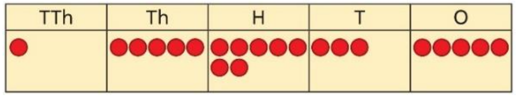
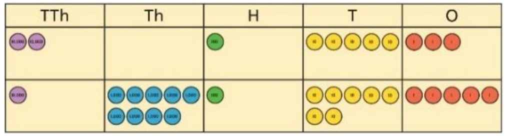
Calculation Policy – Year 5

St Mary's
Catholic Primary School and Nursery

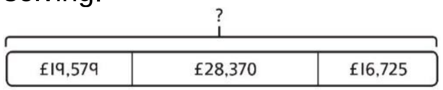
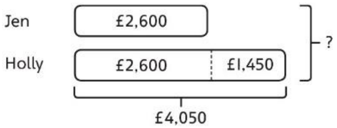
<table>
<tr><th colspan="4">Year 5</th></tr>
<tr><th>Year 5
Addition</th><th>Concrete</th><th>Pictorial</th><th>Abstract</th></tr>
<tr>
<td>Column addition with whole numbers</td>
<td>Use place value equipment to represent additions.

Add a row of counters onto the place value grid to show 15,735 + 4,012.

</td>
<td>Represent additions, using place value equipment on a place value grid alongside written methods.


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
1</td>
<td>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
1 1</td>
</tr>
<tr>
<td>Representing additions</td>
<td></td>
<td>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
1

Th H T O
2 6 0 0
+ 4 0 5 0
6 6 5 0</td>
<td>Use approximation 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
1 1

I will use 23,000 + 8,000 to check.</td>
</tr>
</table>

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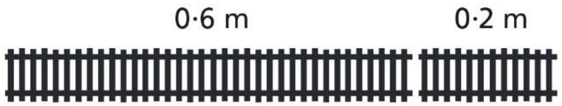
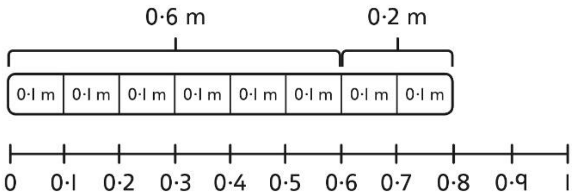
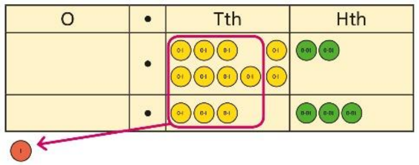
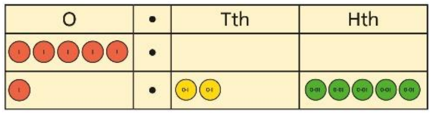
Adding tenths	Link measure with addition of decimals. *Two lengths of fencing are 0·6 m and 0·2 m.* *How long are they when added together?* 	Use a bar model with a number line to add tenths.  *0·6 + 0·2 = 0·8* *6 tenths + 2 tenths = 8 tenths*	Understand the link with adding fractions. $\frac{6}{10}+\frac{2}{10}=\frac{8}{10}$ *6 tenths + 2 tenths = 8 tenths* *0·6 + 0·2 = 0·8*
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.  $\begin{array}{rcll} & O & \cdot\ Tth & Hth \\ \hline & 0 & \cdot\ 9 & 2 \\ + & 0 & \cdot\ 3 & 3 \\ \hline & 1 & \cdot\ 2 & 5 \\ \hline & 1 & & \end{array}$ Include examples where the numbers of decimal places are different.  $\begin{array}{rcll} & O & \cdot\ Tth & Hth \\ \hline & 5 & \cdot\ 0 & 0 \\ + & 1 & \cdot\ 2 & 5 \\ \hline & 6 & \cdot\ 2 & 5 \\ \hline \end{array}$	Add using a column method, ensuring that children understand the link with place value. $\begin{array}{rcll} & O & \cdot\ Tth & Hth \\ \hline & 0 & \cdot\ 2 & 3 \\ + & 0 & \cdot\ 4 & 5 \\ \hline & 0 & \cdot\ 6 & 8 \end{array}$ Include exchange where required, alongside an understanding of place value. $\begin{array}{rcll} & O & \cdot\ Tth & Hth \\ \hline & 0 & \cdot\ 9 & 2 \\ + & 0 & \cdot\ 3 & 3 \\ \hline & 1 & \cdot\ 2 & 5 \\ \hline & 1 & & \end{array}$ Include additions where the numbers of decimal places are different. *3.4 + 0.65 = ?* $\begin{array}{rcll} & O & \cdot\ Tth & Hth \\ \hline & 3 & \cdot\ 4 & 0 \\ + & 0 & \cdot\ 6 & 5 \\ \hline & & \cdot & \\ \hline \end{array}$

