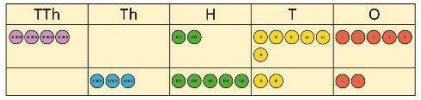
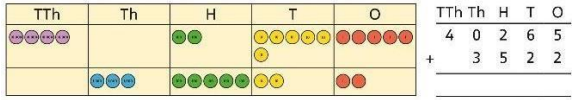
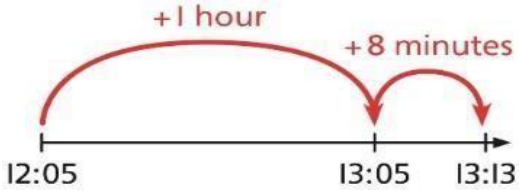
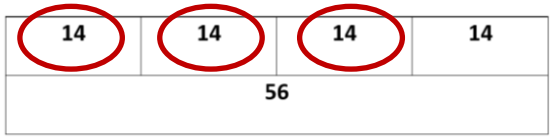
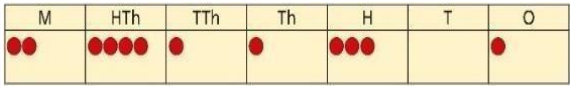
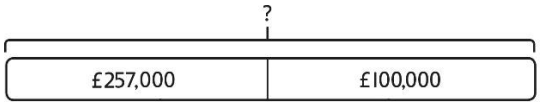
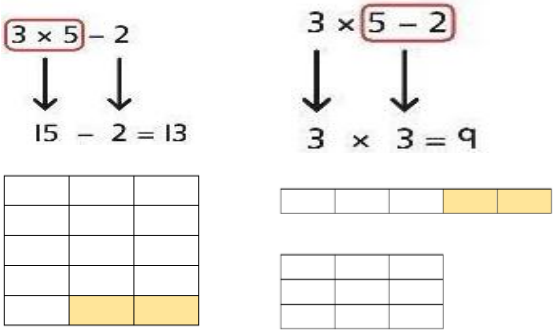
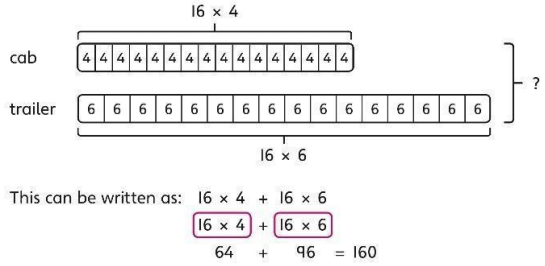
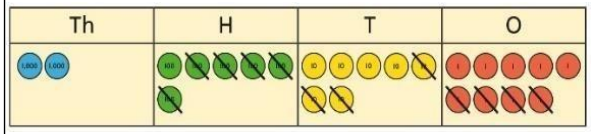
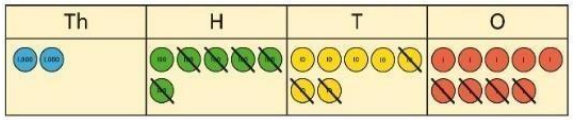
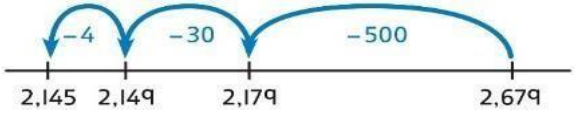
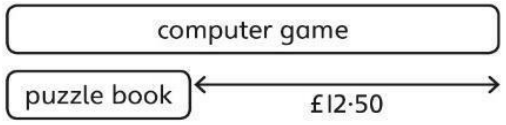
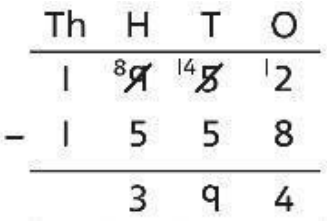
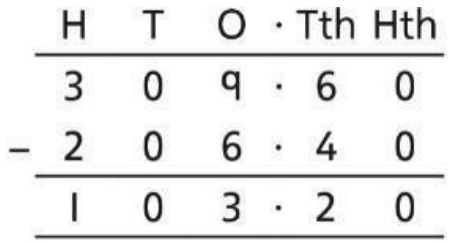
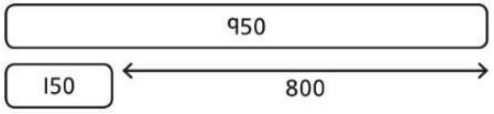
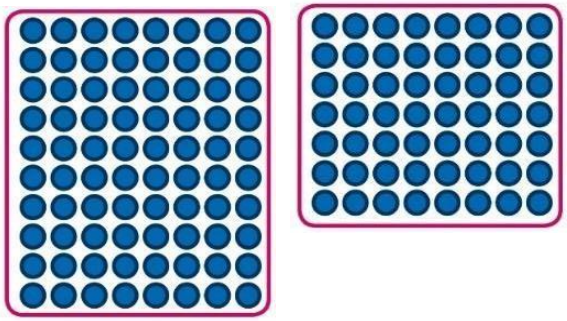
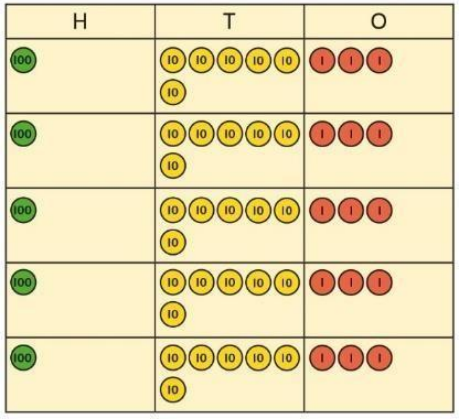
Year 7

