South Gosforth
First School

'Roots to grow and wings to fly'

Calculation Guidance

Contents:

	Pages
Addition	3 - 18
Subtraction	19 - 32
Multiplication	33 - 47
Division	48 - 61

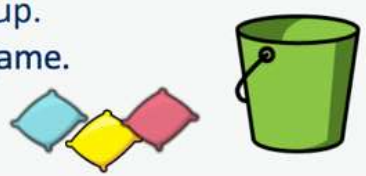
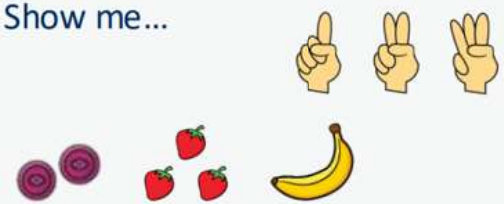
Our approach to calculation is based on guidance and materials produced by White Rose Maths and NCETM. The calculation policy follows the same concrete, pictorial and abstract approach as the White Rose and Mastering Number schemes of learning. Example representations are illustrated; however, this is not an exhaustive list, and teachers may select specific representations that best meet the needs of their cohort.
In Nursery and Reception, these concepts are developed through exploration of number, rather than formal written methods.

©White Rose Education 2024

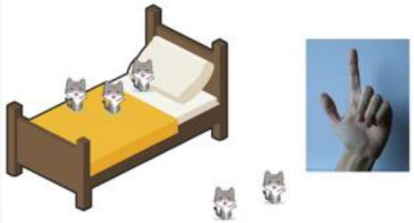
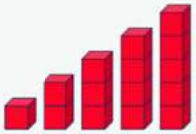
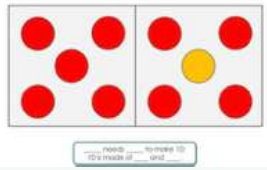
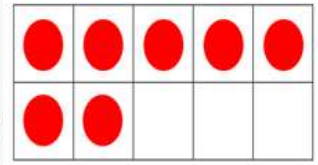
South Gosforth
First School

'Roots to grow and wings to fly'

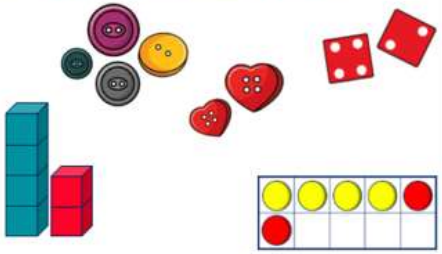
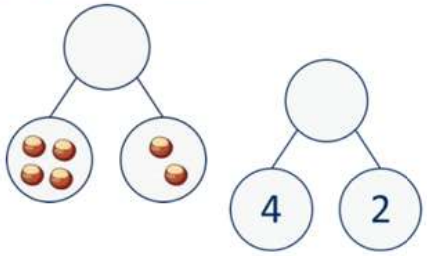
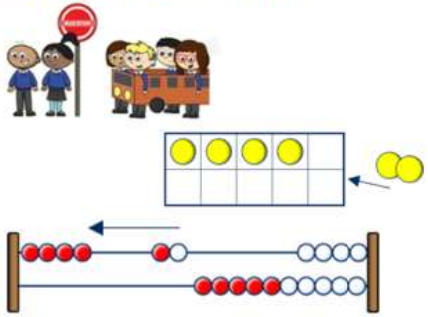
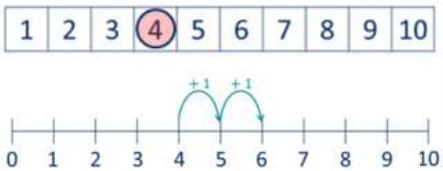
Addition

Nursery	• Begin to have an understanding of numbers to 5 • We recommend focusing on noticing and representing small quantities, perceptual subitising and counting.	
Progression of skills	**Key representations**	
Subitise to 3 Instantly see how many.	How many do you see? 	
Count how many Begin to count objects using 1-1 correspondence.	How many are there? 	Count out … from a larger group. E.g. Collect 3 beanbags for a game. 
Make numbers to 5 Start by showing 1, 2 and 3 using fingers.	Show me… 	Begin to link numerals to quantities.
Add 1 more Through stories, songs and rhymes.	How many do I have now? 	

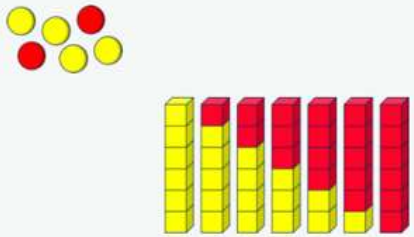
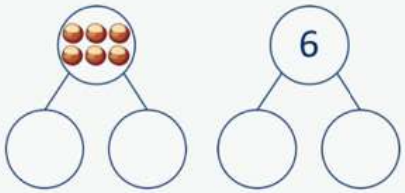
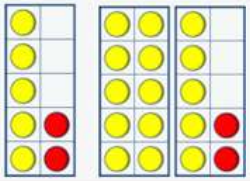
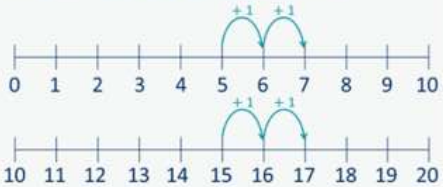
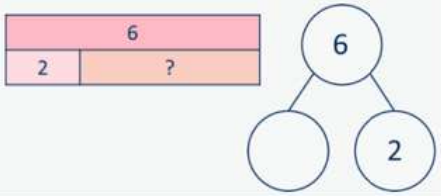
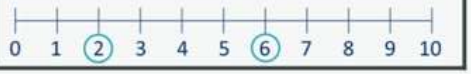
©White Rose Education 2024

Reception	• Have a deep understanding of numbers to 10, including the composition of each number. • Subitise (recognise quantities without counting) up to 5 • Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 and some number bonds to 10, including double facts.
Progression of skills	**Key representations**
Conceptually subitise to 5 Notice the parts that make up the whole.	What do you see? How do you see it?  5 is made of _____ and _____; _____ and _____ make 5.
1 more Continue to link to stories, songs and rhymes.	1 more than … is …  Just add one
Notice the composition of numbers within 10 Link to stories, songs and rhymes.	How many…? How many…? How many altogether?  _____ is made of 5 and _____; 5 and _____ make _____.  7

©White Rose Education 2024

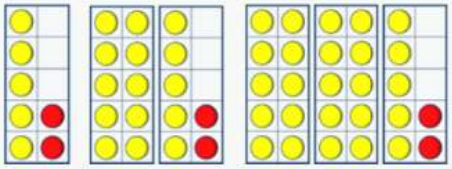
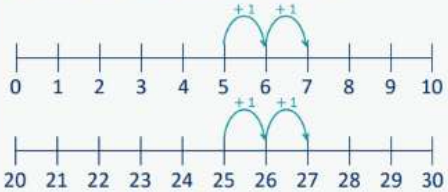
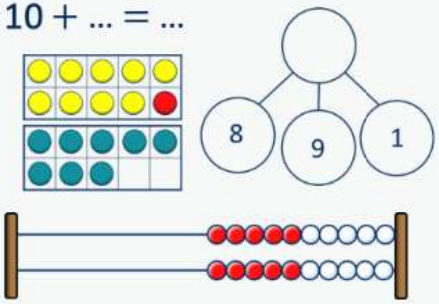
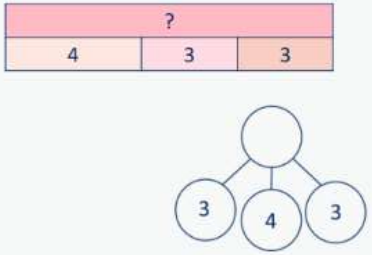
Year 1	• Read, write and interpret mathematical statements involving addition (+) and equals (=) signs. • Represent and use number bonds within 20 • Add 1-digit and 2-digit numbers to 20, including zero. • Solve one-step problems that involve addition, using concrete objects and pictorial representations, and missing number problems such as $7 = \square + 2$		
Progression of skills	**Key representations**		
Add together (aggregation) 2 quantities are combined to find the total.	There are … There are … There are … altogether. 	… is a part. … is a part. … is the whole. 	… plus … is equal to … … is equal to …. + … $4 + 2 = 6$ $2 + 4 = 6$ $6 = 4 + 2$ $6 = 2 + 4$
Add more (augmentation) A quantity is increased.	First… Then… Now… 	I start at … I jump on … I land on … 	… plus … is equal to … is equal to … + … $4 + 2 = 6$ $2 + 4 = 6$ $6 = 4 + 2$ $6 = 2 + 4$

©White Rose Education 2024

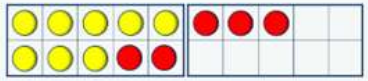
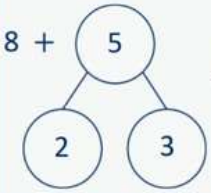
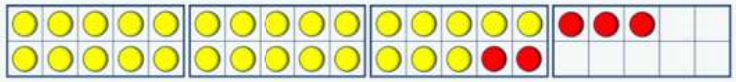
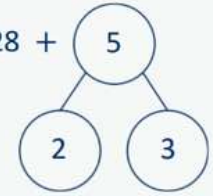
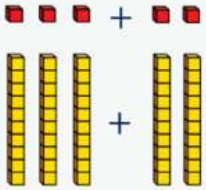
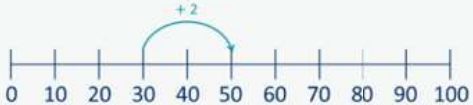
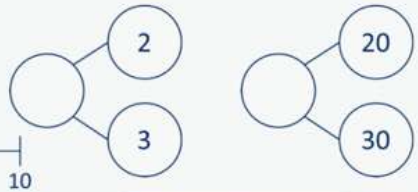
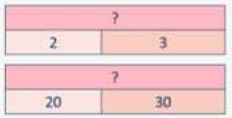
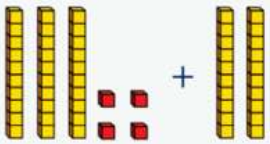
Progression of skills	Key representations		
Bonds within 10 Include bonds for each number within 10 Encourage children to notice patterns.	… is made of … and … … and … make … 	… can be partitioned into … and … 	… plus … is equal to … $6 + 0 = 6$ $5 + 1 = 6$ $4 + 2 = 6$ $3 + 3 = 6$ $2 + 4 = 6$ $1 + 5 = 6$ $0 + 6 = 6$
Related facts within 20 Make links to known facts.	I know that … and … = … so … and … = … 	… more than … is … so … more than … is … 	What patterns do you notice? $5 + 2 = 7$ $15 + 2 = 17$ $7 = 5 + 2$ $17 = 15 + 2$
Missing numbers Make links to known facts.	How many more do you need to make …? 	If … is the whole and … is a part, the other part must be… 	… plus … is equal to … $2 + \square = 6$ $6 = 2 + \square$ 

©White Rose Education 2024

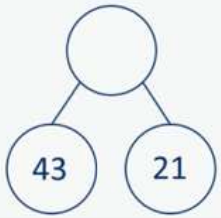
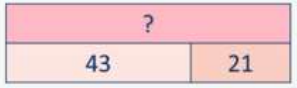
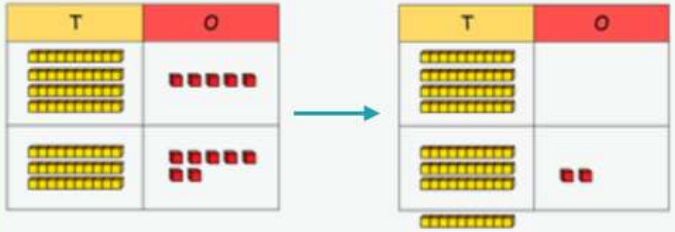
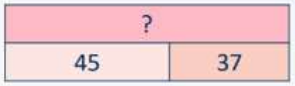
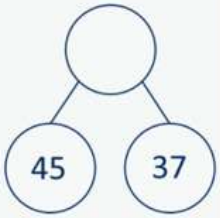
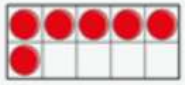
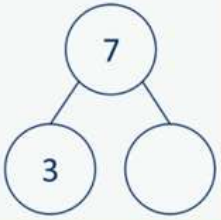
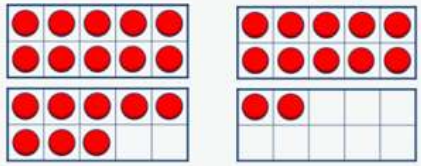
Year 2	• Recall and use addition facts to 20 fluently, and derive and use related facts up to 100
	• Add numbers using concrete objects, pictorial representations, and mentally, including:
	  • a two-digit number and 1s
	  • a two-digit number and 10s
	  • 2 two-digit numbers
	  • adding 3 one-digit numbers
	• Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.		

