Calculations policy

Independent Learners for Life

whatever it takes

Year 2

ADDITION AND SUBTRACTION

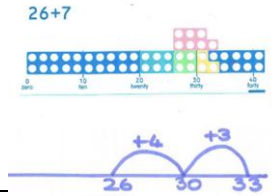
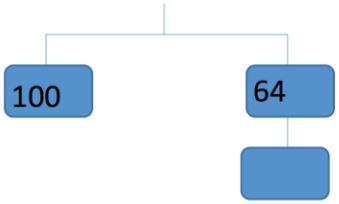
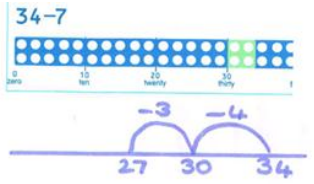
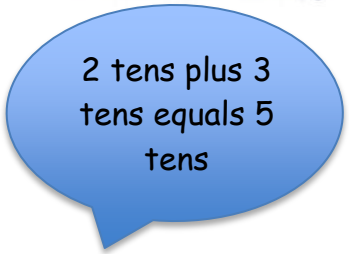
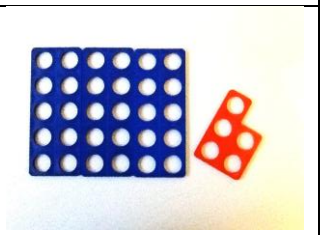
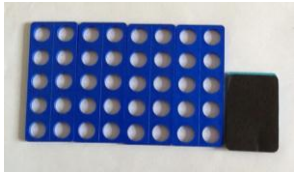
Year group **2**

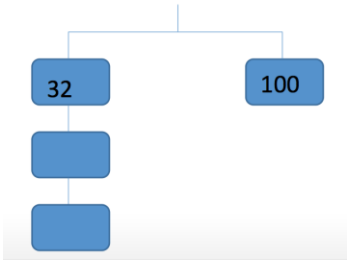
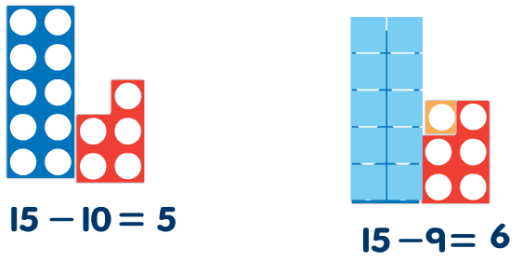
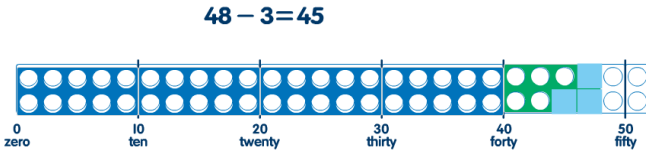
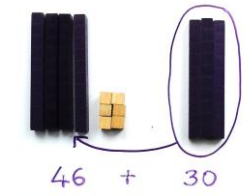
NC end of year statements	**NC Non statutory guidance**
• solve problems with addition and subtraction: using concrete objects and pictorial representations, including those involving numbers, quantities and measures applying their increasing knowledge of mental and written methods • recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100 • add and subtract numbers using concrete objects, pictorial representations, and mentally, including: □ a two-digit number and ones □ a two-digit number and tens □ two two-digit numbers □ adding three one-digit numbers • show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot • recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.	Extend understanding of the language of addition and subtraction to include sum and difference. Practise addition and subtraction to 20 to become increasingly fluent in deriving facts such as using 3 + 7 = 10; 10 – 7 = 3 and 7 = 10 – 3 to calculate 30 + 70 = 100; 100 – 70 = 30 and 70 = 100 – 30. Check calculations, including by adding to check subtraction and adding numbers in a different order to check addition (for example, 5 + 2 + 1 = 1 + 5 + 2 = 1 + 2 + 5). This establishes commutativity and associativity of addition. Record addition and subtraction in columns supports place value and prepares for formal written methods with larger numbers.
Pre-requisite skills	**Associated skills**
• Count in steps of 2, 5 and 10 from 0. • Recognise the place value of each digit in a two-digit number (tens, ones) and use place value and number facts to solve problems • Use a variety of apparatus to identify and represent numbers e.g. Numicon, ten frames and counters, Base 10 • Locate 2 digit numbers on a number line • Compare and order numbers from 0 up to 100; use <, > and = signs • Read and write numbers to at least 100 in numerals and in words • Calculate rather than count in ones to find a total • Understand when and how to add; illustrate with structured apparatus, adding without counting in ones and writing appropriate adding sentences using '+' and '=' • Understand when and how to subtract; illustrate with structured apparatus, subtracting without counting back in ones. Say and write the appropriate adding sentences using '-' and '=' • Understand the commutative property of addition (though not the term), i.e. that numbers can be added in any order and the total remains the same • Use the symbol '=' to show 'balance' or equivalence and know that in addition, the total can appear on the left or right of this symbol	• Count in steps of 3 from 0, and in tens from any number, forward or backward • Recognise benchmark numbers e.g. 5, 10, 50, 100 and know the relationships between them e.g. that 5 is half of 10, 50 is half of 100. • Use benchmark numbers to estimate quantities up to 100 and position of numbers on a number line. • Demonstrate a secure understanding of place value of 2 digit numbers, including 0 as a place holder by showing with apparatus, explaining the value of each digit and flexibly partitioning numbers e.g. 38 as 30/8 and 20/18 • Use knowledge of place value of 2 digit numbers to add/subtract mentally 1/10

