Understanding times-tables up to 12 x 12	Understand the special cases of multiplying by 1 and 0.  5 x 1 = 5 5 x 0 = 0	Represent the relationship between the ×9 table and the ×10 table.  Represent the ×11 table and ×12 tables in relation to the ×10 table.  2 x 11 = 20 + 2 3 x 11 = 30 + 3 4 x 11 = 40 + 4  4 x 12 = 40 + 8	Understand how times-tables relate to counting patterns. Understand links between the ×3 table, ×6 table and ×9 table 5 x 6 is double 5 x 3 ×5 table and ×6 table I know that 7 x 5 = 35 so I know that 7 x 6 = 35 + 7. ×5 table and ×7 table 3 x 7 = 3 x 5 + 3 x 2  ×9 table and ×10 table 6 x 10 = 60 6 x 9 = 60 – 6
Understanding and using	Make multiplications by partitioning.	Understand how multiplication and partitioning are related through addition.	Use partitioning to multiply 2-digit numbers by a single digit.

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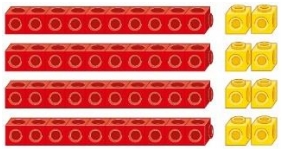
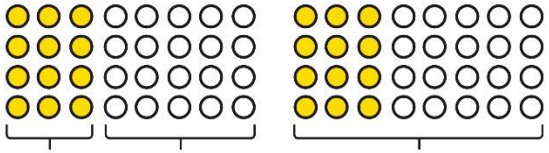
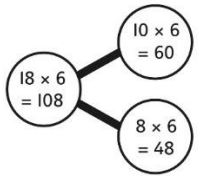
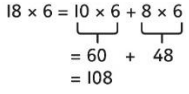
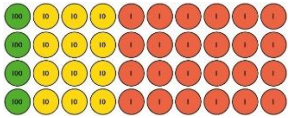
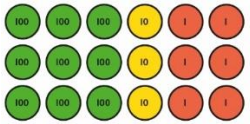
partitioning in multiplication	*4 x 12 is 4 groups of 10 and 4 groups of 2.*  *4 x 12 = 40 + 8*	 4 × 3 = 12 4 × 5 = 20 4 × 8 = 32 *4 x 3 = 12* *4 x 5 = 20* *12 + 20 = 32* *4 x 8 = 32*   *18 x 6 =* *10 x 6 = 60* *8 x 6 = 48* *60 + 48 = 108*	*18 x 6 = ?* *18 x 6 =* *10 x 6 = 60* *8 x 6 = 48* *60 + 48 = 108*
Column multiplication for 2- and 3-digit numbers multiplied by a single digit, no exchange	*Use place value equipment to make multiplications.* *Make 4 x 136 using equipment.*  *I can work out how many 1s, 10s and 100s.*	*Use place value equipment alongside a column method for multiplication of up to 3-digit numbers by a single digit.*  3 1 2 × 3 9 3 6	*Children should initially work on partitioning two digits into grid method to multiply.* *Then complete expanded column alongside.* X 200 30 6 4 800 120 24 800 120 + 24 944 236 X 4 24 120 800 944

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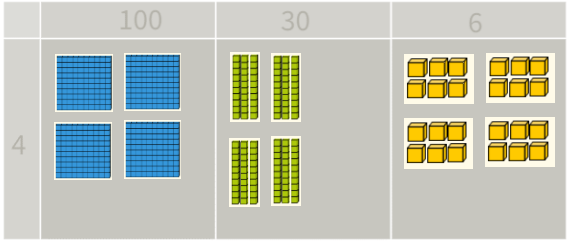
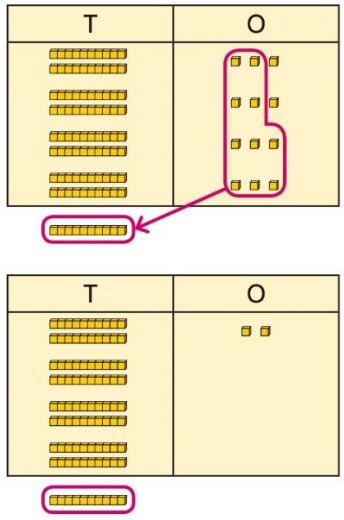
	There are 4 × 6 ones... 24 ones There are 4 × 3 tens ... 12 tens There are 4 × 1 hundreds ... 4 hundreds 24 + 120 + 400 = 544 		Use the formal column method for up to 3-digit numbers multiplied by a single digit. 3 1 2 × 3 9 3 6
Column multiplication for 2- and 3-digit numbers multiplied by a single digit, exchange		Understand that multiplications may require an exchange of 1s for 10s, and also 10s for 100s. 4 × 23 = ?  4 × 23 = 92	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. 2 3 × 5 1 5 1 0 0 1 1 5 2 3 × 5 1 1 5 1

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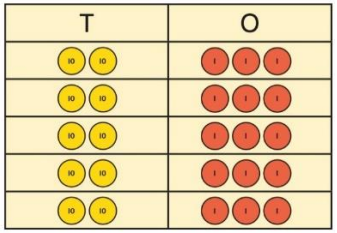
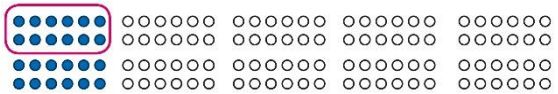
		 *5 × 23 = ?* *5 × 3 = 15* *5 × 20 = 100* *5 × 23 = 115*	
Multiplying more than two numbers	*Represent situations by multiplying three numbers together.*  *Each sheet has 2 × 5 stickers.* *There are 3 sheets.* *There are 5 × 2 × 3 stickers in total.* 5 × 2 × 3 = 30 10 × 3 = 30	*Understand that commutativity can be used to multiply in different orders.*  *2 × 6 × 10 = 120* *12 × 10 = 120* *10 × 6 × 2 = 120* *60 × 2 = 120*	*Use knowledge of factors to simplify some multiplications.* *24 × 5 = 12 × 2 × 5* 12 × 2 × 5 = 12 × 10 = 120 So, 24 × 5 = 120
Year 4 Division			
Understanding the relationship	*Use objects to explore families of multiplication and division facts.*	*Represent divisions using an array.*	*Understand families of related multiplication and division facts.*

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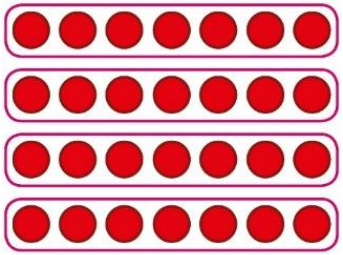
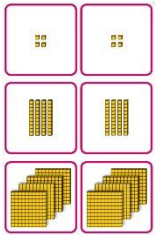
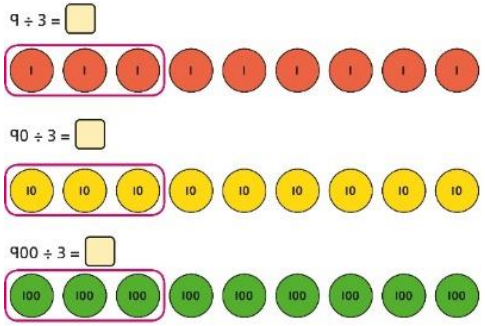
between multiplication and division, including times-tables	 *4 x 6 = 24* *24 is 6 groups of 4.* *24 is 4 groups of 6.* *24 divided by 6 is 4.* *24 divided by 4 is 6.*  *There are 20 divided in to groups of 5* *Or 20 divided in to 4 groups*	 28 ÷ 7 = 4	*I know that 5 x 7 = 35* *so I know all these facts:* *5 x 7 = 35* *7 x 5 = 35* *35 = 5 x 7* *35 = 7 x 5* *35 ÷ 5 = 7* *35 ÷ 7 = 5* *7 = 35 ÷ 5* *5 = 35 ÷ 7*
Dividing multiples of 10 and 100 by a single digit	*Use place value equipment to understand how to use unitising to divide.*  *8 ones divided into 2 equal groups* *4 ones in each group* *8 tens divided into 2 equal groups* *4 tens in each group*	*Represent divisions using place value equipment.*  *9 ÷ 3 = 3* *9 tens divided by 3 is 3 tens.* *9 hundreds divided by 3 is 3 hundreds.*	*Use known facts to divide 10s and 100s by a single digit.* *15 ÷ 3 = 5* *150 ÷ 3 = 50* *1500 ÷ 3 = 500*

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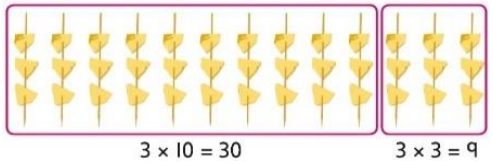
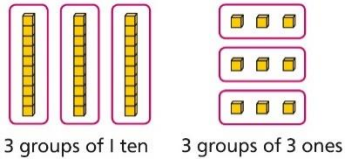
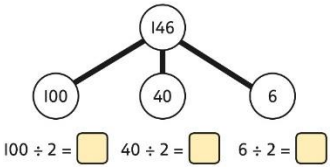
	8 hundreds divided into 2 equal groups 4 hundreds in each group		
Dividing 2-digit and 3-digit numbers by a single digit by partitioning into 100s, 10s and 1s	Partition into 10s and 1s to divide where appropriate. 39 ÷ 3 = ?  39 = 30 + 9 30 ÷ 3 = 10 9 ÷ 3 = 3 39 ÷ 3 = 13	Partition into 100s, 10s and 1s using Base 10 equipment to divide where appropriate. 39 ÷ 3 = ?  39 = 30 + 9 30 ÷ 3 = 10 9 ÷ 3 = 3 39 ÷ 3 = 13 142 ÷ 2 = ?  100 ÷ 2 = 50 40 ÷ 2 = 20 6 ÷ 2 = 3 50 + 20 + 3 = 73 142 ÷ 2 = 73	Partition into 100s, 10s and 1s using a part-whole model to divide where appropriate. 142 ÷ 2 = ? 100 ÷ 2 = 50 40 ÷ 2 = 20 6 ÷ 2 = 3 50 + 20 + 3 = 73 142 ÷ 2 = 73
Dividing 2-digit and 3-digit numbers by a	Use place value equipment to explore why different partitions are needed.	Represent how to partition flexibly where needed.	Make decisions about appropriate partitioning based on the division required.