Progression of skills	**Key representations**		
Add ones to any number (related facts) Make links to known facts.	I know that … and … = … so … and … = … 	… more than … is … so … more than … is … 	What do you notice? Can you continue the pattern? 5 + 2 = 7 15 + 2 = 17 25 + 2 = 27…
Add three 1-digit numbers Prompt children to understand that addition can be done in any order and to make links to known facts.	… and … are a bond to 10 10 + … = … 	Double … + … = … 	What do you notice? Which addition is the easiest to calculate? 8 + 9 + 1 = 8 + 1 + 9 = 9 + 1 + 8 =

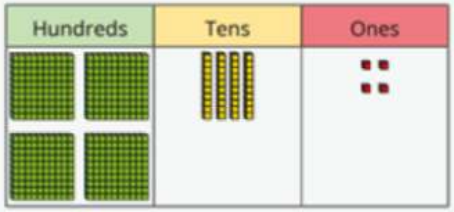
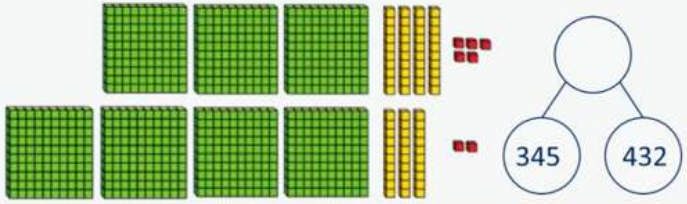
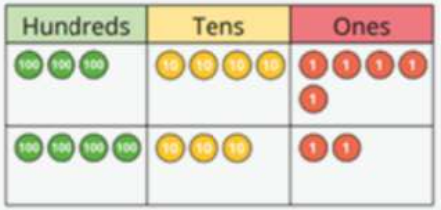
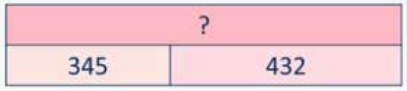
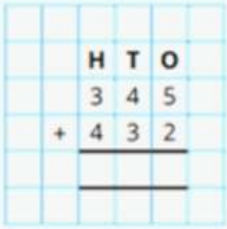
©White Rose Education 2024

Progression of skills	Key representations		
Add across a 10 Partition the number being added to make a full ten.	… can be partitioned into … and …  8 +  	I add … to get to … then I add … $8 + 5 = 13$ $28 + 5 = 33$  28 +  	
Add multiples of 10 Make links to known facts within ten.	… ones + … ones = … ones so … tens + … tens = … tens  $3 + 2 = 5$ $30 + 20 = 50$	What is the same? What is different?    	
Add 10s to any number Make links to known facts.	… tens + … tens = … tens … tens and … ones = … 	To add … I need to add 10 … times. 	I know that … and … = … so … and … = … $30 + 20 = 50$ $34 + 20 = 54$

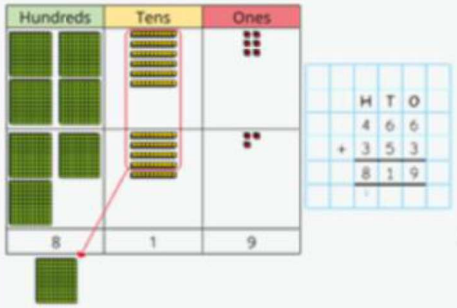
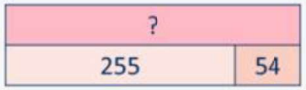
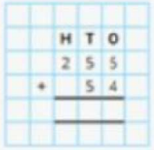
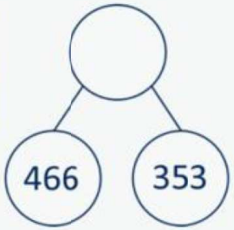
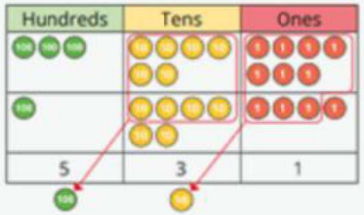
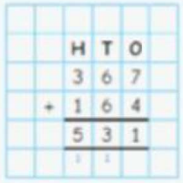
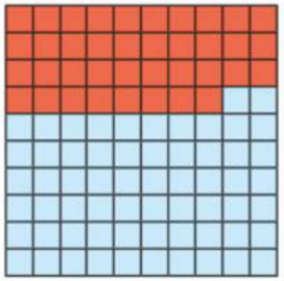
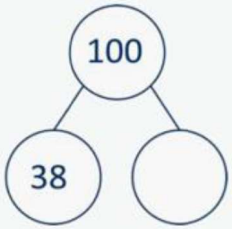
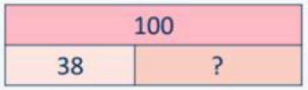
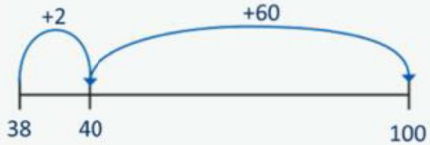
©White Rose Education 2024

Progression of skills	Key representations		
Add 2-digit numbers (not across a ten) Lining up ones and tens in columns will support with later written methods.	… ones + … ones = … ones … tens + … tens = … tens  	3 ones + 1 one = 4 ones 4 tens + 2 tens = 6 tens 6 tens + 4 ones = 64  	
Add 2-digit numbers (across a ten) Begin to exchange 10 ones for 1 ten.	There are …. ones, so I do/do not need to make an exchange. … ones = … ten and … ones  	  5 ones + 7 ones = 12 ones 12 ones = 1 ten and 2 ones 4 tens + 3 tens + 1 ten = 8 tens 8 tens and 2 ones = 82	
Missing numbers Solve missing number problems and use the inverse to check.	How many more do you need to make …?  6 + □ = 10 10 − □ = 6	If … is a whole and … is a part, then … is the other part. □ + 3 = 7 7 − 3 = □  	… can be partitioned into … and … 10 + 8 = 12 + □ 

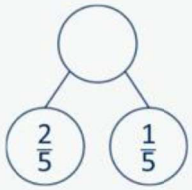
©White Rose Education 2024

Year 3	• Add numbers mentally, including: a three-digit number and ones, a three-digit number and tens, a three-digit number and hundreds. • Add numbers with up to three digits, using formal written methods of columnar addition. • Add fractions with the same denominator within 1 whole. • Calculate the time taken by particular events or tasks.	
Progression of skills	**Key representations**	
Add 1s, 10s or 100s to a 3-digit number Emphasis on mental strategies including number bonds and related facts. Prompt children to notice which digit changes.	The ones/tens/hundreds column will increase by …  444 + 5 = 444 + 50 = 444 + 500 = 777 + 2 = 777 + 20 = 777 + 200 =	What patterns do you notice? 235 + 3 = 235 + 30 = 235 + 300 = 604 + 20 = 604 + 50 = 604 + 90 = 111 + ☐ = 118 111 + ☐ = 181 111 + ☐ = 811
Add two numbers (no exchange) Mental strategies and introduction of formal written method.	… ones + … ones = … ones … tens + … tens = … tens … hundreds + … hundreds = … hundreds     	

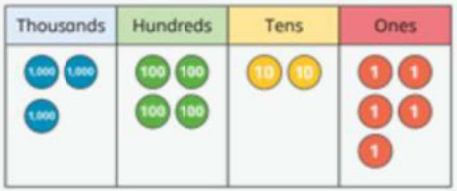
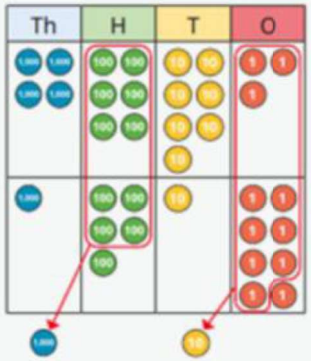
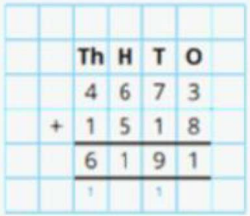
©White Rose Education 2024

Progression of skills	Key representations
Add two numbers across a 10 or 100 Formal written method involving up to 2 exchanges including 3-digit plus 2-digit numbers.	There are … ones, so I do/do not need to make an exchange. There are … tens, so I do/do not need to make an exchange. … ones = … ten and … ones. … tens = … hundred and … tens.      
Complements to 100 Pairs of numbers which total 100	… plus … is equal to 100    I add … to get to the next 10, then … to get to 100  $38 + 62 = 100$ $62 + 38 = 100$ $100 = 38 + 62$ $100 = 62 + 38$

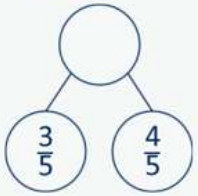
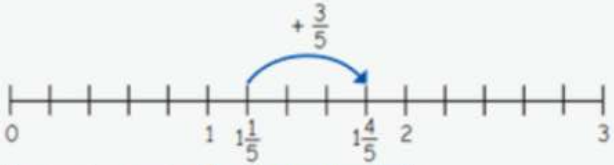
©White Rose Education 2024

Progression of skills	Key representations
Add fractions with the same denominator within 1 whole Make links with known facts.	When adding fractions with the same denominator, I only add the numerator. … fifths + … fifths = … fifths $\frac{1}{5} + \frac{1}{5}$ $\frac{1}{5} + \frac{2}{5}$ $\frac{1}{5} + \frac{3}{5}$ 
Calculate the duration of events Find durations of time between a given start and end point. Children will need to calculate complements to 60	From … to … o'clock is … minutes. From … o'clock to … is … minutes. The total time taken is … minutes.

©White Rose Education 2024

Year 4	• Add numbers with up to 4 digits using a formal written method. • Solve simple measure and money problems involving fractions and decimals to 2 decimal places. • Add fractions with the same denominator.
Progression of skills	**Key representations**
Add 1s, 10s and 100s to a 4-digit number Emphasis on mental strategies including number bonds and related facts. Prompt children to notice which digit changes.	The ones/tens/hundreds/thousands column will increase by …  3,425 + 3 = 3,425 + 30 = 3,425 + 300 = 3,425 + 3,000 = What patterns do you notice? 2,350 + 3 = 2,350 + 30 = 2,350 + 300 = 2,350 + 3,000 = 6,040 + 200 = 6,040 + 500 = 6,040 + 900 = 2,211 + ☐ = 2,251 2,211 + ☐ = 2,215 2,211 + ☐ = 2,511
Add up to two 4-digit numbers Formal written method with up to 3 exchanges. Encourage children to estimate and use inverse operations to check answers to calculations.	There are … ones/tens/hundreds so I do/do not need to make an exchange. I can exchange 10 … for 1 …  

©White Rose Education 2024

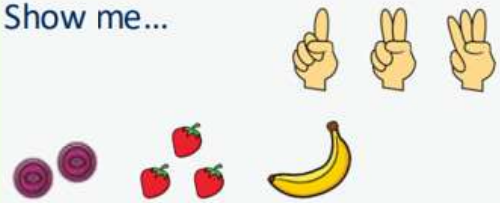
Progression of skills	Key representations	
Add decimal numbers in the context of money Emphasis on partitioning and use of number lines rather than formal written calculations.	… pence + … pence = … pence … pounds + … pounds = … pounds 45p + 25p = 70p £2 + £3 = £5 £5 + 70p = £5.70	£3.25 can be partitioned into £3 + 20p + 5p
Add fractions and mixed numbers with the same denominator beyond 1 whole	When adding fractions with the same denominator, I only add the numerator. … fifths + … fifths = … fifths $\frac{3}{5} + \frac{4}{5} = \frac{7}{5} = 1\frac{2}{5}$   	

©White Rose Education 2024

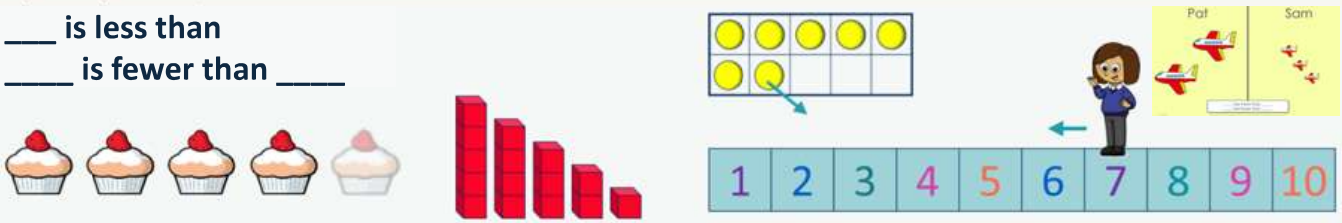
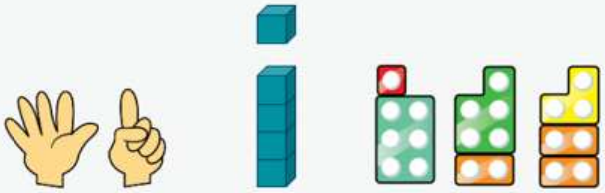
South Gosforth
First School

'Roots to grow and wings to fly'

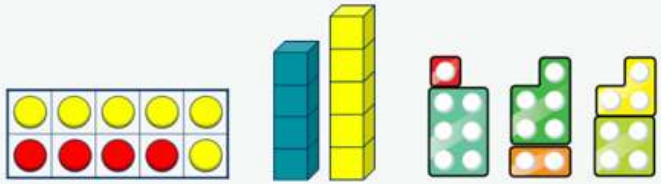
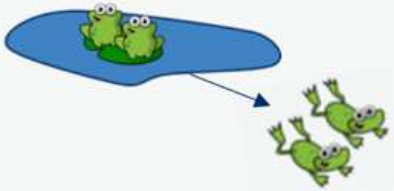
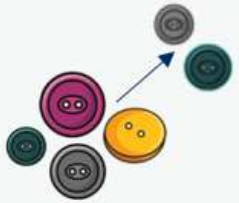
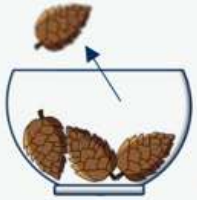
Subtraction

Nursery	• Begin to have an understanding of numbers to 5 • We recommend focusing on noticing and representing small quantities, perceptual subitising and counting.	
Progression of skills	**Key representations**	
Subitise to 3 Instantly see how many.	How many do you see? 	
Count how many Begin to count objects using 1-1 correspondence.	How many are there? 1 2 3 4 5 	Count out … from a larger group. E.g. Collect a cup for everyone at the table.
Make numbers to 5 Start by showing 1, 2 and 3 using fingers.	Show me… 	Begin to link numerals to quantities.
Take 1 away Through stories, songs and rhymes.	How many do we have now? 	