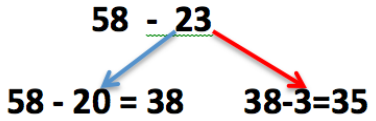
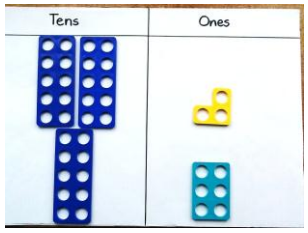
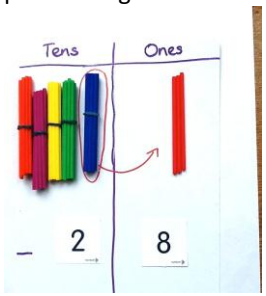
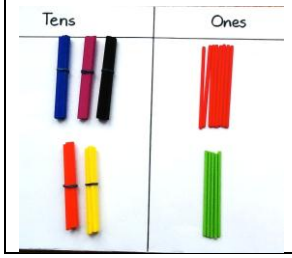
• Know that subtracting number sentences can represent different subtracting situations, e.g. 'take away' or 'comparing to find the difference', and know when to subtract • Know and use equivalence of coin values to solve real life problems	

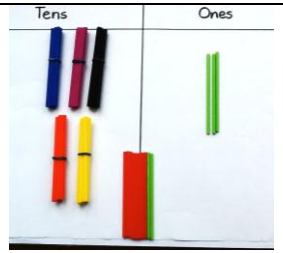
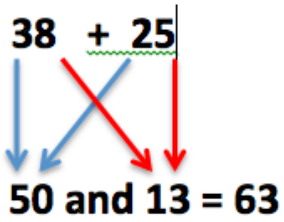
Number facts

- Use knowledge of addition and subtraction facts of numbers up to 10 in calculations using 2 digit numbers e.g. to add/subtract multiples of 10, to add ……
- Add/subtract 1/10 to/from any number within number range
- Know doubles facts for all numbers up to and including 10 and apply these to calculations with 2 digit numbers

ADDITION	OPPORTUNITIES FOR PROBLEM SOLVING	SUBTRACTION
Record informally - using Numicon tens number line and progress to empty number line 	Recognise patterns in similar calculations 4 + 6 14 + 6 24 + 6…… **Fact families** What number sentences can you write with these numerals? 12 20 8 Which four number sentences link these numbers? 100 60 30 If the answer is 25, what was the question? How many different number sentences can you write that are equivalent to 12 - 5 = 3 + 4 **Number mobiles** 	Record informally – use Numicon tens number line and progress to empty number line 
Use knowledge of addition facts to calculate adding multiples of 10 e.g 2 + 3 = 5 so 20 + 30 = 50 		 Use knowledge of addition facts to subtract multiples of 10 e.g 5 – 3 = 2 so 50 – 30 = 20
Say the number 1/10 more than any number within number range		Say the number 1/10 less than any number within number range
Use knowledge of partitioning into TU to add a unit to 10 or a multiple of 10 30 + 5 = 35 		Use knowledge of partitioning into TU to subtract a unit from a TU or subtract a multiple of 10 from TU 46-6=40 and 35-30 = 5 