	Concrete	Pictorial	Abstract
Primary 7 **Addition**			
Column addition with whole number s with up to 7 digits **Video P7- 01**	Use place value equipment to represent additions. 40265 + 3522 =  Regrouping where necessary.	Children can draw a pictorial representation of place value counters and place value columns to support their understanding of addition problems, using alongside written methods to support.  Use bar model and number line representations to model addition in problem- solving and measure contexts.  **Find 75% of 56**  75% = ¾ 56 ÷ 4 = 14 14 x 3 = 42	Use a formal column addition method, including regrouping and carrying, and recognising where mistakes have been made. **32,145 + 4,302 = ?** TTh Th H T O 3 2 1 4 5 + 4 3 0 2 3 6 4 4 7 TTh Th H T O 3 2 1 4 5 + 4 3 0 2 7 5 1 6 5 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. H T O · Tth Hth 1 4 0 · 10 9 + 4 9 · 8 9 1 8 9 · 9 8

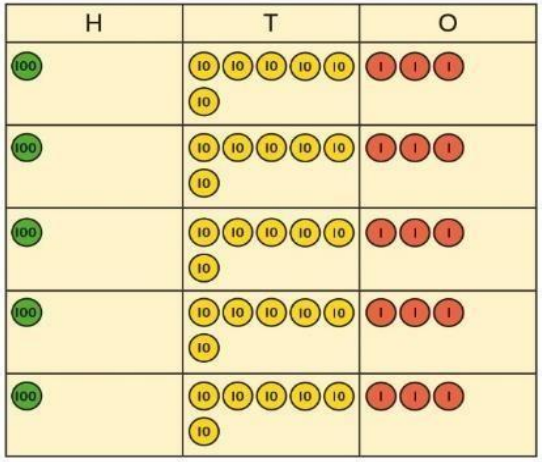
Selecting mental methods for larger numbers where appropriate **Video P7- 02**	Represent 7-digit numbers on a place value grid, and use this to support thinking and mental methods.  **2,411,301 + 500,000 = ?** *This would be 5 more counters in the HTh place.* *So, the total is 2,911,301.* *2,411,301 + 500,000 = 2,911,301*	Use a bar model to support thinking in addition problems. **257,000 + 99,000 = ?**  *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*	Use place value and unitising to support mental calculations with larger numbers. **195,000 + 6,000 = ?** 195 + 5 + 1 = 201 195 thousands + 6 thousands = 201 thousands *So, 195,000 + 6,000 = 201,000*
Understanding order of operations in calculations **Video P7- 03**	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 e.g. In a trailer park there are **16 cabs each 4m in length**. Each cab attaches to a trailer which is **6m in length**. Calculate the total length of all the cabs and trailers. (16 x 4) + (16 x 6)  	Understand the correct order of operations in calculations without brackets. Understand how brackets affect the order of operations in a calculation. 4 + (6 × 16) 4 + 96 = 100 (4 + 6) × 16 10 × 16 = 160