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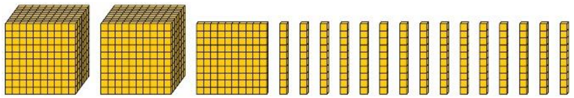
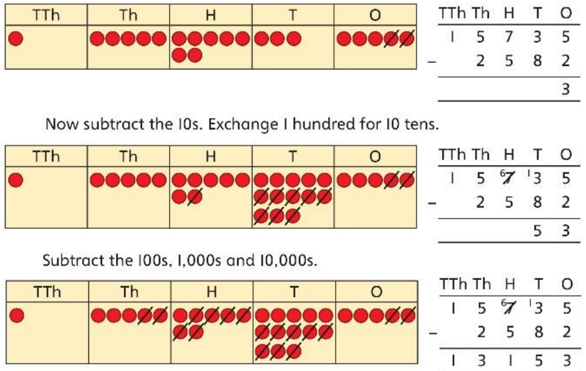
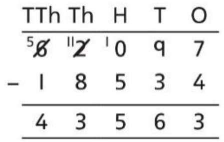
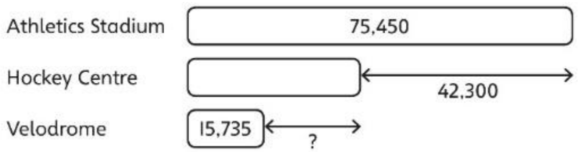
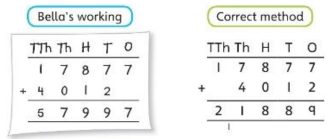
Year 5 Subtraction	Concrete	Pictorial	Abstract
Column subtraction with whole numbers	Use place value equipment to understand where exchanges are required. *2,250 – 1,070* 	Represent the stages of the calculation using place value equipment on a grid alongside the calculation, including exchanges where required. *15,735 − 2,582 = 13,153* 	Use column subtraction methods with exchange where required.  *62,097 − 18,534 = 43,563*
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.*

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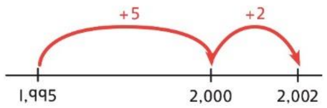
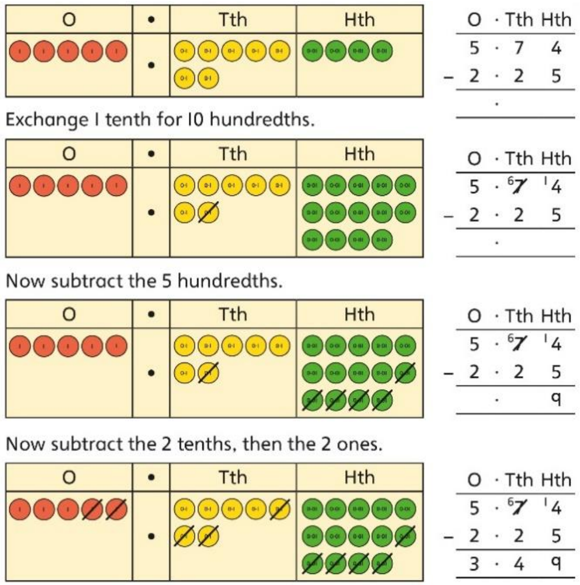
Choosing efficient methods			To subtract two large numbers that are close, children find the difference by counting on. *2,002 − 1,995 = ?*  Use addition to check subtractions. *I calculated 7,546 − 2,355 = 5,191.* *I will check using the inverse.*
Subtracting decimals	Explore complements to a whole number by working in the context of length.  1 m − $\boxed{}$ m = $\boxed{}$ m *1 − 0·49 = ?*	Use a place value grid to represent the stages of column subtraction, including exchanges where required. *5·74 − 2·25 = ?*  	Use column subtraction, with an understanding of place value, including subtracting numbers with different numbers of decimal places. *3·921 − 3·75 = ?* O · Tth Hth Thth 3 · 9 2 1 − 3 · 7 5 0 ·