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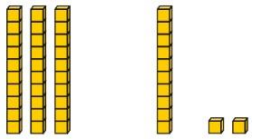
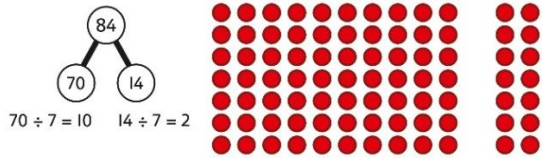
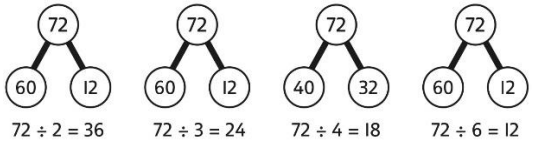
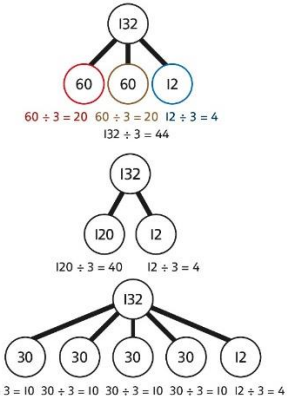
single digit, using flexible partitioning	*42 ÷ 3 = ?* *I will split it into 30 and 12, so that I can divide by 3 more easily.* 	*84 ÷ 7 = ?* *I will partition into 70 and 14 because I am dividing by 7.*  84 ÷ 7 = 12  *Understand that different partitions can be used to complete the same division.*  	*Understand that different partitions can be used to complete the same division.* 72 ÷ 2 = **36** 60 ÷ 2 = 30 12 ÷ 2 = 6 *Understand that different partitions can be used to complete the same division.* 132 ÷ 3 = **44** 60 ÷ 3 = 20 60 ÷ 3 = 20 12 ÷ 3 = 4 120 ÷ 3 = 40 12 ÷ 3 = 4
Dividing three digits by a single digit using short	*Explore grouping using place value equipment.* *268 ÷ 2 = ?*	*Use place value equipment on a place value grid alongside short division.* *The model uses grouping.*	*Use short division for up to 4-digit numbers divided by a single digit.*

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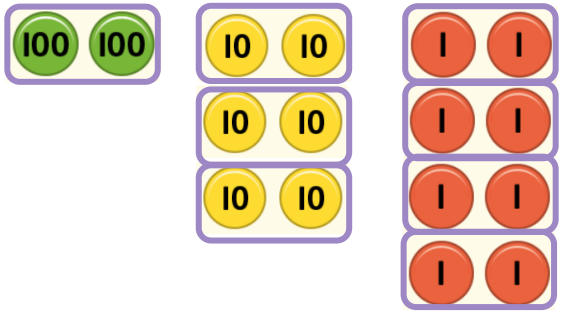
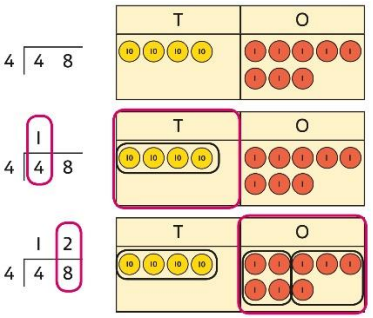
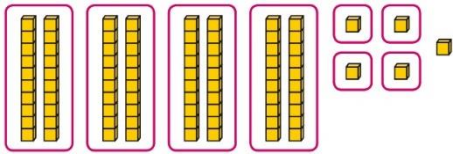
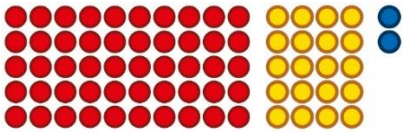
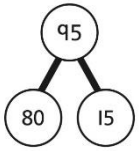
division, no remainders	 *There is 1 group of 2 hundreds.* *There are 3 groups of 2 tens.* *There are 4 groups of 2 ones.* *264 ÷ 2 = 134*	*A sharing model can also be used, although the model would need adapting.*  *Lay out the problem as a short division.* *There is 1 group of 4 in 4 tens.* *There are 2 groups of 4 in 8 ones.*	*639 ÷ 3 =* $\begin{array}{r} 213 \\ 3\overline{)639} \end{array}$ *Use multiplication to check.* *213 X 3 =* *200 X 3 = 600* *10 X 3 = 30* *3 X 3 = 9* *600 + 30 + 9 = 639*
Understanding remainders	*Use place value equipment to find remainders.* *85 shared into 4 equal groups* *There are 24, and 1 that cannot be shared.* 	*Represent the remainder as the part that cannot be shared equally using arrays.*  *72 ÷ 5 = 14 remainder 2*  *80 ÷ 4 = 20* *12 ÷ 4 = 3* *95 ÷ 4 = 23 remainder 3*	*Understand how partitioning can reveal remainders of divisions.* *80 ÷ 4 = 20* *12 ÷ 4 = 3* *95 ÷ 4 = 23 remainder 3*

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UPPER KEY STAGE 2

In Years 5 & 6 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%.

Year 5

	Concrete	Pictorial	Abstract
Year 5 Addition			
4 or 5 digit column addition with whole numbers	Use place value equipment to represent additions. *Add a row of counters onto the place value grid to show 15,735 + 4,012.*	Represent additions, using place value equipment on a place value grid alongside written methods.	Use column addition, including exchanges. TTh Th H T O 1 9 1 7 5 + 1 8 4 1 7 3 7 5 9 2

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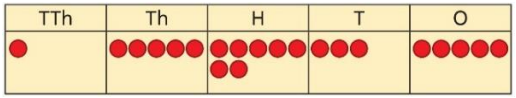
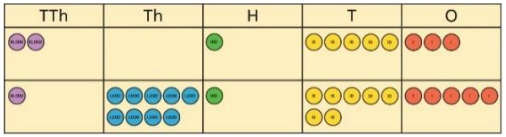
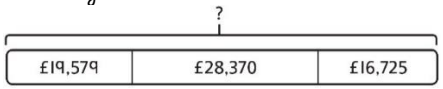
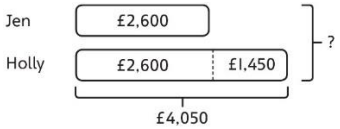
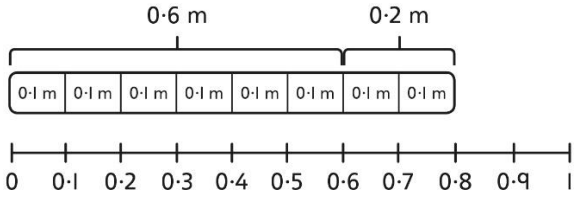
		 *I need to exchange 10 tens for a 100.* TTh Th H T O 2 0 1 5 3 + 1 9 1 7 5 3 9 3 2 8	
Representing additions		*Bar models represent addition of two or more numbers in the context of problem solving.*   Th H T O 2 6 0 0 + 1 4 5 0 4 0 5 0 Th H T O 2 6 0 0 + 4 0 5 0 6 6 5 0	*Use estimation to check whether answers are reasonable.* TTh Th H T O 2 3 4 0 5 + 7 8 9 2 2 0 2 9 7 TTh Th H T O 2 3 4 0 5 + 7 8 9 2 3 1 2 9 7 *I will use 23,000 + 8,000 to check.*
Adding tenths	*Link measure with addition of decimals.* *Two lengths of fencing are 0·6 m and 0·2 m.* *How long are they when added together?* 	*Use a bar model with a number line to add tenths.*  *0·6 + 0·2 = 0·8* *6 tenths + 2 tenths = 8 tenths*	*Understand the link with adding fractions.* $\frac{6}{10}+\frac{2}{10}=\frac{8}{10}$ *6 tenths + 2 tenths = 8 tenths* *0·6 + 0·2 = 0·8*

