Bude Primary Academy - Infants

KS1 Calculation Policy

Addition and Subtraction

and

Multiplication and Division

Calculation Policy

Welcome to our Calculation policy. This incorporates elements of the White Rose Maths Calculation Policy for KS1 and into early KS2.

This document is broken down into addition and subtraction, and multiplication and division.

At the start of each section there is an overview of the different models and images that can support the teaching of different concepts.

Each operation is then broken down into skills and each skill has a dedicated page showing the different models and images that could be used to effectively teach that concept.

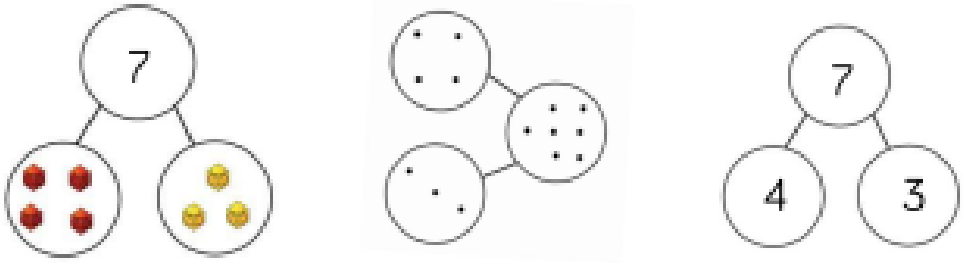
There is an overview of skills linked to year groups to support consistency through the school.

We understand that for children to become competent mathematicians they must be given the opportunity to embed their learning using concrete resources, then develop their understanding of pictorial representations before they are able to solve abstract problems.

Concrete → Pictorial → Abstract

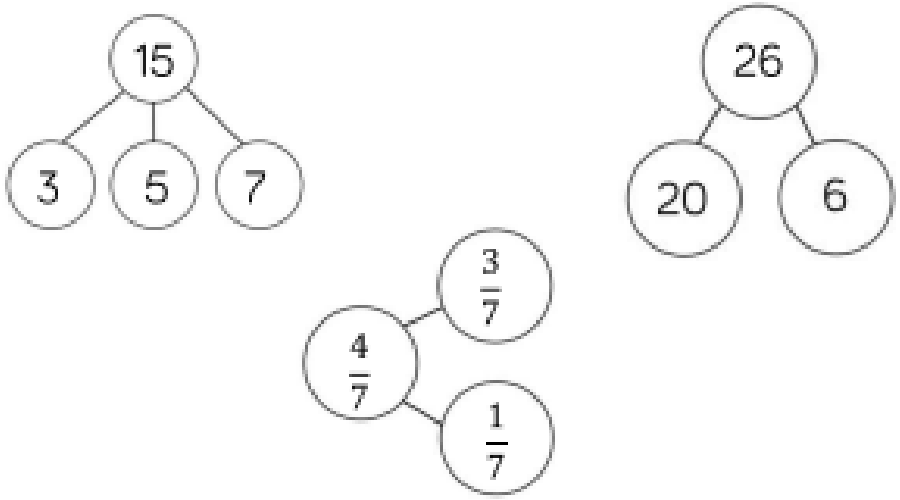
Calculation Policy
Addition and Subtraction

Part-Whole Model

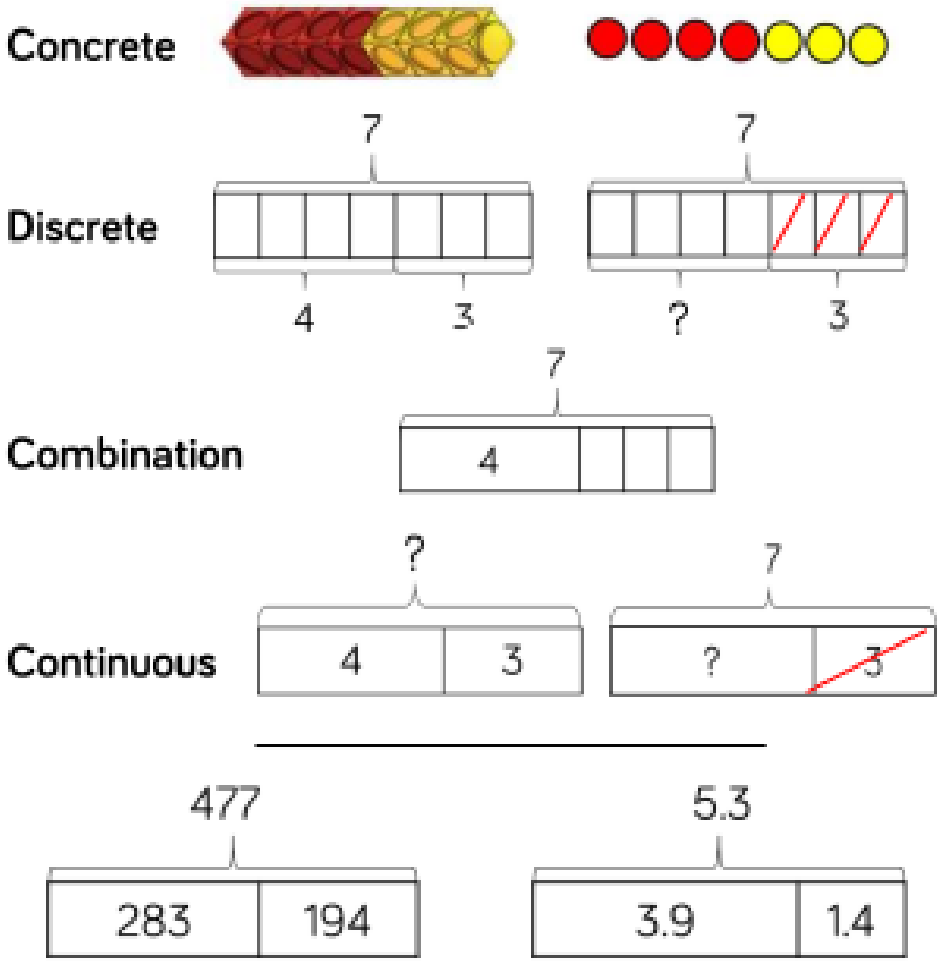


$7 = 4 + 3$
$7 = 3 + 4$

$7 - 3 = 4$
$7 - 4 = 3$

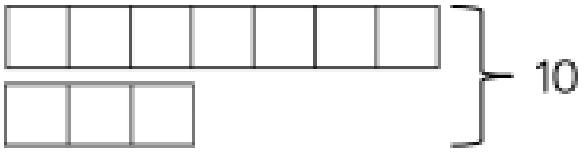


Bar Model (single)

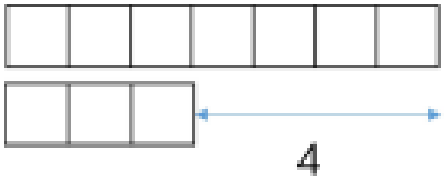


Bar Model (multiple)

