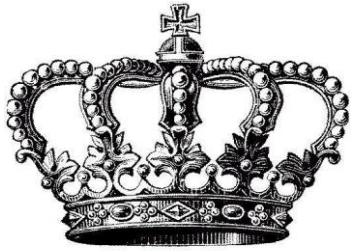
QUEEN'S DRIVE INFANT SCHOOL



CALCULATION POLICY

February 2020

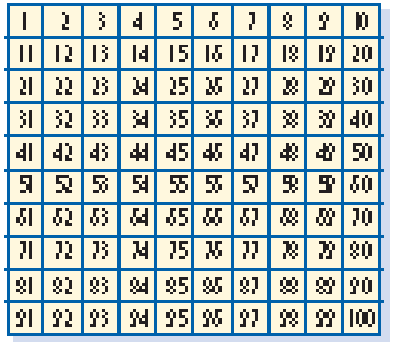
Aim

Children should **secure mental strategies**. They are taught the strategy of counting forwards and backwards in ones and tens first and then 'Special Strategies' are introduced. Children are taught to look carefully at the calculation and decide, which strategy they should use. Children should explain and reason as to why they have chosen a strategy and whether it is the most efficient.

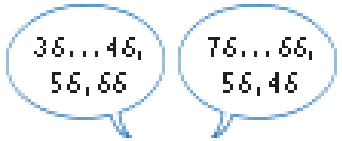
The importance of Mental Strategies:

- A mental strategy that they can always rely on E.g. counting in tens and ones, forwards and backwards E.g. 56 – 25 (count back in 10s 56, 46, 36 and back in ones 36, 35, 34, 33, 32, 31)
- A special strategy they can select from a small range of strategies if they can see something special about the numbers they are being asked to calculate with E.g. 46 – 24 (I can use near doubles to support my calculation E.g. 46 – 23 – 1)

Key representations to support conceptual understanding of addition and subtraction.



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
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

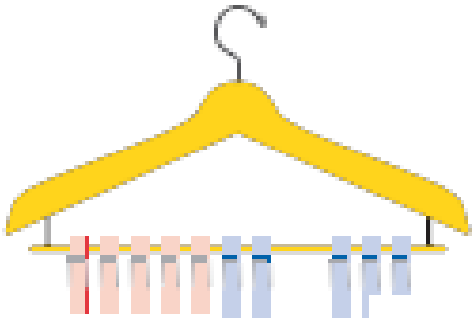


6 + 10 = 16
16 + 10 = 26
26 + 10 = 36
36 + 10 = 46

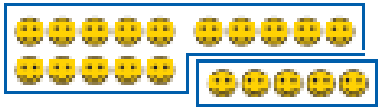
36 + 20 = 56

96 − 10 = 86
86 − 10 = 76
76 − 10 = 66
etc.

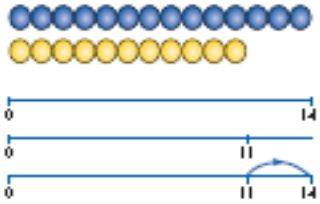
76 − 30 = 46



8 + ? = 10



15 + 5 = 20

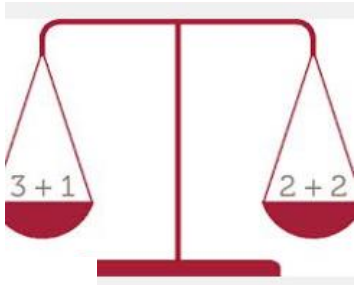


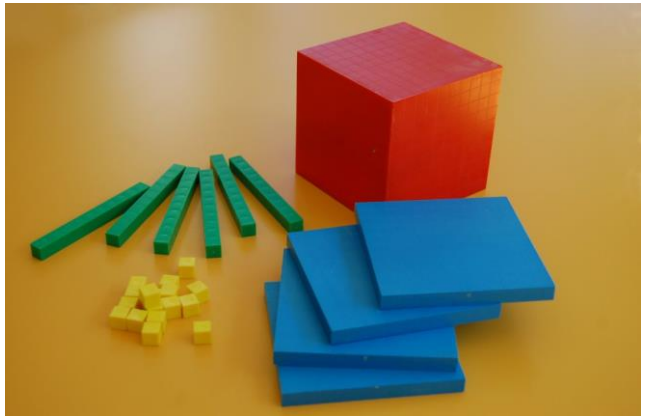
10 = 7 + 3

The difference between 11 and 14 is 3.