	Concrete	Pictorial	Abstract
Primary 7 **Subtraction**			
Column subtraction with whole numbers with up to 7 digits **Video P7- 04**	Use place value equipment to represent subtraction problems. Regrouping where necessary. 2679 - 534 	Use pictorial representations of place value equipment on a place value grid to complete subtraction problems.  Compare subtraction methods alongside place value representations.  **Use a bar model to represent calculations, including 'find the difference' with two bars as comparison.**  In this example, the computer game is £12.50 more expensive The puzzle book is £12.50 cheaper. The computer game is cheaper than £25 (because £12.50 is more than half of the bar model) The puzzle book is approximately 40% of the price of the computer game.	Use column subtraction methods with regrouping where required.  Use column subtraction for decimal problems, including in the context of measure and money. 

Subtracting mentally with larger numbers **Video P7- 05**		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 mentally using decomposition. 10,000 − 500 = ?

	Concrete	**Pictorial**	**Abstract**
Primary 7 **Multiplication**			
Multiplying up to 4-digit numbers by a one or two digit number **Video P7- 06**	Use place value equipment to explore how to use partitioning to multiply efficiently. 8 × 17 = ?  8 × 10 = 80 8 × 7 = 56 80 + 56 = 136 So, 8 × 17 = 136 Use place value equipment to represent multiplication problems.	Use pictorial representations of place value equipment on a place value grid to complete multiplication problems: **163 x 5**  Use grid method to pictorially represent multiplication problems.	Use a column multiplication, including any required regroupings or carrying. $\begin{array}{r} {}^{2}1\,{}^{3}3\;6 \\ \times \quad\; 6 \\ \hline 8\;1\;6 \end{array}$ Use formal method of long multiplication when multiplying by a 2 digit number, regrouping and carrying as necessary. $\begin{array}{rl} & {}^{2}3\;4 \\ \times & 2\;7 \\ \hline & {}^{1}2\;3\;8 \quad \times 7 \\ + & 6\;8\;0 \quad \times 20 \\ \hline & 9\;1\;8 \end{array}$

163 x 5 =



163 x 5 =

	100	60	3
5	100 × 5 = 500	60 × 5 = 300	3 × 5 = 15

15 x 28 =

	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
	1 2	0	0
	1	0	0
		8	0
+		4	0
	4	2	0

$$\begin{array}{rl} & {}^{2}3\ 4 \\ \times & 2\ 7 \\ \hline & {}^{1}2\ 3\ 8 \quad \times 7 \\ + & 6\ 8\ 0 \quad \times 20 \\ \hline & 9\ 1\ 8 \quad \times 27 \end{array}$$

Use column multiplication, ensuring understanding of place value at each stage.

$$\begin{array}{rl} & 1\ 4\ 3 \\ \times & 1\ 2 \\ \hline & {}^{1}2\ 8\ 6 \quad \times 2 \\ + & 1\ 4\ 3\ 0 \quad \times 10 \\ \hline & 1\ 7\ 1\ 6 \quad \times 12 \end{array}$$

Progress to include examples that require multiple exchanges as understanding, confidence and fluency build.