Discrete

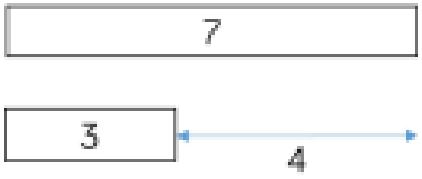


$7 + 3 = 10$

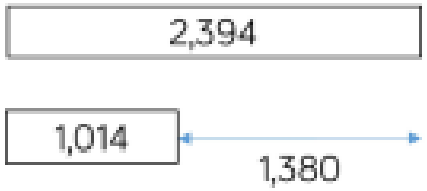


$7 - 3 = 4$

Continuous

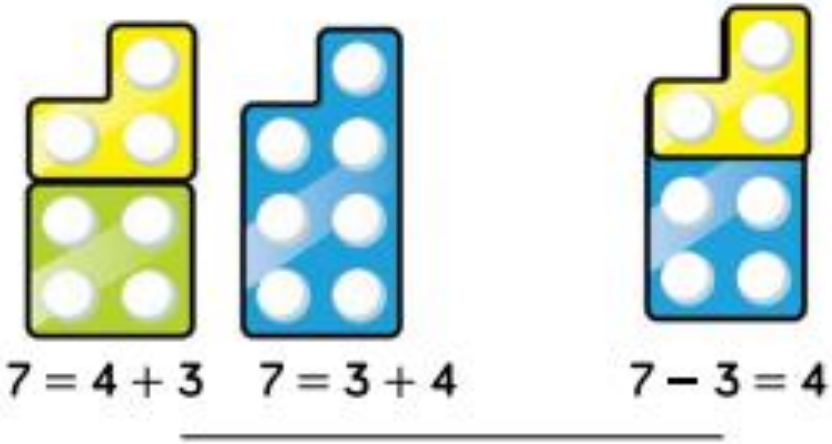


$7 - 3 = 4$

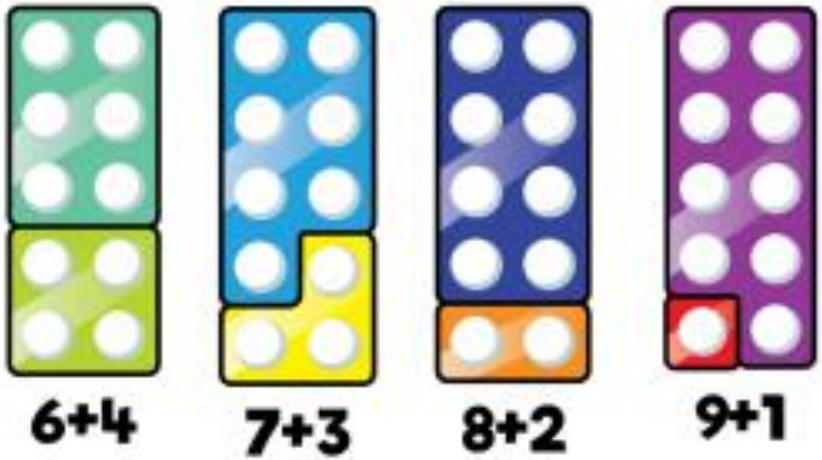


$2{,}394 - 1{,}014 = 1{,}380$

Number Shapes

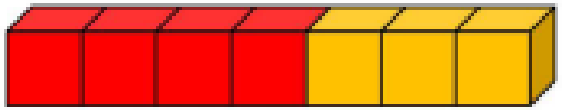


$7 = 4 + 3$ $7 = 3 + 4$ $7 - 3 = 4$

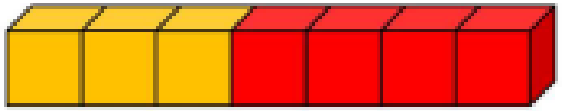


6+4 7+3 8+2 9+1

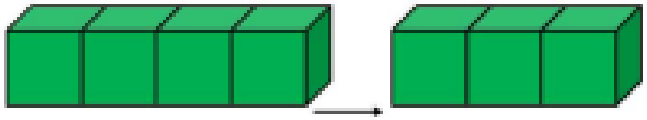
Cubes



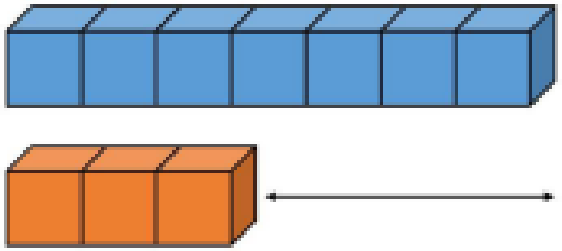
$7 = 4 + 3$



$7 = 3 + 4$

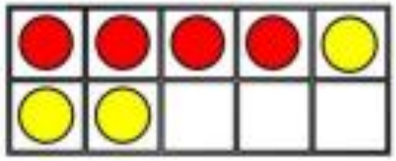


$7 - 3 = 4$



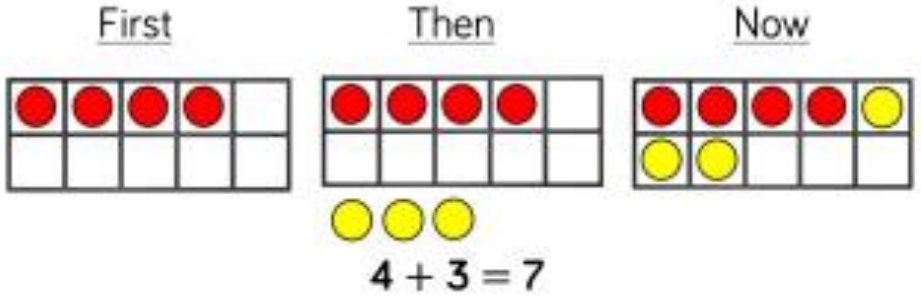
$7 - 3 = 4$

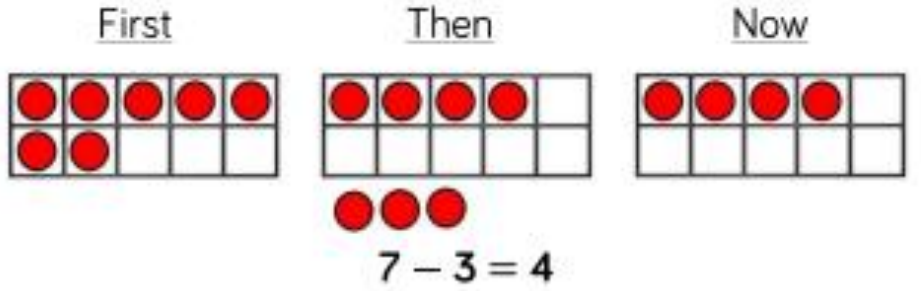
Ten Frames (within 10)



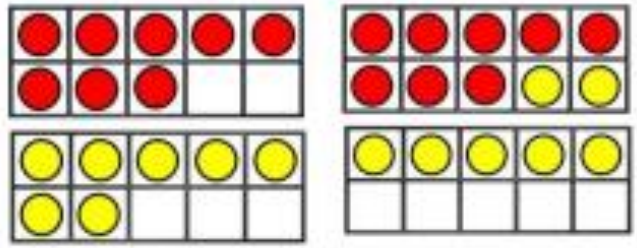
$4 + 3 = 7$
$3 + 4 = 7$
$7 - 3 = 4$
$7 - 4 = 3$

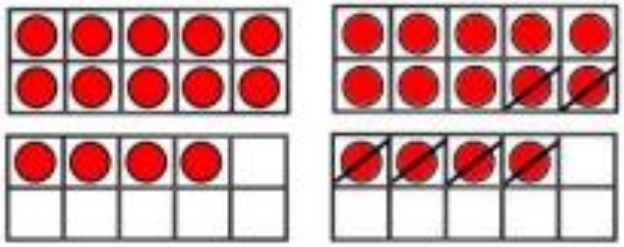
4 is a part.
3 is a part.
7 is the whole.

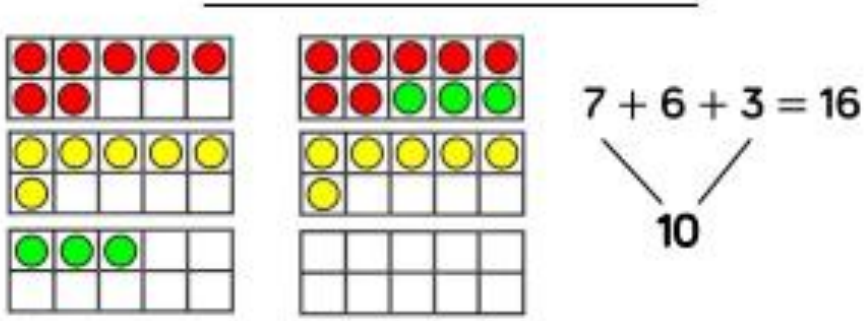




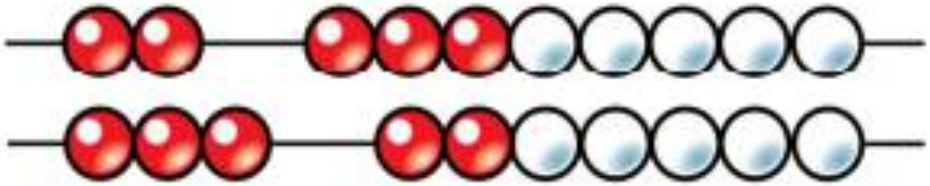
Ten Frames (within 20)