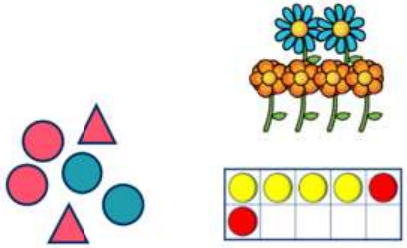
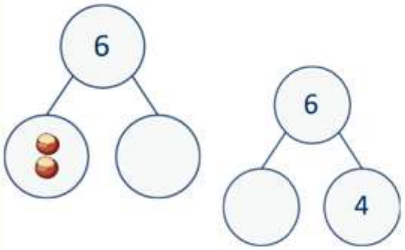
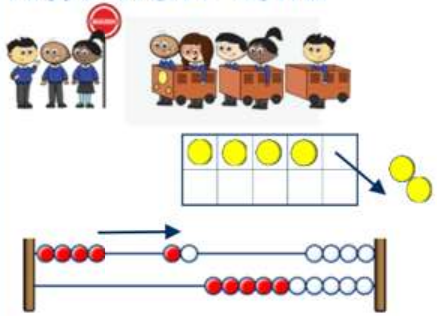
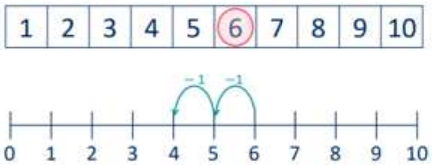
©White Rose Education 2024

Reception	• Have a deep understanding of number to 10, including the composition of each number. • Subitise (recognise quantities without counting) up to 5 • Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (and some subtraction facts) and some number bonds to 10, including double facts.
Progression of skills	**Key representations**
Conceptually subitise to 5 Notice the parts that make up the whole.	What do you see? How do you see it?
Using the language of less than Continue to link to stories, songs and rhymes.	**___ is less than** **____ is fewer than ____** 
Notice the composition of numbers within 10 Link to stories, songs and rhymes.	How many…? How many…? How many altogether? How many ways can you make…? 

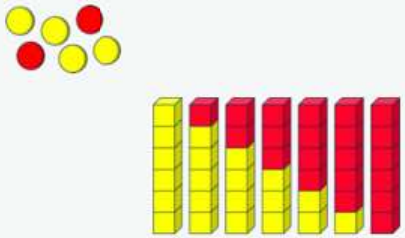
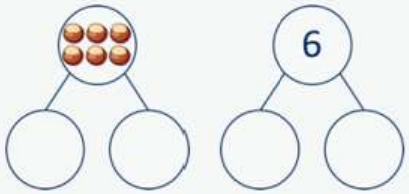
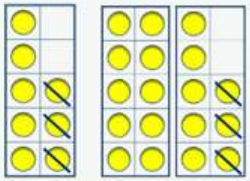
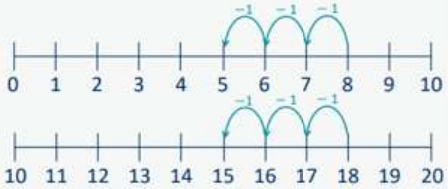
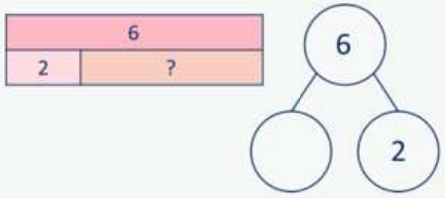
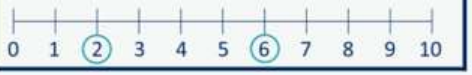
©White Rose Education 2024

Progression of skills	Key representations	
Partition Using objects, explore different ways to partition a number into 2 or more parts.	There are … altogether. I can see … here and … there. 	… and … make … 
Take away A quantity is reduced.	First… Then… Now…  	I have … I take … away Now I have …  

©White Rose Education 2024

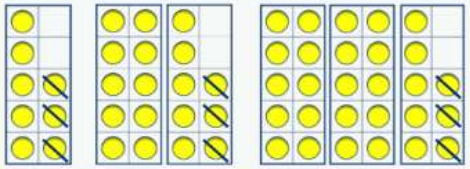
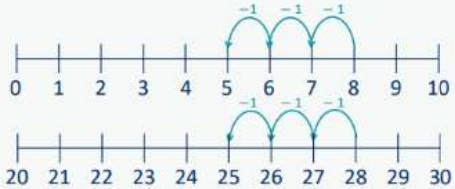
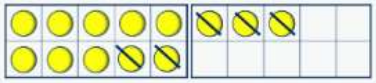
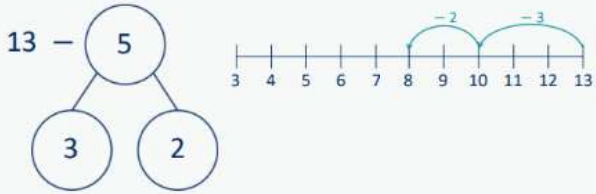
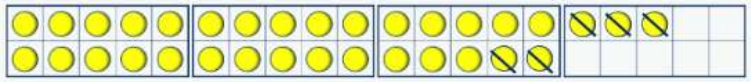
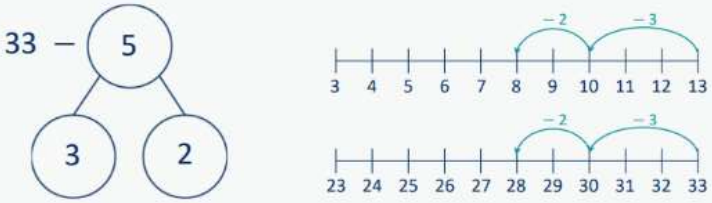
Year 1	• Read, write and interpret mathematical statements involving subtraction (–) and equals (=) signs. • Represent and use number bonds and related subtraction facts within 20 • Subtract one-digit and two-digit numbers to 20, including zero. • Solve one-step problems that involve subtraction, using concrete objects and pictorial representations, and missing number problems such as $7 = \square - 9$		
Progression of skills	**Key representations**		
Find a part Link to number bonds and known facts. E.g. $2 + 4 = 6$ so if 6 is the whole and 4 is a part, the other part must be 2	There are … in total. … are … How many are **not** …? 	… is the whole. … is a part. … is a part. 	… subtract … is equal to … … is equal to … – … $6 - 2 = 4$ $6 - 4 = 2$ $4 = 6 - 2$ $2 = 6 - 4$
Take away A quantity is decreased.	First… Then… Now… 	I start at … I jump back … I land on … 	… minus … is equal to … … is equal to … – … $6 - 2 = 4$ $6 - 4 = 2$ $4 = 6 - 2$ $2 = 6 - 4$

©White Rose Education 2024

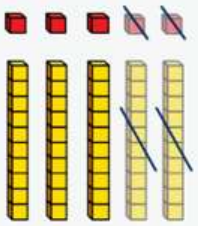
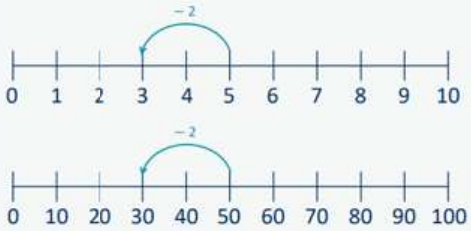
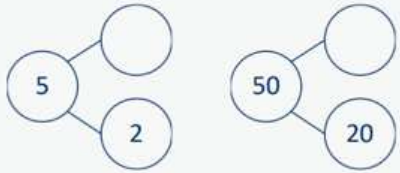
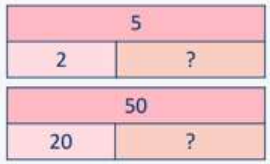
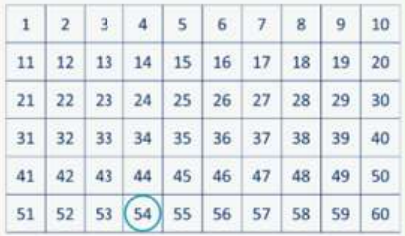
Progression of skills	Key representations		
Bonds within 10 Focus on subtraction facts. Encourage children to notice patterns.	… is made of … and … … and … make … 	… can be partitioned into … and … 	… minus … is equal to … $6 - 0 = 6$ $6 - 1 = 5$ $6 - 2 = 4$ $6 - 3 = 3$ $6 - 4 = 2$ $6 - 5 = 1$ $6 - 6 = 0$
Related facts within 20 Make links to known facts.	I know that … minus … = … so … minus … = … 	… less than … is … so … less than … is … 	What patterns do you notice? $8 - 3 = 5$ $18 - 3 = 15$ $5 = 8 - 3$ $15 = 18 - 3$
Missing numbers Make links to known facts.	How many do you need to subtract to make …? 	If … is the whole and … is a part, the other part must be… 	… minus … is equal to … $6 - \square = 2$ $2 = 6 - \square$ 

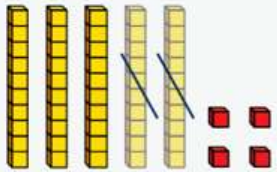
©White Rose Education 2024

Year 2	• Recall and use subtraction facts to 20 fluently, and derive and use related facts up to 100
	• Subtract numbers using concrete objects, pictorial representations, and mentally, including:
	  • a two-digit number and 1s
	  • a two-digit number and 10s
	  • 2 two-digit numbers
	• Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.		

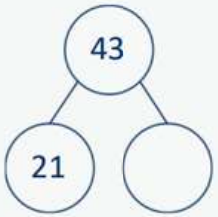
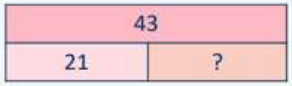
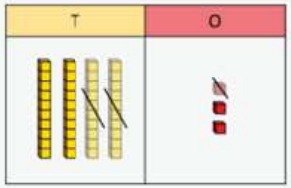
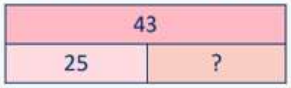
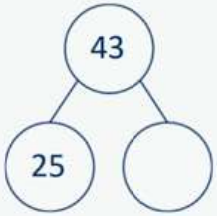
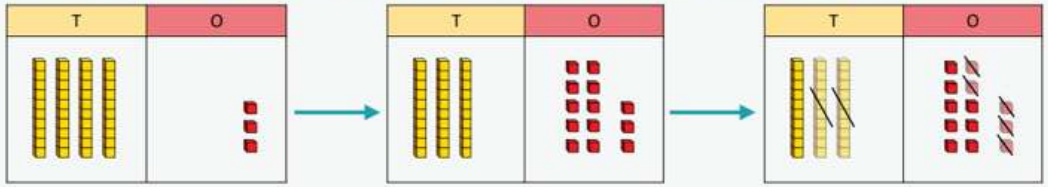
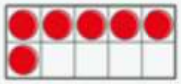
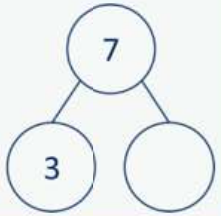
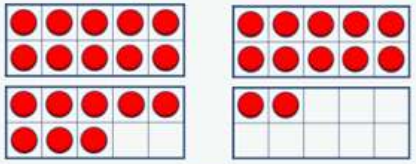
Progression of skills	**Key representations**		
Subtract ones from any number (related facts) Make links to known facts.	I know that … minus … = … so … minus … = … 	… less than … is … so … less than … is … 	What do you notice? Can you continue the pattern? $8 - 3 = 5$ $18 - 3 = 15$ $28 - 3 = 25$…
Subtract across a 10 Partition the number being subtracted to bridge through a ten.	… can be partitioned into … and …  	Make links with related facts.  	