Using knowledge of factors and partitions to compare methods for Multiplications

Video P7- 07

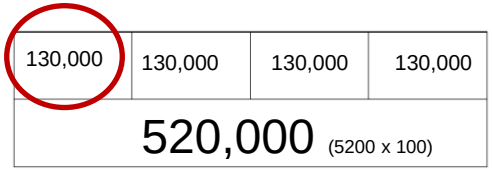
Use equipment to understand square numbers and cube numbers.

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

Represent and compare methods using a bar model.

5200 x 25

25 is ¼ of 100



5200 x 25

5 x 5

x	5,000	200
5	25000	1000

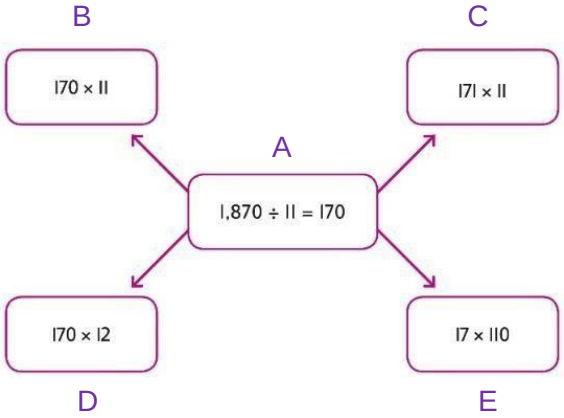
x	20,000	6,000
5	100,000	30,000

100,000 + 30,000 = 130,000

Use a known fact to generate families of related facts.

Use factors to calculate efficiently.

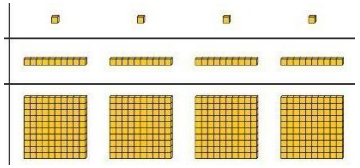
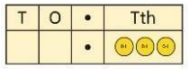
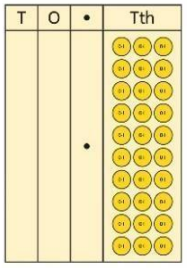
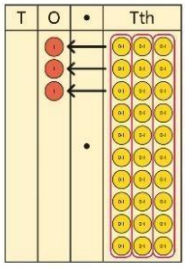
15 × 16
= 3 × 5 × 2 × 8
= 3 × 8 × 2 × 5
= 24 ×10
= 240



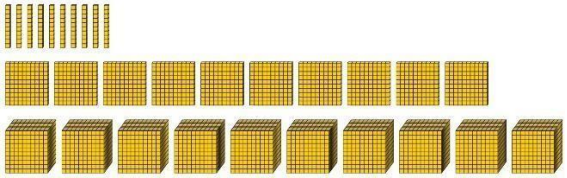
- If Fact A (above) is known then Fact B is also known because it is the inverse calculation.
- If Fact B is known then Fact C is known because it is the same number of groups/times counting but the number is 1 more. In other words, it is 11 more because 171 is 1 more than 170 and this is repeated 11 times.
- If Fact B is known then Fact D is known because it is 170 **more** than Fact B.
- If Fact B is known then Fact E is known because the first number is now 10 times smaller while the second number is now 10 times larger making the answer the same.

<table>
<tr>
<td>Multiplying by 10, 100 and 1,000

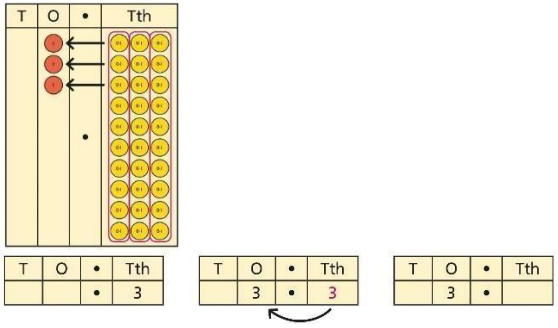
Video P7- 08</td>
<td>Use place value equipment and place value grids to multiply by 10, 100 and 1,000 by unitizing and moving appropriate number of columns to the left, including decimal numbers.

1 x 4 = 4
10 x 4 = 40
100 x 4 = 400
 
 
Represent 0·3.
 
Multiply by 10.
 
Exchange each group of ten tenths.