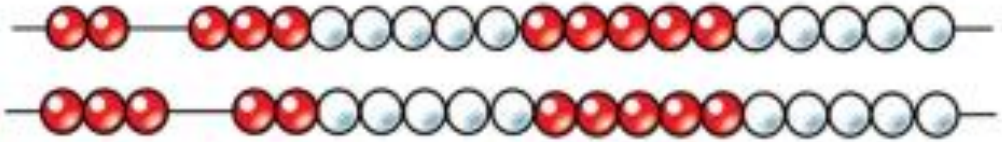






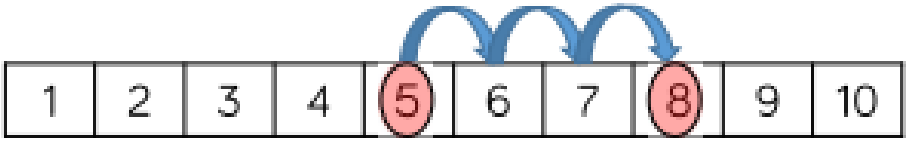
Bead Strings



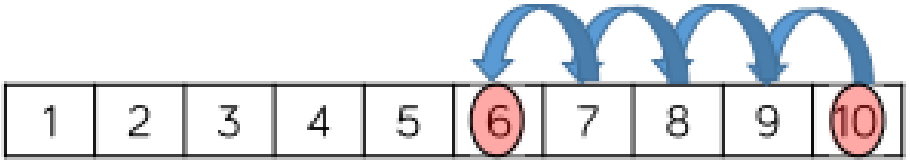


Number Tracks

$5 + 3 = 8$



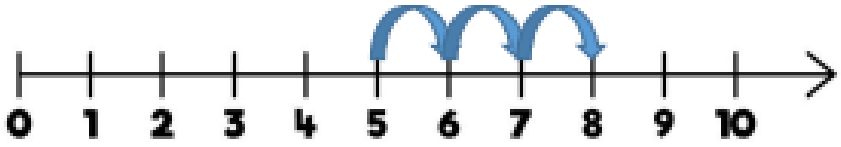
$10 - 4 = 6$

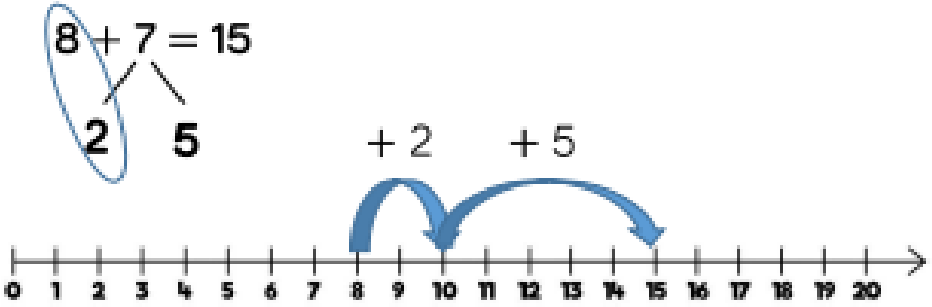


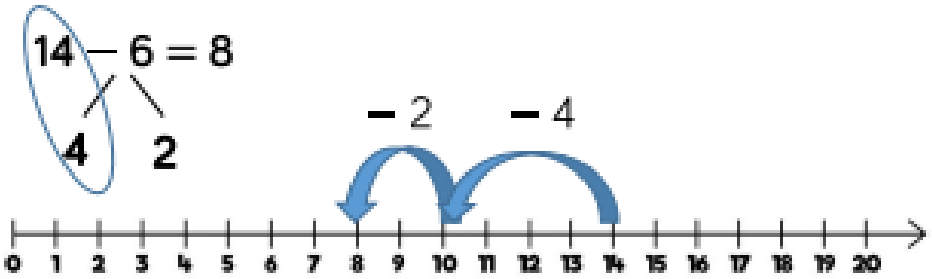
$8 + 7 = 15$

Number Lines (labelled)

$5 + 3 = 8$

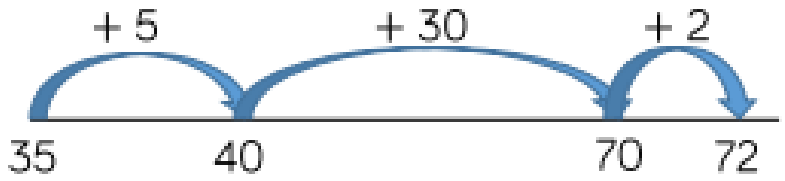




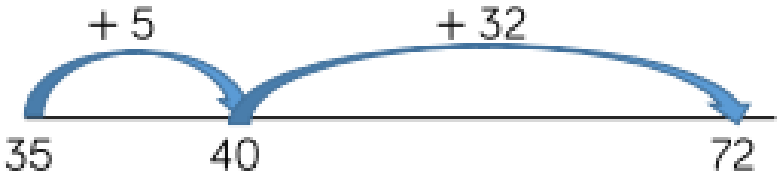


Number Lines (blank)