14 − 11 = 3

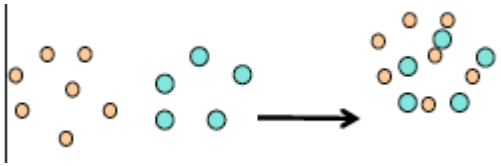
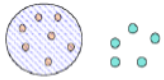
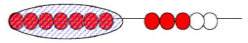
11 + □ = 14



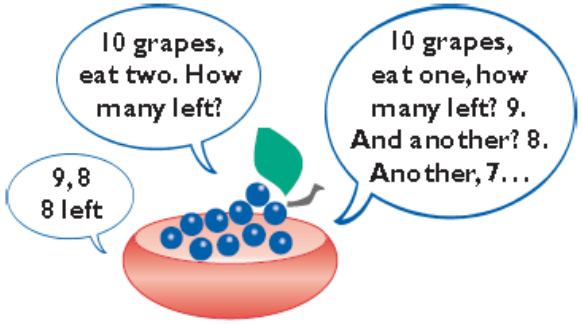
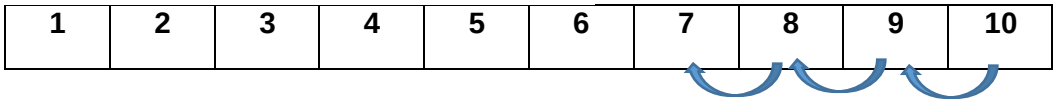
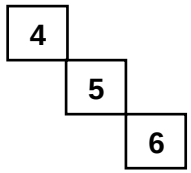


ADDITION AND SUBTRACTION

Reception

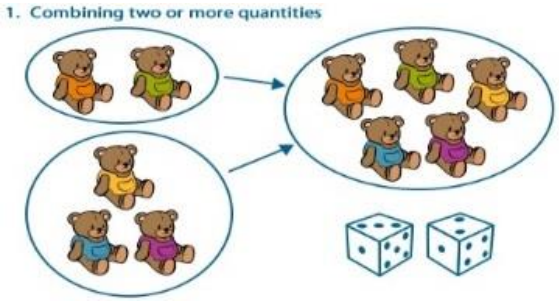
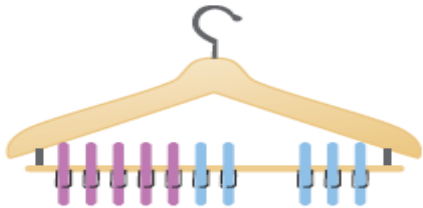
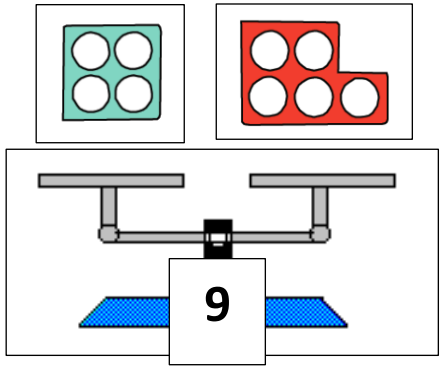
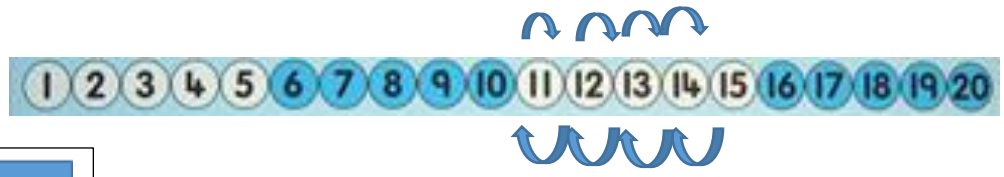
ELG	**ADDITION**
Children count reliably with numbers from one to 20, place them in Order and say which number is one more or one less than a given number. Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer. They solve problems, including doubling, halving and sharing.	**Combining two sets (aggregation)** Putting together – two or more amounts or numbers are put together to make a total 7 + 5 = 12  Count one set, then the other set. Combine the sets and count again. Starting at 1. Counting along the bead string, count out the 2 sets, then draw them together, count again. Starting at 1.  **Combining two sets (augmentation)** This stage is essential in starting children to calculate rather than counting Where one quantity is increased by some amount. Count on from the total of the first set, e.g. put 3 in your head and count on 2. Always start with the largest number. Counters: Start with 7, then count on 8, 9, 10, 11, 12  Bead strings: Make a set of 7 and a set of 5. Then count on from 7.  Number tracks 