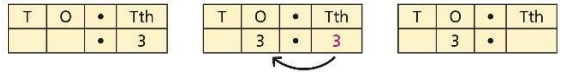
0·3 × 10 = ?
0·3 is 3 tenths
3 tenths x 10 is 30 tenths.
30 tenths are equivalent to 3 ones.</td>
<td>Pictorially represent multiplying by 10, 100 and 1000 using a place value grid.

Understanding how regrouping affects decimal numbers on a place value grid.

0·3 × 10 =3</td>
<td>Understand the movement of digits on a place value grid.

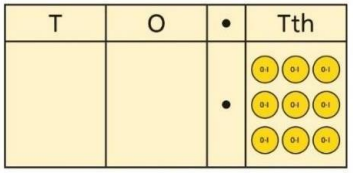
Use knowledge of multiplying by 10, 100 and 1,000 to multiply by multiples of 10, 100 and 1000.

8 × 100 = 800
8 × 300 = 800 × 3
= 2,400

2·5 × 10 = 25
2·5 × 20 = 2·5 × 10 × 2
= 50</td>
</tr>
<tr>
<td>Multiplying decimals

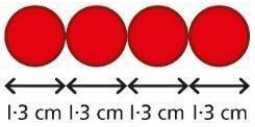
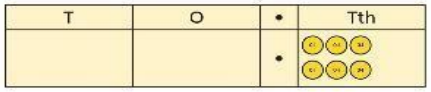
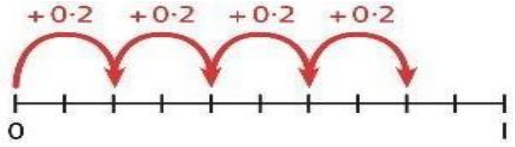
Video P7- 09</td>
<td>Use place value equipment and place value grid to explore decimal multiplications, including measure and money.

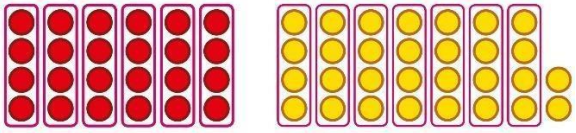
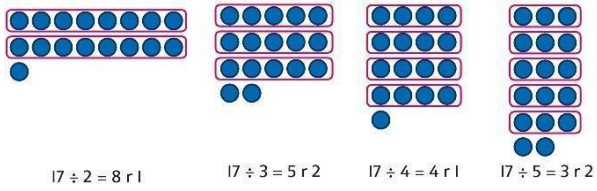
4 tenths x 3 is 12 tenths
3 tenths x 4 is 12 tenths.</td>
<td>Use pictorial representations of place value equipment on a place value grid to complete decimal multiplication problems.

3 x 3 = 9
0.3 x 3 = 0.9
  </td>
<td>Use known facts to multiply decimals.
3 × 4 = 12
0.3 × 4 = 1·2
0.03 × 4 = 0·12

5 × 20 = 100
0.5 × 20 = 10
0.05 ×20 = 1

Find families of facts from a known multiplication.</td>
</tr>
</table>

	 *1 cm x 4 = 4 cm* *0·3 cm x 4 = 1.2 cm* *1·3 x 4 = 4 + 1·2 = 5·2 cm*	Use grid method and bar model to pictorially represent multiplication problems. Understand the link between multiplying decimals and repeated addition.  	*I know that 18 × 4 = 72. This can help me work out:* *1·8 × 4 = ?* *18 × 0·4 = ?* *180 × 0·4 = ?* *18 × 0·04 = ?* Use a place value grid to understand the effects of multiplying decimals. H T O • Tth Hth 2 × 3: 6 • 0·2 × 3: 0 • 6 0·02 × 3: 0 • 0 6