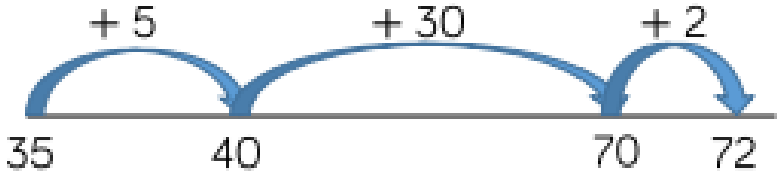
35 + 37 = 72



35 + 37 = 72

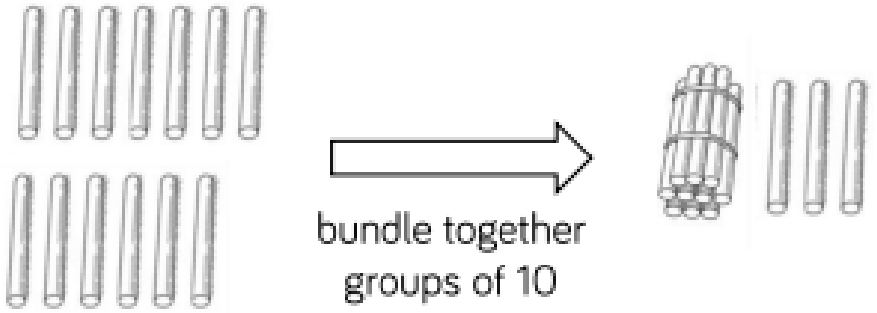


72 − 35 = 37

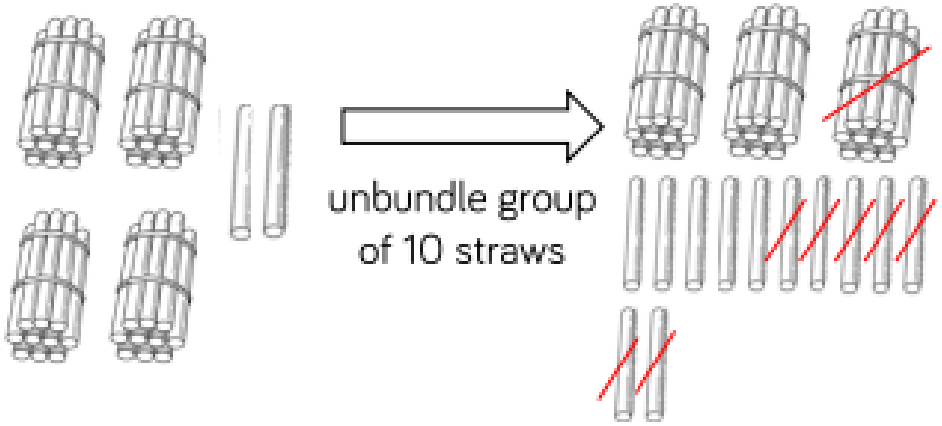


Straws

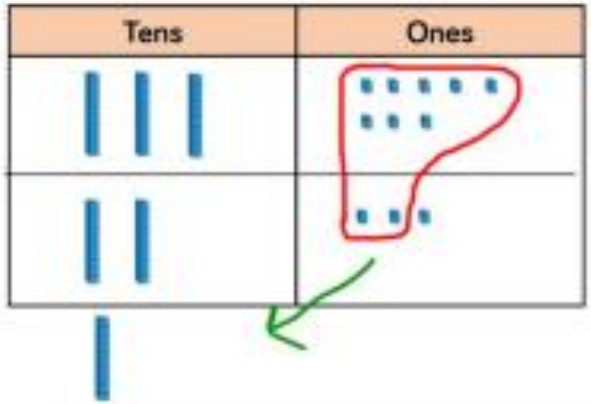
7 + 6 = 13



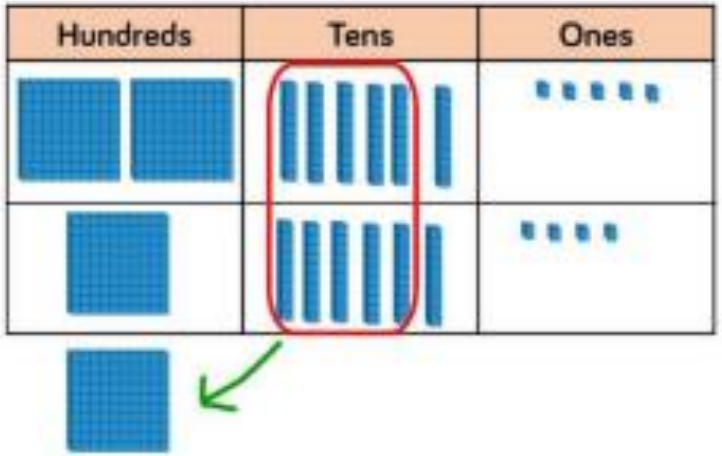
42 − 17 = 25



Base 10/Dienes (addition)

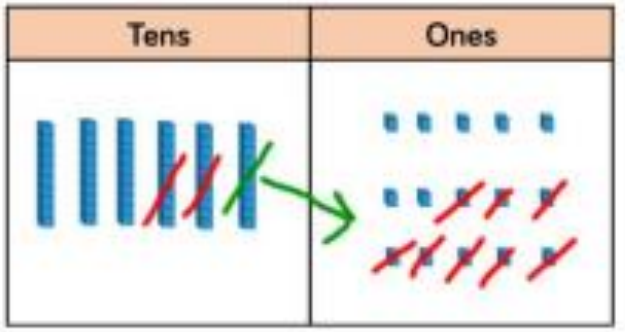


$$\begin{array}{r} 38 \\ +\ 23 \\ \hline 61 \\ \hline 1 \end{array}$$

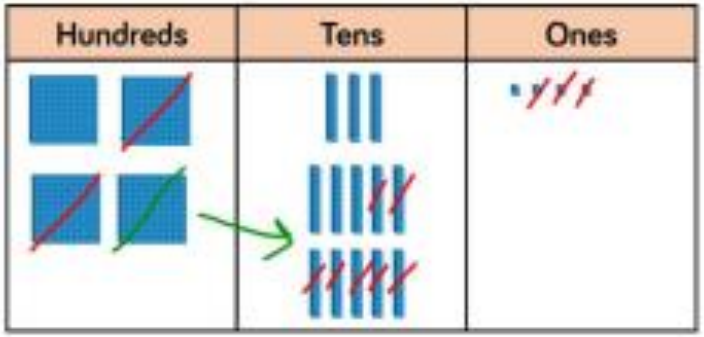


$$\begin{array}{r} 265 \\ +\ 164 \\ \hline 429 \\ \hline 1 \end{array}$$

Base 10/Dienes (subtraction)



$$\begin{array}{r} {\scriptstyle 5\ 1} \\ 6\not{5} \\ -\ 28 \\ \hline 37 \end{array}$$

