



Kenmore Park Infant and Nursery School



PROGRESSION IN CALCULATION POLICY– Teaching for Mastery

Mastery is for all, and the aim of this policy is to ensure all children leave our school with a secure understanding of the four operations and can confidently use both written and mental calculation strategies in a range of contexts. It aims to ensure consistent strategies, models and images are used across the school to embed and deepen children's learning and understanding of mathematical concepts.

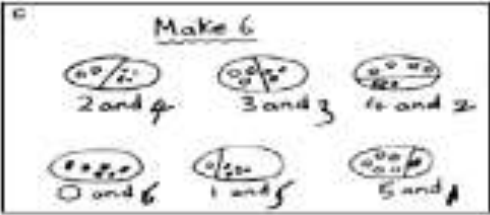


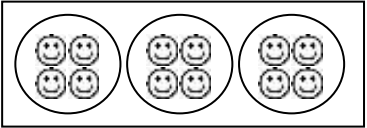
This policy sets out the progression of strategies and written methods which children will be taught as they develop in their understanding of the four operations. Strategies are set out to develop a Concrete, Pictorial, Abstract (CPA) approach to develop children's deep understanding and mastery of mathematical concepts.

Models and images from the White Rose Calculation Policy have been included in this policy.

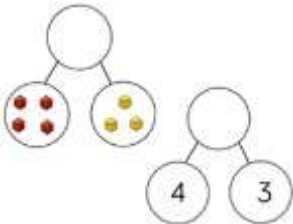
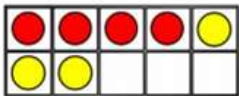

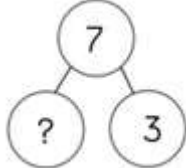
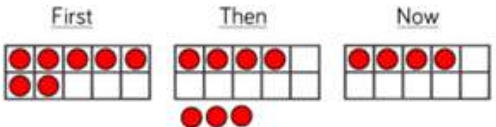
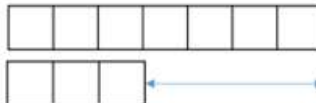
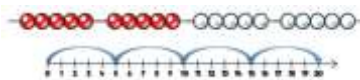
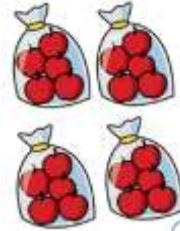
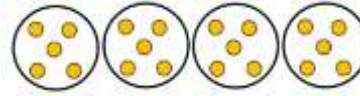


Article 28

You have the right to a good quality education.
You should be encouraged to go to school to
the highest level you can.

Kenmore Park Infant and Nursery School Progression in Calculation Policy – Teaching for Mastery

	Addition	Subtraction	Multiplication	Division
Reception	<p>Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They develop ways of recording calculations using pictures, etc.</p>  <p>Cubes are also used to solve addition problems.</p> <p>They use number lines and practical resources to support calculation. Teachers demonstrate the use of the number line.</p>	<p>Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They develop ways of recording calculations using pictures etc.</p>  <p>Cubes can be used to solve subtraction problems.</p> <p>They use number lines and practical resources to support calculation. Teachers demonstrate the use of the number line.</p>	<p>Children will work on practical problem solving activities involving equal sets or groups.</p>  <p>Doubling is taught as part of multiplication.</p>	<p>Children will understand equal groups and share items out in play and problem solving.</p>  <p>Halving is taught as part of division.</p>

Kenmore Park Infant and Nursery School Progression in Calculation Policy – Teaching for Mastery

	Addition	Subtraction	Multiplication	Division
Year 1	<p>Children use concrete and/or pictorial representations of the following: cherry diagrams (part/whole model), cubes, tens frames, Numicon, bar model (part/whole model), bead strings, number-lines. Pupils learn to combine 2 sets and when a quantity is increased by another.</p>  <p>Cherry diagrams</p>  <p>Tens frame</p>  <p>Numicon</p>	<p>Children use concrete and/or pictorial representations of the following: cherry diagrams (part/whole model), cubes, tens frames, Numicon, bar model (part/whole model), bead strings, number-lines to support partitioning, reduction and finding the difference.</p>  <p>Partitioning</p>  <p>Reduction</p>  <p>Finding the difference</p>	<p>Children represent multiplication as repeated addition in many different ways.</p>  $5 + 5 + 5 + 5 = 20$ <p>Children use concrete and pictorial representations to solve problems. They are not expected to record multiplication formally.</p>  <div style="border: 1px solid gray; padding: 5px; width: fit-content; margin: 10px auto;"> <p>One bag holds 5 apples. How many apples do 4 bags hold?</p> </div> 	<p>Children solve problems by sharing amounts into equal groups.</p>  <p>Children use concrete and pictorial representations to solve problems. They are not expected to record division formally.</p> <div style="border: 1px solid gray; padding: 5px; width: fit-content; margin: 10px auto;"> <p>There are 20 apples altogether. They are shared equally between 5 bags. How many apples are in each bag?</p> </div> 

Kenmore Park Infant and Nursery School Progression in Calculation Policy – Teaching for Mastery

Children should also be taught use of the 100 square to support addition using counting on in ones along the rows and counting on in tens going down a column, both practically and then visualising a mental image.

Count on 3 \rightarrow $3 + 3 = 6$

Count on 10

$11 + 10 = 21$

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

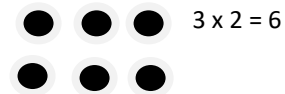
Children should also be taught use of the 100 square to support subtraction using counting back in ones along the rows and counting back in tens going up a column, both practically and then visualising a mental image.