Record doubles facts as addition number sentences and develop mental strategies for doubling higher numbers 15 + 15 = 30	What can you tell me about the missing numbers in this number mobile?  	Use knowledge of doubles facts to derive subtraction facts e.g. 30-15 = 15
Add 11 or 9 by adding 10 and adjusting		Subtract 11 or 9 by subtracting 10 and adjusting 
Use known addition facts to add a U to a TU without crossing the tens boundary 54 + 2 = 56	**Sometimes/Always/Never?** When adding 1 to a number, only the ones digit changes. If you add three numbers less than 10 the answer will be an odd number?	Use known subtraction facts to subtract a U from a TU without crossing the tens boundary 
Use a variety of strategies to add 3 single digit numbers e.g. identifying pairs to 10 or near doubles. *Give example*	**Hard or easy?** Which questions are easy / hard? 23 + 10 = 93 + 10 = 54 + 9 = 54 + 1 = Explain why you think the hard questions are hard?	Use knowledge of subtraction facts to subtract a multiple of 10 from a 2 digit number e.g. 45 – 20 = 25
Use knowledge of addition facts to add a multiple of 10 to a 2 digit number 46 + 30 = 76  	Continue the pattern 90 = 100 – 10 80 = 100 – 20 Can you make up a similar pattern starting with the numbers 74, 26 and 100? **Missing numbers** 91 + ☐ = 100 100 - ☐ = 89 What numbers go in the boxes?	Subtract a U from TU by bridging through the multiple of 10 e.g. 52-7 = 45 Record informally
Add U to TU by bridging through the multiple of 10 e.g. 47 + 5 = 52. Record informally	**True or false?** Are these number sentences true or false? 73 + 40 = 113 98 – 18 = 70 46 + 77 = 123 92 – 67 = 35	Subtract a 2 digit number from a 2 digit number not crossing the tens boundary 58- 23 = Use structured apparatus to support either to and record informally, using partitioning or a tens and units frame

	Give your reasons. **Possibilities** ☐ + ☐ + ☐ = 14 What single digit numbers could go in the boxes? How many different ways can you do this? **What else do you know?** If you know 87 = 100 – 13 , what other facts do you know? **Missing symbols** Write the missing symbols (+ - =) in these number sentences: 80 ☐ 20 ☐ 100 100 ☐ 70 ☐ 30 87 ☐ 13 ☐ 100 **Convince me** What digits could go in the boxes? 7☐ - 2☐ = 46 Try to find all of the possible answers. How do you know you have got them all? Convince me **Estimating** Which of these number sentences have the answer that is between 50 and 60 74 - 13 55 + 17 87 – 34 In my head I have two odd numbers with a difference of 2. What could they be?	
Add two 2 digit numbers not crossing the tens boundary 34 + 45 = 79 Use structured apparatus (Numicon, tens frames, Cuisenaire rods, Base 10) to support adding the tens first and then the ones. Choose own informal notation to record.  23 + 16 = 39		Subtract two 2 digit numbers together, crossing the tens boundary Use structured apparatus (Numicon, tens frames, Cuisenaire rods, Base 10) to support subtracting the tens first and then the ones. Choose own informal notation to record. This may be supported by mental jottings such as partitioning or use of an empty number line.  53 - 28 = 25
Add two 2 digit numbers together, crossing the tens boundary. This may be supported by use of a place value frame and apparatus or mental jottings such as an empty number line or partitioning 		

 38 + 25 = 63 		

Notes: Include resources from NRICH website
* Pupils must be familiar with 'exchanging' ones and tens using Base 10 or Numicon first before using the apparatus to support calculation of 2 digit numbers. Allow plenty of opportunities to play games such as Race to 100 or Race to 0.