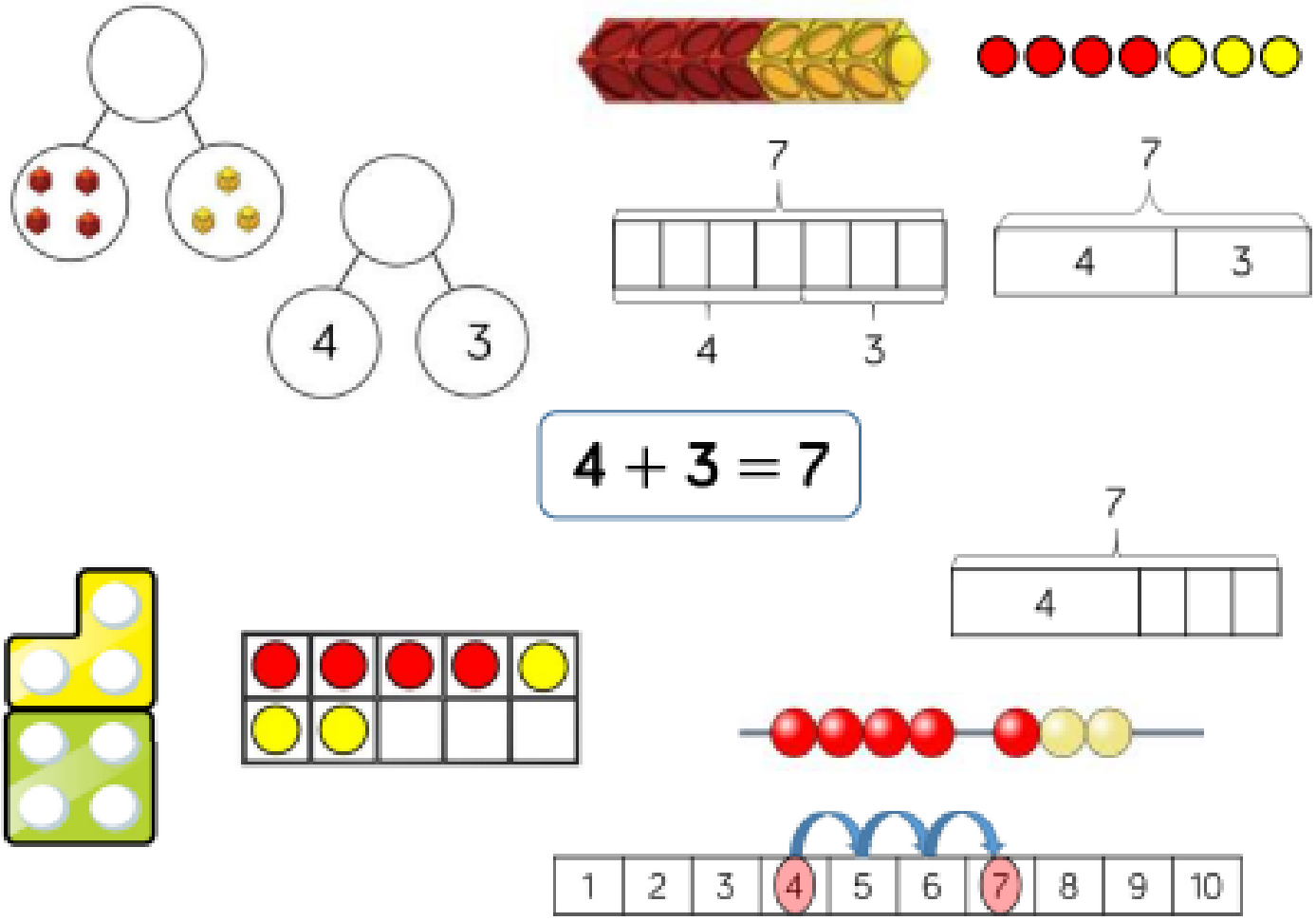


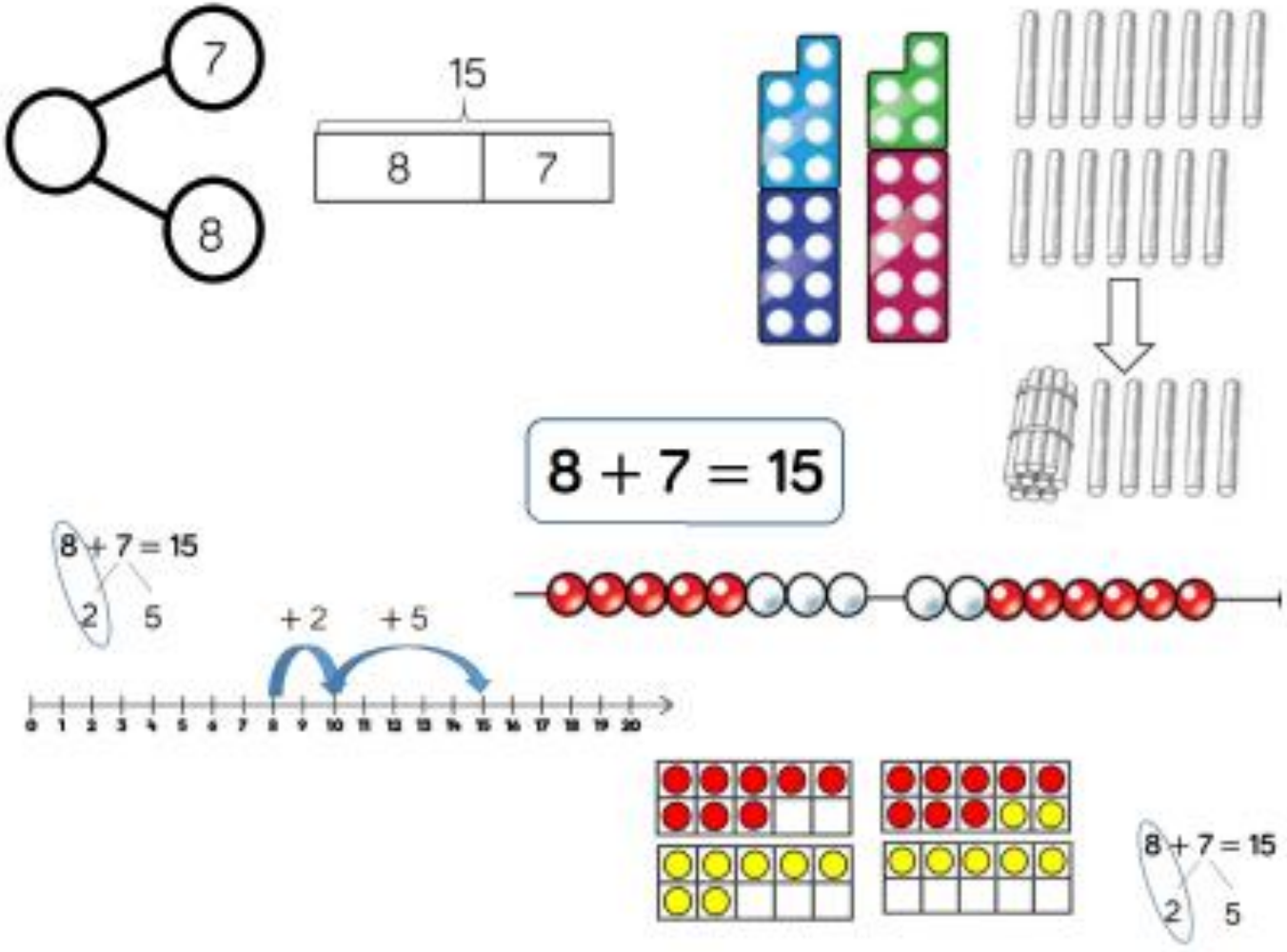
$$\begin{array}{r} {\scriptstyle 3\ 1} \\ 4\not{3}5 \\ -\ 273 \\ \hline 162 \end{array}$$

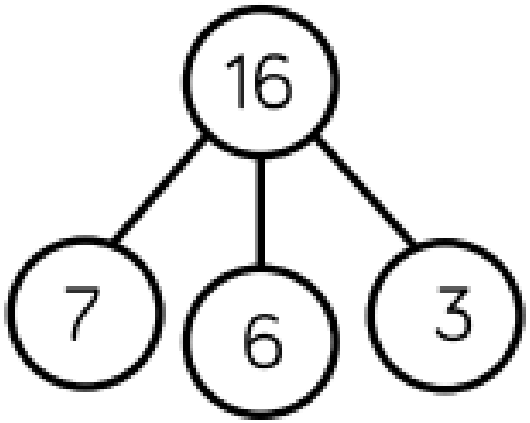
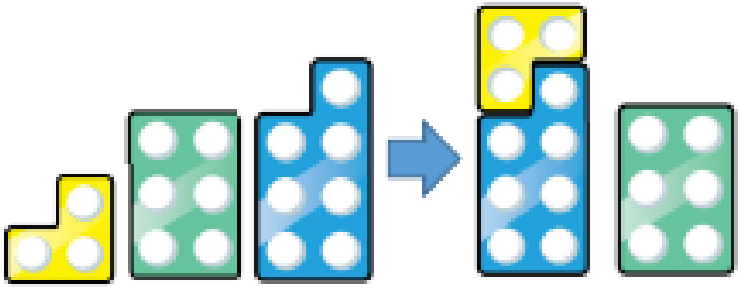
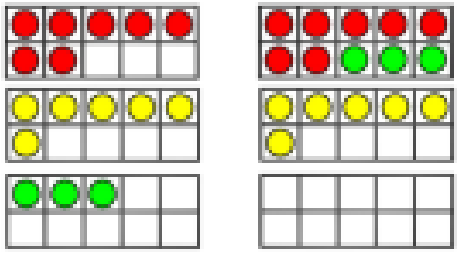
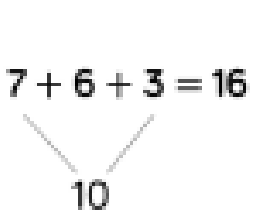
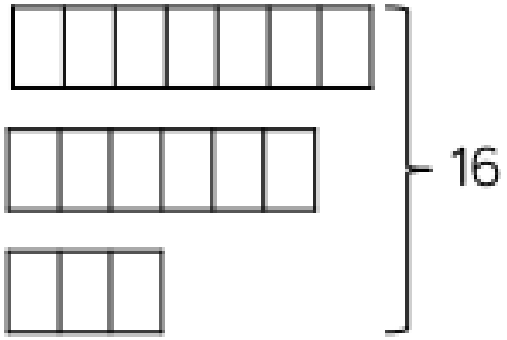
Addition

Skill	Year	Representations and models	
Add two 1-digit numbers to 10	1	Part-whole model Bar model Number shapes	Ten frames (within 10) Bead strings (10) Number tracks
Add 1 and 2-digit numbers to 20	1	Part-whole model Bar model Number shapes Ten frames (within 20)	Bead strings (20) Number tracks Number lines (labelled) Straws
Add three 1-digit numbers	2	Part-whole model Bar model	Ten frames (within 20) Number shapes
Add 1 and 2-digit numbers to 100	2	Part-whole model Bar model Number lines (labelled)	Number lines (blank) Straws Hundred square

Skill	Year	Representations and models	
Add two 2-digit numbers	2	Part-whole model Bar model Number lines (blank) Straws	Base 10 Place value counters

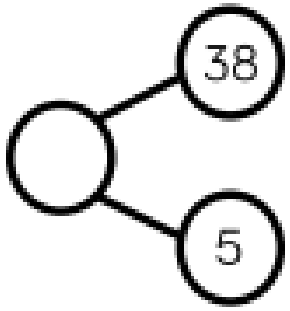
Skill: Add 1-digit numbers within 10	Year: 1
	When adding numbers to 10, children can explore both aggregation and augmentation. The part-whole model, discrete and continuous bar model, number shapes and ten frame support aggregation. The combination bar model, ten frame, bead string and number track all support augmentation.