Count back 3 $8 - 3 = 5$

Count back 10

$13 - 3 = 10$

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



$3 \times 2 = 6$

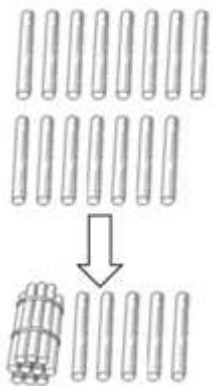
$2 \times 3 = 6$

Kenmore Park Infant and Nursery School Progression in Calculation Policy – Teaching for Mastery

Partitioning

Children will be taught to partition numbers into tens and units (ones).

$$17 = 10 + 5 \quad 26 = 20 + 6$$



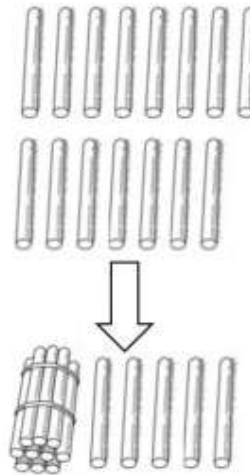
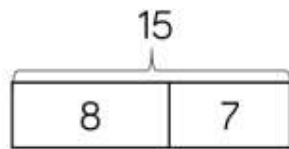
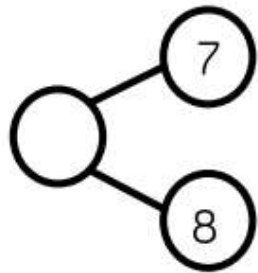
Kenmore Park Infant and Nursery School Progression in Calculation Policy – Teaching for Mastery

Skill: Add 1-digit numbers within 10	Year: 1
<p style="text-align: center;">4 + 3 = 7</p>	<p>When adding numbers to 10, children can explore both aggregation and augmentation.</p> <p>The part-whole model, discrete and continuous bar model, number shapes and ten frame support aggregation.</p> <p>The combination bar model, ten frame, bead string and number track all support augmentation.</p>

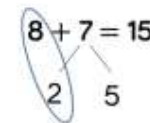
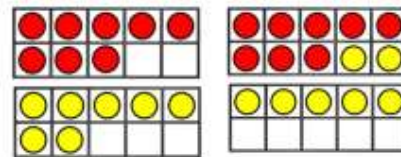
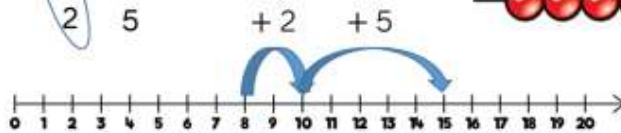
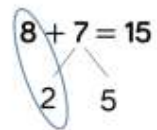
Kenmore Park Infant and Nursery School Progression in Calculation Policy – Teaching for Mastery

Skill: Add 1 and 2-digit numbers to 20

Year: 1/2



$$8 + 7 = 15$$



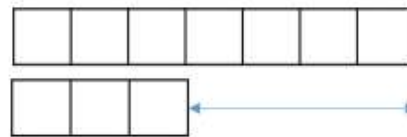
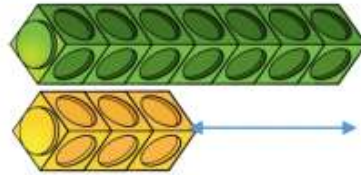
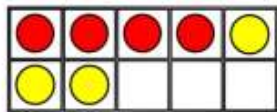
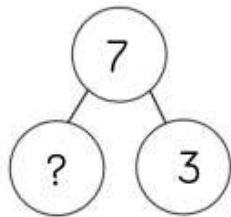
When adding one-digit numbers that cross 10, it is important to highlight the importance of ten ones equalling one ten.

Different manipulatives can be used to represent this exchange. Use concrete resources alongside number lines to support children in understanding how to partition their jumps.

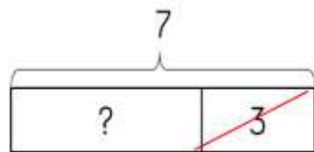
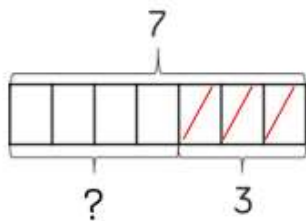
Kenmore Park Infant and Nursery School Progression in Calculation Policy – Teaching for Mastery

Skill: Subtract 1-digit numbers within 10

Year: 1



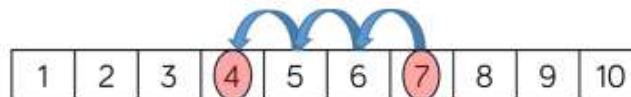
$$7 - 3 = 4$$



First

Then

Now



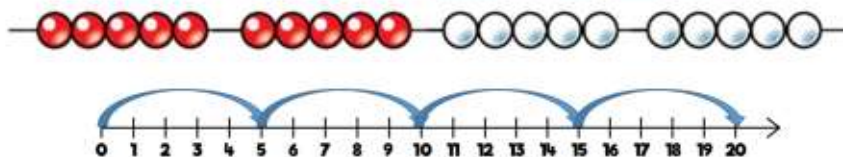
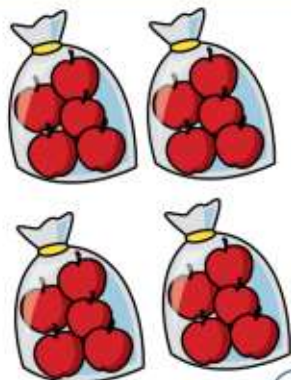
Part-whole models, bar models, ten frames and number shapes support partitioning.

Ten frames, number tracks, single bar models and bead strings support reduction.