MULTIPLICATION AND DIVISION

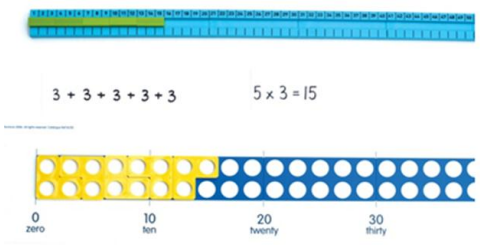
Year group **2**

NC end of year statements	**Non statutory guidance**
• recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers • calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs • show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot • solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts. • Find simple fractions ½ of 6 = 3	Use a variety of language to describe multiplication and division. Become fluent in the 2, 5 and 10 multiplication tables and connect them to each other. Connect the 10 multiplication table to place value, and the 5 multiplication table to the divisions on the clock face. Begin to use other multiplication tables and recall multiplication facts, including using related division facts to perform written and mental calculations. Work with a range of materials and contexts in which multiplication and division relate to grouping and sharing discrete and continuous quantities, to arrays and to repeated addition. Begin to relate these to fractions and measures (for example, 40 ÷ 2 = 20, 20 is a half of 40). Use commutativity and inverse relations to develop multiplicative reasoning (for example, 4 × 5 = 20 and 20 ÷ 5 = 4).
Pre-requisite skills	**Associated skills**
• Count in 1s, 2s and 5s from 0 • Understand double as 2 equal groups of objects and apply this to numbers • Understand and use +/- signs • Recognise = sign as equivalence • Recognise multiples of 2, 5 and 10 • Recognise patterns in multiples of 2, 5 and 10 • Know doubles facts up to 10	• Counting in 3's from 0 • Count in 10s from any number • Extend understanding and use of fractions to $^1/_3$, $^1/_4$, $^2/_4$ and $^3/_4$ of lengths, shapes, sets of objects or quantity. • Write simple fractions e.g. $^1/_2$ of 6 = 3 and recognise the equivalence of two quarters and one half. • Count in halves and quarters

Number facts
• Count in steps of 2, 3 and 5 from 0 and in 10s from any number forward or backward (pre requisite?) • Know all doubles facts of numbers up to 10 and corresponding halves • Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers

MULTIPLICATION	**OPPORTUNITIES FOR PROBLEM SOLVING**	**DIVISION**
Recognise multiplication in real life situations, involving repeated addition Use Numicon shapes and link to repeated addition number sentence. *There are 5 cars in the car park. How many wheels?*	Understand that doubling is the inverse of halving	Recognise division in real life situations involving sharing and grouping Respond to problems such as *12 bulbs planted in 3 pots. How many bulbs can be planted in each pot?* Or *12 bulbs to be planted in threes in a pot. How many pots?* Use drawings/images to help solve the problem

Describe this as 5 lots of 4 or 5 groups of 4 and record informally in groups or as 4 + 4 + 4 + 4 + 4 = 20
Child initiated recording of pictorial images leading repeated addition number sentence and then multiplication sentence

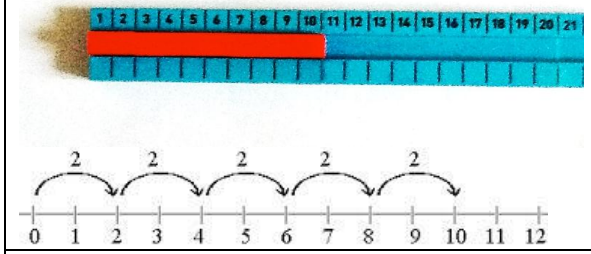


Introduce recording of multiplication sentence when children are:

- secure with making equal groups, using a variety of apparatus
- can explain using the appropriate language what they have done

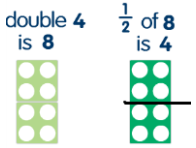
can record informally using numerals, diagrams/pictures.

Represent multiplication of 2, 5 and 10 as equal jumps on a number line e.g. 5 jumps of 2



Begin to understand multiplication as scaling using vocabulary such as twice as big/long/wide etc
Make a tower twice as high as the orange tower.