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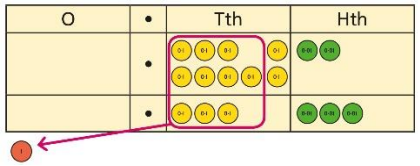
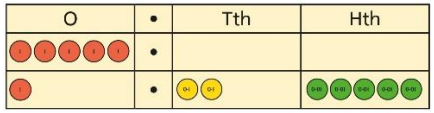
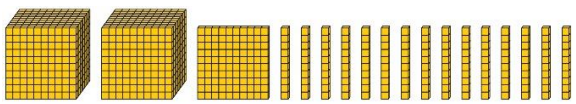
Adding decimals using column addition	Use place value equipment to represent additions. *Show 0·23 + 0·45 using place value counters.*	Use place value equipment on a place value grid to represent additions. Represent exchange where necessary.  O · Tth Hth 0 · 9 2 + 0 · 3 3 1 · 2 5 1 Include examples where the numbers of decimal places are different.  O · Tth Hth 5 · 0 0 + 1 · 2 5 6 · 2 5	Add using a column method, ensuring that children understand the link with place value. O · Tth Hth 0 · 2 3 + 0 · 4 5 0 · 6 8 Include exchange where required, alongside an understanding of place value. O · Tth Hth 0 · 9 2 + 0 · 3 3 1 · 2 5 1 Include additions where the numbers of decimal places are different. *3.4 + 0.65 = ?* O · Tth Hth 3 · 4 0 + 0 · 6 5 ·
Year 5 Subtraction			
Column subtraction with whole numbers	Use place value equipment to understand where exchanges are required. *2,250 – 1,070* 	Represent the stages of the calculation using place value equipment on a grid alongside the calculation, including exchanges where required. *15,735 – 2,582 = 13,153*	Use column subtraction methods with exchange where required. TTh Th H T O $^{5}\not{6}$ $^{11}\not{2}$ $^{1}0$ 9 7 – 1 8 5 3 4 4 3 5 6 3 *62,097 – 18,534 = 43,563*

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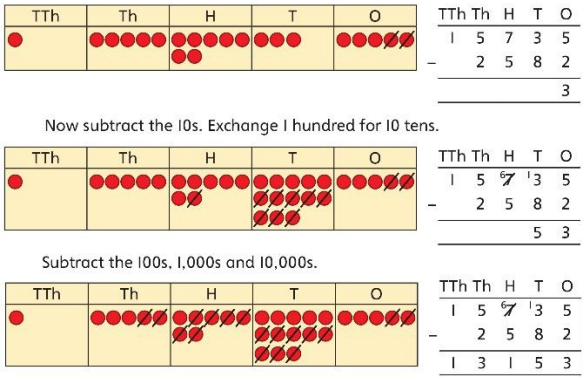
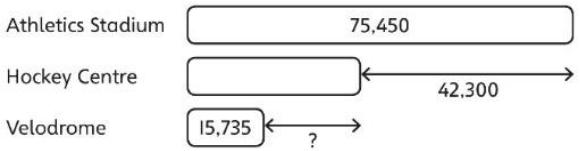
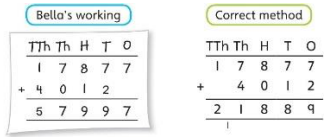
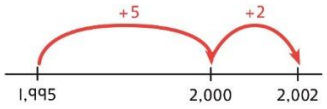
			
Checking strategies and representing subtractions		*Bar models represent subtractions in problem contexts, including 'find the difference'.* 	*Children can explain the mistake made when the columns have not been ordered correctly.*  *Use approximation to check calculations.* *I calculated 18,000 + 4,000 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 = ?* 	*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.*	*Use a place value grid to represent the stages of column subtraction, including exchanges where required.*	*Use column subtraction, with an understanding of place value, including*

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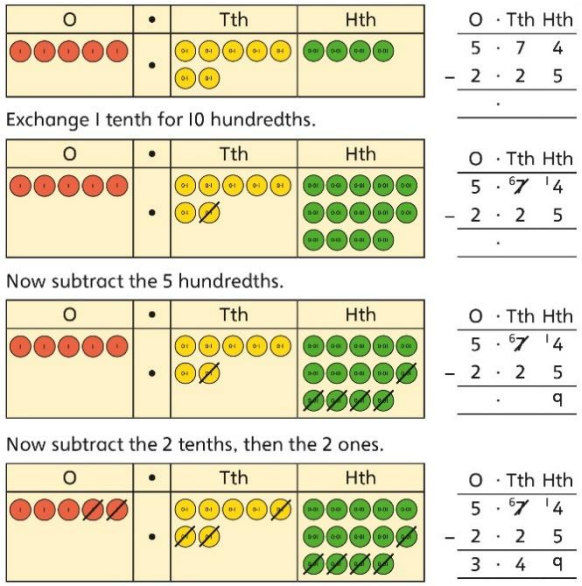
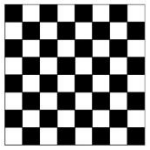
	 1 m – ☐ m = ☐ m *1 – 0·49 = ?*	*5·74 – 2·25 = ?* 	*subtracting numbers with different numbers of decimal places.* *3·921 – 3·75 = ?* O · Tth Hth Thth 3 · 9 2 1 – 3 · 7 5 0 ·
Year 5 Multiplication			
Understanding factors	*Use cubes or counters to explore the meaning of 'square numbers'.* *25 is a square number because it is made from 5 rows of 5.* *Use cubes to explore cube numbers.*	*Use images to explore examples and* ***non-examples*** *of square numbers.*  *8 × 8 = 64* $8^2 = 64$	*Understand the pattern of square numbers in the multiplication tables.* *Use a multiplication grid to circle each square number. Can children spot a pattern?*

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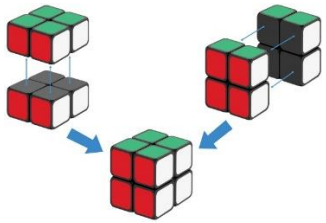
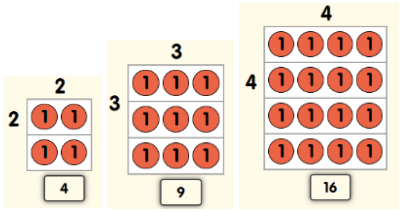
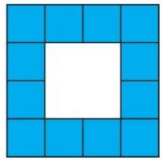
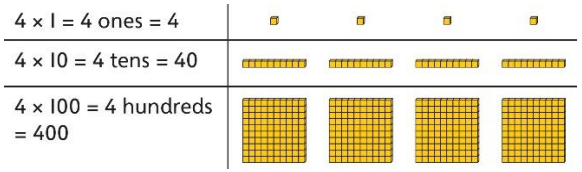
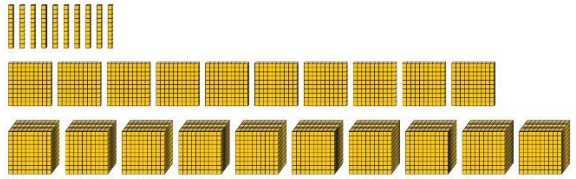
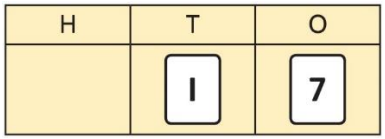
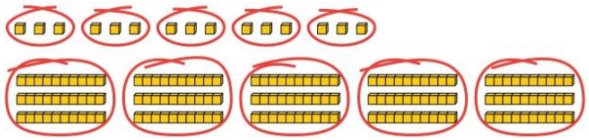
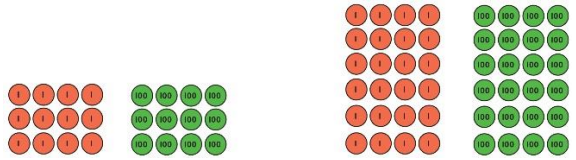
	 *8 is a cube number.*	  *12 is not a square number, because you cannot multiply a whole number by itself to make 12.*	
Multiplying by 10, 100 and 1,000	Use place value equipment to multiply by 10, 100 and 1,000 by unitising.  4 × 1 = 4 ones = 4 4 × 10 = 4 tens = 40 4 × 100 = 4 hundreds = 400	Understand the effect of repeated multiplication by 10. 	Understand how exchange relates to the digits when multiplying by 10, 100 and 1,000.  *17 × 10 = 170* *17 × 100 = 17 × 10 × 10 = 1,700* *17 × 1,000 = 17 × 10 × 10 × 10 = 17,000*
Multiplying by multiples of 10, 100 and 1,000	Use place value equipment to explore multiplying by unitising. 	Use place value equipment to represent how to multiply by multiples of 10, 100 and 1,000. 	Use known facts and unitising to multiply. *5 × 4 = 20* *5 × 40 = 200* *5 × 400 = 2,000* *5 × 4,000 = 20,000* *5,000 × 4 = 20,000*