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Children count reliably with numbers from one to 20, place them in Order and say which number is one more or one less than a given number. Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer. They solve problems, including doubling, halving and sharing.	**SUBTRACTION** Through familiar stories encourage children to recognise subtraction as taking away, including recognising the empty set as zero. ● What is one more, one less than 6, 4, 8 etc? ● There are 5 toys in a box. If I put one more in (take one out) how may are in the box now? Understanding subtraction: • There are three people on the bus. One gets off. How many are there now? ● There are four children in the home corner. One leaves. How many are left? Encourage children to record what they have done, e.g. by drawing or tallying.   Use number staircases to show a starting point and how you arrive at another point when something is added or taken away.  Understand subtraction as comparison. Use the language of less than, more than and difference to compare two sets.  The difference is?

ADDITION AND SUBTRACTION

YEAR 1

Objectives from the National Curriculum	
given a number, identify one more and one less than numbers to and across 100 **represent** and **use** number bonds and related subtraction facts within 20 read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs add and subtract one-digit and two-digit numbers to 20, including zero	Immerse children in practical opportunities to develop understanding of addition and subtraction. Link practical representations on a number track on, a bead string and then recording on a number line. **By the end of Year 1 children should be able to recall and use facts within and to 20 for addition and subtraction.**  **Coathanger and pegs**  4 + 5 = 9 5 + 4 = 9  Children should be confident at counting forwards and backwards in ones along a number track. Be consistent with how you show this on your track – eg addition above track; subtraction below track.   Recall of facts = +

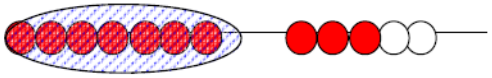
If we know 4 + 5 = 9
We also know:
5 + 4 = 9

9 – 5 = 4
14 + 5 = 19
5 = 19 – 14, etc

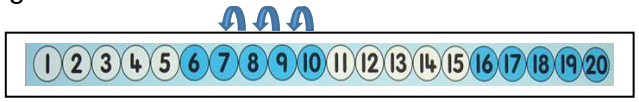
What numbers could go into these boxes?

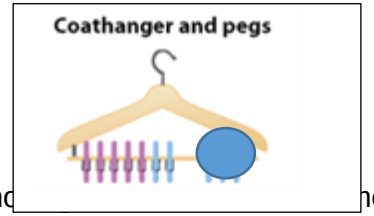
Bridging through 10

7 + 5 = 7 + 3 + 2



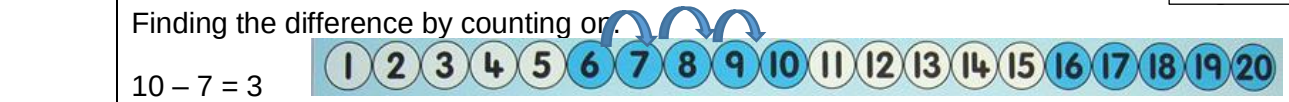
Children should understand subtraction as:
Take away and finding the difference: 10 – 3 = 7





Count back in ones mo ne.

Finding the difference by counting on.



10 – 7 = 3

Children should compare objects understanding that subtraction is also related to finding the difference and recognise that counting on gives you the difference and use the language 'the difference between 10 and 7 equals 3.

Number line

Year 2

NC Objectives:	**Mental Recall/Jottings:**

Show that addition of two numbers can be done in any order and subtraction cannot.

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:
2 digit number and ones

2 digit number and tens

Two 2 digit numbers

Add three 1 digit numbers

· applying their increasing knowledge of mental and written methods

Ensure children recognise the commutativity of addition but not of subtraction

Using Known Facts

If I know 2 + 3 = 5

I also know:

3 + 2 = 5

20 + 30 = 50

What are the missing numbers?

