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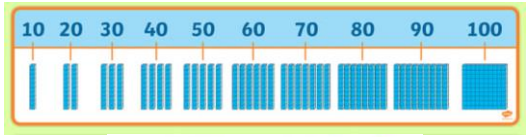
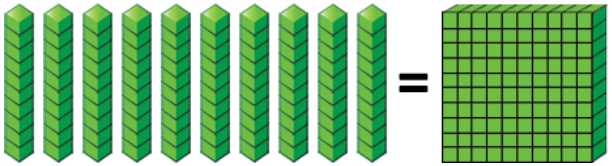
Hugglescote Calculation Policy

Progression in Calculations at Hugglescote- reviewed 2021 (with reference to 2020 Ready to Progress Government Guidance and other local schools)

Number and Place Value

Objective and link to RTP criteria	Concrete	Pictorial	Abstract
Know equivalence of tens and hundreds Year 3 NPV–1 Know that 10 tens are equivalent to 1 hundred, and that 100 is 10 times the size of 10; apply this to identify and work out how many 10s there are in other three digit multiples of 10.	Children use base 10 and place value counters and 10s frames to show how many tens in one hundred.  	Children see pictures of a 10s frame with 10 counters to see that 10 tens = 1 hundred and pictures of 10 base 10 tens equalling one hundred.  	Children can completer missing numbers. 1 hundred = ___ tens ___ tens = 3 hundreds
Know the place value of 3 digit numbers, then 4 digit numbers Year 3 3NPV–2 Recognise the place value of each digit in	Children use place value counters and Base 10 to explore the value of 3 digit and 4 digit numbers.	Children see numbers represented on bar models, 10s frames and part part whole model to represent 3 then 4 digit numbers and partition them in standard and non standard ways:	Children use knowledge of place value to find missing numbers.

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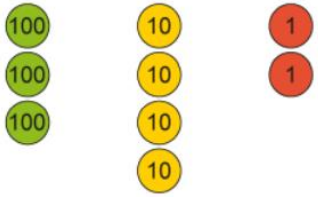
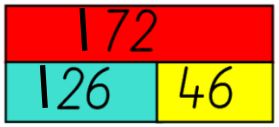
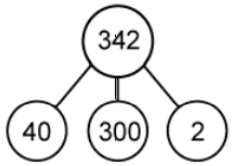
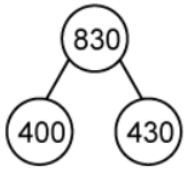
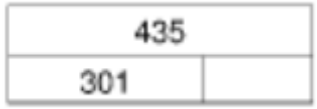
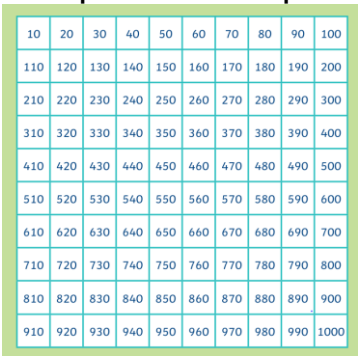
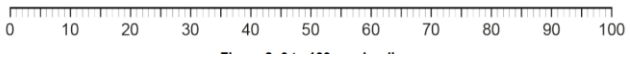
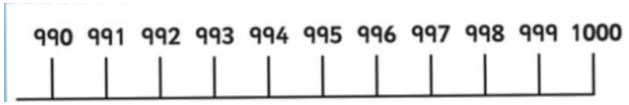
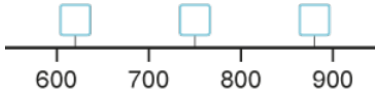
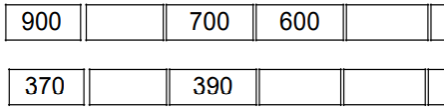
three-digit numbers, and compose and decompose three-digit numbers using standard and non-standard partitioning Year 4 4NPV–2 As above, but 4 digit numbers	 40 + 300 + 2 is equal to 342, not 432. 	     830 – 400 = 430	342 – 300 = ☐ 342 – ☐ = 302 
Find a number on a number line and identify the previous and next multiple of 10 or 100 Year 3 NPV–3 Reason about the location of any three digit number in the linear number system, including identifying the previous and next multiple of 100 and 10.	Count forward and back in 1s, 10s and 100s from any number and identify which multiple of 10 or 100 is before and after a given number. Use 1000 squares to help. 	Use number lines to find a number and to identify the multiple of 10 or 100 that is before and after it.   	Children use place value knowledge to complete number tracks and number lines and work out missing numbers.  previous multiple of 100 — next multiple of 100 600 < 681 < 700
Read scales to 100 marked in	Children use number lines to count in 10s, 50s, 20s and 25s forwards and back.	Children see a range of scales including numbers represented on number lines and bar models.	Children can complete number tracks and bar