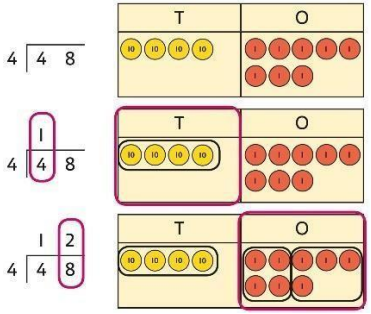
	Concrete	**Pictorial**	**Abstract**
Primary 7 **Division**			
Understanding factors **Video P7- 10**	*Use equipment to explore different factors of a number.*  4 is a factor of 24 but is not a factor of 30.	*Recognise prime numbers as numbers having exactly two factors. Understand the link with division 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.* 1 (2) (3) 4 (5) 6 (7) 8 9 10 (11) 12 (13) 14 15 16 (17) 18 (19) 20 21 22 (23) 24 25 26 27 28 (29) 30 (31) 32 33 34 35 36 (37) 38 (39) 40 41 42 (43) 44 45 46 (47) 48 49 50

Dividing by a single digit number

Video P7- 11

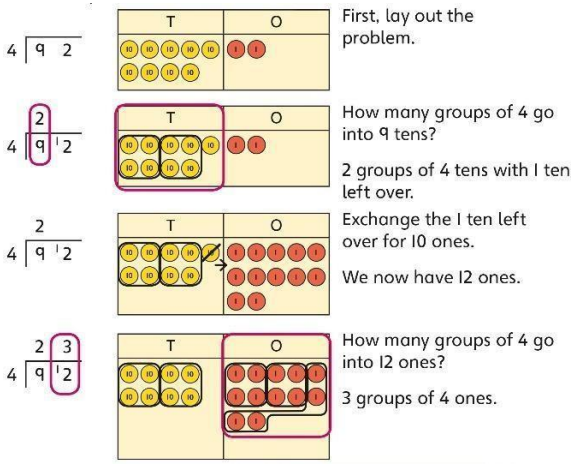
Use place value equipment to represent division problem.

48 ÷4 =

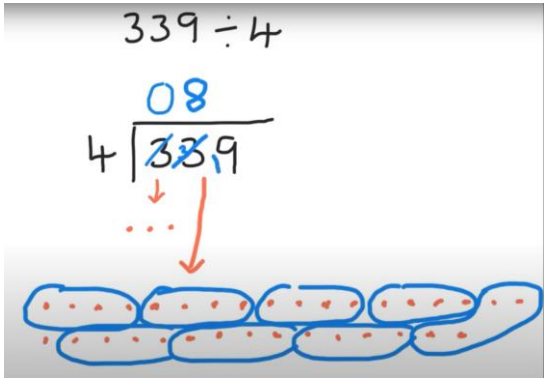


There is 1 group of 4 in 4 tens.
There are 2 groups of 4 in 8 ones.
48 ÷4 = 12

Including problems that require regrouping and carrying.

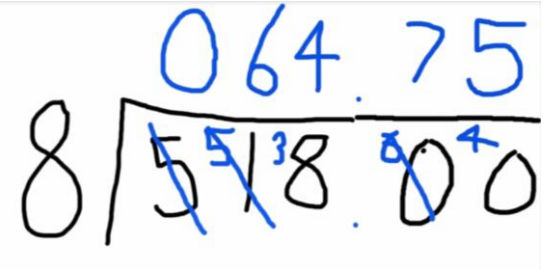


Use pictorial representations to begin written calculations. Each number is represented by **dots** which are then circled and put into groups (in this example, groups of 4). The dots left ungrouped are the remainder that are carried forward and put **in front of** the next number.