©White Rose Education 2024

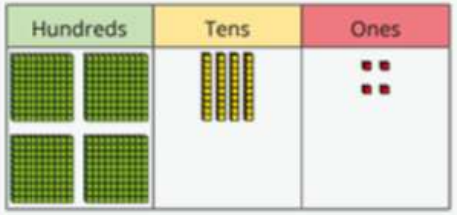
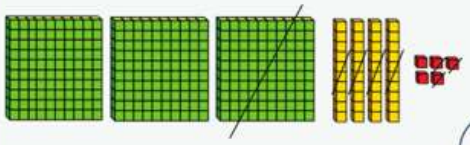
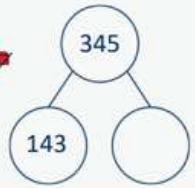
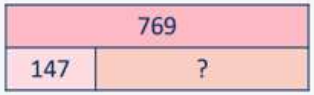
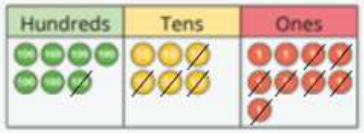
Progression of skills	Key representations		
Subtract multiples of 10 Make links to known facts within ten.	… ones − … ones = … ones so … tens − … tens = … tens  5 − 2 = 3 50 − 20 = 30	What is the same? What is different?   	
Subtract 10s from any number Make links to known facts.	… tens − … tens = … tens … tens and … ones = …	To subtract … I need to subtract 10 … times.  1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60	I know that … minus … = … so … minus … = … 50 − 20 = 30 54 − 20 = 34



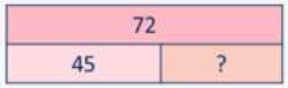
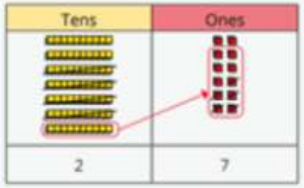
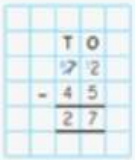
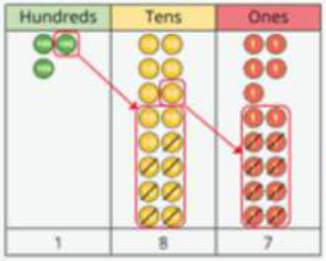
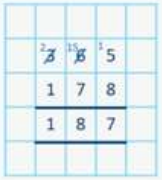
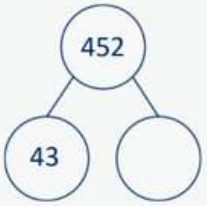
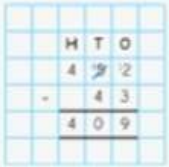
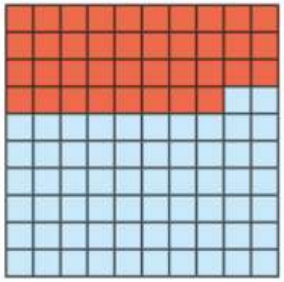
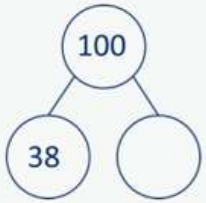
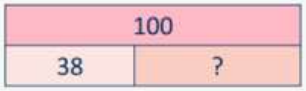
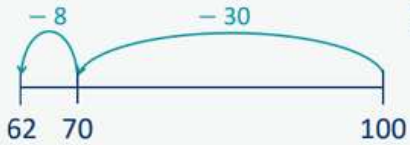
©White Rose Education 2024

Progression of skills	Key representations
Subtract two 2-digit numbers (not across a ten)	… ones – … ones = … ones … tens – … tens = … tens    3 ones – 1 one = 2 ones 4 tens – 2 tens = 2 tens 2 tens and 2 ones = 22
Subtract two 2-digit numbers (across a ten) Begin to exchange 1 ten for 10 ones.	I need to make an exchange because I do not have enough ones to subtract … ones.    3 ones – 5 ones (I need to exchange 1 ten for 10 ones) 13 ones – 5 ones = 8 ones 3 tens – 2 tens = 1 ten 1 ten and 8 ones = 18
Missing numbers Solve missing number problems and use the inverse to check.	How many do you need to subtract to make …?  10 – □ = 6 6 + □ = 10 If … is a whole and … is a part, then … is the other part. 7 – 3 = □ □ + 3 = 7  … can be partitioned into … and … 18 – □ = 12 + 2 

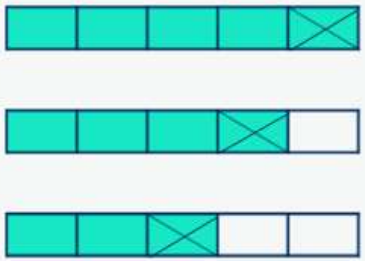
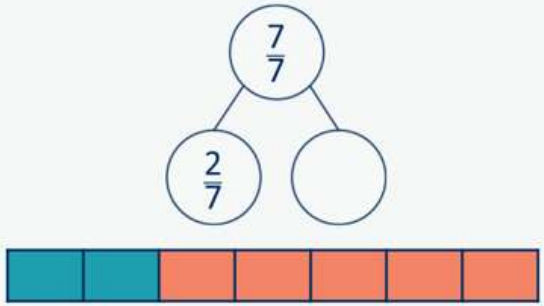
©White Rose Education 2024

Year 3	• Subtract numbers mentally, including: a three-digit number and ones, a three-digit number and tens, a three-digit number and hundreds. • Subtract numbers with up to three digits, using formal written methods. • Subtract fractions with the same denominator within 1 whole.	
Progression of skills	**Key representations**	
Subtract 1s, 10s and 100s from a 3-digit number Emphasis on mental strategies including number bonds and related facts. Prompt children to notice which digit changes.	The ones/tens/hundreds column will decrease by …  444 − 2 = 444 − 20 = 444 − 200 = 777 − 4 = 777 − 40 = 777 − 400 =	What patterns do you notice? 235 − 3 = 235 − 30 = 235 − 300 = 624 − 20 = 654 − 50 = 694 − 90 = 118 − ☐ = 111 181 − ☐ = 111 811 − ☐ = 111
Subtract two numbers (no exchange) Mental strategies and introduction of formal written method.	… ones − … ones = … ones … tens − … tens = … tens … hundreds − … hundreds = … hundreds     	

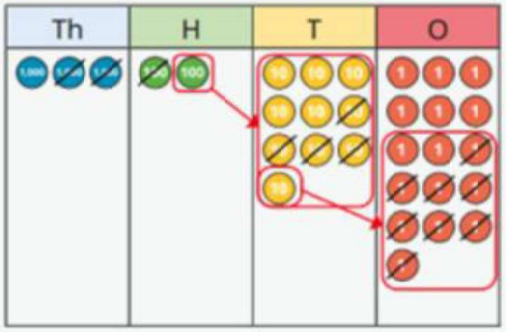
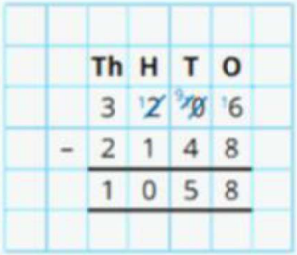
©White Rose Education 2024

Progression of skills	Key representations
Subtract two numbers across a 10 or 100 Formal written method involving up to 2 exchanges including 3-digit subtract 2-digit numbers.	I need to subtract … ones. I do/do not need to make an exchange. I need to subtract … tens. I do/do not need to make an exchange. I can exchange 1 … for 10 …       
Complements to 100 Focus on subtraction facts. Encourage children to notice patterns.	100 minus … is equal to …    I subtract … tens, then I subtract … ones. $100 - 38 = 62$ $100 - 62 = 38$ $62 = 100 - 38$ $38 = 100 - 62$ 

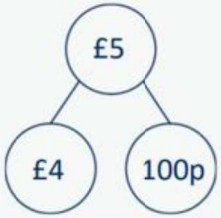
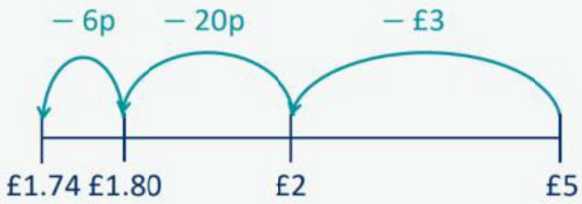
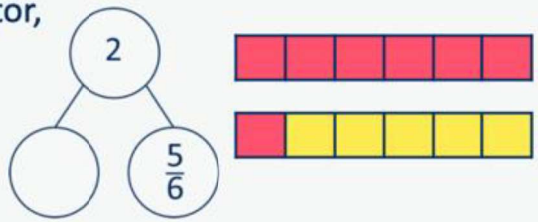
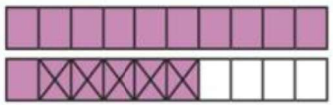
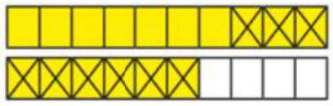
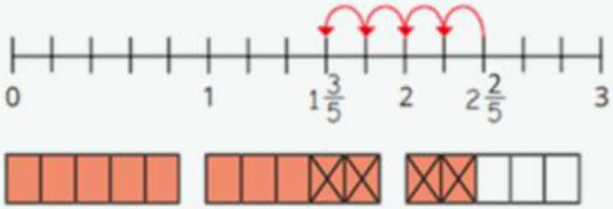
©White Rose Education 2024

Progression of skills	Key representations
Subtract fractions with the same denominator within 1 whole Make links with known facts.	When subtracting fractions with the same denominator, I only subtract the numerator. … fifths − … fifths = … fifths  $\frac{5}{5} - \frac{1}{5}$ $\frac{4}{5} - \frac{1}{5}$ $\frac{3}{5} - \frac{1}{5}$ 

©White Rose Education 2024

Year 4	• Subtract numbers with up to 4 digits using a formal written method. • Solve simple measure and money problems involving fractions and decimals to 2 decimal places. • Subtract fractions with the same denominator.
Progression of skills	**Key representations**
Subtract 1s, 10s, 100s and 1,000s from a 4-digit number Emphasis on mental strategies including number bonds and related facts. Prompt children to notice which digit changes.	The ones/tens/hundreds/thousands column will decrease by … 3,425 – 2 = 3,425 – 20 = 3,425 – 200 = 3,425 – 2,000 = What patterns do you notice? 4,356 – 3 = 4,356 – 30 = 4,356 – 300 = 4,356 – 3,000 = 6,940 – 200 = 6,940 – 300 = 6,940 – 400 = 4,433 – ☐ = 4,430 4,433 – ☐ = 4,033 4,433 – ☐ = 4,403
Subtract up to two 4-digit numbers Formal written method with up to 3 exchanges. Encourage children to estimate and use inverse operations to check answers to calculations.	I need to subtract… ones/tens/hundreds. I do/do not need to make an exchange. I can exchange 1… for 10…  

©White Rose Education 2024

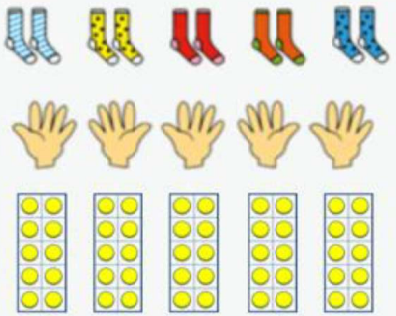
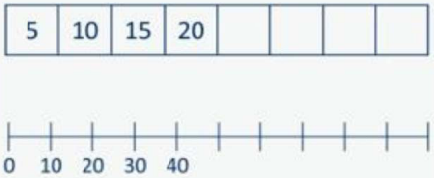
Progression of skills	Key representations	
Subtract decimal numbers in the context of money Emphasis here is on partitioning and use of number lines rather than formal written calculations.	I can partition £… into £… and 100p £… − £… = £… 100p − …p = …p **£5 − £3.26** £4 − £3 = £1 100p − 26p = 74p £5 - £3.26 = £1.74 	£3.26 can be partitioned into £3 + 20p + 6p 
Subtract fractions and mixed numbers with the same denominator Include subtracting fractions from wholes.	When subtracting fractions with the same denominator, I only subtract the numerator. … tenths − … tenths = … tenths   $\frac{16}{10} - \frac{5}{10}$  $\frac{16}{10} - \frac{9}{10}$ 	