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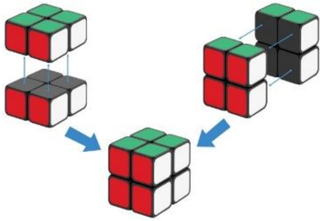
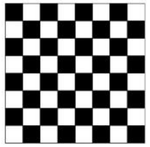
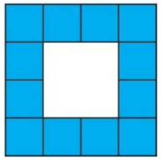
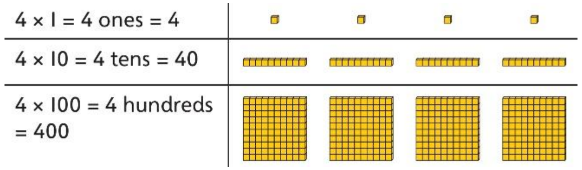
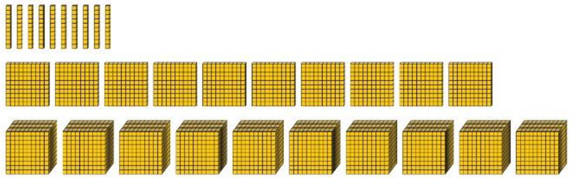
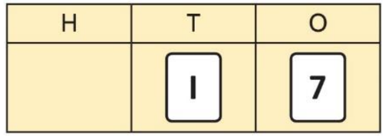
Year 5 Multiplication	Concrete	Pictorial	Abstract
Understanding factors	Use cubes or counters to explore the meaning of ‘square numbers’. *25 is a square number because it is made from 5 rows of 5.* Use cubes to explore cube numbers.  *8 is a cube number.*	Use images to explore examples and non-examples of square numbers.  *$8 \times 8 = 64$* *$8^2 = 64$*  *12 is not a square number, because you cannot multiply a whole number by itself to make 12.*	Understand the pattern of square numbers in the multiplication tables. Use a multiplication grid to circle each square number. Can children spot a pattern?
Multiplying by 10, 100 and 1,000	Use place value equipment to multiply by 10, 100 and 1,000 by unitising. 	Understand the effect of repeated multiplication by 10. 	Understand how exchange relates to the digits when multiplying by 10, 100 and 1,000.  *$17 \times 10 = 170$* *$17 \times 100 = 17 \times 10 \times 10 = 1,700$* *$17 \times 1,000 = 17 \times 10 \times 10 \times 10 = 17,000$*

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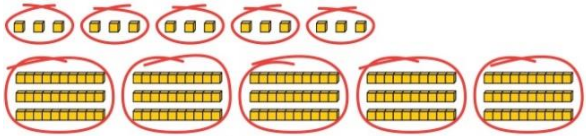
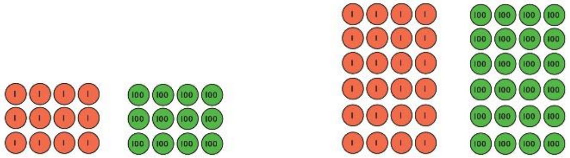
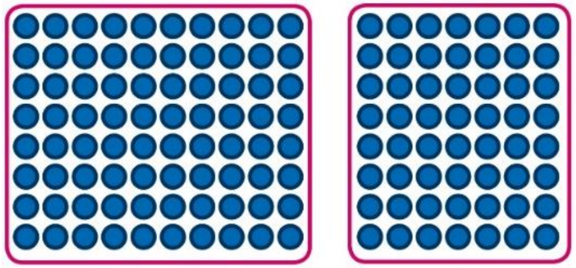
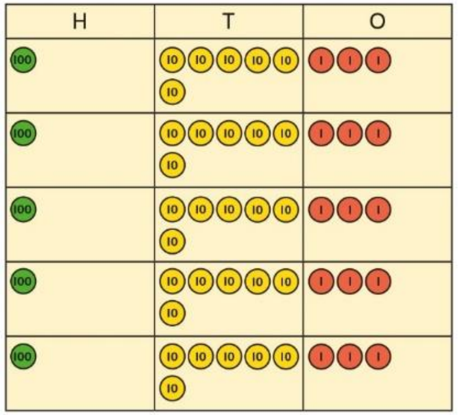
Multiplying by multiples of 10, 100 and 1,000	Use place value equipment to explore multiplying by unitising.  *5 groups of 3 ones is 15 ones.* *5 groups of 3 tens is 15 tens.* *So, I know that 5 groups of 3 thousands would be 15 thousands.*	Use place value equipment to represent how to multiply by multiples of 10, 100 and 1,000.  *4 × 3 = 12* *4 × 300 = 1,200* *6 × 4 = 24* *6 × 400 = 2,400*	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*
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. $\begin{array}{c\|c\|c\|c\|} & 100 & 60 & 3 \\ \hline 5 & 100 \times 5 = 500 & 60 \times 5 = 300 & 3 \times 5 = 15 \\ \hline \end{array}$ Use a column multiplication, including any required exchanges. $\begin{array}{rccc} & 1 & 3 & 6 \\ \times & & & 6 \\ \hline & 8 & 1 & 6 \\ \hline & & {}_2 & {}_3 \end{array}$