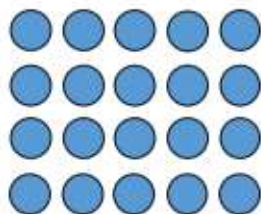
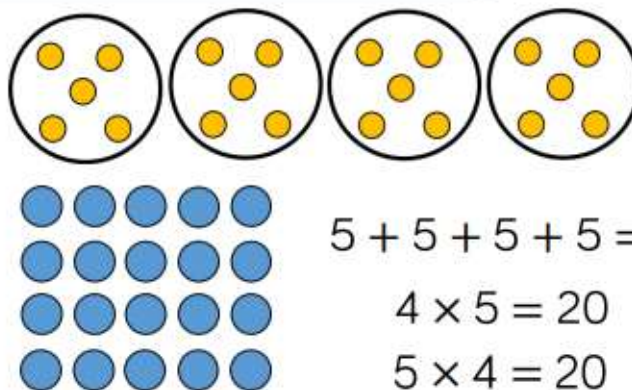
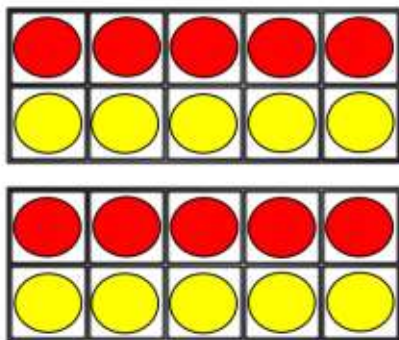
Cubes and bar models with two bars can support finding the difference.

Skill: Solve 1-step problems using multiplication

Year: 1/2



One bag holds 5 apples.
How many apples do 4 bags hold?



$$5 + 5 + 5 + 5 = 20$$

$$4 \times 5 = 20$$

$$5 \times 4 = 20$$

Children represent multiplication as repeated addition in many different ways.

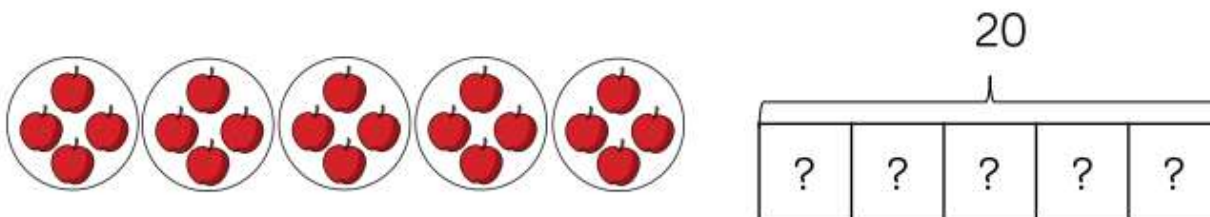
In Year 1, children use concrete and pictorial representations to solve problems. They are not expected to record multiplication formally.

In Year 2, children are introduced to the multiplication symbol.

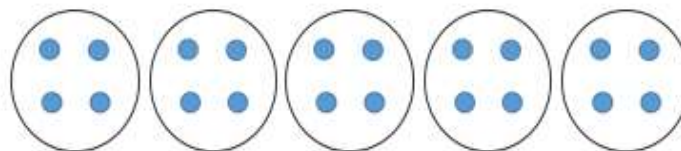
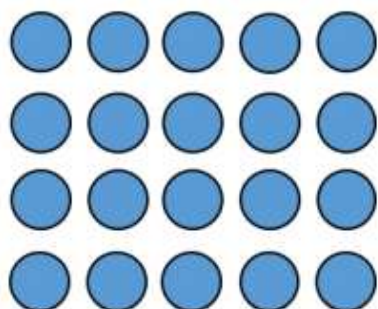
Kenmore Park Infant and Nursery School Progression in Calculation Policy – Teaching for Mastery

Skill: Solve 1-step problems using multiplication (sharing)

Year: 1/2



There are 20 apples altogether.
They are shared equally between 5 bags.
How many apples are in each bag?



$$20 \div 5 = 4$$

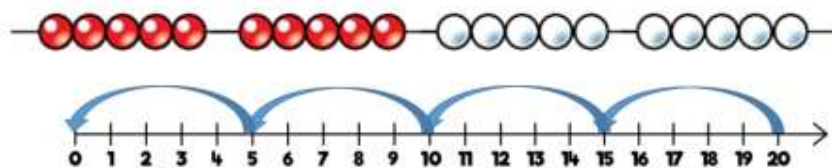
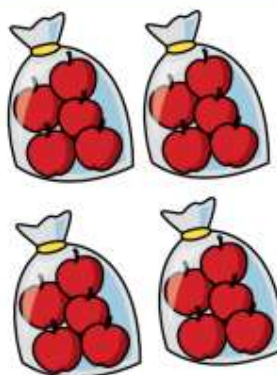
Children solve problems by sharing amounts into equal groups.

In Year 1, children use concrete and pictorial representations to solve problems. They are not expected to record division formally.

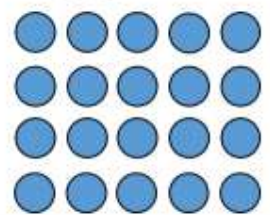
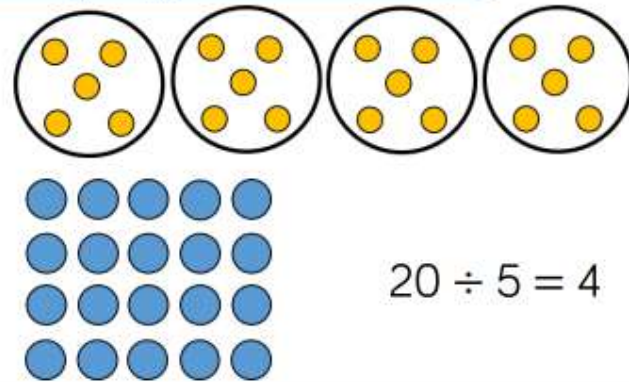
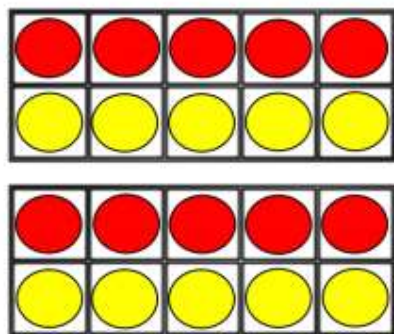
In Year 2, children are introduced to the division symbol.