Counting on/back in10s

26 + 20 = 46

67-20 = 47

Re-ordering

(e.g. to find bonds to 10 or putting larger number first)

2 + 7 + 8 = 8 + 2 + 7

23 + 34 = 43 + 23

Partitioning

23 + 34 = 34 + 23 = 34 + 20 + 3

46—25 = 46 – 20 – 5 = 26 – 5 = 21

Bridge through 10

addition and subtraction

26 + 7 = 26 + 4 + 3

26 + 4 = 30

30 + 3 = 33

Special Strategies

Rounding and adjusting

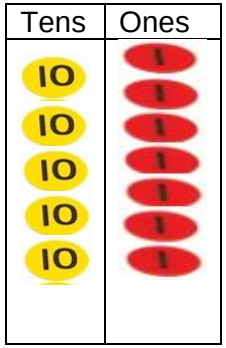
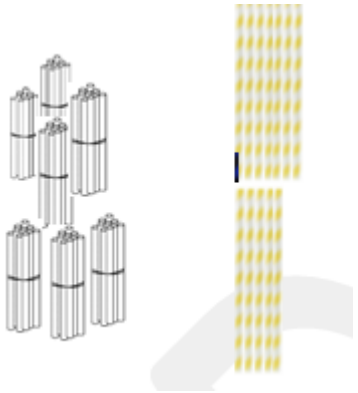
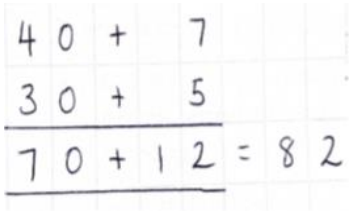
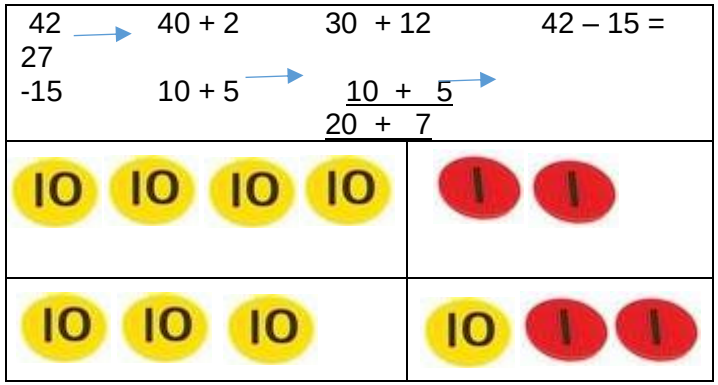
+ 9 or – 9 by adding on or subtracting 10 and adjusting by 1.

+11—11 by adding on or subtracting 10 and adjusting by 1

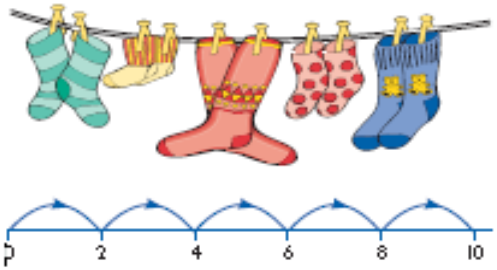
Near Doubles

6 + 7 = 6 + 6 + 1

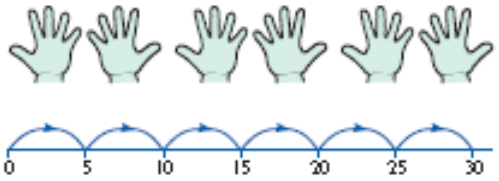
= 12 + 1

	Progressing Towards Written algorithm with Representations *Recording addition and subtraction in columns supports place value and prepares for formal written methods.*
Add and subtract numbers using concrete objects, pictorial representations and mentally including: 2 digit number and ones 2 digit number and tens Two 2 digit numbers Add three 1 digit numbers • applying their increasing knowledge of mental and written methods	   With the subtraction written method ensure children understand why they need to partition 42 into 30 + 12.  During your unit on place value ensure your children are confident with **partitioning numbers in different ways in preparation for subtracting using decomposition:** 90 + 2 80 + 12 (I have subtracted a ten and added it onto the ones) Model using place value apparatus, e.g. base 10 apparatus, to ensure children are confident about the partitioning.