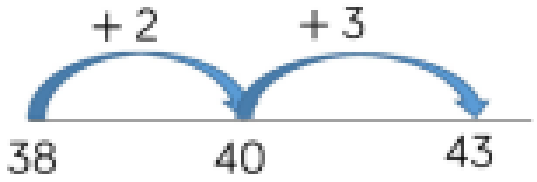
Skill: Add 1 and 2-digit numbers to 20	Year: 1/2
	When adding one-digit numbers that cross 10, it is important to highlight the importance of ten ones equalling one ten. In Year 1, this is only done just by counting on. From Year 2, use different manipulatives can be used to represent this exchange alongside number lines to support children in understanding how to partition their jumps.

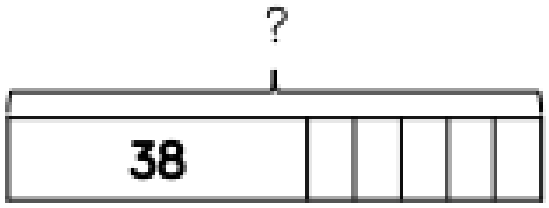
Skill: Add three 1-digit numbers	Year: 2
  $7 + 6 + 3 = 16$   	When adding three 1-digit numbers, children should be encouraged to look for number bonds to 10 or doubles to add the numbers more efficiently. This supports children in their understanding of commutativity. Manipulatives that highlight number bonds to 10 are effective when adding three 1-digit numbers.

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

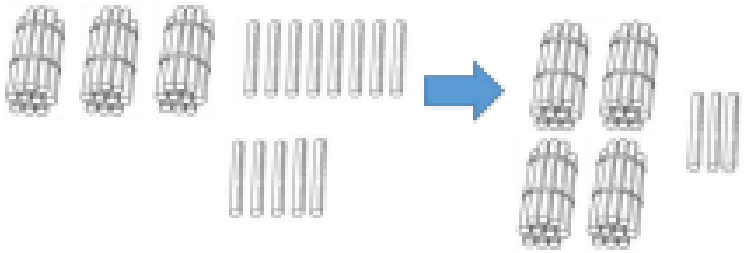
Year: 2/3







$$38 + 5 = 43$$



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

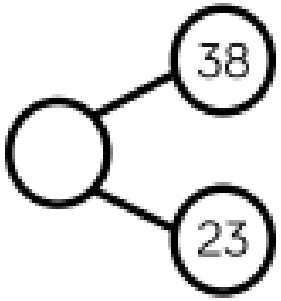
When adding single digits to a two-digit number, children should be encouraged to count on from the larger number.

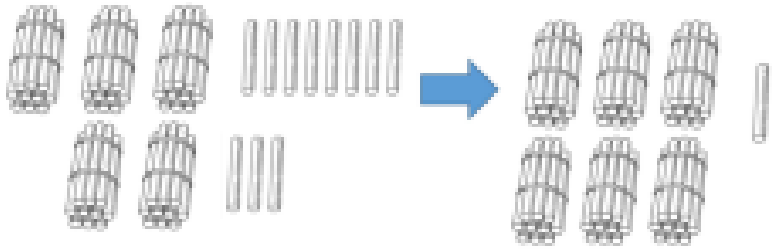
They should also apply their knowledge of number bonds to add more efficiently e.g. 8 + 5 = 13 so 38 + 5 = 43.

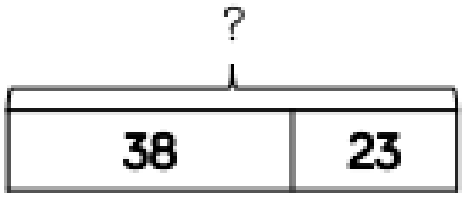
Hundred squares and straws can support children to find the number bond to 10.

Skill: Add two 2-digit numbers to 100

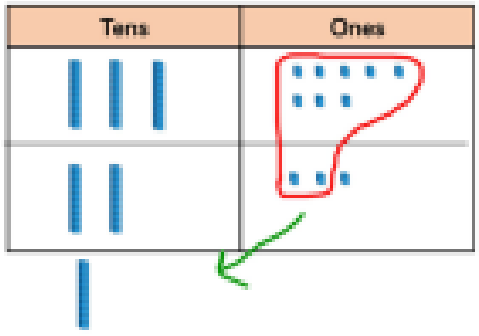
Year: 2/3



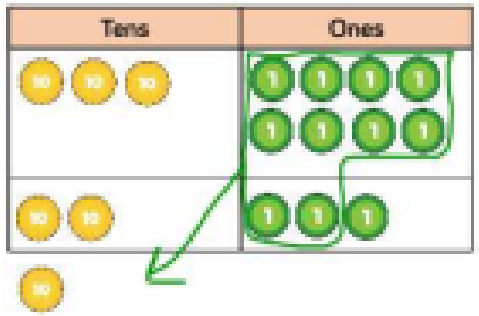




$$38 + 23 = 61$$



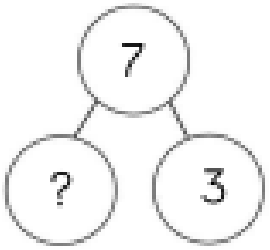
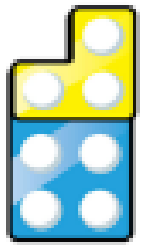
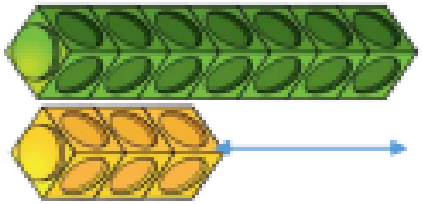
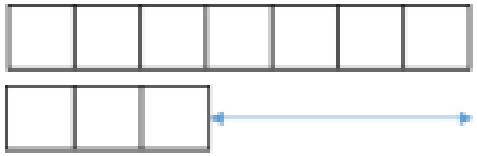
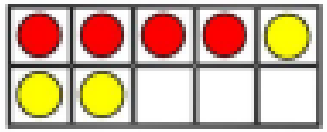
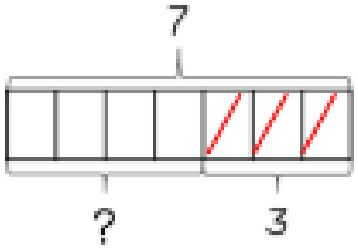
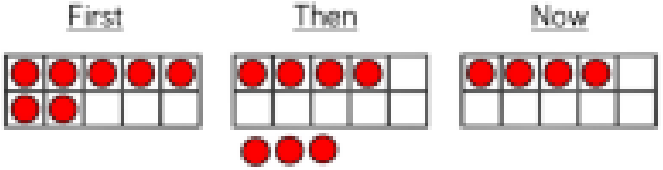
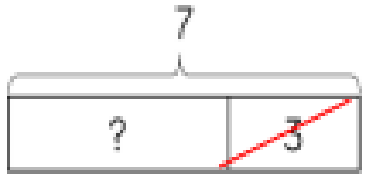
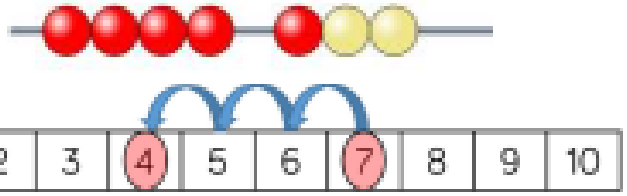
$$\begin{array}{r} 38 \\ +\ 23 \\ \hline 61 \\ \hline 1 \end{array}$$



Children can use a blank number line and other representations to count on to find the total. Encourage them to jump to multiples of 10 to become more efficient.
From Year 3, 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.