Skill: Solve 1-step problems using division (grouping)

Year: 1/2



There are 20 apples altogether.
They are put in bags of 5.
How many bags are there?



$$20 \div 5 = 4$$

Children solve problems by grouping and counting the number of groups. Grouping encourages children to count in multiples and links to repeated subtraction on a number line. They can use concrete representations in fixed groups such as number shapes which helps to show the link between multiplication and division.

Kenmore Park Infant and Nursery School Progression in Calculation Policy – Teaching for Mastery

Skill: Divide 2-digits by 1-digit (sharing with no exchange)	Year: 1/2						
<div style="display: flex; justify-content: space-around; align-items: center;"> <table border="1" style="border-collapse: collapse; text-align: center;"> <thead> <tr style="background-color: #fff9c4;"> <th style="padding: 5px;">Tens</th> <th style="padding: 5px;">Ones</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">10 10</td> <td style="padding: 5px;">1 1 1 1</td> </tr> <tr> <td style="padding: 5px;">10 10</td> <td style="padding: 5px;">1 1 1 1</td> </tr> </tbody> </table> <div style="text-align: center;"> </div> </div> <div style="text-align: center; margin: 10px 0;"> <div style="border: 1px solid black; border-radius: 15px; padding: 5px; display: inline-block;"> $48 \div 2 = 24$ </div> </div> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> </div> <div style="text-align: center;"> </div> </div>	Tens	Ones	10 10	1 1 1 1	10 10	1 1 1 1	<p>When dividing larger numbers, children can use manipulatives that allow them to partition into tens and ones.</p> <p>Straws, Base 10 and place value counters can all be used to share numbers into equal groups.</p> <p>Part-whole models can provide children with a clear written method that matches the concrete representation.</p>
Tens	Ones						
10 10	1 1 1 1						
10 10	1 1 1 1						

Kenmore Park Infant and Nursery School Progression in Calculation Policy – Teaching for Mastery

Year 2

Addition

Children are taught when adding two digit numbers to partition into tens and ones using Base 10 equipment (Dienes)

$$\begin{array}{r} 23 + 34 \\ \hline 20 \quad 3 \quad 30 \quad 4 \end{array}$$

$$20 + 30 = 50$$

$$3 + 4 = 7$$

$$50 + 7 = 57$$

Children are encouraged to use the formal column method when calculating alongside base 10 or place value counters.

Tens	Ones
	●●●●
	●●●●

$$\begin{array}{r} 38 \\ + 23 \\ \hline 61 \\ \hline 1 \end{array}$$

Children should also be taught use of the 100 square to support addition using counting on in ones along the rows and in tens down the columns, both practically and then visualising a mental image.

Subtraction

Children will begin to use empty number lines to support calculations by counting mon to find the difference.

$$65 - 28 = 37$$

Children are encouraged to use the formal column method when calculating alongside base 10 or place value counters.

Tens	Ones
	●●●●
	●●●●

$$\begin{array}{r} 5 \quad 1 \\ 65 \\ - 28 \\ \hline 37 \end{array}$$

Children should also be taught use of the 100 square to support subtraction using counting back in ones along the rows and in tens up the columns, both practically and then visualising a mental image.

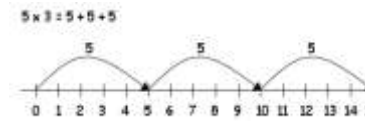
Multiplication

Children will develop their understanding of multiplication and be introduced to the Multiplication symbol.

Repeated addition

3 times 5 is $5 + 5 + 5 = 15$ or 3 lots of 5 or 5×3

Repeated addition can be shown easily on a number line:



●●●●● ●●●●● ●●●●●	$5 + 5 + 5 + 5 = 20$
	$4 \times 5 = 20$
	$5 \times 4 = 20$

Commutativity

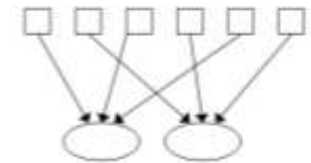
Children should know that 3×5 has the same answer as 5×3 .

Division

Children will develop their understanding of division and be introduced to the division symbol.

Sharing equally

6 sweets shared between 2 people, how many do they each get?



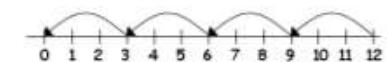
Grouping or repeated subtraction

There are 6 sweets, how many people can have 2 sweets each?



Repeated subtraction using a number line

$$12 \div 3 = 4$$



Kenmore Park Infant and Nursery School Progression in Calculation Policy – Teaching for Mastery

+ 20

$31 + 20 = 51$

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

+ 4
 $93 + 4 = 97$

Using symbol to stand for unknown numbers to complete equations using inverse operations.

$\square + 2 = 4$ $4 + \triangle = 20$ $\square + \triangle = 12$

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

- 30

$58 - 30 = 28$

- 7

$78 - 7 = 71$

Using symbols to stand for unknown numbers to complete equations using inverse operations.

$\square - 2 = 4$ $20 + \triangle = 16$ $\square + \triangle = 12$

Using symbols to stand for unknown numbers to complete equations using inverse operations.

$\square \times 2 = 4$ $4 \times \triangle = 20$

$\square \times \triangle = 12$

Children will learn multiplication tables and table facts for 2x, 10x, 5x tables.