The giant is twice as high as the house. The house is 10 m high – how tall is the giant?



Use Cuisenaire Rods to make different 'trains'. Make a train with the red rods which is exactly the same length as the green rod train. Can you make any other trains that are just one colour? Can you describe your trains? What number sentences can you write to describe these?

Missing numbers

10 x 4 = 5 x ? What number goes in the box?

Making links

I have 30p in my pocket in 5p coins. How many coins do I have?

Alex buys 30 stickers altogether. They come in packets of 2, 5 and 10. What packets could he have bought?

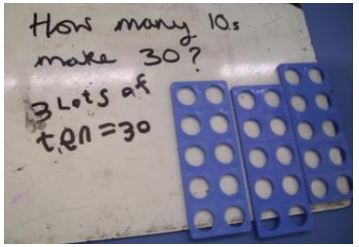
Apples are sold in packs. Mrs Pullen buys 12 apples altogether.
How many packs could she have bought? How many different answers can you think of?

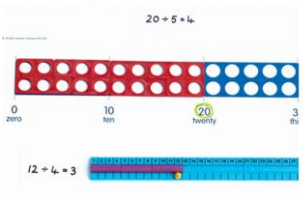
There are 20 eggs.
A box holds 6 eggs.
How many boxes are needed to hold all the eggs?

Ella has 12 counters.
Some are red and some are green. She can put the green counters in equal groups of 2 and 5 with none left over. She can out the green counters in equal groups of 2 and 4 with none left over. How many red counters does she have and hw many green counteres does she

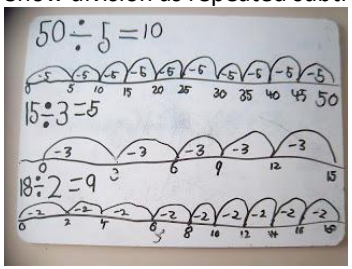
The blue ribbon is half as long as the red ribbon. The red ribbon is 10 cm long. How long if the blue ribbon?

Informal recording, using similar representations as in multiplication



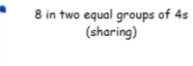
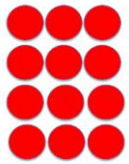
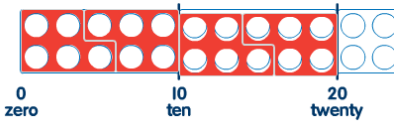
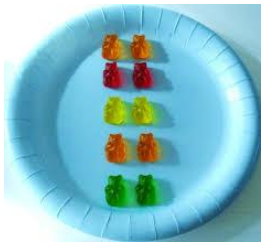
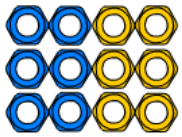


Show division as repeated subtraction on a number line



Interpret real life division problems using grouping and sharing in number sentences, using ÷ and =

I have 8 counters, how many friends can have 2 each?

	have? **Arrays** What number sentences can you write for this array? Write the multiplication number sentences to describe this array What do you notice? Write the division sentences. **Prove It** Which four number sentences link these numbers? 3, 5, 15 How can you show this? **True or false?** When you count up in tens starting at 5 there will always be 5 units. 4 x 5 = 5 + 5 + 5 3 x 5 = 5 x 3 2 x 5 = 2 + 5 10 ÷ 2 = 10 – 2 20 ÷ 5 = 5 ÷ 20 **Usiing the inverse** Use the inverse to check if the following calculations are correct: 12 ÷ 3 = 4 3 x 5 = 14 **Equivalent statements** Fill in the missing number: 5 x 4= 10 x ☐ What multiplication and division statements can you write that are equivalent to 5 x 4? **True or false?** 8 × 2 = 8 + 8 3 × 10 = 3 + 3 + 3 5 × 4 = 5 + 5 + 5 + 5	If I want to share 8 balls between 2 buckets, how many balls in each bucket?   Introduce recording of division sentence when children are: • secure with making equal groups, using a variety of apparatus • can explain using the appropriate language what they have done can record informally using numerals, diagrams/pictures.
Represent multiplication as an array  2 rows of 3 and 3 rows of 2 4 x 3  3 x 4		Understand that division is the inverse of multiplication. 5 × 4=20  How many 5s in 20?  How many 2s in 10.?.....How many 5s in 10? What division number sentences can we write about this array?
Understand that representations of equal groups, equal jumps and arrays can all be shown as a multiplication sentence e.g. 5 x 3		Link finding fractions of quantities to division e.g. ½ of 12 is the same as 12 ÷ 2. 