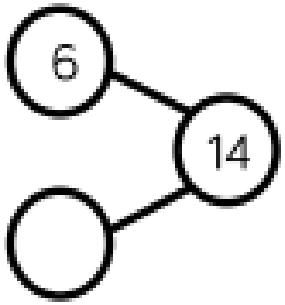
Subtraction

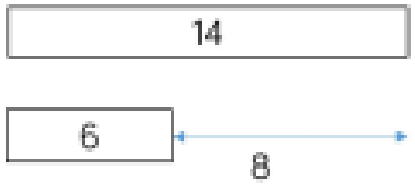
Skill	Year	Representations and models	
Subtract two 1-digit numbers to 10	1	Part-whole model Bar model Number shapes	Ten frames (within 10) Bead strings (10) Number tracks
Subtract 1 and 2-digit numbers to 20	1	Part-whole model Bar model Number shapes Ten frames (within 20)	Bead string (20) Number tracks Number lines (labelled) Straws
Subtract 1 and 2-digit numbers to 100	2	Part-whole model Bar model Number lines (labelled)	Number lines (blank) Straws Hundred square
Subtract two 2-digit numbers	2	Part-whole model Bar model Number lines (blank) Straws	Base 10 Place value counters

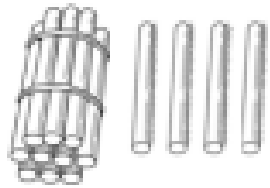
Skill: Subtract 1-digit numbers within 10	Year: 1
     $7 - 3 = 4$    	Part-whole models, bar models, ten frames and number shapes support partitioning. Ten frames, number tracks, single bar models and bead strings support reduction. Cubes and bar models with two bars can support finding the difference.

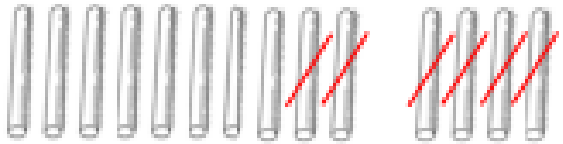
Skill: Subtract 1 and 2-digit numbers to 20

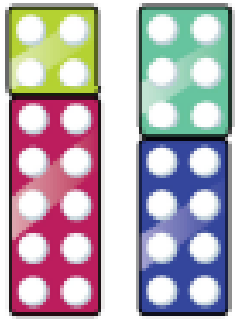
Year: 1/2



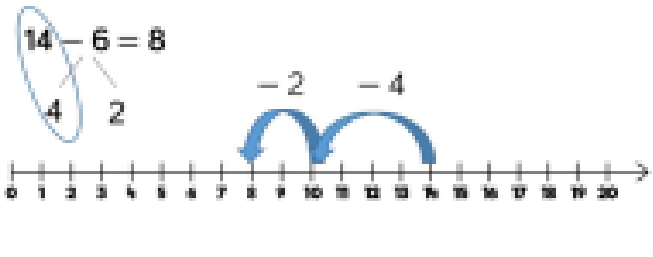


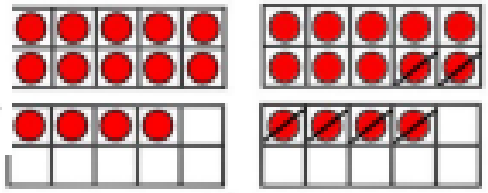


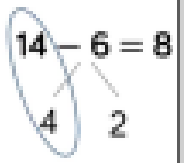




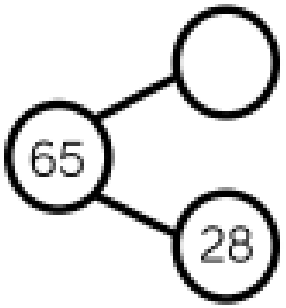
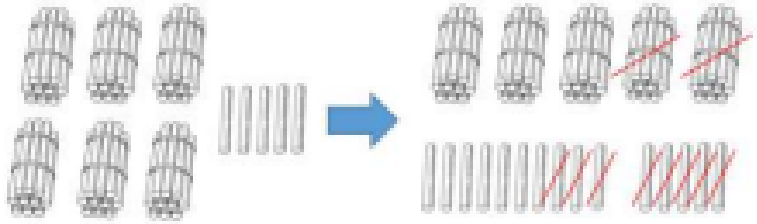
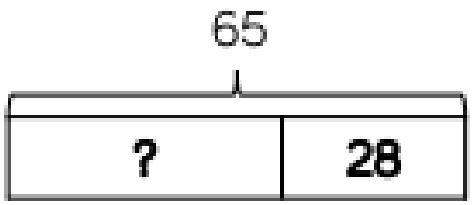
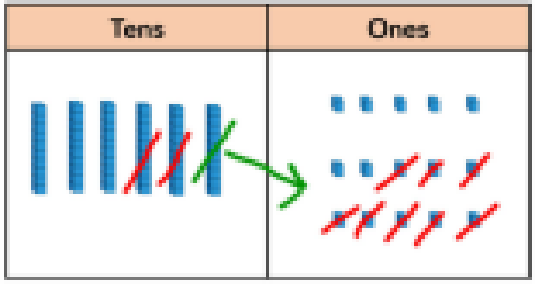
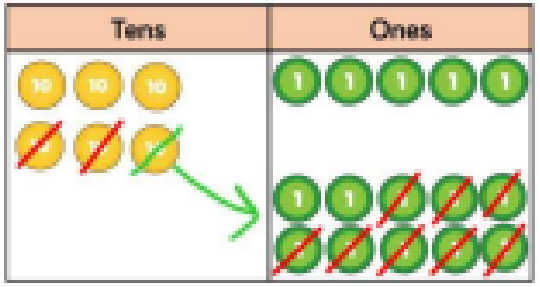
$$14 - 6 = 8$$





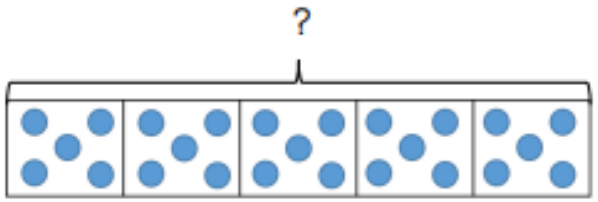


In Year 1, subtracting one-digit numbers that cross 10, is done by counting back, using objects, number tracks and number lines. From Year 2, children should be encouraged to find the number bond to 10 when partitioning the subtracted number. Ten frames, number shapes and number lines are particularly useful for this.

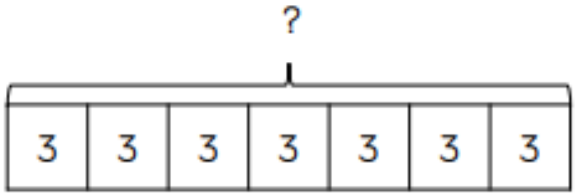
Skill: Subtract 1 and 2-digit numbers to 100	Year: 2/3
    $65 - 28 = 37$  $\begin{array}{r} {}^{5}\not{6}\,{}^{1}\not{5} \\ -\ 2\ 8 \\ \hline 3\ 7 \end{array}$ 	Children can also use a blank number line to count back to find the difference. Encourage them to jump to multiples of 10 to become more efficient. From Year 3, 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.