Using symbols to stand for unknown numbers to complete equations using inverse operations

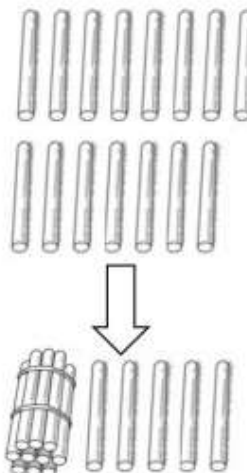
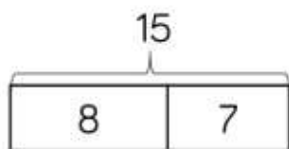
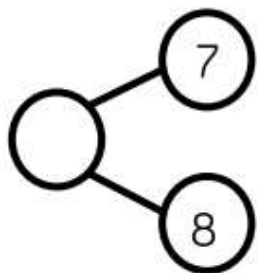
$\square \div 2 = 4$ $20 \div \triangle = 4$

$\square \div \triangle = 4$

Kenmore Park Infant and Nursery School Progression in Calculation Policy – Teaching for Mastery

Skill: Add 1 and 2-digit numbers to 20

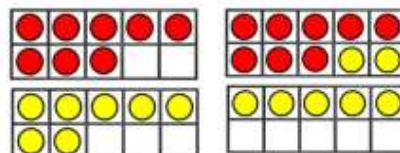
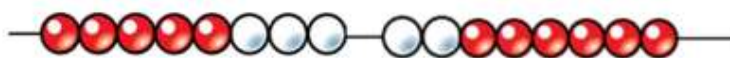
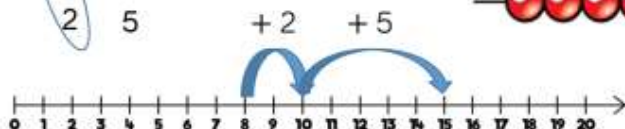
Year: 1/2



$$8 + 7 = 15$$

$$8 + 7 = 15$$

2 5

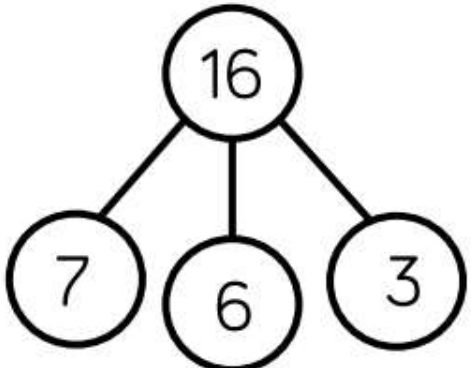
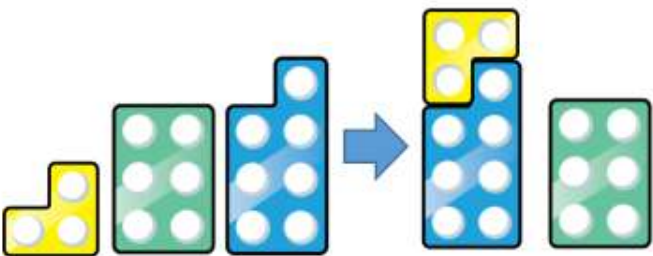
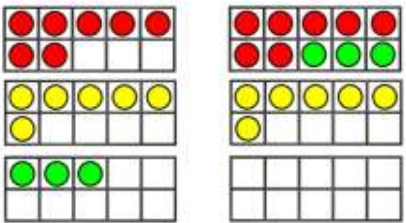
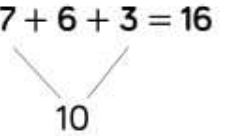
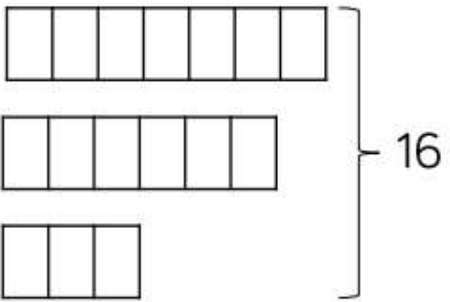


$$8 + 7 = 15$$

2 5

When adding one-digit numbers that cross 10, it is important to highlight the importance of ten ones equalling one ten.

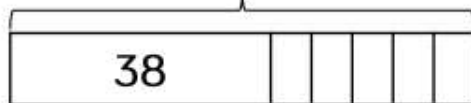
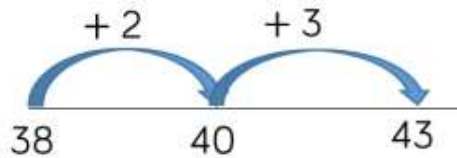
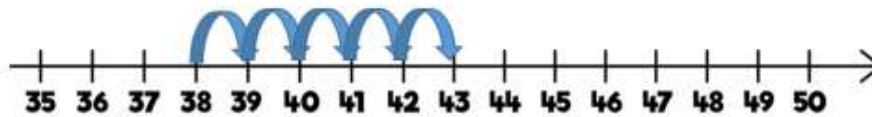
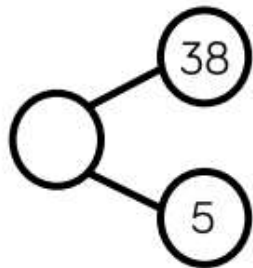
Different manipulatives can be used to represent this exchange. Use concrete resources alongside number lines to support children in understanding how to partition their jumps.

Skill: Add three 1-digit numbers	Year: 2
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div> <div style="text-align: center; margin: 10px 0;"> $7 + 6 + 3 = 16$ </div> <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;">  </div> <div style="text-align: center;"> $7 + 6 + 3 = 16$  </div> <div style="text-align: center;">  </div> </div>	<p>When adding three 1-digit numbers, children should be encouraged to look for number bonds to 10 or doubles to add the numbers more efficiently.</p> <p>This supports children in their understanding of commutativity.</p> <p>Manipulatives that highlight number bonds to 10 are effective when adding three 1-digit numbers.</p>

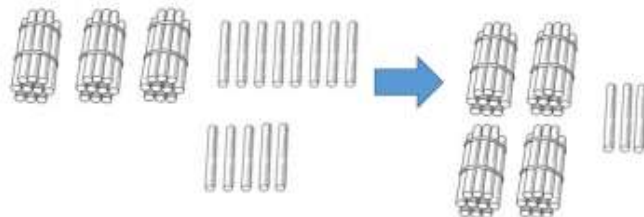
Kenmore Park Infant and Nursery School Progression in Calculation Policy – Teaching for Mastery

Skill: Add 1-digit and 2-digit numbers to 100

Year: 2/3



$$38 + 5 = 43$$



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

When adding single digits to a two-digit number, children should be encouraged to count on from the larger number.