©White Rose Education 2024

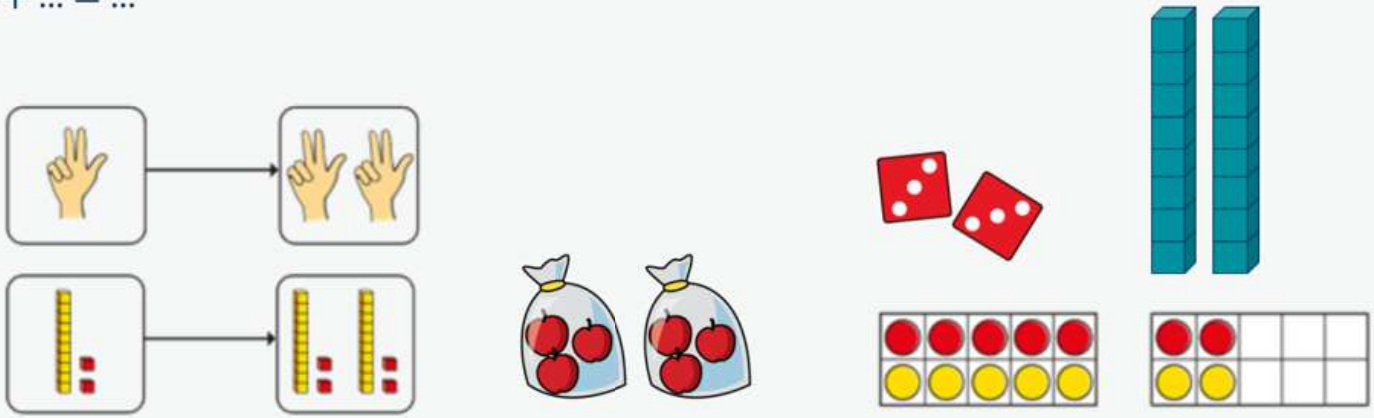
South Gosforth
First School

'Roots to grow and wings to fly'

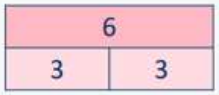
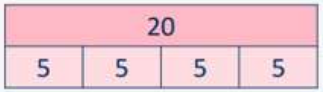
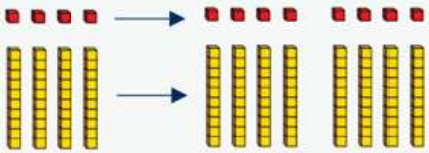
Multiplication

Year 1	• Count in multiples of twos, fives and tens. • Solve one-step problems involving multiplication, using concrete objects, pictorial representations and arrays with the support of the teacher.		
Progression of skills	**Key representations**		
Count in 2s, 5s and 10s Begin by counting objects that naturally come in 2s, 5s and 10s, for example pairs of socks or fingers.	There are … equal groups of … There are … altogether. 	Continue to colour in …s What do you notice? 	Complete the number track/number line by counting in …s. 
Add equal groups (repeated addition) Children should be able to write a repeated addition to represent equal groups and to draw pictures or use objects to represent a repeated addition.	There are … groups of … There are … altogether. $10 + 10 + 10 = 30$ $5 + 5 + 5 + 5 = 20$	What is the same? What is different? $2 + 2 + 2 =$ $5 + 5 + 5 =$ $10 + 10 + 10 =$ Use objects or a drawing to represent the equal groups and find how many in total.	

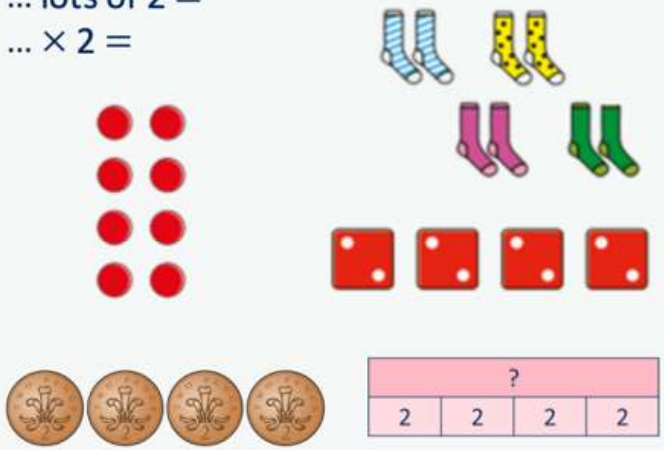
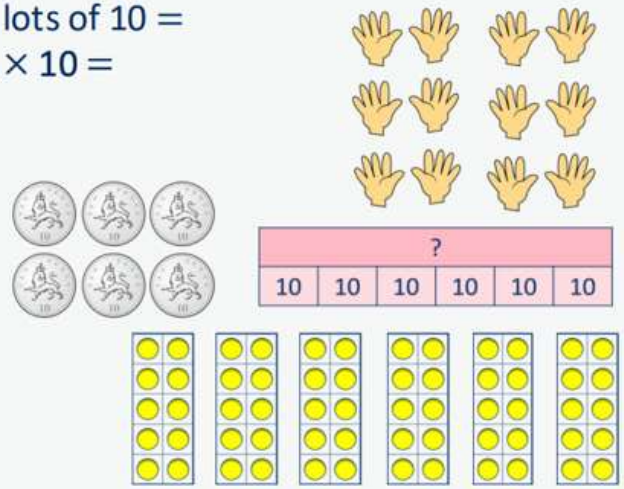
©White Rose Education 2024

Progression of skills	Key representations
Make arrays Children use their knowledge of adding equal groups to arrange objects in columns and rows.	There are … rows of … There are … altogether. There are … columns of … There are … altogether.
Make doubles Children understand that doubles are two equal groups. Children may begin to explore doubles beyond 20 using base 10	Double … is … … + … = … 

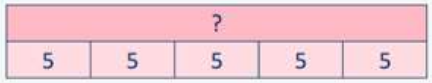
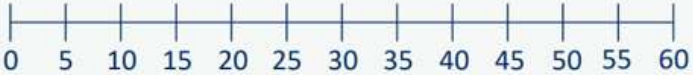
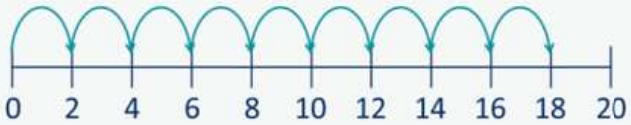
©White Rose Education 2024

Year 2	• Recall and use multiplication facts for the 2, 5 and 10 multiplication tables. • Calculate mathematical statements for multiplication within the multiplication tables and write them using the multiplication (×) and equals (=) signs. • Show that multiplication of two numbers can be done in any order (commutative).
Progression of skills	**Key representations**
Link repeated addition and multiplication Encourage children to make the link between repeated addition and multiplication.	There are … equal groups with … in each group. There are … altogether.  $3 + 3 = 6$ $2 \times 3 = 6$  $5 + 5 + 5 + 5 = 20$ $4 \times 5 = 20$
Use arrays Encourage children to see that multiplication is commutative.	There are … rows with … in each row. There are … columns with … in each column. 3 lots of 5 = 15 $5 + 5 + 5 = 15$ 5 lots of 3 = 15 $3 + 3 + 3 + 3 + 3 = 15$ I can see … × … and … ×… $3 \times 5 = 15$ $5 \times 3 = 15$ $3 \times 5 = 5 \times 3$
Double Encourage children to make links with related facts.	Double … is … Double 4 = 4 + 4 Double 4 is 8 Double … is … so double … is …  Double 4 is 8 Double 40 is 80

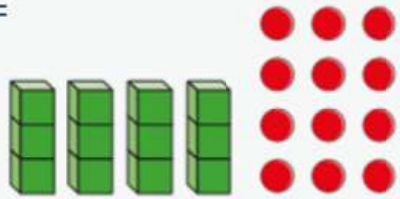
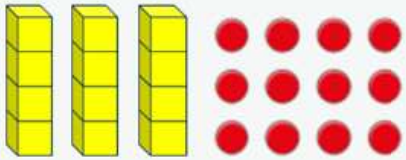
©White Rose Education 2024

Progression of skills	Key representations	
The 2 times-table Encourage daily counting in multiples both forwards and back. Notice that all multiples of 2 are even numbers.	… lots of 2 = … × 2 = 	… times 2 is equal to … 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 1 × 2 = 2 2 = 1 × 2 2 × 2 = 4 4 = 2 × 2 3 × 2 = 6 6 = 3 × 2 0 2 4 6 8 10 12 14 16 18 20 22 24
The 10 times-table Encourage daily counting in multiples both forwards and back. Notice the pattern in the numbers.	… lots of 10 = … × 10 = 	… times 10 is equal to … 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 1 × 10 = 10 10 = 1 × 10 2 × 10 = 20 20 = 2 × 10 3 × 10 = 30 30 = 3 × 10 0 10 20 30 40 50 60 70 80 90 100 110 120

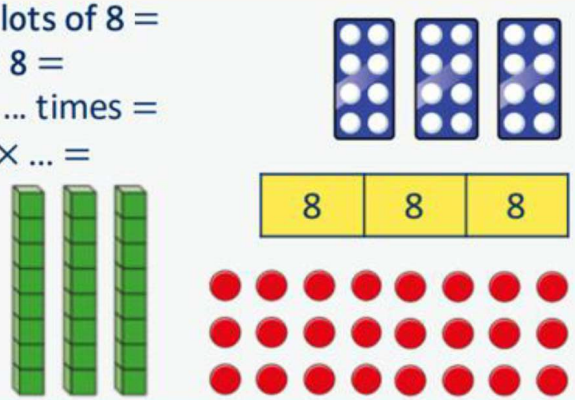
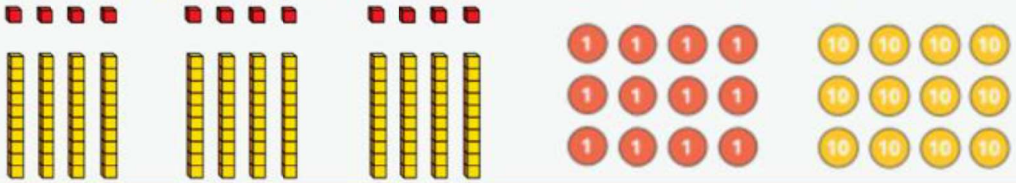
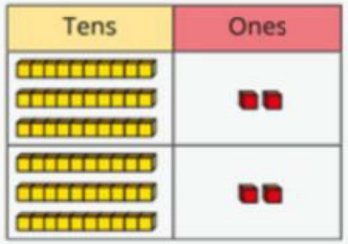
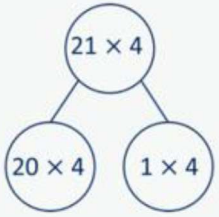
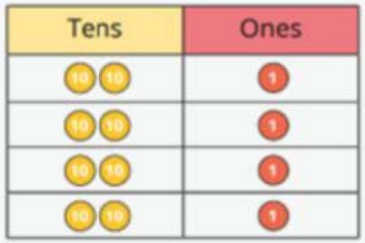
©White Rose Education 2024

Progression of skills	Key representations	
The 5 times-table Encourage daily counting in multiples both forwards and back. Notice the pattern in the numbers.	… lots of 5 = … × 5 =  	… times 5 is equal to … 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 $1 \times 5 = 5$ $5 = 1 \times 5$ $2 \times 5 = 10$ $10 = 2 \times 5$ $3 \times 5 = 15$ $15 = 3 \times 5$ 
Missing numbers Make links to known facts.	… is equal to … groups of … 18 socks, how many pairs?  	… times … is equal to … $\square \times 2 = 18$ $18 = 2 \times \square$

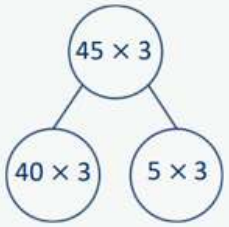
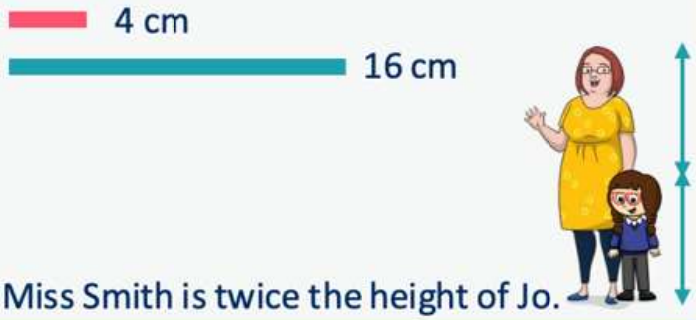
©White Rose Education 2024