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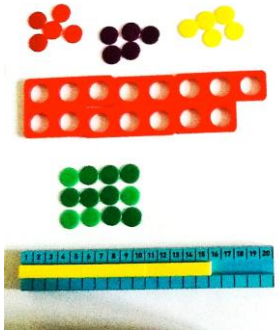
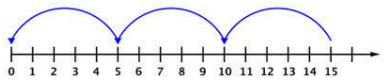
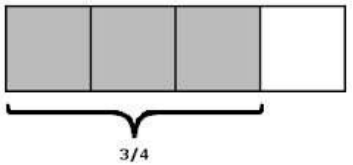
<td> 
 
</td>
<td rowspan="3">Is 3 lots of 4 always / sometimes / never the same as 4 lots of 3? Show me.

The Giant is 10m tall. He is 5 times as tall as the door. How tall is the door?</td>
<td>Know that one quarter means one of 4 equal parts of a whole and one third means one of 3 equal parts

Recognise find read and write ½, ¼ 1/3 and ¾ and explain that fractions are between whole numbers on the number libe.
Explain ¾ as 3 of 4 equal parts

 
</td>
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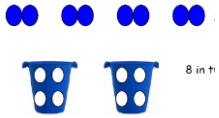
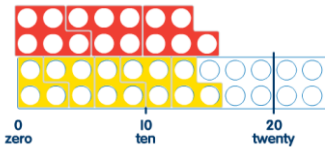
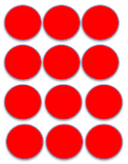
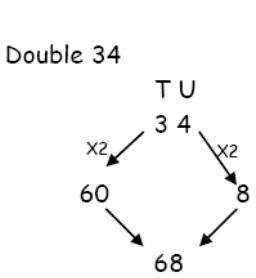
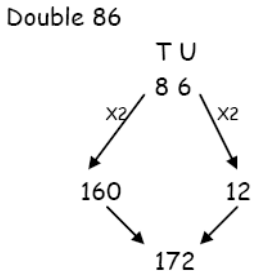
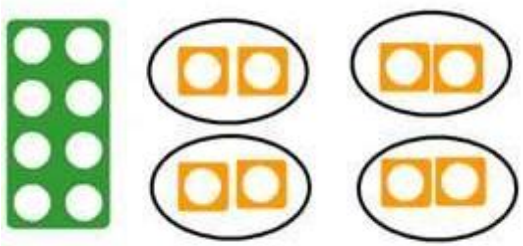
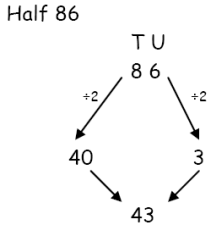
<tr>
<td>Understand that multiplication is commutative
 
4 x 2 = 8
2 x 4 = 8

5 x 3 = 15 3 x 5 = 15
 
</td>
<td>Understand the relationship between multiplication as equal groups and division as grouping and sharing
 
12 in 4 groups of 3
12 in 3 groups of 4

How many rows of 3 in the array of 12? 12 ÷ 3 = ☐
How many columns of 4 in the array of 12? 12 ÷ 4 =</td>
</tr>
<tr>
<td>Interpret real life multiplication problems in number sentences, using x and =
Introduce multiplication using the Numicon visiting table: How many times did you get a 5 shape?
How can we record this?
Record as shapes and corresponding number sentence</td>
<td>Know that mutiplying has a commutative proprty (and dividing does not) and use this to help when solving dividing questions</td>
</tr>
<tr>
<td>Double 2 digit numbers by partitioning into TU.</td>
<td>Use 2, 5 and 10 x facts to derive corresponding division facts</td>
</tr>
</table>

<table>
<tr>
<td>




</td>
<td rowspan="2"></td>
<td>

2 x 4 = 8 (or a group of 2 four times)
8 ÷ 2 (or in groups of 2)
</td>
</tr>
<tr>
<td>Know 2, 5 and 10 x facts and use these supported by apparatus to derive new facts - use 2 x 5 to calculate 20 x 5</td>
<td>
Halve even 2 digit numbers first with an even number of tens and progress to an odd number of tens
Partition into TU to halve.