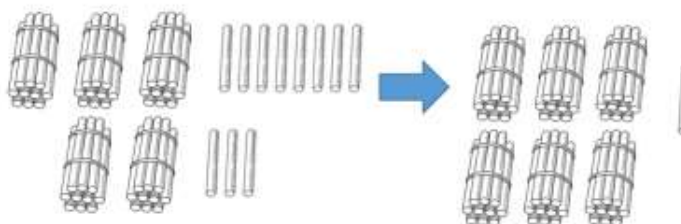
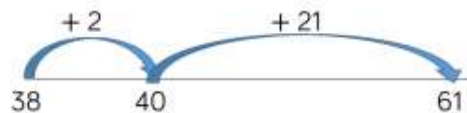
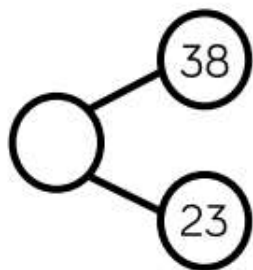
They should also apply their knowledge of number bonds to add more efficiently e.g. $8 + 5 = 13$ so $38 + 5 = 43$.

Hundred squares and straws can support children to find the number bond to 10.

Kenmore Park Infant and Nursery School Progression in Calculation Policy – Teaching for Mastery

Skill: Add two 2-digit numbers to 100

Year: 2/3



?	
38	23

$$38 + 23 = 61$$

Tens	Ones
	●●●●
	●●

$$\begin{array}{r} 38 \\ + 23 \\ \hline 61 \\ 1 \end{array}$$

Tens	Ones
●●●	●●●●
●●	●●●
●	

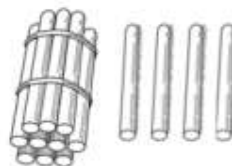
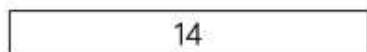
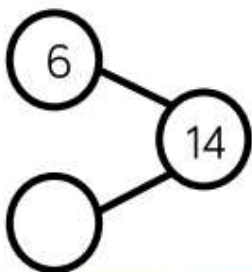
At this stage, encourage children to use the formal column method when calculating alongside straws, base 10 or place value counters. As numbers become larger, straws become less efficient.

Children can also use a blank number line to count on to find the total. Encourage them to jump to multiples of 10 to become more efficient.

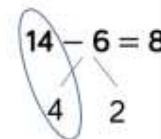
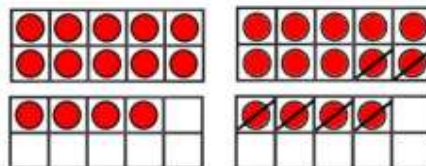
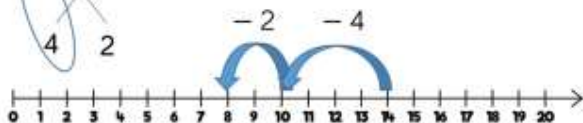
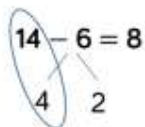
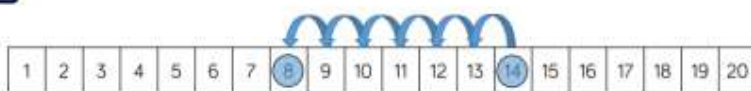
Kenmore Park Infant and Nursery School Progression in Calculation Policy – Teaching for Mastery

Skill: Subtract 1 and 2-digit numbers to 20

Year: 1/2



$$14 - 6 = 8$$



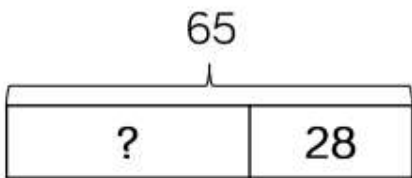
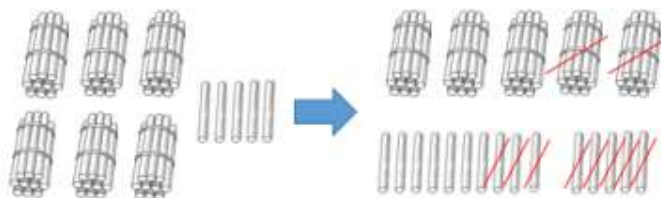
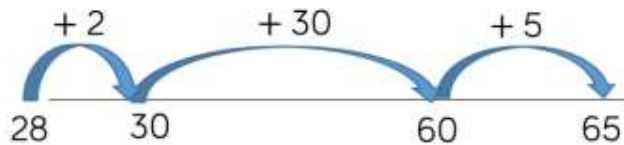
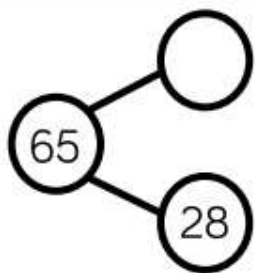
When subtracting one-digit numbers that cross 10, it is important to highlight the importance of ten ones equalling one ten.

Children should be encouraged to find the number bond to 10 when partitioning the subtracted number. Ten frames, number shapes and number lines are particularly useful for this.

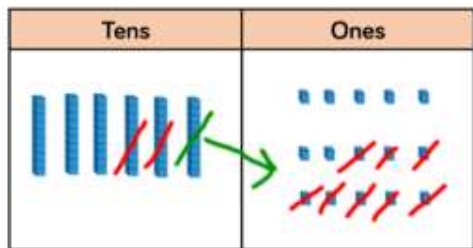
Kenmore Park Infant and Nursery School Progression in Calculation Policy – Teaching for Mastery

Skill: Subtract 1 and 2-digit numbers to 100

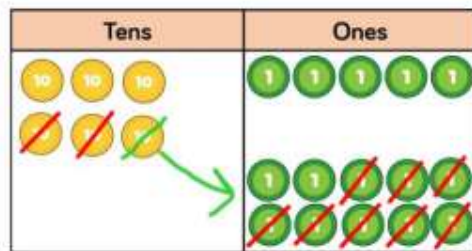
Year: 2



$$65 - 28 = 37$$



$$\begin{array}{r} 5 \ 1 \\ 65 \\ - 28 \\ \hline 37 \end{array}$$



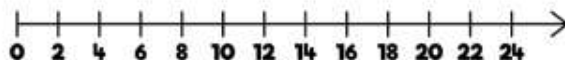
At this stage, encourage children to use the formal column method when calculating alongside straws, base 10 or place value counters. As numbers become larger, straws become less efficient.