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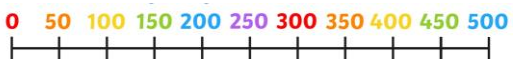
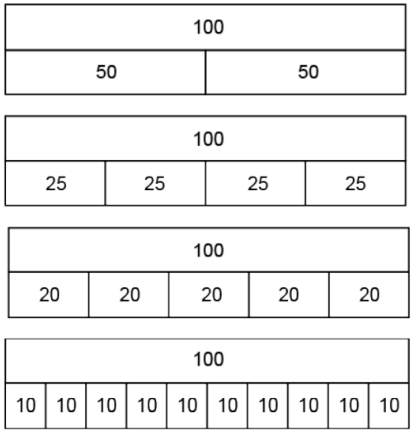
2,4 and 5 equal parts

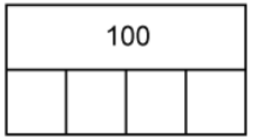
Year 3 NPV–4 Divide 100 into 2, 4, 5 and 10 equal parts, and read scales/number lines marked in multiples of 100 with 2, 4, 5 and 10 equal parts.



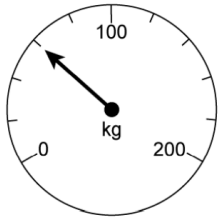
Children read scales to measure weight and capacity.



models with missing numbers.



Children can read scales.

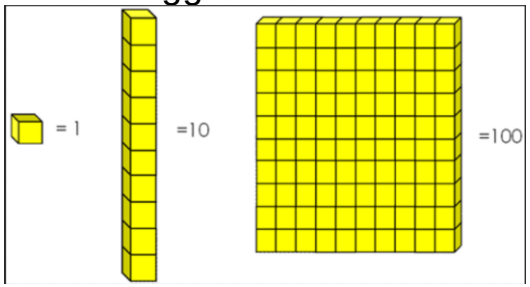


Use scaling to manipulate facts (by 10 and then 100)

Year 3 NF–3 Apply place-value knowledge to known additive and multiplicative number facts (scaling facts by 10).

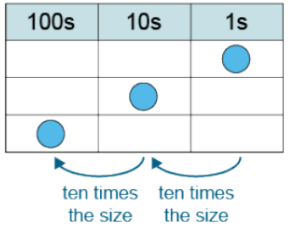
Year 4 NF–3 Apply place-value knowledge to known additive and multiplicative number facts (scaling facts by 100)

Children use base 10 and place value counters to work out which numbers are 10 times bigger and then 100 times bigger than a number.



Use place value charts to show how counters move as they become 10x or 100x bigger.

Children look at this visual representation of scaling.



Children understand how a Gattegno Chart shows scaling.

1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000
100	200	300	400	500	600	700	800	900
10	20	30	40	50	60	70	80	90
1	2	3	4	5	6	7	8	9

Figure 3: Gattegno chart showing multiples of 1, 10, 100 and 1,000

Children can use scaling to manipulate facts.

2 x 5 = 10 so

2 x 50 = 100 as 50 is 10 times bigger than 5 so the answer must be 10 times bigger

5 x 6 = 30 so

5 x 600 = 3000 as 600 is 100 time bigger than 6 so the answer must be 100 times bigger