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

Additional resources

White Rose Maths - fluency, reasoning, problem solving - whiterosemaths.com

Numbots - fluency - bit.ly/stmargsnumbots

Times Table Rockstars - fluency - bit.ly/stmargsttrockstars

Nrich - reasoning and problem solving - nrich.maths.org

Year Two Maths Organiser

Doubles	
11	22
12	24
13	26
14	28
15	30
16	32
17	34
18	36
19	38
20	40

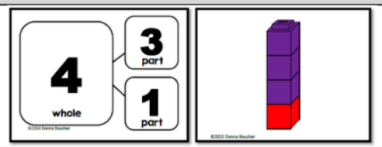
Halves	
22	11
24	12
26	13
28	14
30	15
32	16
34	17
36	18
38	19
40	20

Bonds To 20	
0	20
1	19
2	18
3	17
4	16
5	15
6	14
7	13
8	12
9	11
10	10

Fractions	
$\frac{1}{2}$	one half
$\frac{1}{3}$	one third
$\frac{2}{3}$	two thirds
$\frac{1}{4}$	one quarter
$\frac{3}{4}$	three quarters
$\frac{1}{5}$	one fifth
½ = 2/4	

Bonds Up To 20	
19 = 0 + 19	19 = 5 + 14
19 = 1 + 18	19 = 6 + 13
19 = 2 + 17	19 = 7 + 12
19 = 3 + 16	19 = 8 + 11
19 = 4 + 15	19 = 9 + 10

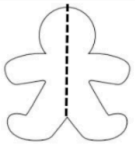
Derived Facts



part + part = whole	3 + 1 = 4
part + part = whole	1 + 3 = 4
whole = part + part	4 = 3 + 1
whole = part + part	4 = 1 + 3
whole - part = part	4 - 3 = 1
whole - part = part	4 - 1 = 3
part = whole - part	1 = 4 - 3
part = whole - part	3 = 4 - 1

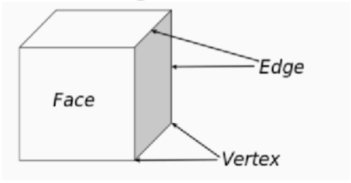
Multiplication Tables				
X	**2**	**3**	**5**	**10**
1	2	3	5	10
2	4	6	10	20
3	6	9	15	30
4	8	12	20	40
5	10	15	25	50
6	12	18	30	60
7	14	21	35	70
8	16	24	40	80
9	18	27	45	90
10	20	30	50	100
11	22	33	55	110
12	24	36	60	120

2D Shapes

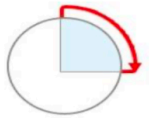
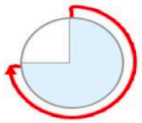
Quadrilateral	Four straight sides Four vertices
Pentagon	Five straight sides Five vertices
Hexagon	Six straight sides Six vertices
Polygon	A closed shape with three or more straight sides
Regular Shape	A shape where all sides are equal and all angles are equal
Irregular Shape	A shape with sides or angles of different sizes
Has a line of symmetry	
Does not have a line of symmetry	

3D Shapes

Faces, Edge and Verticies



Turns

Quarter Turn	Three-quarter Turn
	
1 right angle quarter turn 90°	3 right angles 3 quarter turns 270°

Time

Quarter Past		The minute hand points to three and the hour hand points past the hour.
Quarter To		The minute hand points to nine and the hour hand points near the next hour.

Numbers to 1000			
100	one hundred	600	six hundred
200	two hundred	700	seven hundred
300	three hundred	800	eight hundred
400	four hundred	900	nine hundred
500	five hundred	1000	one thousand

Place Value Grid			
	hundreds	tens	ones
Numeral	100	10	1