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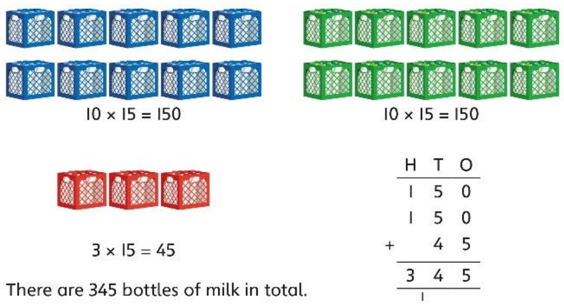
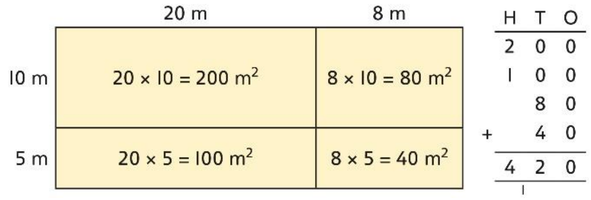
<table>
<tr>
<td>Multiplying 2-digit numbers by 2-digit numbers</td>
<td>Partition one number into 10s and 1s, then add the parts.

23 × 15 = ?



23 × 15 = 345</td>
<td>Use an area model and add the parts.

28 × 15 = ?

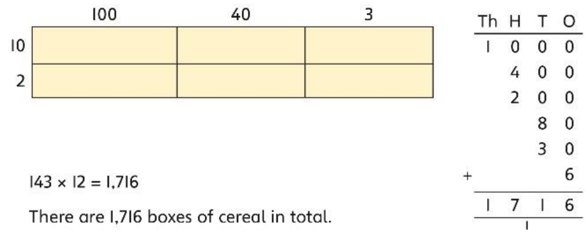


28 × 15 = 420</td>
<td>Use column multiplication, ensuring understanding of place value at each stage.

3 4
× 2 7
2 $3_2$8 34 × 7

3 4
× 2 7
2 $3_2$8 34 × 7
6 8 0 34 × 20

3 4
× 2 7
2 $3_2$8 34 × 7
6 8 0 34 × 20
9 1 8 34 × 27
1</td>
</tr>
<tr>
<td>Multiplying up to 4-digits by 2-digits</td>
<td></td>
<td>Use the area model then add the parts.

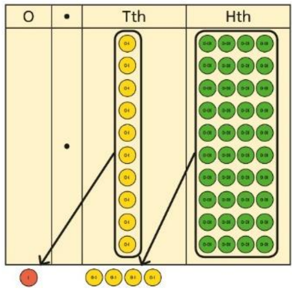
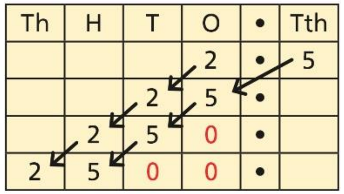


143 × 12 = 1,716</td>
<td>Use column multiplication, ensuring understanding of place value at each stage.

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.</td>
</tr>
</table>

			$\begin{array}{rcccc l} & 1 & 2 & 7 & 4 & \\ \times & & & 3 & 2 & \\ \hline & 2 & 5_{1} & 4 & 8 & 1{,}274 \times 2 \\ \hline \\ \hline \end{array}$ *Then multiply 1,274 by 30.* $\begin{array}{rcccc l} & 1 & 2 & 7 & 4 & \\ \times & & & 3 & 2 & \\ \hline & 2 & 5_{1} & 4 & 8 & 1{,}274 \times 2 \\ 3 & 8_{2} & 2_{1} & 2 & 0 & 1{,}274 \times 30 \\ \hline \\ \hline \end{array}$ *Finally, find the total.* $\begin{array}{rcccc l} & 1 & 2 & 7 & 4 & \\ \times & & & 3 & 2 & \\ \hline & 2 & 5_{1} & 4 & 8 & 1{,}274 \times 2 \\ 3 & 8_{2} & 2_{1} & 2 & 0 & 1{,}274 \times 30 \\ \hline 4_{1} & 0 & 7 & 6 & 8 & 1{,}274 \times 32 \\ \hline \end{array}$ *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 