Key representations to support conceptual understanding of multiplication and division



$2 + 2 + 2 + 2 + 2 = 10$
$2 \times 5 = 10$
2 multiplied by 5
5 pairs
5 hops of 2



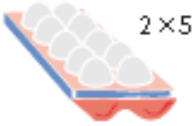
$5 + 5 + 5 + 5 + 5 + 5 = 30$
$5 \times 6 = 30$
5 multiplied by 6
6 groups of 5
6 hops of 5

10p + 10p + 10p + 10p + 10p = 50p
10p × 5 = 50p
5 hops of 10

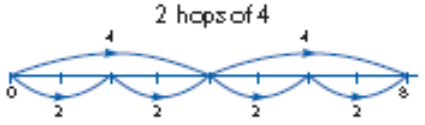
$4 \times 2 = 8$
$2 \times 4 = 8$

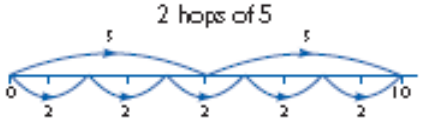
$5 \times 2 = 10$
$2 \times 5 = 10$

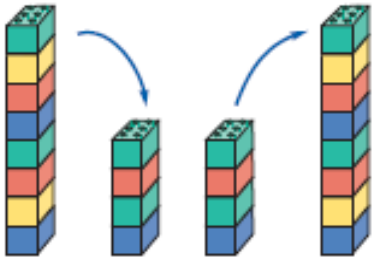
$2 \times 4 = 8$
$4 \times 2 = 8$



$2 \times 5 = 10$
$5 \times 2 = 10$

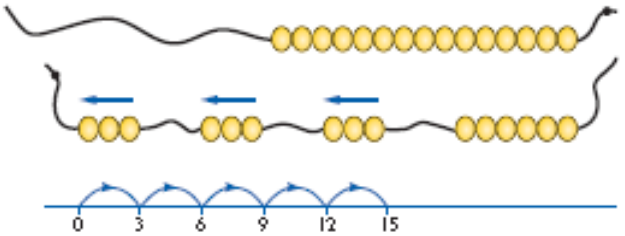


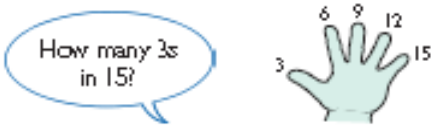




half of 8 is 4
$8 \div 2 = 4$

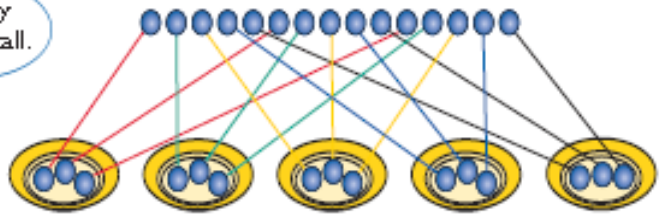
double 4 is 8
$4 \times 2 = 8$

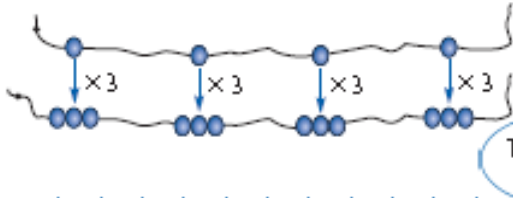


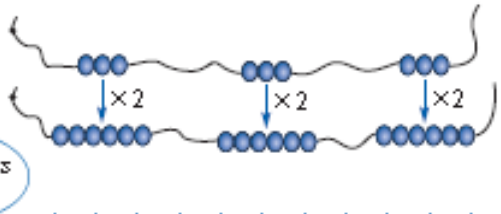


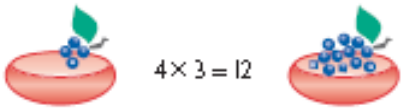
$15 \div 3 = 5$

5 hops in 15. How big is each hop?
$15 \div 5 = 3$
15 shared between 5



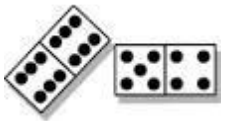
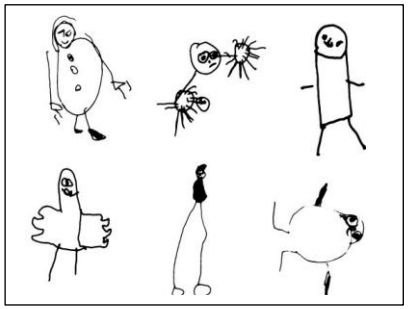