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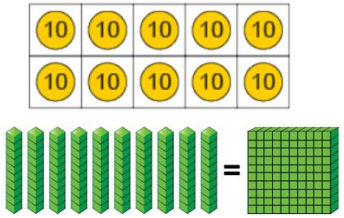
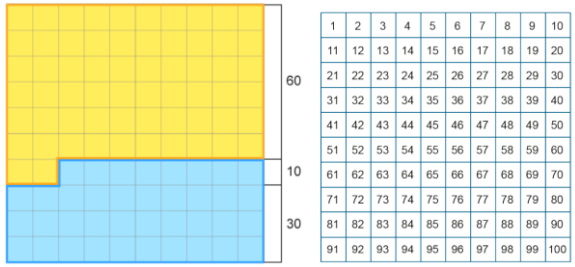
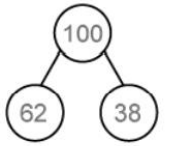
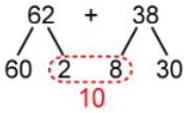
Addition and Subtraction

Objective and link to RTP criteria	Concrete	Pictorial	Abstract
Calculate complements to 100 Year 3 AS–1 Calculate complements to 100	Children use Base 10, counters and 10s frames to work out complements to 100. (Start with multiples of 10, then multiples of 5, then all.)  Help children regroup base 10 and place value counters so as make 10 when finding complements to 100. 53 + 47 =  3 + 7 = 10 50 + 40 = 90 10 + 90 = 100	Show pictures of place value counters in 10s frames and of Base 10 and a 100 square to help children work out complements to 10. 62 + 38 = 100  Use part part models to show finding 10 in order to find complements to 100:   	Children use knowledge of complements to 100 to work out missing numbers: $100 - 29 = \square$ $\square = 100 - 83$ $65 + \square = 100$ $100 = 42 + \square$
Understand how to apply inverse relationships	Use Base 10 and place value counters to explore inverse relationships.	Use part part whole model and bar model to show children how inverse relationships can be used to work out related facts and to check calculations.	Children understand addition can be done in any order (commutative).

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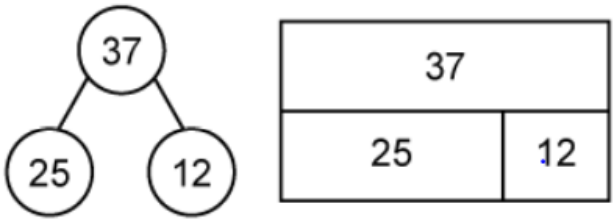
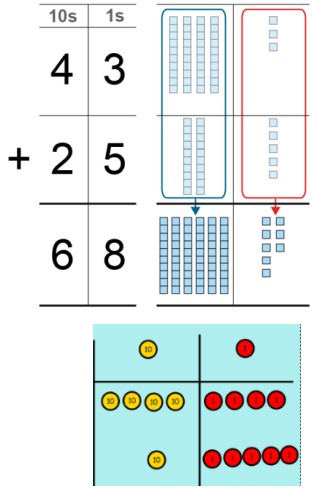
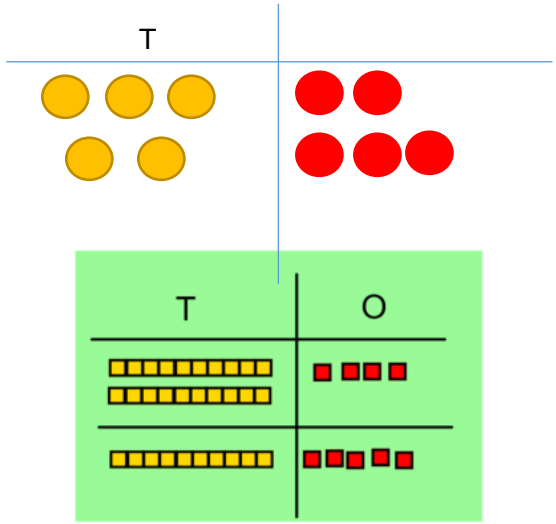
Year 3 AS–3 Understand and use the commutative property of addition, and understand the related property for subtraction.			$25+12=37$ $12+25=37$ Children understand the related property of subtraction. $37-12=25$ $37-25=12$
Column addition - no exchanging (Once ready in Year 2) (Year 3 to ensure secure before moving on) Year 2 AS–4 Add and subtract any 2 two digit numbers.	24 + 15= Add together the ones first then add the tens. Use the Base 10 blocks first before moving onto place value counters. 	After practically using the base 10 blocks and place value counters, children can draw the counters to help them to solve additions. 	When ready children then record in columns. Labelling columns to start with as T for tens and O for ones. Children must add ones first then tens. First children can partition to add. 20 + 4 + 30 + 1 50 + 5 Then: T O 2 4 + 3 1 5 5
Column addition- with exchanging (Year 4 to ensure secure)	Use Base 10 first and then place value counters to make both numbers on a place value grid.	Children can be shown or could draw a pictoral representation of the columns and base 10 or place value counters.	Start by partitioning the numbers before moving on to clearly show the exchange above the column. 23 + 47 = 70