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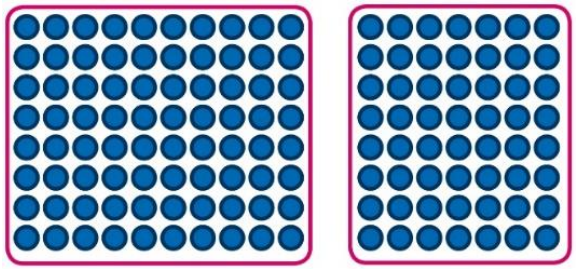
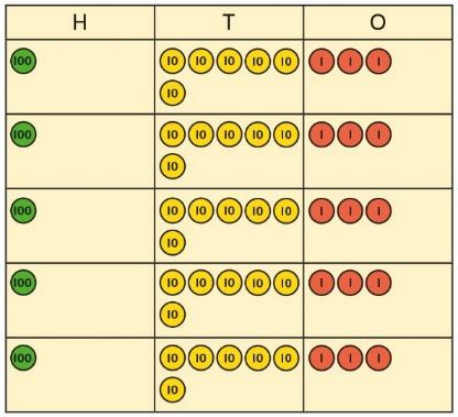
	5 groups of 3 ones is 15 ones. *5 groups of 3 tens is 15 tens.* *So, I know that 5 groups of 3 thousands would be 15 thousands.*	*4 × 3 = 12* *6 × 4 = 24* *4 × 300 = 1,200* *6 × 400 = 2,400*	
Multiplying up to 4-digit numbers by a single digit	*Explore how to use partitioning to multiply efficiently.* *8 × 17 = ?*  8 × 10 = 80 8 × 7 = 56 80 + 56 = 136 *So, 8 × 17 = 136*	*Represent multiplications using place value equipment and add the 1s, then 10s, then 100s, then 1,000s.*  	*Use an area model and then add the parts.* 100 60 3 5 | 100 × 5 = 500 | 60 × 5 = 300 | 3 × 5 = 15 *Use a column multiplication, including any required exchanges.* 1 3 6 × 6 8 1 6 2 3
Multiplying 2-digit numbers by 2-digit numbers	*Partition one number into 10s and 1s, then add the parts.* *23 × 15 = ?*	*Use an area model and add the parts.* *28 × 15 = ?* 20 m | 8 m 10 m | 20 × 10 = 200 m² | 8 × 10 = 80 m² 5 m | 20 × 5 = 100 m² | 8 × 5 = 40 m² H T O 2 0 0 1 0 0 8 0 + 4 0 4 2 0 1	*Use column multiplication, ensuring understanding of place value at each stage.* 3 4 × 2 7 2 3 8 (2) 34 × 7 _____ _____

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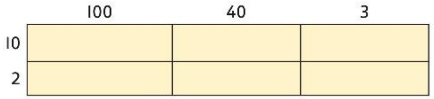
	 10 × 15 = 150 10 × 15 = 150  3 × 15 = 45 There are 345 bottles of milk in total. H T O 1 5 0 1 5 0 + 4 5 3 4 5 1 *23 × 15 = 345*	*28 × 15 = 420*	3 4 × 2 7 2 3 8 (2) 34 × 7 6 8 0 34 × 20 3 4 × 2 7 2 3 8 (2) 34 × 7 6 8 0 34 × 20 9 1 8 34 × 27 1
Multiplying up to 4-digits by 2-digits		*Use the area model/grid method then add the parts.*  100 40 3 10 2 143 × 12 = 1,716 There are 1,716 boxes of cereal in total. Th H T O 1 0 0 0 4 0 0 2 0 0 8 0 3 0 + 6 1 7 1 6 1 *143 × 12 = 1,716*	*Use column multiplication, ensuring understanding of place value at each stage.* 1 4 3 × 1 2 2 8 6 143 × 2 1 4 3 0 143 × 10 1 7 1 6 143 × 12 1 *Progress to include examples that require multiple exchanges as understanding, confidence and fluency build.* *1,274 × 32 = ?* *First multiply 1,274 by 2.* 1 2 7 4 × 3 2 2 5 (1) 4 8 1,274 × 2 *Then multiply 1,274 by 30.*

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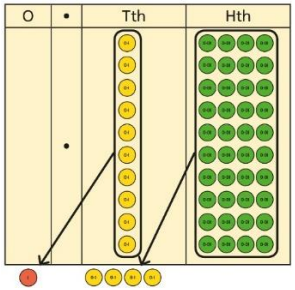
			1 2 7 4 × 3 2 2 5 4 8 1,274 × 2 3 8 2 2 1 2 0 1,274 × 30 *Finally, find the total.* 1 2 7 4 × 3 2 2 5 4 8 1,274 × 2 3 8 2 2 1 2 0 1,274 × 30 4 0 7 6 8 1,274 × 32 *1,274 × 32 = 40,768*
Multiplying decimals by 10, 100 and 1,000	*Use place value equipment to explore and understand the exchange of 10 tenths, 10 hundredths or 10 thousandths.*	*Represent multiplication by 10 as exchange on a place value grid.*  *0·14 × 10 = 1·4*	*Understand how this exchange is represented on a place value chart.* 2·5 × 10 = 25 2·5 × 100 = 250 2·5 × 1,000 = 2,500 Th H T O • Tth 2 • 5 2 5 •
Year 5 Division			
Understanding factors and prime numbers	*Use equipment to explore the* ***factors*** *of a given number.*  *24 ÷ 3 = 8* *24 ÷ 8 = 3*	*Understand that prime numbers are numbers with exactly two factors. Explore & prove by drawing arrays* *13 ÷ 1 = 13* *13 ÷ 2 = 6 r 1* *13 ÷ 4 = 4 r 1*	*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.*

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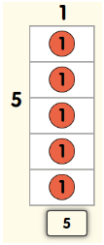
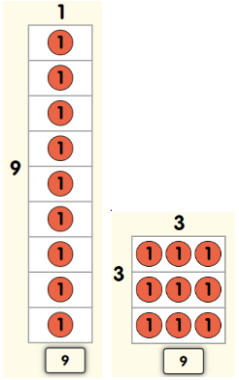
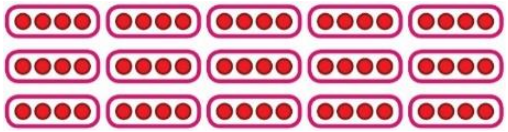
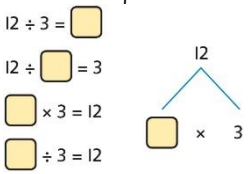
	8 and 3 are factors of 24 because they divide 24 exactly. 24 ÷ 5 = 4 remainder 4.  5 is not a factor of 24 because there is a remainder.	1 and 13 are the only factors of 13. 13 is a prime number.  1 and 5 are the only factors of 5, 5 is a prime number.  1, 9 and 3 are factors of 9, 9 is not a prime number	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.	Represent multiplicative relationships and explore the families of division facts.  60 ÷ 4 = 15 60 ÷ 15 = 4	Represent the different multiplicative relationships to solve problems requiring inverse operations. 

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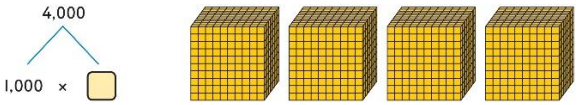
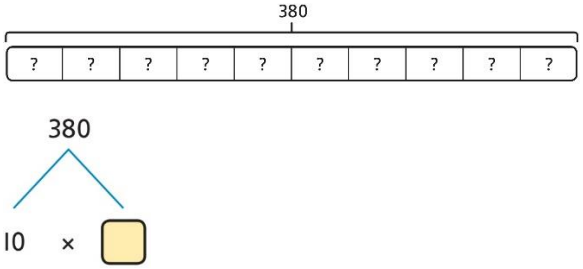
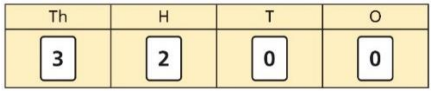
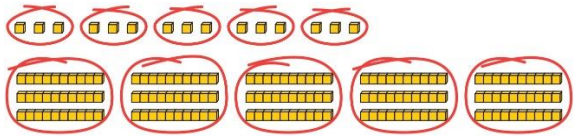
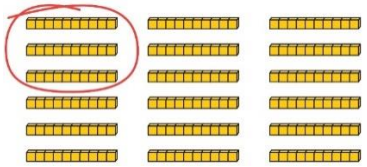
	I have 28 in total. I made groups of 4. There are 7 equal groups.		Understand missing number problems for division calculations and know how to solve them using inverse operations. 22 ÷ ? = 2 22 ÷ 2 = ? ? ÷ 2 = 22 ? ÷ 22 = 2
Dividing whole numbers by 10, 100 and 1,000	Use place value equipment to support unitising for division. 4,000 ÷ 1,000  4,000 is 4 thousands. 4 × 1,000= 4,000 So, 4,000 ÷ 1,000 = 4	Use a bar model to support dividing by unitising. 380 ÷ 10 = 38  380 is 38 tens. 38 × 10 = 380 10 × 38 = 380 So, 380 ÷ 10 = 38	Understand how and why the digits change on a place value grid when dividing by 10, 100 or 1,000.  3,200 ÷ 100 = ? 3,200 is 3 thousands and 2 hundreds. 200 ÷ 100 = 2 3,000 ÷ 100 = 30 3,200 ÷ 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 ÷ 3 = 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.	Reason from known facts, based on understanding of unitising. Use knowledge of the inverse relationship to check. 3,000 ÷ 5 = 600 3,000 ÷ 50 = 60 3,000 ÷ 500 = 6 5 × 600 = 3,000 50 × 60 = 3,000 500 × 6 = 3,000