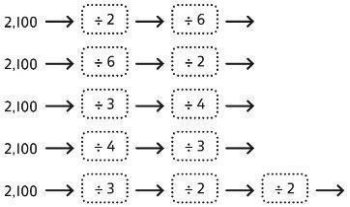
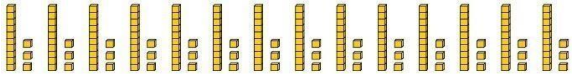
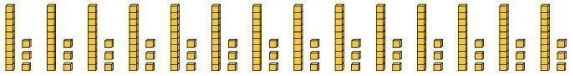
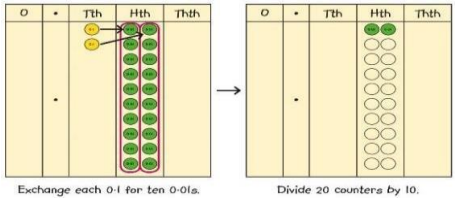
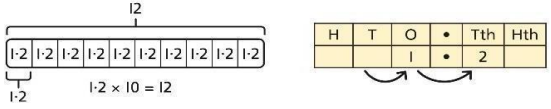
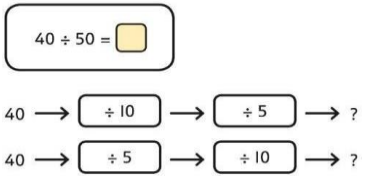


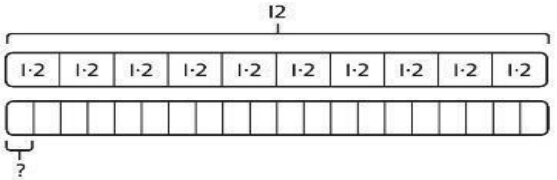
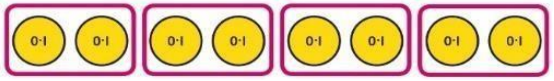
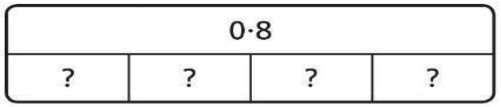
Use short division for up to 4-digit numbers divided by a single digit- remainders as a decimal (see accompanying video)

1. Children will be taught to list multiples of the divisor (in this case 8) underneath the bus stop / short division calculation.



2. When dividing each digit of the dividend (the number being divided), children should find the multiple written below that is the **closest** to this number **but note that it must not be larger.**
3. In the example above, '48' is the closest multiple of 8 to 51, that is not larger.
4. This leaves a difference of 3 (51-48) that is then carried forward and placed in front of the next digit of the dividend.
5. Keep going until the calculation is complete.
6. If left with a remainder, the dividend should then be extended accordingly to including point zero (.0) If a remainder is still left, the dividend can be extended again by a further place holding zero. This process can repeat until it is fully exhausted; it relies on children intrinsically understanding that 518 (example above) is the same as 518.0 or 518.00.

Dividing by a 2-digit number using factors **Video P7- 12**	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 = ?*  *1,260 ÷ 2 = 630* *630 ÷ 7 = 90* *1,260 ÷ 14 = 90*	Use factors and repeated division where appropriate. *2,100 ÷ 12 = ?* 
Dividing by a 2 digit number using long division **Video P7- 13**	Use place value equipment to represent long division problems. Use equipment to build numbers from groups.  *182 divided into groups of 13. There are 14 in total.*	Use pictorial representations of place value equipment on a place value grid to complete long division problems, alongside written method. Including problems that require regrouping and carrying. 	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.  See written example above and accompanying video. Divisions with a remainder explored in problem-solving contexts.
Dividing by 10, **100 and 1,000** **Video P7- 14**	Use place value equipment to explore division as exchange **e.g. 0.2 ÷10 = 0.02**  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. **12 ÷ 10= 1.2**  Understand how to divide using division by 10, 100 and 1,000.	Use knowledge of factors to divide by multiples of 10, 100 and 1,000.  40 ÷ 5 = 8 8 ÷ 10 = 0·8 So, 40 ÷ 50 = 0·8

		How would you calculate 12 ÷ 20 = ?  12 ÷ 10 = 1·2 1·2 ÷ 2 = 0·6	
Dividing decimals **Video P7- 15**	Use place value equipment to explore division of decimals.  8 tenths divided into 4 groups. 2 tenths in each group.	Use a bar model to represent divisions.  4 × 2 = 8 8 ÷ 4 = 2 So, 4 × 0·2 = 0·8 0·8 ÷ 4 = 0·2	Use short division to divide decimals with up to 2 decimal places.