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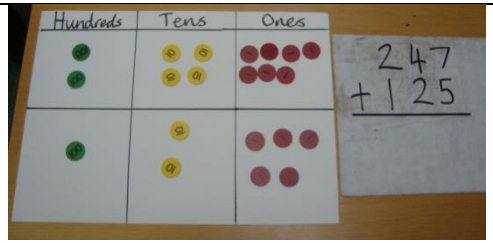
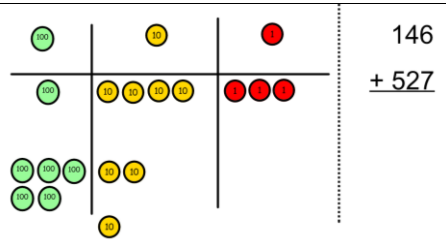
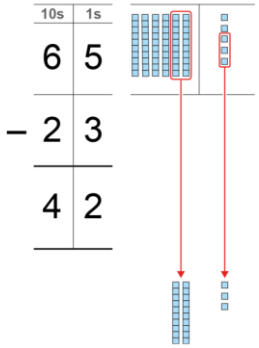
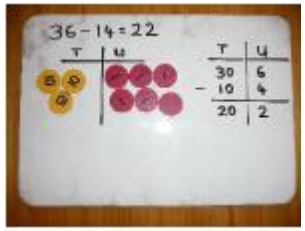
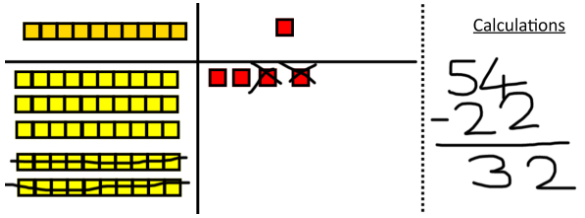
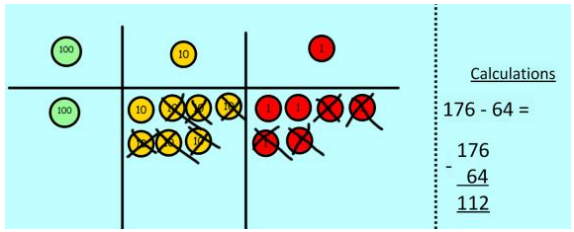
Year 3 NF–1 Secure fluency in addition and subtraction facts that bridge 10, through continued practice.	 Add up the ones and exchange 10 ones for one 10 as needed. 10 tens for 1 hundred as needed.		20 + 3 + 40 + 7 60 + 10 1 23 +47 70
Column subtraction without exchanging (Once ready in Year 2) (Year 3 to ensure secure before moving on) Year 2 AS–4 Add and subtract any 2 two digit numbers.	Use Base 10 to make the bigger number then take the smaller number away.  Show how you partition numbers to subtract. Use place value counters. 	Show pictures or children could draw the Base 10 or place value counters alongside the written calculation to help. Cross out what is taken away.  	When ready children then record in columns. Labelling columns to start with as T for tens and O for ones. Largest number on top line. Children must subtract ones first then tens. First children can partition to subtract. 50 + 2 - 20 + 1 30 + 1 Then: T O 5 2 - 2 1 3 1
Column subtraction	Use Base 10 and then place value counters to show how to use exchanging when subtracting. Always start with ones.	Children can be shown or could draw a pictoral representation of the columns and base 10 or place value counters to help with understanding.	Start by partitioning the numbers before moving on to clearly show the exchange next to the column.