Year 3	• Recall and use multiplication facts for the 3, 4 and 8 multiplication tables. • Write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods. • Solve problems, including missing number problems, involving multiplication, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.	
Progression of skills	**Key representations**	
The 3 times-table Encourage daily counting in multiples both forwards and back.	... groups of 3 = ... × 3 = 3, ... times = 3 × ... =  	... times 3 is equal to ... 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 $4 \times 3 = 12 \quad 12 = 4 \times 3$ 0 3 6 9 12 15 18 21 24 27 30 33 36
The 4 times-table Encourage daily counting in multiples both forwards and back. Encourage children to notice links between the 2 and 4 times-tables.	... groups of 4 = ... × 4 = 4, ... times = 4 × ... =  	... times 4 is equal to ... 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 $3 \times 4 = 12 \quad 12 = 3 \times 4$ 0 4 8 12 16 20 24 28 32 36 40 44 48

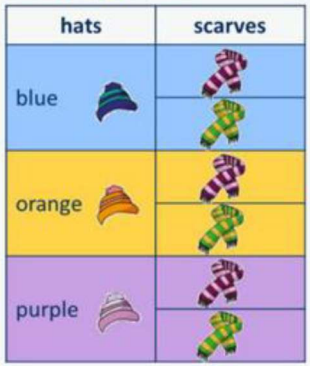
©White Rose Education 2024

Progression of skills	Key representations
The 8 times-table Encourage daily counting in multiples both forwards and back. Encourage children to notice links between the 2, 4 and 8 times-tables.	… lots of 8 = × 8 = 8, … times = 8 × … =  … times 8 is equal to … 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 3 × 8 = 24 24 = 3 × 8 0 8 16 24 32 40 48 56 64 72 80 88 96
Related facts Use knowledge of multiplying by 10 to scale times-table facts.	… × … ones is equal to … ones so … × … tens is equal to … tens.  3 × 4 = 12 3 × 40 = 120
Multiply a 2-digit number by a 1-digit number - no exchange Children apply their understanding of partitioning to represent and solve calculations using the expanded method.	… tens multiplied by … is equal to … tens. …ones multiplied by … is equal to … ones.  30 × 2 = 60 2 × 2 = 4 32 × 2 = 64  

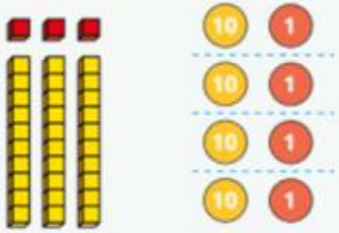
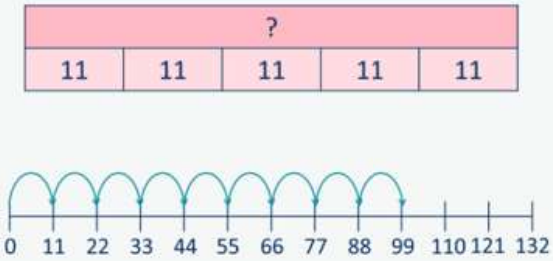
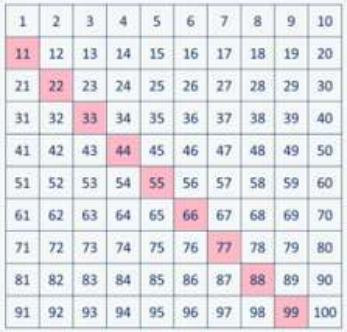
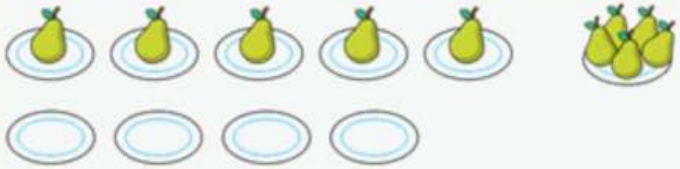
©White Rose Education 2024

Progression of skills	Key representations
Multiply a 2-digit number by a 1-digit number - with exchange Children apply their understanding of partitioning to represent and solve calculations using the expanded method.	… tens multiplied by … is equal to … tens. … ones multiplied by … is equal to … ones. $20 \times 4 = 80$ $4 \times 4 = 16$ $24 \times 4 = 96$ 
Scaling Children focus on multiplication as scaling (…. times the size) as opposed to repeated addition.	There are …. times as many … as … There are 3 times as many triangles as circles. … is … times the size of … … is … times the length/height of …  Miss Smith is twice the height of Jo.

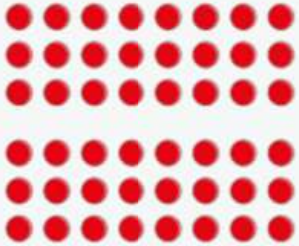
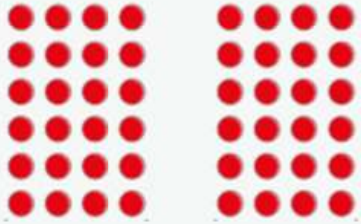
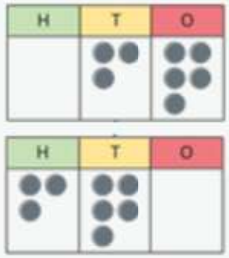
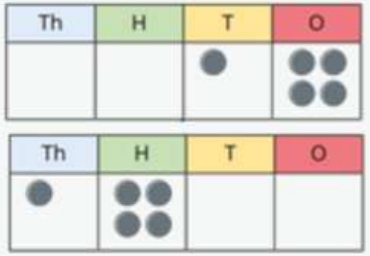
©White Rose Education 2024

Progression of skills	Key representations
Correspondence problems (How many ways?) Encourage children to work systematically to find all the different possible combinations.	For every … , there are … possible … There are … × … possibilities altogether.  For every hat, there are two possible scarves. $3 \times 2 = 6$ There are 6 possibilities altogether.

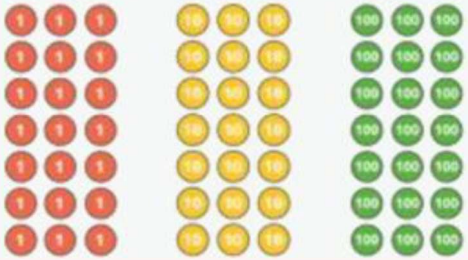
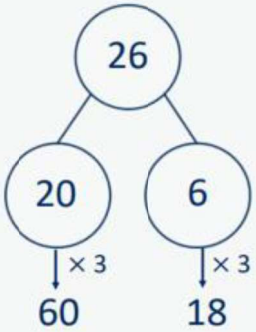
©White Rose Education 2024

Year 4	• Recall multiplication facts for multiplication tables up to 12 × 12 • Use place value, known and derived facts to multiply mentally, including: multiplying by 0 and 1; multiplying together three numbers. • Recognise and use factor pairs and commutativity in mental calculations. • Multiply two-digit and three-digit numbers by a one-digit number using formal written layout. • Solve problems involving multiplying and adding, including using the distributive law to multiply two-digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects.
Progression of skills	**Key representations**
Times-table facts to 12 × 12 Encourage daily counting in multiples both forwards and back. Encourage children to notice links between related times-tables.	… groups of … = … times … is equal to … … × … =   
Multiply by 1 and 0	Any number multiplied by 1 is equal to … Any number multiplied by 0 is equal to …  … × … = … $1 \times 1 = 1$ $1 \times 0 = 0$ $2 \times 1 = 2$ $2 \times 0 = 0$ $3 \times 1 = 3$ $3 \times 0 = 0$ $4 \times 1 = 4$ $4 \times 0 = 0$

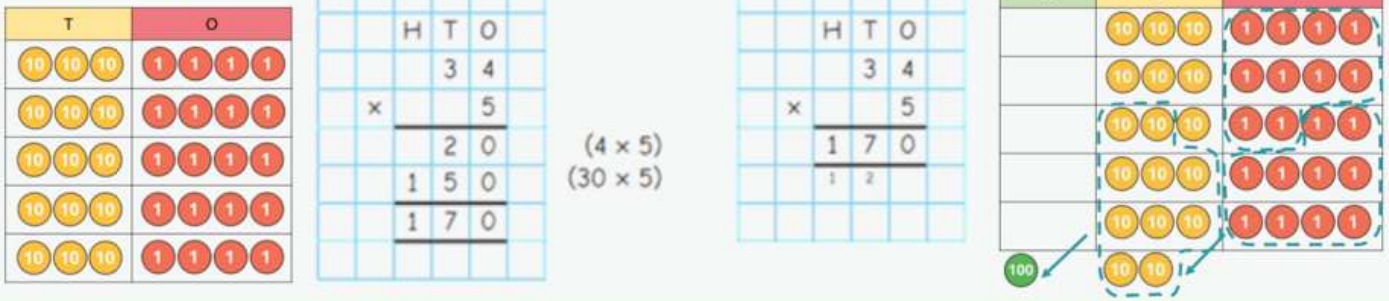
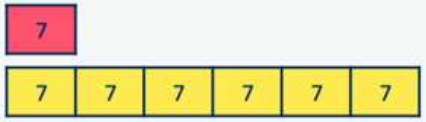
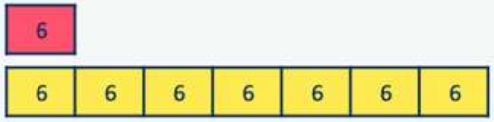
©White Rose Education 2024

Progression of skills	Key representations	
Multiply 3 numbers Children use their understanding of commutativity to multiply more efficiently.	To work out … × … × …, I can first calculate … × … and then multiply the answer by … $4 \times 2 \times 3 = 8 \times 3 = 24$ $2 \times 3 \times 4 = 6 \times 4 = 24$ $3 \times 4 \times 2 = 12 \times 2 = 24$	
Factor pairs Children explore equivalent calculations using different factors pairs.	12 = … × … , so … × 12 = … × … × …  $8 \times 6 = 8 \times 3 \times 2$ $8 \times 6 = 24 \times 2$  $6 \times 8 = 6 \times 4 \times 2$ $6 \times 8 = 24 \times 2$	
Multiply by 10 and 100 Some children may over-generalise that multiplying by 10 or 100 always results in adding zeros. This will cause issues later when multiplying decimals.	When I multiply by 10, the digits move … place value column to the left. … is 10 times the size of …  $35 \times 10 = 350$	When I multiply by 100, the digits move … place value columns to the left. … is 100 times the size of …  $14 \times 100 = 1{,}400$

©White Rose Education 2024

Progression of skills	Key representations
Related facts Use knowledge of multiplying by 10 and 100 to scale times-table facts.	… × … ones is equal to … ones so … × … tens is equal to … tens and … × … hundreds is equal to … hundreds.  $3 \times 7 = 21$ $\quad$ $7 \times 3 = 21$ $3 \times 70 = 210$ $\quad$ $7 \times 30 = 210$ $3 \times 700 = 2{,}100$ $\quad$ $7 \times 300 = 2{,}100$
Mental strategies Partition 2 or 3-digit numbers to multiply using informal methods.	… tens multiplied by … is equal to … tens. …ones multiplied by … is equal to … ones. $3 \times 26 = 60 + 18 = 78$  $26 \times 8 = 80 + 80 + 48 = 208$

©White Rose Education 2024

Progression of skills	Key representations
Multiply a 2 or 3-digit number by a 1-digit number The short multiplication method is introduced for the first time, initially in an expanded form.	To multiply a 2-digit number by … , I multiply the ones by … and the tens by … To multiply a 3-digit number by … , I multiply the ones by … , the tens by … and the hundreds by … 
Scaling Children focus on multiplication as scaling (… times the size).	… is … times the size of …  A computer mouse costs £7 A keyboard costs 6 times as much.  A red ribbon is 6 cm. A yellow ribbon is 7 times as long.
Correspondence problems Encourage children to use tables to show all the different possible combinations.	For every … , there are … possibilities. There are … × … possibilities altogether. A pizza company offers a choice of 5 toppings and 3 bases. $5 \times 3 = 15$

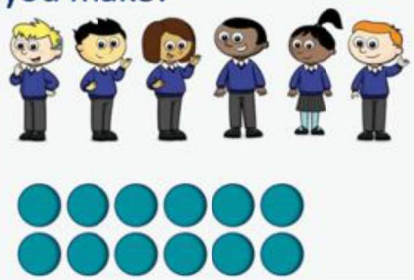
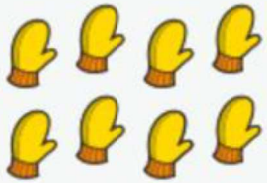
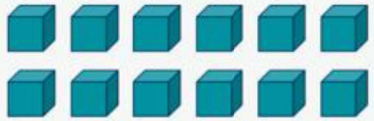
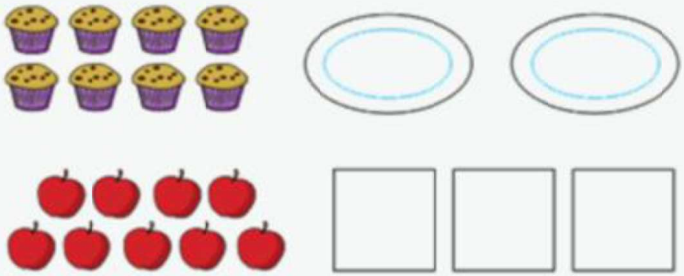
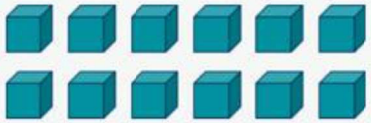
	Deep pan	Italian	Thin
Cheese	C DP	C I	C Th
Mushroom	M DP	M I	M Th
Vegetable	V DP	V I	V Th
Chicken	C DP	C I	C Th
Tuna	T DP	T I	T Th