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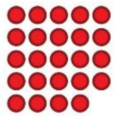
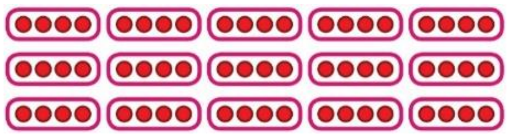
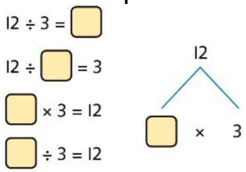
Year 5 Division			
Understanding factors and prime numbers	Use equipment to explore the factors of a given number.  *24 ÷ 3 = 8* *24 ÷ 8 = 3* *8 and 3 are factors of 24 because they divide 24 exactly.* 24 ÷ 5 = 4 remainder 4.  *5 is not a factor of 24 because there is a remainder.*	Understand that prime numbers are numbers with exactly two factors. *13 ÷ 1 = 13* *13 ÷ 2 = 6 r 1* *13 ÷ 4 = 4 r 1* *1 and 13 are the only factors of 13.* *13 is a prime number.*	Understand how to recognise prime and composite numbers. *I know that 31 is a prime number because it can be divided by only 1 and itself without leaving a remainder.* *I know that 33 is not a prime number as it can be divided by 1, 3, 11 and 33.* *I know that 1 is not a prime number, as it has only 1 factor.*
Understanding inverse operations and the link with multiplication, grouping and sharing	Use equipment to group and share and to explore the calculations that are present. *I have 28 counters.* *I made 7 groups of 4. There are 28 in total.* *I have 28 in total. I shared them equally into 7 groups. There are 4 in each group.* *I have 28 in total. I made groups of 4. There are 7 equal groups.*	Represent multiplicative relationships and explore the families of division facts.  *60 ÷ 4 = 15* *60 ÷ 15 = 4*	Represent the different multiplicative relationships to solve problems requiring inverse operations.  Understand missing number problems for division calculations and know how to solve them using inverse operations. *22 ÷ ? = 2* *22 ÷ 2 = ?* *? ÷ 2 = 22* *? ÷ 22 = 2*

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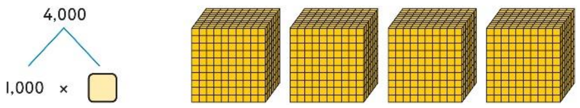
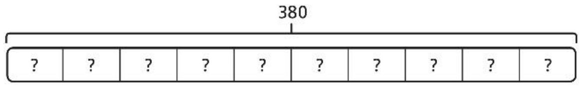
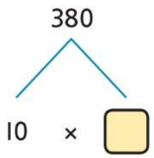
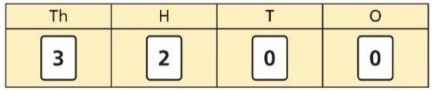
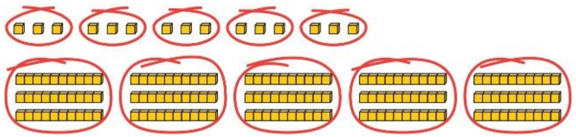
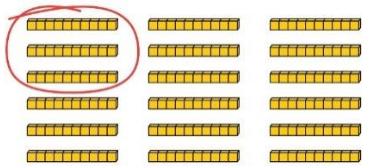
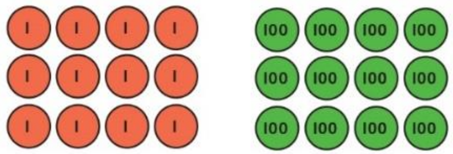
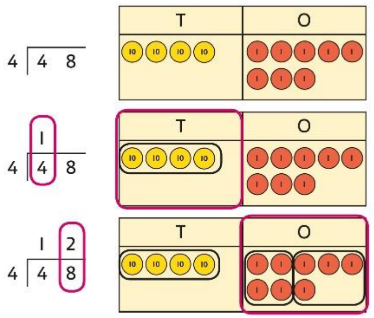
Dividing whole numbers by 10, 100 and 1,000	Use place value equipment to support unitising for division. *4,000 ÷ 1,000*  *4,000 is 4 thousands.* *4 × 1,000= 4,000* *So, 4,000 ÷ 1,000 = 4*	Use a bar model to support dividing by unitising. *380 ÷ 10 = 38*   *380 is 38 tens.* *38 × 10 = 380* *10 × 38 = 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* *15 tens put into groups of 3 tens. There are 5 groups.* *150 ÷ 30 = 5*	Represent related facts with place value equipment when dividing by unitising.  *180 is 18 tens.* *18 tens divided into groups of 3 tens. There are 6 groups.* *180 ÷ 30 = 6* 	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*