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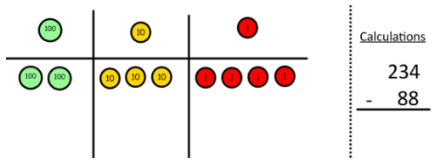
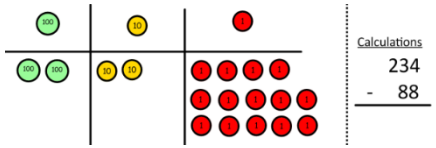
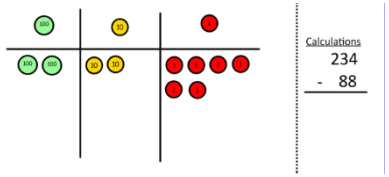
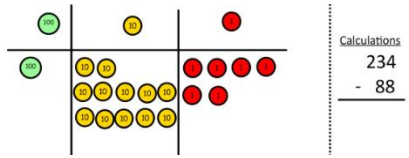
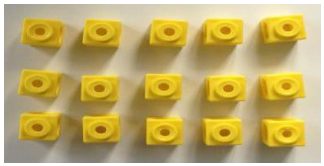
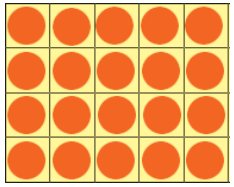
with exchanging (Year 4 to ensure secure) Year 3 NF–1 Secure fluency in addition and subtraction facts that bridge 10, through continued practice.	1.  2.  	3.  4.  	65 - 47 = 18 60 + 5 + 40 + 7 50 + 15 - 40 + 7 10 + 8 5 6 15 - 4 7 1 8

Multiplication and Division

Objective and link to RTP criteria	Concrete	Pictorial	Abstract
Understand commutative multiplication (arrays) Year 2 MD–1 Recognise repeated addition and multiplication equations and calculating the product. 3MD–1 Apply known multiplication and division facts	Create arrays using counters/ cubes to show multiplication.  	Show pictures of arrays and read them as row multiplied by column e.g. 5 x 4  Draw arrays in different rotations to find **commutative** multiplication sentences.	Children look at an array and can write two matching multiplication sentences and two matching repeated addition sentences.  5 x 3 = 15 3 x 5 = 15 5 + 5 + 5 = 15 3 + 3 + 3 + 3 + 3 = 15

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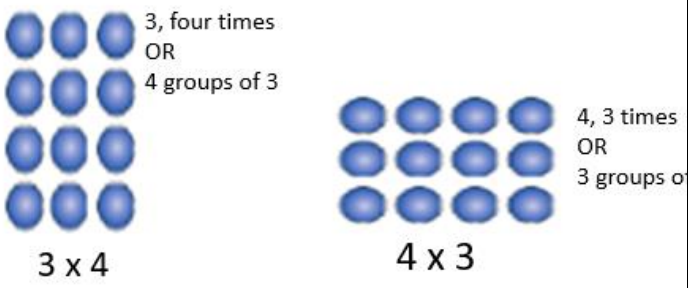
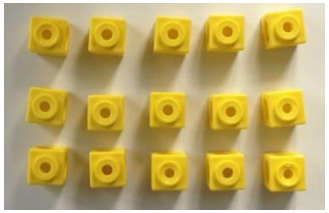
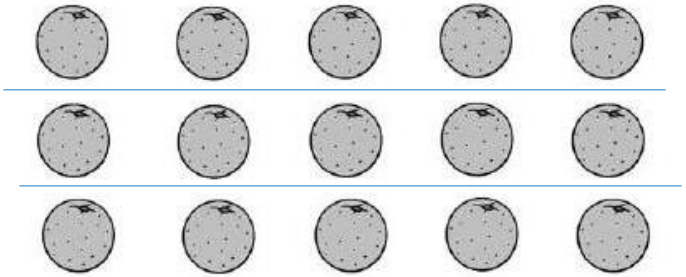
			
Division within arrays 3MD–1 Apply known multiplication and division facts	 Link division to multiplication by creating an array and thinking about the number sentences that can be created. Eg 15 ÷ 3 = 5 5 x 3 = 15 15 ÷ 5 = 3 3 x 5 = 15	 Draw an array and use lines to split the array into groups to make multiplication and division sentences.	Find the inverse of multiplication and division sentences by creating four linking number sentences. 7 x 4 = 28 4 x 7 = 28 28 ÷ 7 = 4 28 ÷ 4 = 7

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Solve problems using grouping to divide two digit numbers by 1 digit

3MD–1 Apply known multiplication and division facts to solve contextual problems with different structures, including quotitive and partitive division.