©White Rose Education 2024

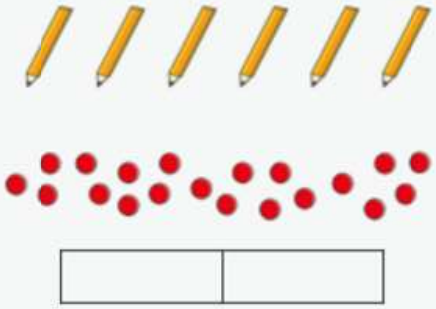
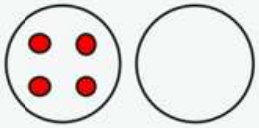
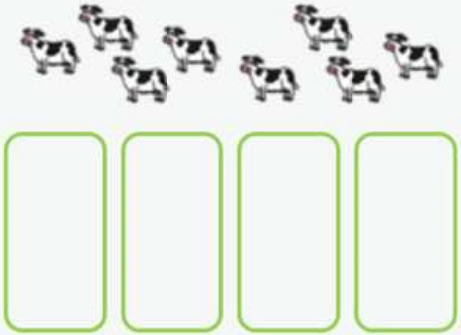
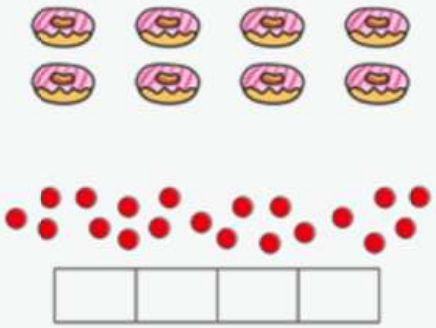
South Gosforth
First School

'Roots to grow and wings to fly'

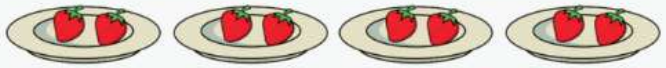
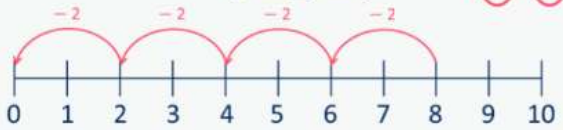
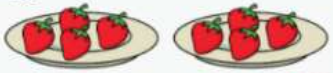
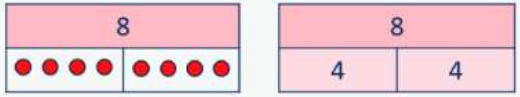
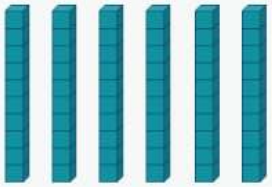
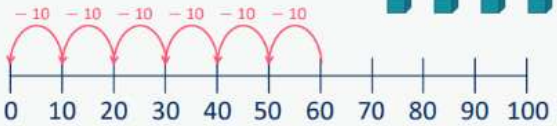
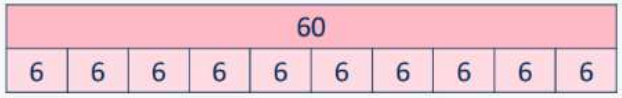
Division

Year 1	• Solve simple one-step problems involving division, using concrete objects, pictorial representations and arrays with the support of the teacher. • Recognise, find and name a half as one of two equal parts of a quantity. • Recognise, find and name a quarter as one of four equal parts of an object, shape or quantity.		
Progression of skills	**Key representations**		
Make equal groups - grouping Encourage children to physically move objects into equal groups. They can also circle equal groups when using pictures.	There are … altogether. How many groups of … can you make? 	Circle groups of 2 There are … groups of 2 	Take … cubes. Make equal groups.  There are … groups of …
Make equal groups – sharing Encourage children to check that the objects have been shared fairly and each group is the same.	… have been shared equally between… There are … on/in each … 	Take … cubes. Share them between …  12 shared between … is …	

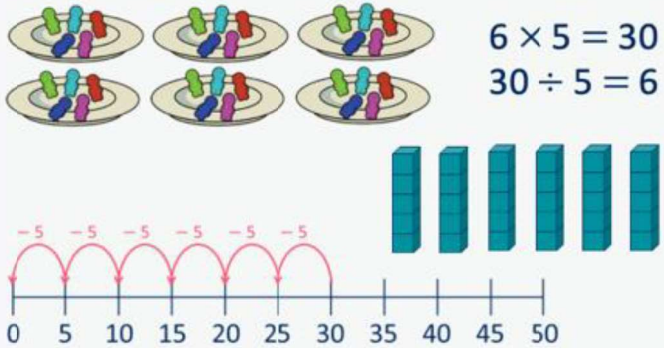
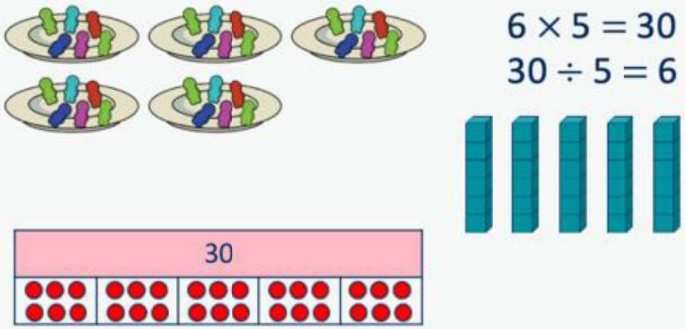
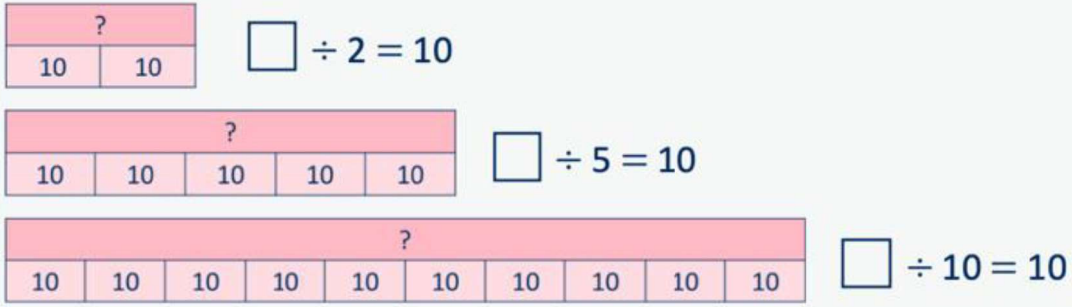
©White Rose Education 2024

Progression of skills	Key representations		
Find a half Start with practical opportunities to share a quantity into 2 groups. Progress to circling half of the objects in a picture and then to finding the whole from a given half.	To find half, I need to share into 2 equal groups. There are … in each group.	Half of … is … 	If … is half, what is the whole?  4 is half of …
Find a quarter Start with practical opportunities to share a quantity into 4 groups. Progress to using pictures or bar models to find a quarter and then to finding the whole from a given quarter.	To find a quarter, I need to share into 4 equal groups.  There are … in each group.	A quarter of … is … 	If … is one quarter, what is the whole? 3 is one quarter of …

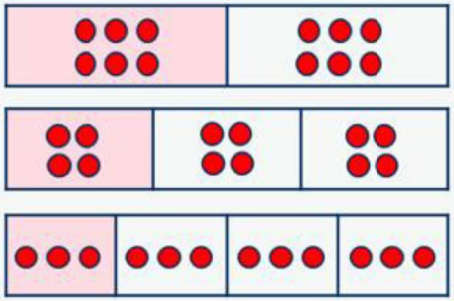
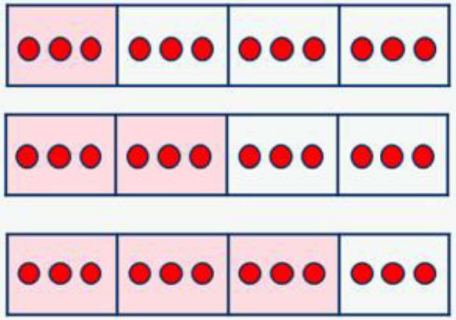
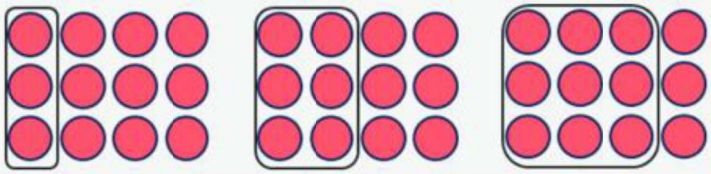
©White Rose Education 2024

Year 2	• Recall and use division facts for the 2, 5 and 10 multiplication tables. • Calculate mathematical statements for division within the multiplication tables and write them using the division (÷) and equals (=) signs. • Recognise, find, name and write fractions $\frac{1}{3}, \frac{1}{4}, \frac{2}{4}$ and $\frac{3}{4}$ of a quantity.	
Progression of skills	**Key representations**	
Divide by 2 Encourage children to compare the grouping and sharing structures of division and to make links with times-table facts and halving.	There are … equal groups of 2 … ÷ 2 = …  4 × 2 = 8 8 ÷ 2 = 4  	… shared equally between 2 is … Half of … is … … ÷ 2 = …  4 × 2 = 8 8 ÷ 2 = 4 
Divide by 10 Encourage children to compare the grouping and sharing structures of division and to make links with times-table facts.	There are … equal groups of 10 … ÷ 10 = … 6 × 10 = 60 60 ÷ 10 = 6   	… shared equally between 10 is … … ÷ 10 = … 6 × 10 = 60 60 ÷ 10 = 6 

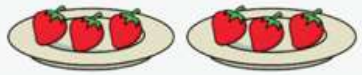
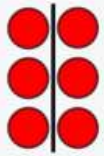
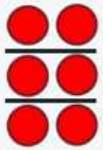
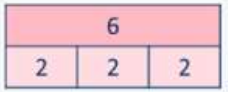
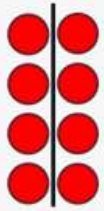
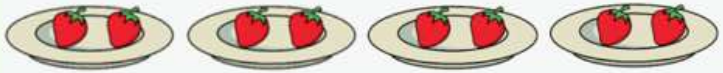
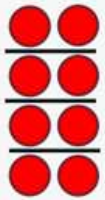
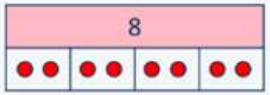
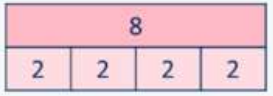
©White Rose Education 2024

Progression of skills	Key representations	
Divide by 5 Encourage children to compare the grouping and sharing structures of division and to make links with times-table facts.	There are … equal groups of 5 … ÷ 5 = …  	… shared equally between 5 is … … ÷ 5 = … 
Missing numbers Bar models are useful to show the link between multiplication and division.	… divided by 2/5/10 is equal to …  	

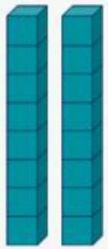
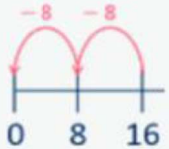
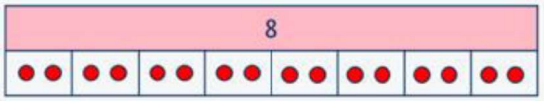
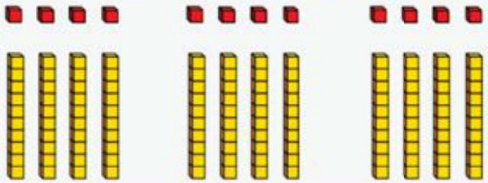
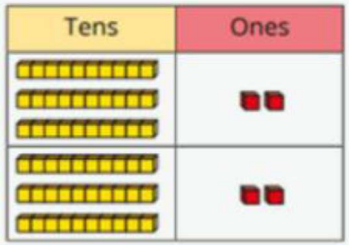
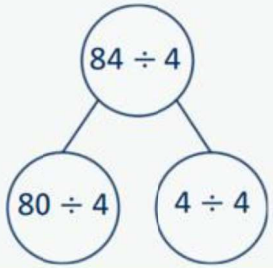
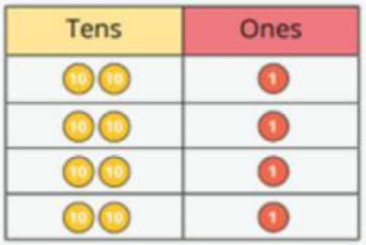
©White Rose Education 2024

Progression of skills	Key representations	
Unit fractions In Y2 the focus is on finding $\frac{1}{2}$, $\frac{1}{4}$ and $\frac{1}{3}$ Bar models are useful to show the link between division and finding a fraction.	The objects have been shared fairly into … groups. $\frac{1}{\square}$ of … is … 	There are … equal parts. There is … part circled. $\frac{1}{\square}$ is circled.
Non-unit fractions In Y2 the focus is on finding $\frac{2}{4}$ and $\frac{3}{4}$ Prompt children to notice that $\frac{2}{4}$ is equivalent to $\frac{1}{2}$	The objects have been shared fairly into … groups. $\frac{\square}{\square}$ of … is … 	There are … equal parts. There are … parts circled. $\frac{\square}{\square}$ is circled. 