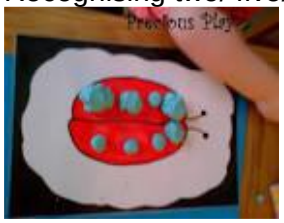


$4 \times 3 = 12$

$12 \times 2 = 24$

Year R	
ELG	**Multiplication**
Children count reliably with numbers from one to 20, place them in Order and say which number is one more or one less than a given number. Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer. They solve problems, including doubling, halving and sharing.	Children will be given lots of opportunities for grouping objects and pattern work, both practical and oral. Solve practical problems in a real or role play context – e.g., how many shoe lace holes are there on this shoe? Put 5 cherries on each cake. How many cherries do you need? Use rhymes, songs and stories involving counting in ones, twos, fives and tens. Use a 100 square to show number patterns. Pass the teddy round counting in 10s and stand up when you get to 100 repeat the count. High low counting in 5s; hands in the air for 5 and on your lap for multiples of 10  Can you find all the double dominoes? Can you make some double dominoes? By the end of Foundation Stage all children will have developed ways of recording calculations using simple pictures such as:  How many legs? How many fingers? 
	Division
	Demonstrate and model sharing out objects with the children – how many do we have altogether? Share 4 sweets between 4 children – how many do we have each? How many do we have altogether? They do not have to share equally. Use pegs and shapes to reinforce counting.

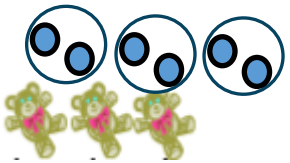
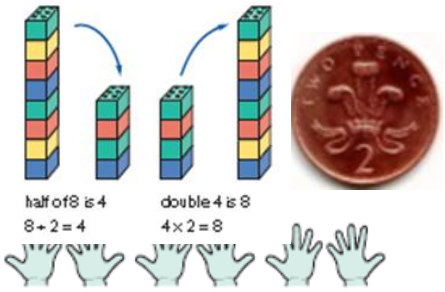
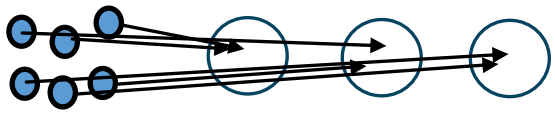

(This is to demonstrate using numicon pegs and shapes to help count accurately. Recognising two/ five/ ten objects as one **group** of an amount using concrete objects during play.