Children can also use a blank number line to count on to find the difference. Encourage them to jump to multiples of 10 to become more efficient.

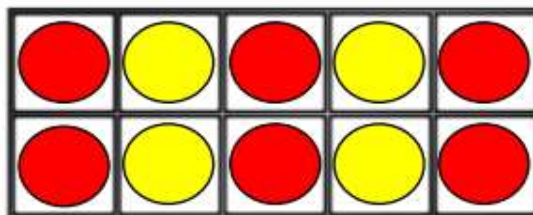
Kenmore Park Infant and Nursery School Progression in Calculation Policy – Teaching for Mastery

Skill: 2 times table

Year: 2



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



Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square.

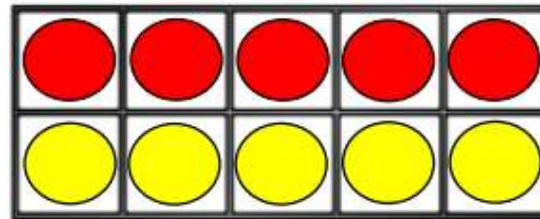
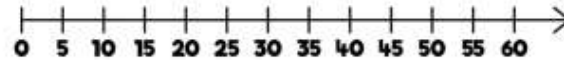
Look for patterns in the two times table, using concrete manipulatives to support. Notice how all the numbers are even and there is a pattern in the ones.

Use different models to develop fluency.

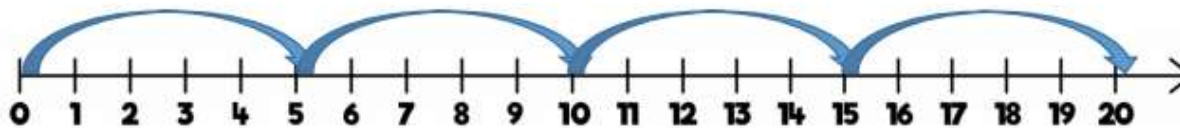
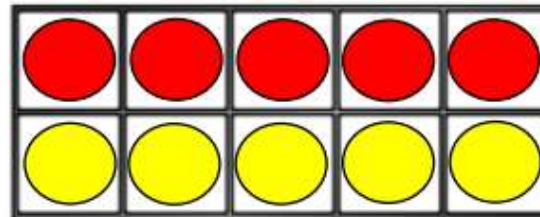
Kenmore Park Infant and Nursery School Progression in Calculation Policy – Teaching for Mastery

Skill: 5 times table

Year: 2



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



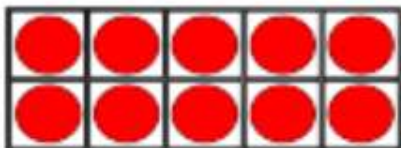
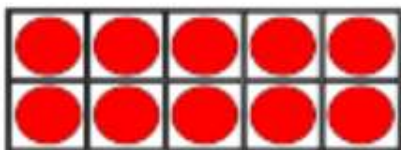
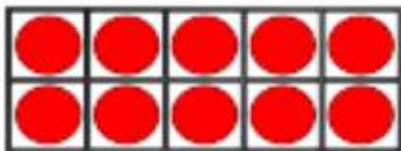
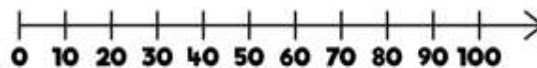
Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square.

Look for patterns in the five times table, using concrete manipulatives to support. Notice the pattern in the ones as well as highlighting the odd, even, odd, even pattern.

Kenmore Park Infant and Nursery School Progression in Calculation Policy – Teaching for Mastery

Skill: 10 times table

Year: 2



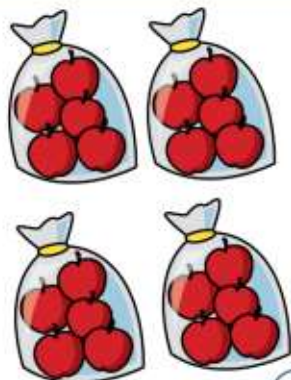
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square.

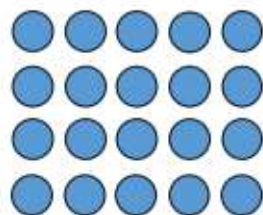
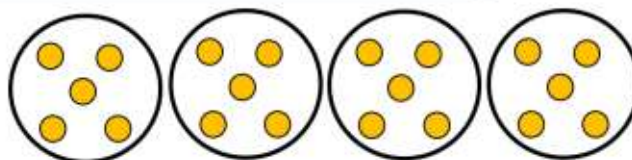
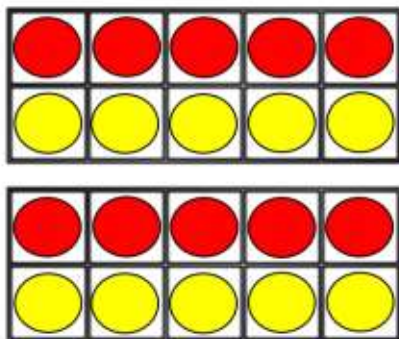
Look for patterns in the ten times table, using concrete manipulatives to support. Notice the pattern in the digits- the ones are always 0, and the tens increase by 1 ten each time.

Skill: Solve 1-step problems using multiplication

Year: 1/2



One bag holds 5 apples.
How many apples do 4 bags hold?



$$5 + 5 + 5 + 5 = 20$$

$$4 \times 5 = 20$$

$$5 \times 4 = 20$$

Children represent multiplication as repeated addition in many different ways.