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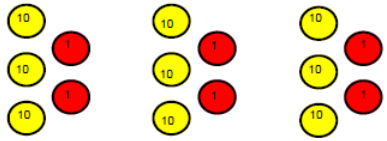
Use place value counters to show how to share counters into a number of groups (quotitive division) ensuring counters are shared fairly (partitive division) .

96 ÷ 3 = 32



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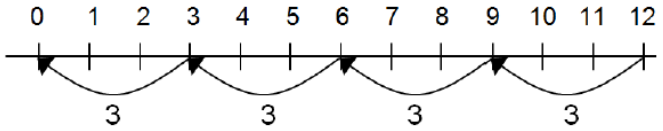
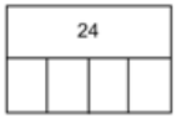
Use a number line to show jumps in groups. The number of jumps equals the number of groups.



Use a bar model to show how a number can be divided into equal groups.

24 ÷ 4 =



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Use grouping to solve division calculations and problems.

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Division with a remainder of two digits by 1 digit/interpret in context

3MD–1 Apply known multiplication and division facts

4NF–2 Solve division problems, that involve remainders, and interpret remainders appropriately according to the context.

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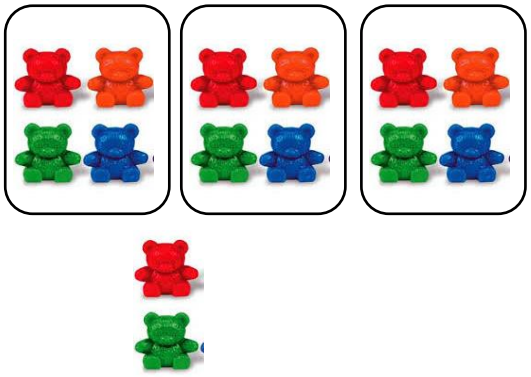
Divide objects between groups and see how much is left over.

14 ÷ 3 =



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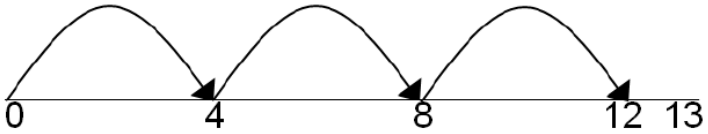
<td>

Jump forward in equal jumps on a number line then see how many more you need to jump to find a remainder.



</td>
<td>

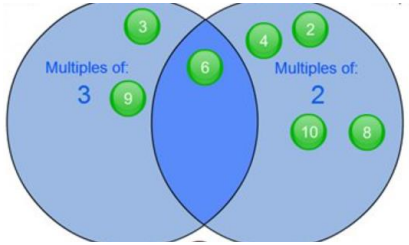
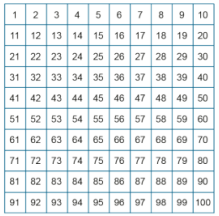
Complete written divisions and show the remainder using r.

Also solve problems using context such as:

Each mini-bus holds 6 children. There are 13 children.
How many buses are needed?

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

Year 3 Yellow

Know all multiplication facts and matching division facts for 2x,5x,10x (consolidating) and 4x,8x Year 3 NF–2 Recall multiplication facts, and corresponding division facts, in the 10, 5, 2, 4 and 8 multiplication tables, and recognise products in these multiplication tables as multiples of the corresponding number.	Count on and back in multiples. Use a counting stick to rehearse counting forward and back in multiples.  Sort multiples using hoops as Venn diagrams to help spot patterns. 	Use a 100 square to explore patterns in times tables and also show multiples in 5 by 3 grids of 15 squares to help spot patterns.  Use a multiplication square to help children to count in multiples and to become familiar with multiples. 	Children can use facts they know from KS1 – 1x,2x,5x and 10x to work out those they don't know. e.g. 3x = 2x + 1 multiple more 6x = 5x + 1 multiple more 7x = 5x + 2x 9x = 10x count back 1 multiple 4x = double 2x 8x = double 2x double 4x