Calculation Policy – Year 5

		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.* Work with divisions that require exchange.	Use short division for up to 4-digit numbers divided by a single digit. $\begin{array}{r} 0\;\;5\;\;5\;\;6 \\ 7\overline{)\,3\;\;{}^{3}8\;\;{}^{3}9\;\;{}^{4}2} \end{array}$ *3,892 ÷ 7 = 556* Use multiplication to check. *556 × 7 = ?* *6 × 7 = 42* *50 × 7 = 350* *500 × 7 = 3500* *3,500 + 350 + 42 = 3,892*

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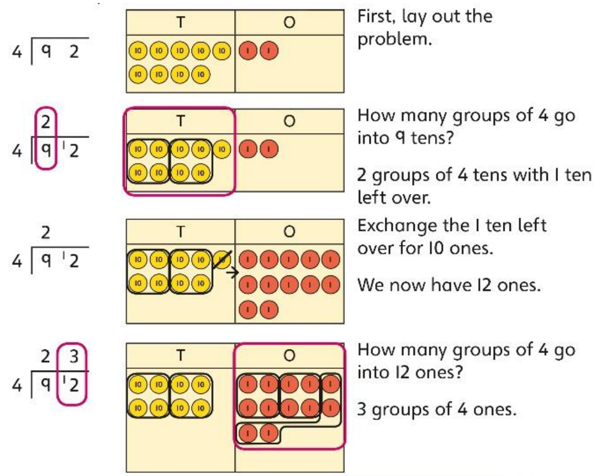
<td>
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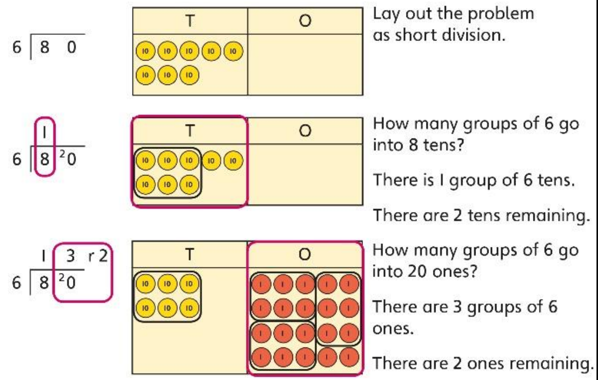
<tr>
<td>Understanding remainders</td>
<td>Understand remainders using concrete versions of a problem.

80 cakes divided into trays of 6.

80 cakes in total. They make 13 groups of 6, with 2 remaining.</td>
<td>Use short division and understand remainders as the last remaining 1s.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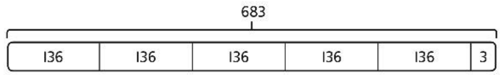
<td>In problem solving contexts, represent divisions including remainders with a bar model.



683 = 136 × 5 + 3
683 ÷ 5 = 136 r 3</td>
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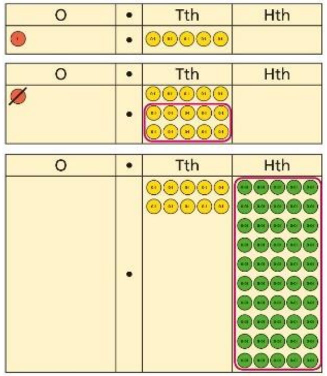
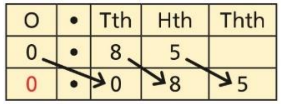
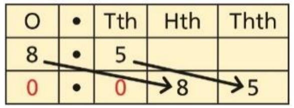
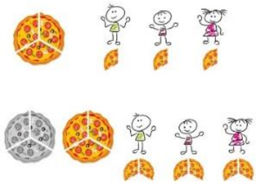
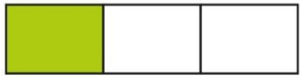
Calculation Policy – Year 5

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. $5 \div 4 = \frac{5}{4} = 1\frac{1}{4}$ $11 \div 4 = \frac{11}{4} = 2\frac{3}{4}$