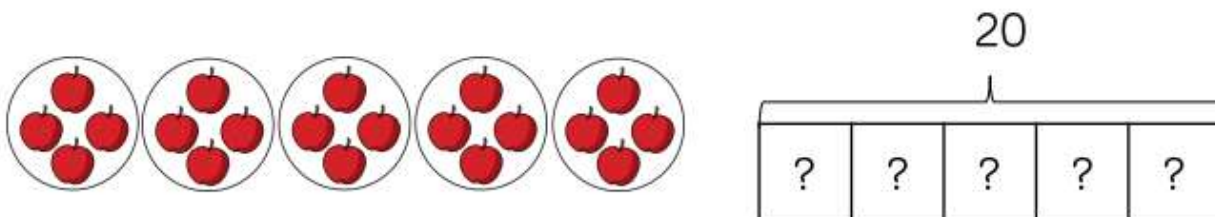
In Year 1, children use concrete and pictorial representations to solve problems. They are not expected to record multiplication formally.

In Year 2, children are introduced to the multiplication symbol.

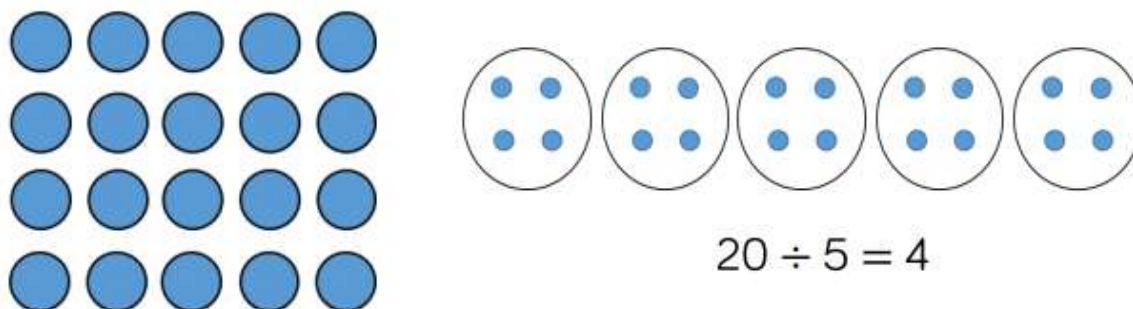
Kenmore Park Infant and Nursery School Progression in Calculation Policy – Teaching for Mastery

Skill: Solve 1-step problems using multiplication (sharing)

Year: 1/2



There are 20 apples altogether.
They are shared equally between 5 bags.
How many apples are in each bag?



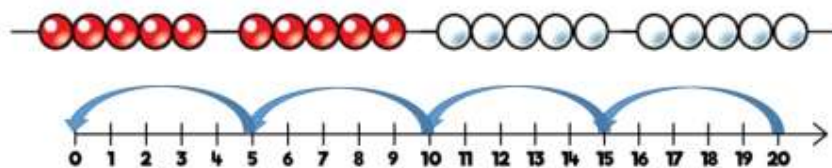
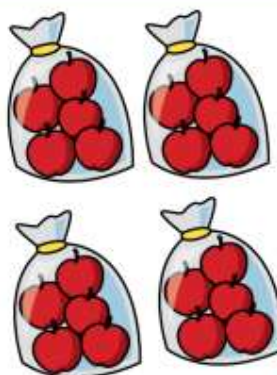
Children solve problems by sharing amounts into equal groups.

In Year 1, children use concrete and pictorial representations to solve problems. They are not expected to record division formally.

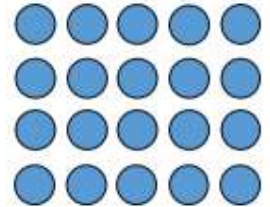
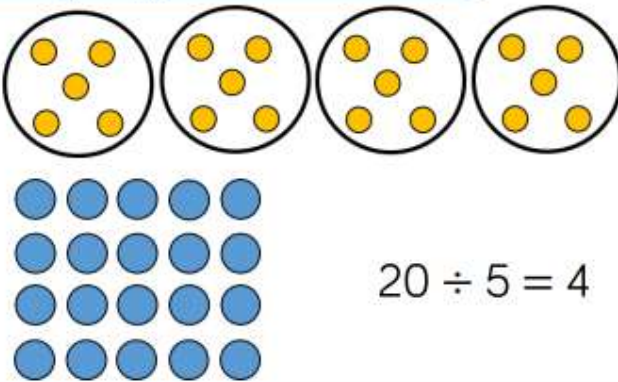
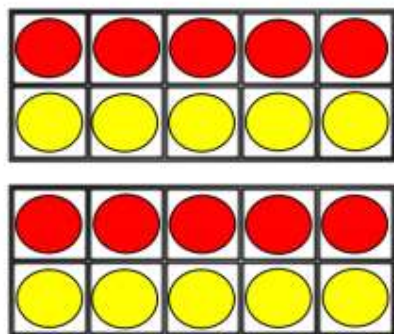
In Year 2, children are introduced to the division symbol.

Skill: Solve 1-step problems using division (grouping)

Year: 1/2



There are 20 apples altogether.
They are put in bags of 5.
How many bags are there?



$$20 \div 5 = 4$$

Children solve problems by grouping and counting the number of groups. Grouping encourages children to count in multiples and links to repeated subtraction on a number line. They can use concrete representations in fixed groups such as number shapes which helps to show the link between multiplication and division.

Kenmore Park Infant and Nursery School Progression in Calculation Policy – Teaching for Mastery

Mathematical Language

The Following Mathematical language will be consistently used by teachers with reference to the four operations, however, children will be taught that there are many different words which apply to the four operations:

The word *number sentence* will be used with any of the four operations.

Addition: **Add**

Subtraction: **Subtract**

Multiplication: **Multiplied by**

Division: **Divided by**