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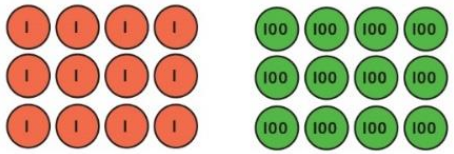
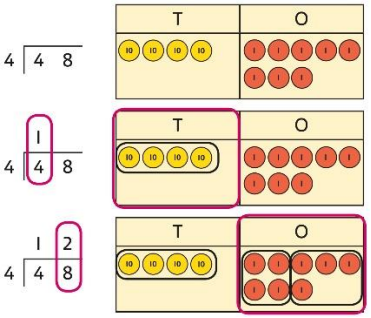
	15 tens put into groups of 3 tens. There are 5 groups. 150 ÷ 30 = 5	180 ÷ 30 = 6  12 ones divided into groups of 4. There are 3 groups. 12 hundreds divided into groups of 4 hundreds. There are 3 groups. 1200 ÷ 400 = 3	
Dividing up to four digits by a single digit using short division	Explore grouping using place value equipment. 268 ÷ 2 = ? There is 1 group of 2 hundreds. There are 3 groups of 2 tens. There are 4 groups of 2 ones. 264 ÷ 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.	Use short division for up to 4-digit numbers divided by a single digit. 0 5 5 6 7 | 3 ³8 ³9 ⁴2 3,892 ÷ 7 = 556 Use multiplication to check. 556 x 7 = ? 6 x 7 = 42 50 x 7 = 350 500 x 7 = 3500 3,500 + 350 + 42 = 3,892

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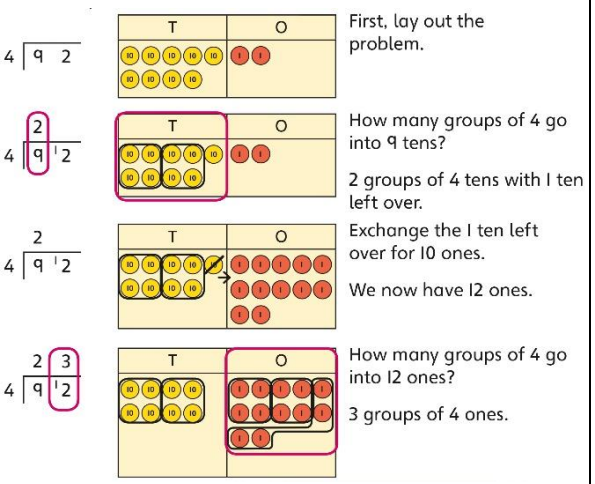
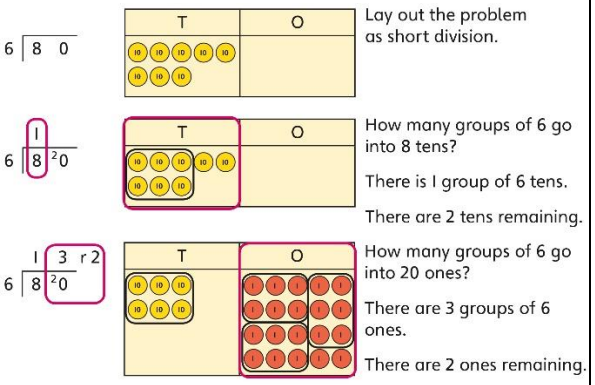
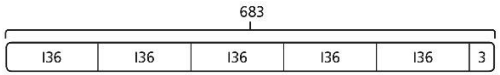
		Work with divisions that require exchange.  	
Understanding remainders	Understand remainders using concrete versions of a problem. 80 cakes divided into trays of 6.  80 cakes in total. They make 13 groups of 6, with 2 remaining.	Use short division and understand remainders as the last remaining 1s.  	In problem solving contexts, represent divisions including remainders with a bar model.  683 = 136 x 5 + 3 683 ÷ 5 = 136 r 3

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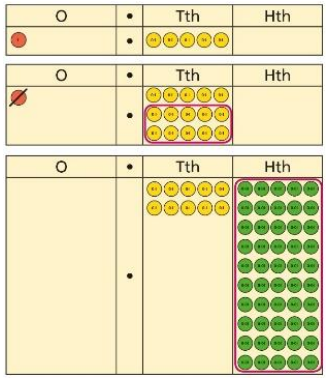
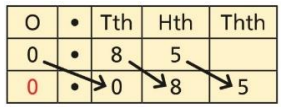
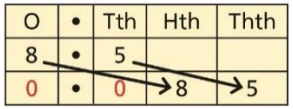
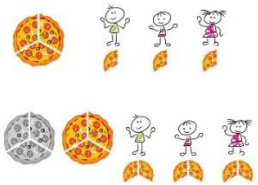
Dividing decimals by 10, 100 and 1,000	Understand division by 10 using exchange. 2 ones are 20 tenths. 20 tenths divided by 10 is 2 tenths.	Represent division using exchange on a place value grid.  1·5 is 1 one and 5 tenths. This is equivalent to 10 tenths and 50 hundredths. 10 tenths divided by 10 is 1 tenth. 50 hundredths divided by 10 is 5 hundredths. 1·5 divided by 10 is 1 tenth and 5 hundredths. 1·5 ÷ 10 = 0.15	Understand the movement of digits on a place value grid.  0·85 ÷ 10 = 0·085  8·5 ÷ 100 = 0·085
Understanding the relationship between fractions and division	Use sharing to explore the link between fractions and division. 1 whole shared between 3 people. Each person receives one-third. 	Use a bar model and other fraction representations to show the link between fractions and division.  $1 \div 3 = \frac{1}{3}$	Use the link between division and fractions to calculate divisions. $5 \div 4 = \frac{5}{4} = 1\frac{1}{4}$ $11 \div 4 = \frac{11}{4} = 2\frac{3}{4}$

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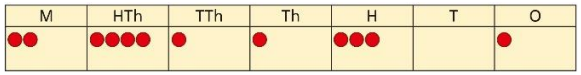
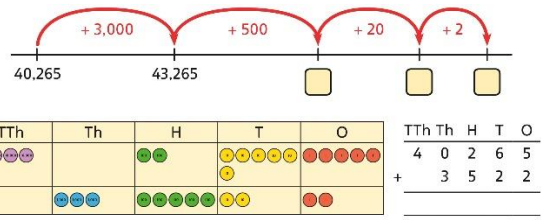
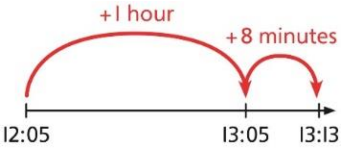
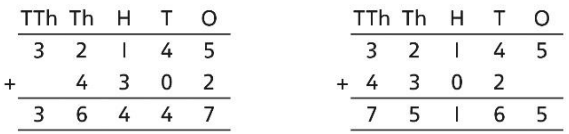
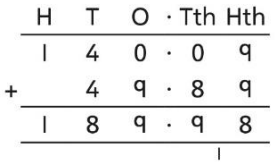
Year 6			
	Concrete	**Pictorial**	**Abstract**
Year 6 Addition			
Comparing and selecting efficient methods	Represent 7-digit numbers on a place value grid, and use this to support thinking and mental methods. 	Discuss similarities and differences between methods, and choose efficient methods based on the specific calculation. Compare written and mental methods alongside place value representations.  Use bar model and number line representations to model addition in problem-solving and measure contexts. 	Use column addition where mental methods are not efficient. Recognise common errors with column addition. *32,145 + 4,302 = ?*  *Which method has been completed accurately?* *What mistake has been made?* Column methods are also used for decimal additions where mental methods are not efficient. 
Selecting mental methods for larger numbers	Represent 7-digit numbers on a place value grid, and use this to support thinking and mental methods.	Use a bar model to support thinking in addition problems. *257,000 + 99,000 = ?*	Use place value and unitising to support mental calculations with larger numbers. *195,000 + 6,000 = ?*

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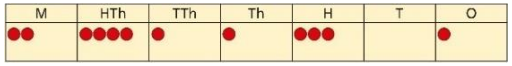
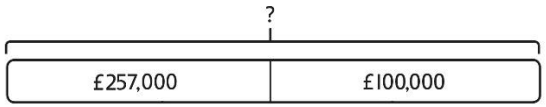
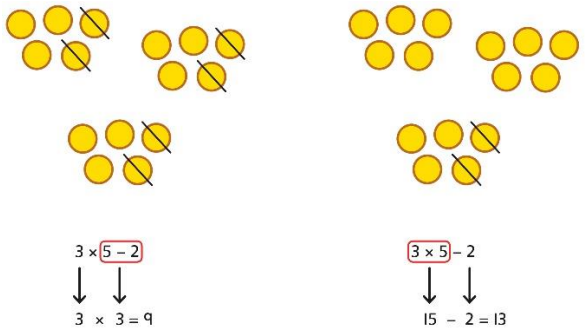
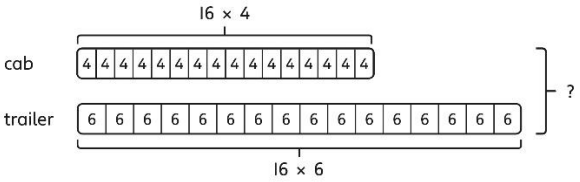
where appropriate	 2,411,301 + 500,000 = ? This would be 5 more counters in the HTh place. So, the total is 2,911,301. 2,411,301 + 500,000 = 2,911,301	 I added 100 thousands then subtracted 1 thousand. 257 thousands + 100 thousands = 357 thousands 257,000 + 100,000 = 357,000 357,000 - 1,000 = 356,000 So, 257,000 + 99,000 = 356,000	195 + 5 + 1 = 201 195 thousands + 6 thousands = 201 thousands So, 195,000 + 6,000 = 201,000
Understanding order of operations in calculations	Use equipment to model different interpretations of a calculation with more than one operation. Explore different results. 3 × 5 − 2 = ? 	Model calculations using a bar model to demonstrate the correct order of operations in multi-step calculations.  This can be written as: 16 × 4 + 16 × 6 16 × 4 + 16 × 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 x 16 4 + 96 = 100 (4 + 6) x 16 10 x 16 = 160
Year 6 Subtraction			
Comparing and selecting efficient methods	Use counters on a place value grid to represent subtractions of larger numbers.	Compare subtraction methods alongside place value representations.	Compare and select methods. Use column subtraction when mental methods are not efficient.