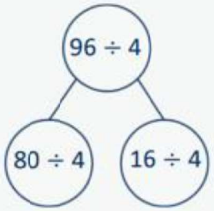
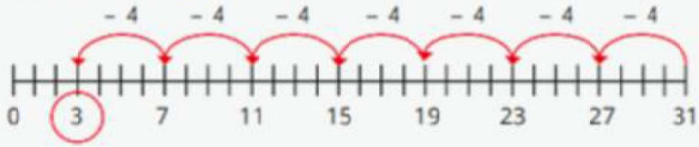
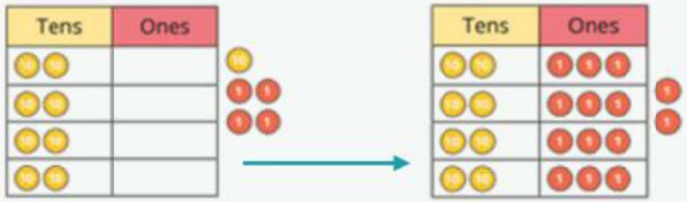
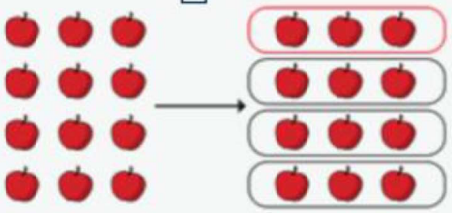
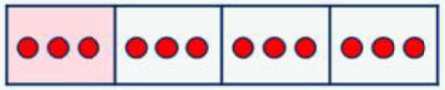
©White Rose Education 2024

Year 3	• Recall and use division facts for the 3, 4 and 8 multiplication tables. • Write and calculate mathematical statements for division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods. • Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators.	
Progression of skills	**Key representations**	
Divide by 3 Encourage children to compare the grouping and sharing structures of division and to make links with times-table facts.	There are … groups of 3 in … … ÷ 3 =  $2 \times 3 = 6$ $6 \div 3 = 2$  	… has been shared equally into 3 equal groups. … ÷ 3 = $2 \times 3 = 6$ $6 \div 3 = 2$  
Divide by 4 Encourage children to compare the grouping and sharing structures of division and to make links with times-table facts.	There are … groups of 4 in … … ÷ 4 = $2 \times 4 = 8$ $8 \div 4 = 2$  	… has been shared equally into 4 equal groups. … ÷ 4 =  $2 \times 4 = 8$ $8 \div 4 = 2$   

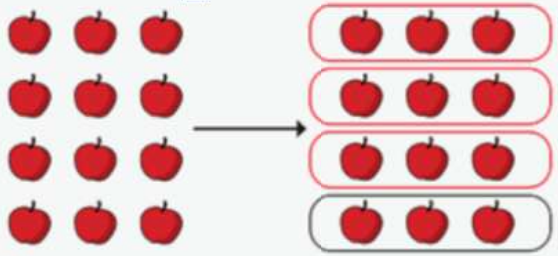
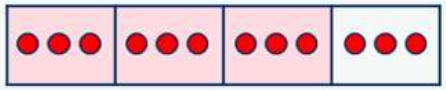
©White Rose Education 2024

Progression of skills	Key representations	
Divide by 8 Encourage children to compare the grouping and sharing structures of division and to make links with times-table facts.	There are … groups of 8 in … … ÷ 8 =  2 × 8 = 16 16 ÷ 8 = 2  	… has been shared equally into 8 equal groups. … ÷ 8 =  2 × 8 = 16 16 ÷ 8 = 2
Related facts Link to known times-table facts.	… ÷ … is equal to …, so … tens ÷ … is equal to … tens.  12 ÷ 3 = 4 120 ÷ 3 = 40	
Divide a 2-digit number by a 1-digit number - no exchange Partition into tens and ones to divide and then recombine.	… tens divided by … is equal to … tens. … ones divided by … is equal to … ones.  60 ÷ 2 = 30 4 ÷ 2 = 2 64 ÷ 2 = 32  	

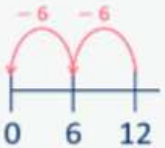
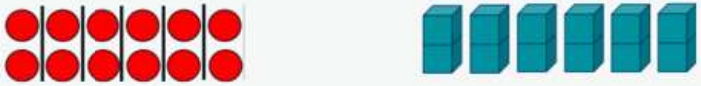
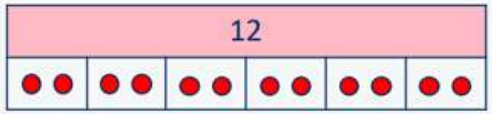
©White Rose Education 2024

Progression of skills	Key representations	
Divide a 2-digit number by a 1-digit number - with remainders Encourage children to partition numbers flexibly to help them to divide more efficiently.	… tens divided by … is equal to … tens. … ones divided by … is equal to … ones.  $80 \div 4 = 20$ $16 \div 4 = 4$ $96 \div 4 = 24$	There are … groups of … There are … remaining. $31 \div 4 = 7$ r3  $94 \div 4 = 23$ r2 
Unit fractions of a set of objects Bar models are useful to show the link between division and fractions, for example, dividing by 3 and finding a third.	The whole is divided into … equal parts. Each part is $\frac{1}{\square}$ of the whole.  $\frac{1}{4}$ of 12 apples is 3 apples.	One … of … is … $\frac{1}{4}$ of 12 is 3  $\frac{1}{3}$ of 36 is 12

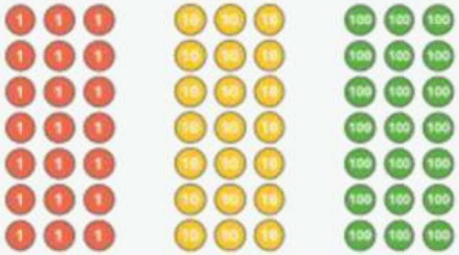
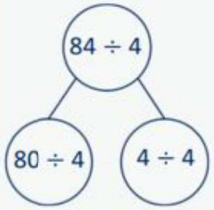
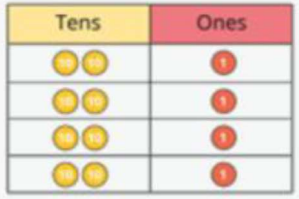
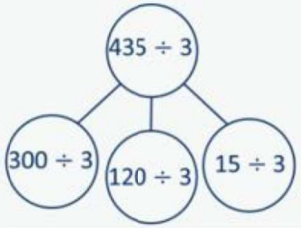
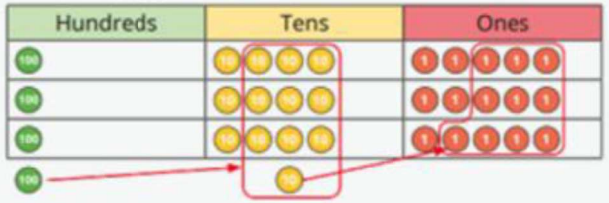
©White Rose Education 2024

Progression of skills	Key representations	
Non-unit fractions of a set of objects Bar models are a useful representation and show the links with division and multiplication.	The whole is divided into … equal parts. Each part is $\frac{1}{\square}$ of the whole.  $\frac{3}{4}$ of 12 apples is 9 apples.	$\frac{1}{\square}$ of … is …, so $\frac{\square}{\square}$ of … is … $\frac{3}{4}$ of 12 is 9  $\frac{2}{3}$ of 36 is 24

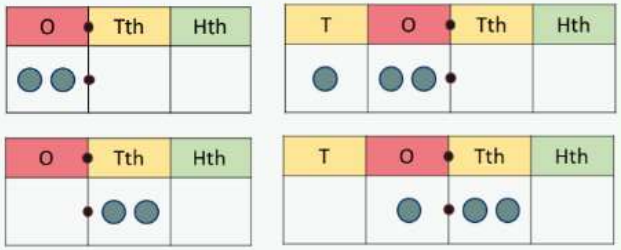
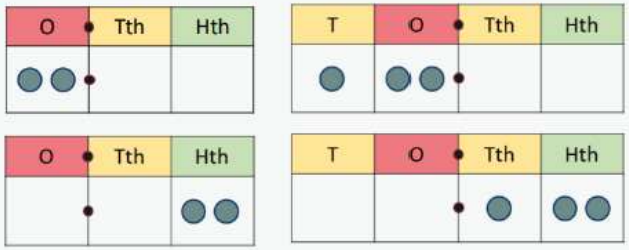
©White Rose Education 2024

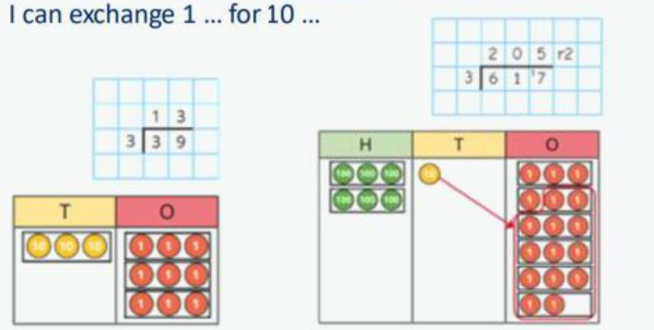
Year 4	• Recall division facts for multiplication tables up to 12 × 12 • Use place value, known and derived facts to divide mentally, including: dividing by 1 • Find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths.	
Progression of skills	**Key representations**	
Division facts to 12 × 12 Encourage children to compare the grouping and sharing structures of division and to make links with times-table facts.	There are … groups of … in … … ÷ … =  2 × 6 = 12 12 ÷ 6 = 2	… has been shared equally into … equal groups. … ÷ … =   2 × 6 = 12 12 ÷ 6 = 2
Divide a number by 1 and itself Children may try to divide a number by zero and it should be highlighted that this is not possible.	When I divide a number by 1, the number remains the same. 5 shared between 1 is 5 There are **5** groups of 1 in 5 	When I divide a number by itself, the answer is 1 5 shared between 5 is 1 There is **1** group of 5 in 5

©White Rose Education 2024

Progression of skills	Key representations	
Related facts Link to known times-table facts.	… ÷ … is equal to … so … tens ÷ … is equal to … tens and … hundreds ÷ … is equal to … hundreds.  $21 \div 7 = 3$ $210 \div 7 = 30$ $2{,}100 \div 7 = 300$ $21 \div 3 = 7$ $210 \div 3 = 70$ $2{,}100 \div 3 = 700$	
Divide a 2 or 3-digit number by a 1-digit number Progress from divisions with no exchange, to divisions with exchange and then divisions with remainders.	I can partition … into … tens and … ones.  $80 \div 4 = 20$ $4 \div 4 = 1$ $84 \div 4 = 21$  	I cannot share the hundreds/tens equally, so I need to exchange 1 … for 10 …  $300 \div 3 = 100$ $120 \div 3 = 40$ $15 \div 3 = 5$ $435 \div 3 = 145$ 

©White Rose Education 2024

Progression of skills	Key representations	
Divide by 10 and 100 Encourage children to notice that dividing by 100 is the same as dividing by 10 twice.	When I divide by 10, the digits move 1 place value column to the right. ... is one-tenth the size of ...  $2 \div 10 = 0.2$ $12 \div 10 = 1.2$	When I divide by 100, the digits move 2 place value columns to the right. ... is one-hundredth the size of ...  $2 \div 100 = 0.02$ $12 \div 100 = 0.12$

In Year 4, the children progress to the formal written method of division.

Progression of skills	Key representations
Divide a 2 or 3-digit number by a 1-digit number.	There are ... groups of ... hundreds/tens/ones/ in ... I can exchange 1 ... for 10 ...