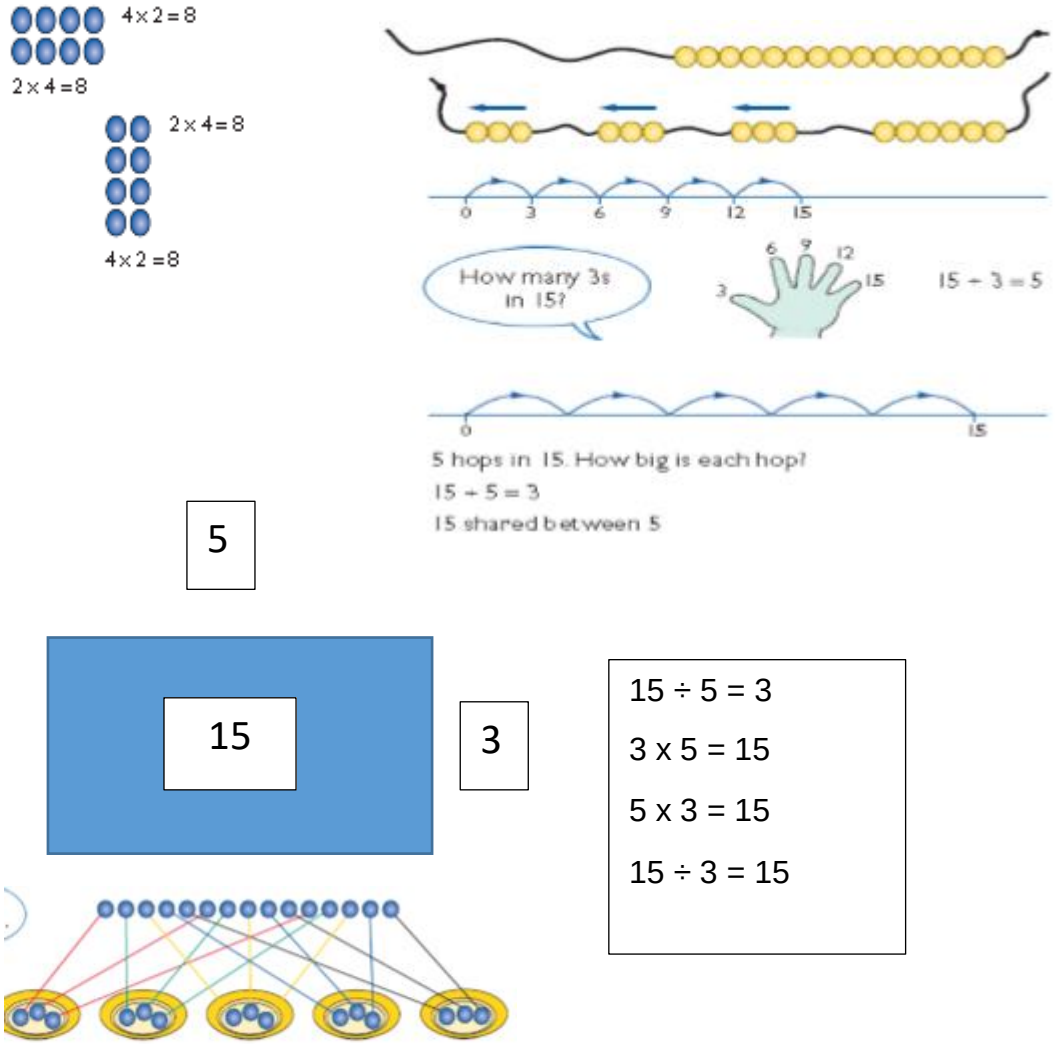

- Doubling and halving

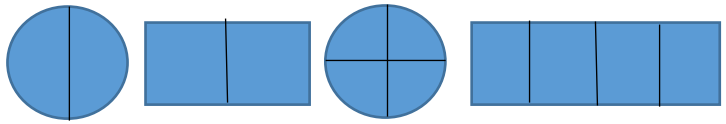
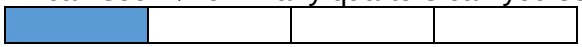

- Language of sharing


- can we make the party bags fair?

	 - real life context  - build a half or doubles numberline

MULTIPLICATION AND DIVISION		
Year 1		
Objective	**Examples**	**Representations**
Count, read and write numbers to 100 in numerals; count in multiples of twos, fives and tens Double numbers to 20	Use of visual models to support counting in 2, 5, 10 Ensure children begin to see the patterns of counting in 2, 5, 10. Double numbers up to 10. Halve even numbers up to 20. Children do not need to record number sentences using the symbols. Develop the vocabulary by encouraging children to explain what they are doing.	Grouping and sharing  How many legs will 3 teddies have?    **Arrays**   

Year 2		
Objective	**Examples**	**Models and Images**
Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers How that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs	2 x 5 = 10 5 x 2 = 10 10 ÷ 2 = 5 10 ÷ 5 = 2 Use knowledge of doubling: 2 x 10 = 20 10 x 2 = 20 20 ÷ 2 = 10 20 ÷ 10 = 2 Children should be confident with doubling numbers up to 20 and halving even numbers up to 40. e.g if I know double 20 (20 x 2) is 40 then I also know half of 40 (40 ÷2) is 20.	

DEVELOPING UNDERSTANDING OF FRACTIONS, DECIMALS AND PERCENTAGES			
Year	**NC Objectives**	**Examples**	**Models and Images**
Year 1	• Recognise, find and name a half as one of two equal parts of an object, shape or quantity • Recognise, find and name a quarter as one of four equal parts of an object, shape or quantity	Children use their knowledge of fractions of shape to find fractions of quantities. Children should be give practical apparatus to find halves and quarters of quantities within 20. Record work pictorially.	
Year 2	• Recognise, find, name and write fractions $\frac{1}{3}$, $\frac{1}{4}$, $\frac{2}{4}$ and $\frac{3}{4}$ of a length, shape, set of objects or quantity • Write simple fractions for example, $\frac{1}{2}$ of 6 = 3 and recognise the equivalence of $\frac{2}{4}$ and $\frac{1}{2}$.	Children use their knowledge of unit and non-unit fractions of shapes to find fractions of quantities. They relate this to find fractions of a length e.g. 2/4 of 1m = Children need to relate finding a quarter to halving and halving again. *Pupils should count in fractions up to 10, starting from any number and using the1/2 and 2/4 equivalence on the number line (Non Statutory Guidance)*	If I can see ¼ how many quarters can you see?  If I can see 2/3 how many thirds can you see?