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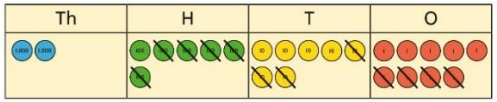
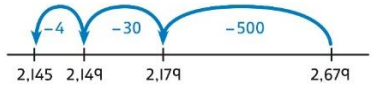
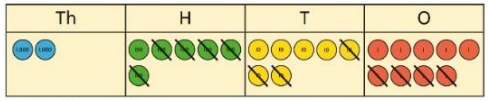
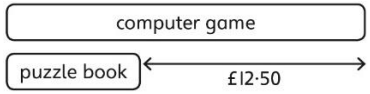
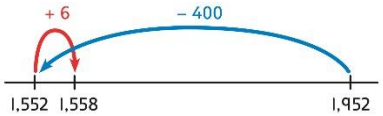
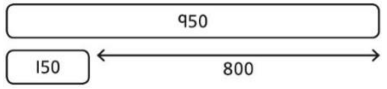
		  Th H T O 2 6 7 9 − 5 3 4 2 1 4 5 *Use a bar model to represent calculations, including 'find the difference' with two bars as comparison.* 	*Use two different methods for one calculation as a checking strategy.* Th H T O 1 ~~8~~ ~~14~~ 12 − 1 5 5 8 3 9 4  *Use column subtraction for decimal problems, 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	*Use equipment to explore multiplications.*	*Use place value equipment to compare methods.*	*Understand area model and short multiplication.*

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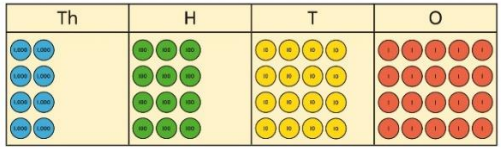
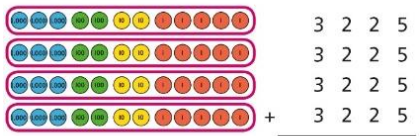
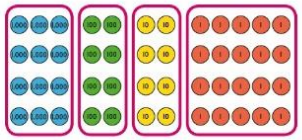
single digit number	 *4 groups of 2,345* *This is a multiplication:* *4 × 2,345* *2,345 × 4*	**Method 1**  3 2 2 5 3 2 2 5 3 2 2 5 + 3 2 2 5 1 2 9 0 0 1 1 2 **Method 2**  4 × 3,000 4 × 200 4 × 20 4 × 5 12,000 + 800 + 80 + 20 = 12,900	*Compare and select appropriate methods for specific multiplications.* **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 0 1 2
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 1 2 3 5 × 2 1 5 1 × 5 3 0 1 × 30 2 0 0 1 × 200 1 0 0 0 1 × 1,000 1 0 0 20 × 5 6 0 0 20 × 30 4 0 0 0 20 × 200 2 0 0 0 0 20 × 1,000 2 5 9 3 5 21 × 1,235	*Use compact column multiplication with understanding of place value at all stages.* 1 2 3 5 × 2 1 1 2 3 5 1 × 1,235 2 4 7 0 0 20 × 1,235 2 5 9 3 5 21 × 1,235
Using knowledge of factors and partitions to compare methods for multiplications	*Use equipment to understand square numbers and cube numbers.*	*Compare methods visually using an area model. Understand that multiple approaches will produce the same answer if completed accurately.*	*Use a known fact to generate families of related facts.*

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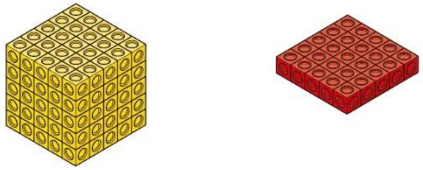
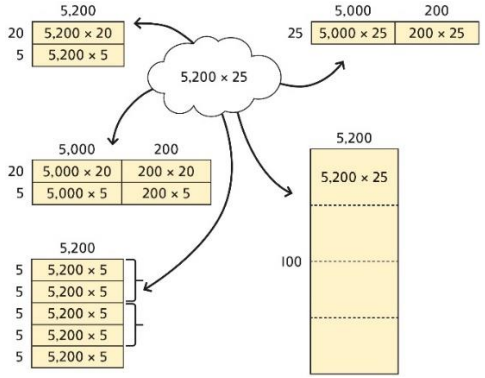
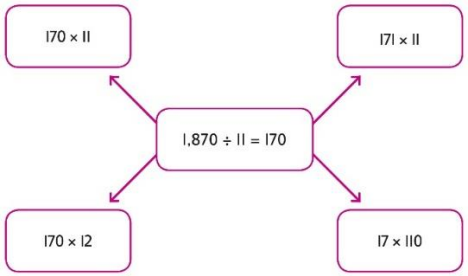
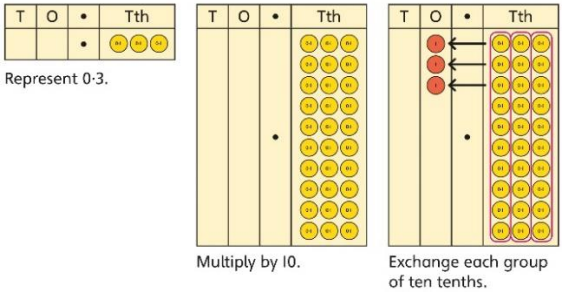
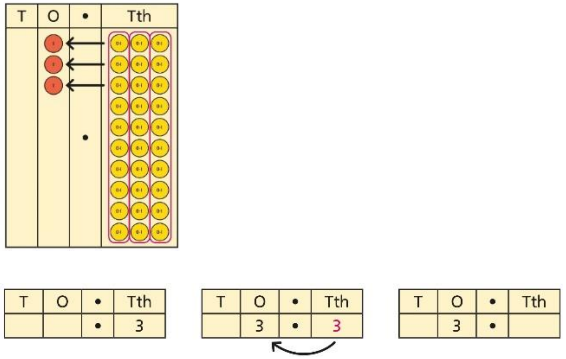
	 $5 \times 5 = 5^2 = 25$ $5 \times 5 \times 5 = 5^3 = 25 \times 5 = 125$	 Represent and compare methods using a bar model.	 Use factors to calculate efficiently. 15×16 $= 3 \times 5 \times 2 \times 8$ $= 3 \times 8 \times 2 \times 5$ $= 24 \times 10$ $= 240$
Multiplying by 10, 100 and 1,000	Use place value equipment to explore exchange in decimal multiplication.  Represent 0·3. Multiply by 10. Exchange each group of ten tenths. $0.3 \times 10 = ?$ 0·3 is 3 tenths. 10 x 3 tenths are 30 tenths. 30 tenths are equivalent to 3 ones.	Understand how the exchange affects decimal numbers on a place value grid.  $0.3 \times 10 = 3$	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.	Represent calculations on a place value grid.	Use known facts to multiply decimals. $4 \times 3 = 12$ $4 \times 0.3 = 1.2$

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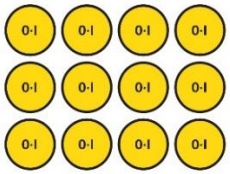
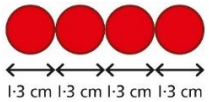
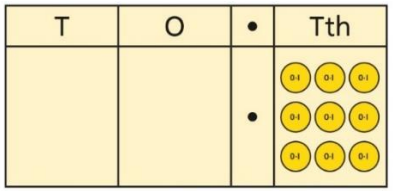
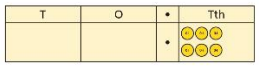
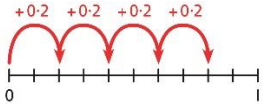
	 *3 groups of 4 tenths is 12 tenths.* *4 groups of 3 tenths is 12 tenths.*  *4 x 1 cm = 4 cm* *4 x 0·3 cm = 1.2 cm* *4 x 1·3 = 4 + 1.2 = 5·2 cm*	3 x 3 = 9 3 x 0·3 = 0·9  *Understand the link between multiplying decimals and repeated addition.*  	*4 x 0·03 = 0·12* *20 x 5 = 100* *20 x 0·5 = 10* *20 x 0·05 = 1* *Find families of facts from a known multiplication.* *I know that 18 x 4 = 72.* *This can help me work out:* *1·8 x 4 = ?* *18 x 0·4 = ?* *180 x 0·4 = ?* *18 x 0·04 = ?* *Use a place value grid to understand the effects of multiplying decimals.*
Year 6 Division			
Understanding factors	*Use equipment to explore different factors of a number.*	*Recognise prime numbers as numbers having exactly two factors. Understand the link with division and remainders.*	*Recognise and know primes up to 100. Understand that 2 is the only even prime, and that 1 is not a prime number.*

	H	T	O	•	Tth	Hth
2 x 3			6	•		
0·2 x 3			0	•	6	
0·02 x 3				•		

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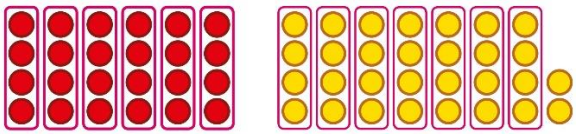
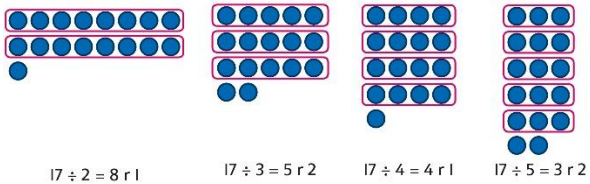
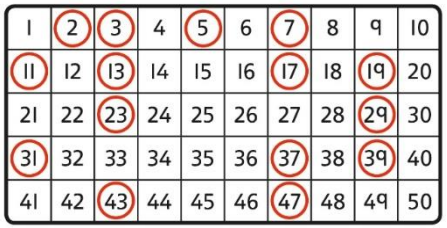
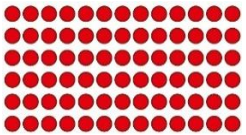
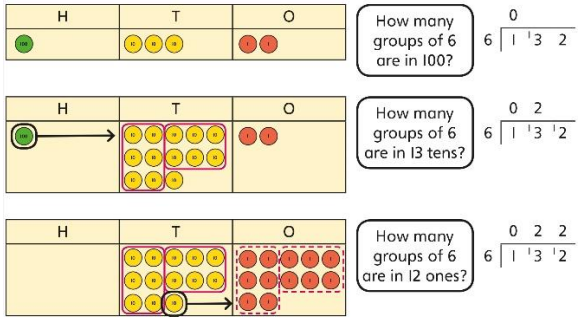
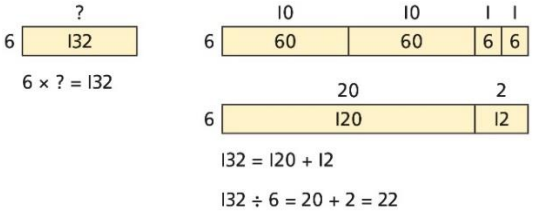
	 24 ÷ 4 = 6 30 ÷ 4 = 7 remainder 2 *4 is a factor of 24 but is not a factor of 30.*	 17 ÷ 2 = 8 r 1 17 ÷ 3 = 5 r 2 17 ÷ 4 = 4 r 1 17 ÷ 5 = 3 r 2	
Dividing by a single digit	*Use equipment to make groups from a total.*  *There are 78 in total.* *There are 6 groups of 13.* *There are 13 groups of 6.*		*Use short division to divide by a single digit.* 6 | 1 3 2 → 0 6 | 1 3 2 → 0 2 6 | 1 3 2 → 0 2 2 *Use an area model to link multiplication and division.* 
Dividing by a 2-digit number using factors	*Understand that division by factors can be used when dividing by a number that is not prime.*	*Use factors and repeated division.* *1,260 ÷ 14 = ?*	*Use factors and repeated division where appropriate.* *2,100 ÷ 12 = ?*

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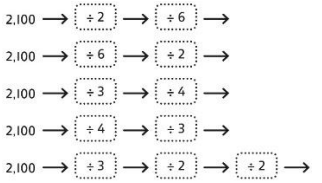
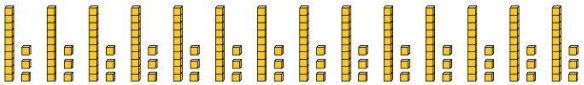
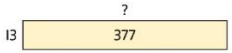
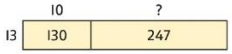
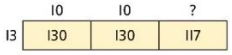
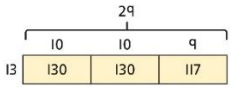
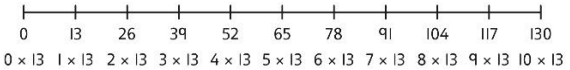
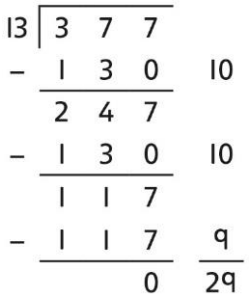
		 *1,260 ÷ 2 = 630* *630 ÷ 7 = 90* *1,260 ÷ 14 = 90*	
Dividing by a 2-digit number using long division	*Use equipment to build numbers from groups.*  *182 divided into groups of 13.* *There are 14 groups.*	*Use an area model alongside written division to model the process.* *377 ÷ 13 = ?*     *377 ÷ 13 = 29*	*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.* *377 ÷ 13 = ?*   *377 ÷ 13 = 29* *A slightly different layout may be used, with the division completed above rather than at the side.*

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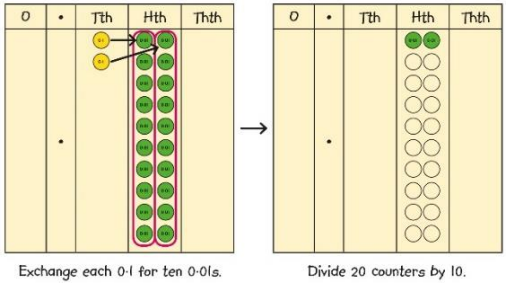
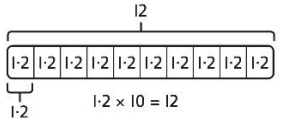
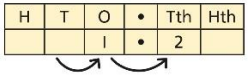
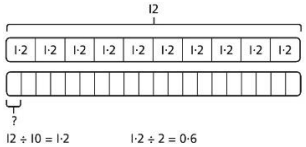
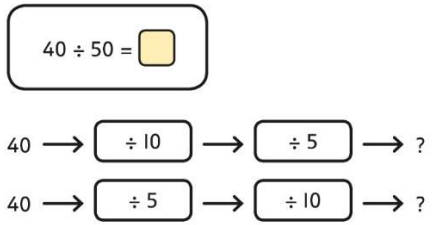
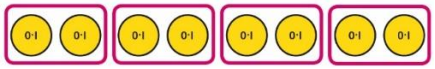
			3 21 | 7 9 8 − 6 3 0 1 6 8 3 8 21 | 7 9 8 − 6 3 0 1 6 8 − 1 6 8 0 *Divisions with a remainder explored in problem-solving contexts.*
Dividing by 10, 100 and 1,000	*Use place value equipment to explore division as exchange.*  Exchange each 0·1 for ten 0·01s. Divide 20 counters by 10. *0·2 is 2 tenths.* *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.* *12 ÷ 20 = ?*  	*Use knowledge of factors to divide by multiples of 10, 100 and 1,000.*  *40 ÷ 5 = 8* *8 ÷ 10 = 0·8* *So, 40 ÷ 50 = 0·8*
Dividing decimals	*Use place value equipment to explore division of decimals.*  	*Use a bar model to represent divisions.*	*Use short division to divide decimals with up to 2 decimal places.*

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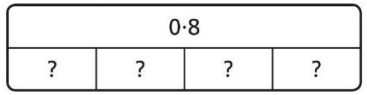
	8 tenths divided into 4 groups. 2 tenths in each group.	 $4 \times 2 = 8$ $8 \div 4 = 2$ So, $4 \times 0{\cdot}2 = 0{\cdot}8$ $0{\cdot}8 \div 4 = 0{\cdot}2$	$8 \overline{)4 \cdot 24}$ $8 \overline{)4 \cdot {}^{4}2\ 4}$ 0 · $8 \overline{)4 \cdot {}^{4}2\ {}^{2}4}$ 0 · 5 $8 \overline{)4 \cdot {}^{4}2\ {}^{2}4}$ 0 · 5 3

Vocabulary

All vocabulary should be consistent, year group appropriate and built upon year on year (See vocabulary progression document).

Progression in Mathematical language

Counting & the number system (inc. estimating)

Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
number zero, one, two, three... to twenty and beyond zero, ten, twenty... one hundred none how many...? count, count (up) to count on (from, to) count back (from, to) count in ones, twos... tens... more, less, many, few odd, even every other how many times? pattern, pair guess how many, estimate nearly, close to, about the same as just over, just under too many, too few, enough, not enough	roughly	Two hundred...one thousand, threes, fours, fives, tally, multiple of, sequence, continue, predict, rule, exact, exactly, round, nearest, round to the nearest ten	Hundreds, relationship, approximate, approximately, round-up, round-down	Thousands, ten thousand, hundred thousand, million, numeral, four-digit,	≥, ≤, greater than or equal to, less than or equal to, ascending/descending order, ≈, approximately equal to, round to the nearest thousand, formula, divisibility, square number, one squared, two squared..., 1^2, 2^2, ...	Factorise, prime, prime factor

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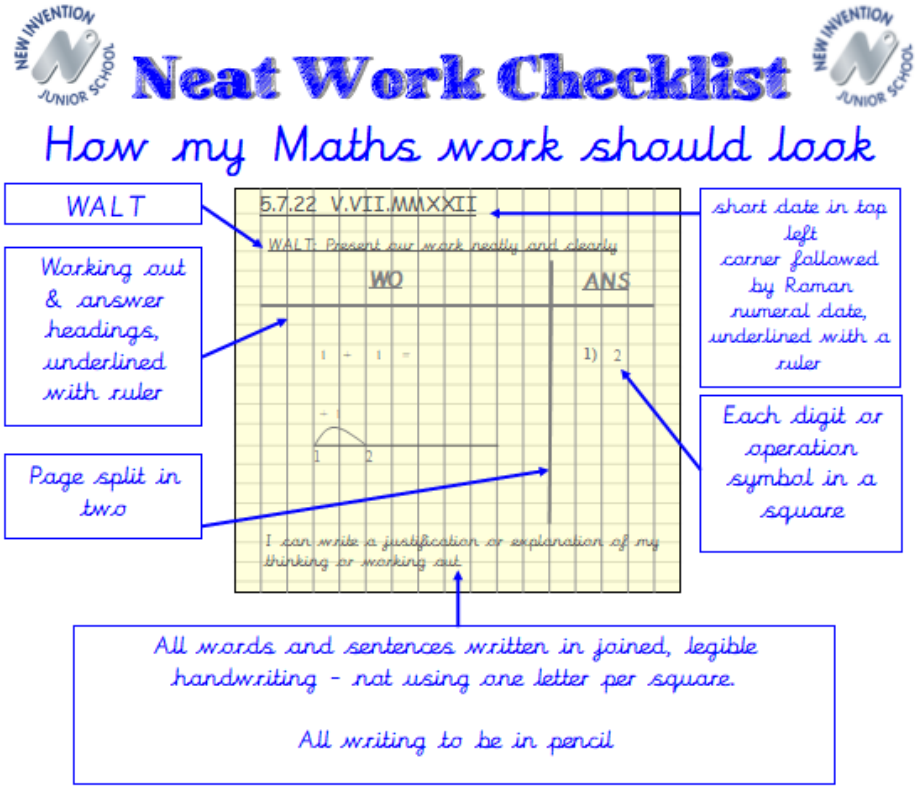
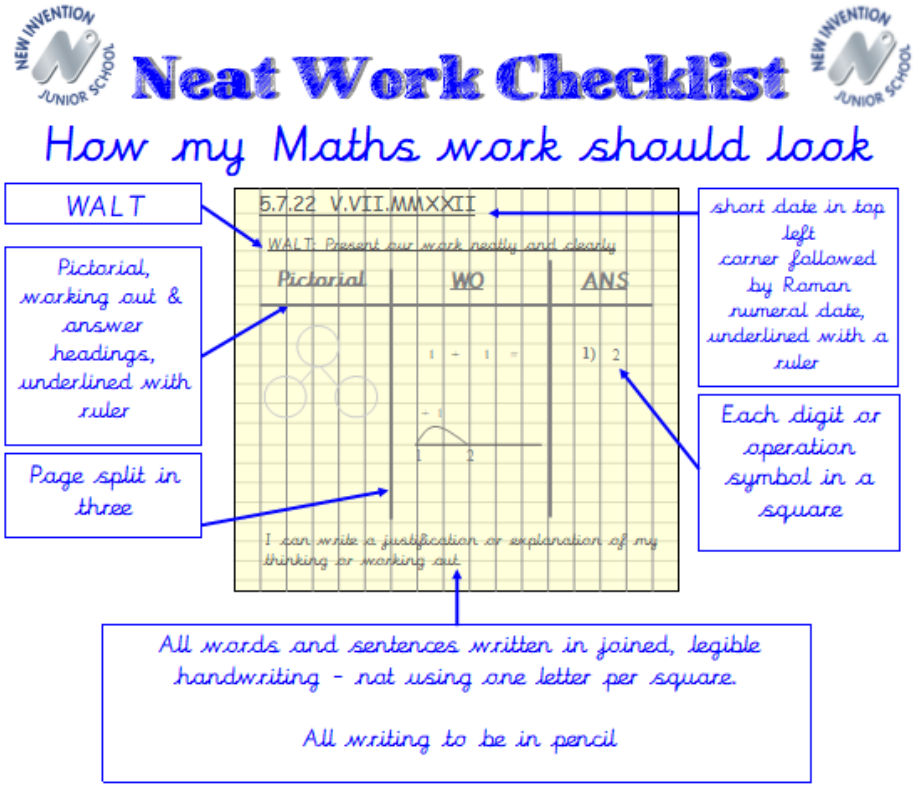
Work presentation

Throughout calculation written work, pupils' books should be set out as below, allowing for a section for working out and a section to write their final answer. Where required, it may be split further to allow for evidence of the CPA approach.





Some work, however, may not be suitable to fit this format, such as shape, data handling or creative investigative work, which should therefore be set out using the squares provided. Worksheets should be kept to a minimum, only using them if it is unsuitable for the pupils to set it out themselves. (see whole school **presentation policy**).

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Mental maths

Mental maths objectives are taught in line and sequential within other planning objectives, and revisited frequently as mental maths starters. Evidence is recorded in pupil's mental maths books, in addition to the use of Times Tables Rockstars and Numbots. The rote recall of times tables has a progressive approach from Year three, where specific tables are taught through the use of chanting, songs and rote recall booklets in each year group.

Problem solving and reasoning & mastery approach

Here, we supplement our curriculum with a problem solving sub-curriculum, whereby the skills of problem solving are taught explicitly and progressively throughout year 3-6. These develop the skills of interpreting and using mathematical vocabulary; deciphering worded problems to building independence and resilience.

Planning

New Invention Junior School adheres to the guidelines laid down in the National Curriculum for Mathematics, these have been developed in to our yearly long-term plans in the form of assessment grids for each year group, from which staff work collaboratively to produce progressive, medium term plans. Additional resources to inform planning include White Rose, Power Maths and I See Reasoning. Planning is monitored throughout the year by the Maths co-ordinator.

Assessment

See whole school assessment policy

At present the framework for assessment is as follows:

- Statutory end of Key Stage assessment in year six. Supported by termly, formal testing.
- On entry into Year 3, pupils are assessed using a baseline assessment, in the form of the Year 2 SATs tests and external moderation & baseline.
- School-devised assessment grids are used to teacher assess the pupils throughout each curriculum domain, supported by bi/tri-weekly arithmetic tests, and termly non-statutory formal tests in each year group and moderation within school.
- Continuous daily assessment takes through interaction with children and marking of exercise books inside and outside of the lesson.
- A clear marking policy is followed, providing ongoing challenge for all pupils (See marking policy).
- Half-termly times tables tests on online platform (in line with Y4 MTC)
- Termly whole school moderation of teacher assessments

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- In-school trained moderators

All assessment tools are formative, leading to developments in planning and intervention groups.

Record keeping

- All summative data is entered to Arbor termly
- Expected progress to be 2 steps per term / 6 steps per year
- Bi/tri weekly arithmetic stored centrally and analysed by subject lead
- Data is analysed by subject leader/ SMT
- Case study books are tracked and kept by groups of pupils from Year 3 to Year 6.

Meeting the needs of all

Maths lessons aim to meet the needs of all pupils whilst delivering an inclusive objective. All pupils in the class aim to achieve the same objective, with teaching being adaptive so as:

- Higher attainers are challenged and learning aims to go deeper;
- SEND pupils are supported and scaffolded through a range of techniques and resources;
- TAs are deployed effectively to support pupils' needs;
- Intervention groups aim to address needs and close gaps to improve progress;
- Practical resources used effectively to move learning forward.

Monitoring

The mathematics co-ordinator, Headteacher and SMT take responsibility for the monitoring of the mathematics curriculum and the standards achieved by the pupils. Monitoring takes the form of:

- Lesson observations;
- Medium term planning (see curriculum overviews on school website);
- Book/work scrutiny;
- Learning Walks;
- Pupil interviews;
- Data analysis.

All monitoring fed back to staff either individually or collectively depending on need, and should be used to identify strengths and areas for development or to inform leader's action plan to move maths forward.

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Cross-curricular

Maths is encouraged to extend and be applied outside of the maths lesson. Cross-curricular maths takes varying forms in different subjects:

- Geography – climate graphs (drawing & interpreting), grid references (link to co-ordinates), map skills (converting units of measure);
- DT – Market research graphs (bar charts / stacked bar charts);
- MFL – Currency (conversions & conversion graphs);
- Writing – writing within maths (maths stories, famous mathematician focus);
- Art – Facial proportions (link with fractions);
- PE – distance, timing (stopwatches);
- History – timelines (link with negative numbers);
- Generic – Venn / carol diagrams (pitched at year group maths level), tables (pitched at year group maths level).

Maths used to enhance foundation subjects, and should apply previously taught maths skills independently, with the maths pitched at current year group level where this supports the foundation subject objective.

Resources

- **Year Group Key Document Folders** (containing all guidance to plan and deliver maths at NIJ)
- Collins Busy Ant text books;
- Power Maths online resources (CPA);
- Number Sense;
- Times Tables Rock Stars;
- Numbots;
- White Rose minute maths;
- MyMaths.co.uk;
- Testbase;
- Concept cartoons;
- Stocked resources room with practical equipment;
- Blue Maths box in each classroom containing: dice, counters, place value sliders, place value charts, playing cards, number lines.
- I See Reasoning & I See Problem Solving

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