Calculation Policy
Multiplication and Division

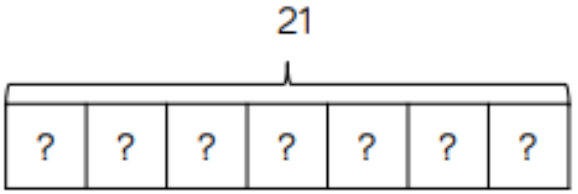
Bar Model



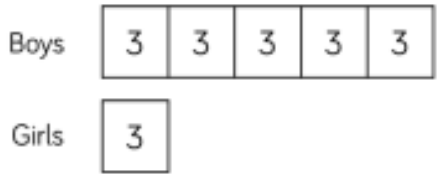
5 × 5 = 25



3 × 7 = 21
7 × 3 = 21



21 ÷ 7 = 3



Number Shapes

5 × 4 = 20
4 × 5 = 20

5 × 4 = 20
4 × 5 = 20

18 ÷ 3 = 6

Bead Strings

$5 \times 3 = 15$
$3 \times 5 = 15$

$15 \div 3 = 5$

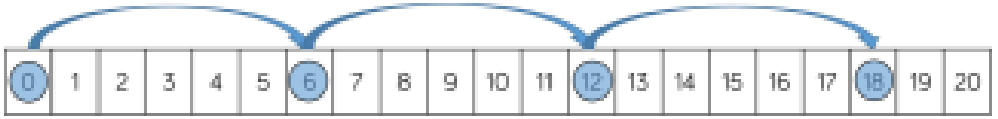
$5 \times 3 = 15$
$3 \times 5 = 15$

$15 \div 5 = 3$

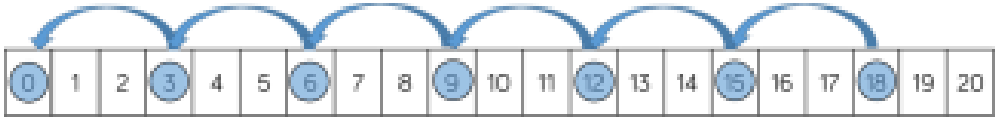
$4 \times 5 = 20$
$5 \times 4 = 20$

$20 \div 4 = 5$

Number Tracks

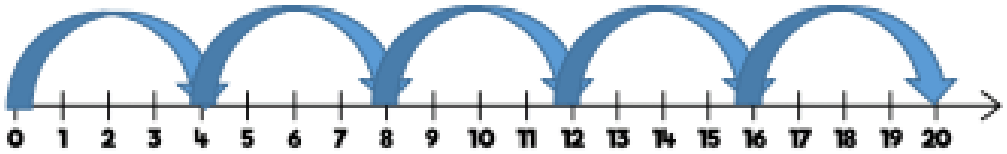


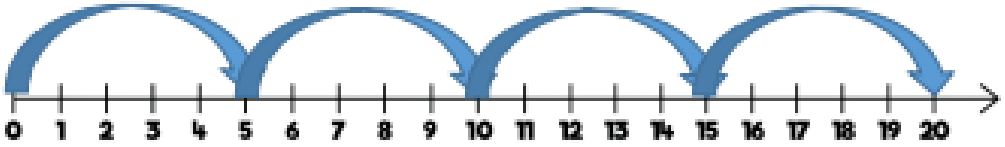
$6 \times 3 = 18$
$3 \times 6 = 18$



$18 \div 3 = 6$

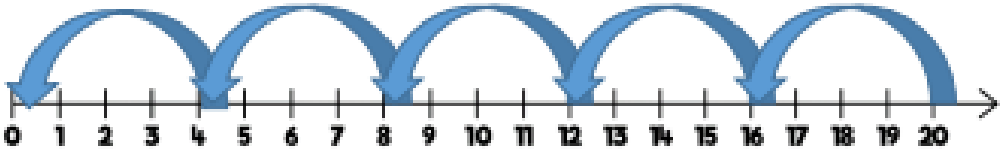
Number Lines (labelled)





$4 \times 5 = 20$

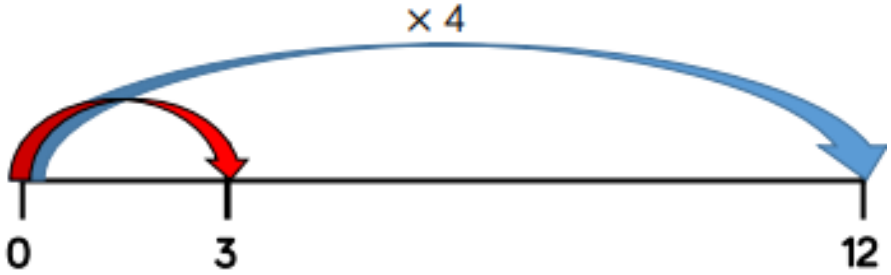
$5 \times 4 = 20$



$20 \div 4 = 5$

Number Lines (blank)

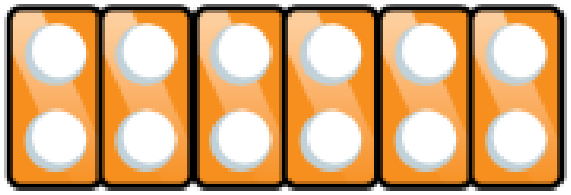
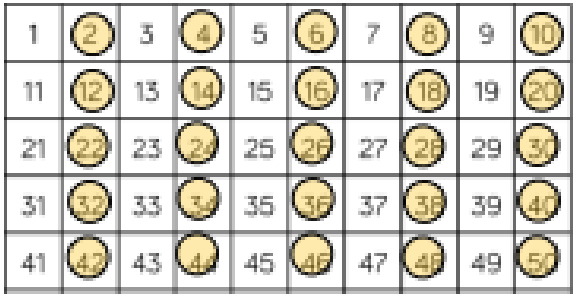
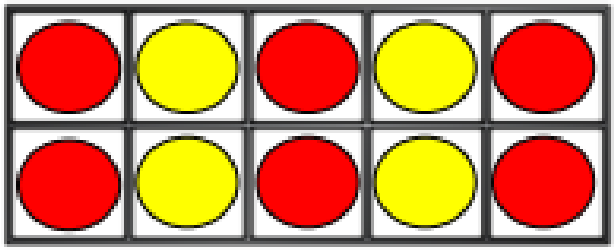
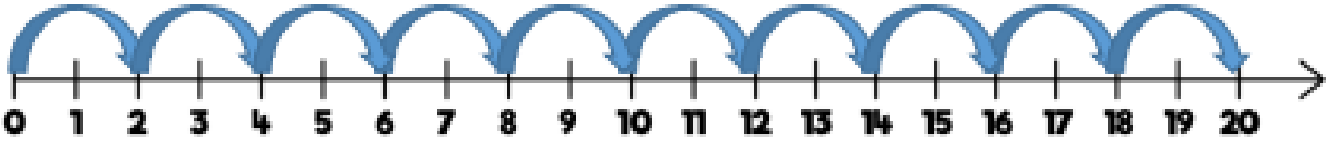
A red car travels 3 miles.
A blue car 4 times further.
How far does the blue car travel?

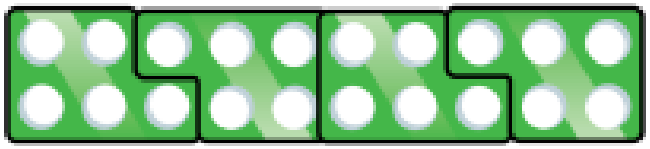
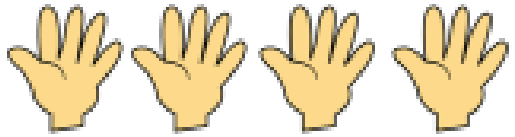
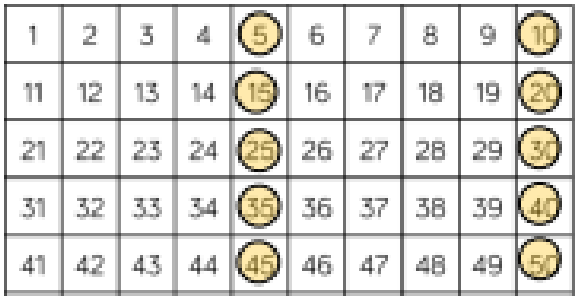
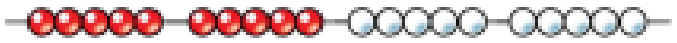
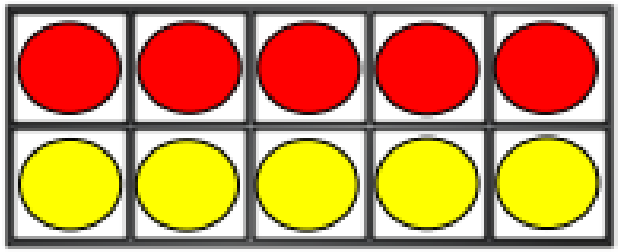
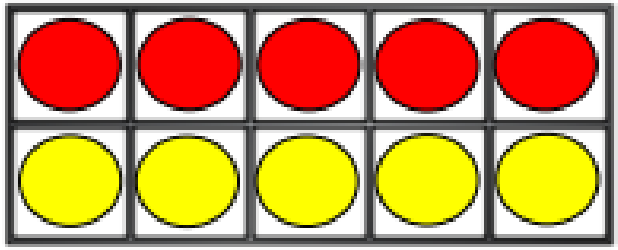
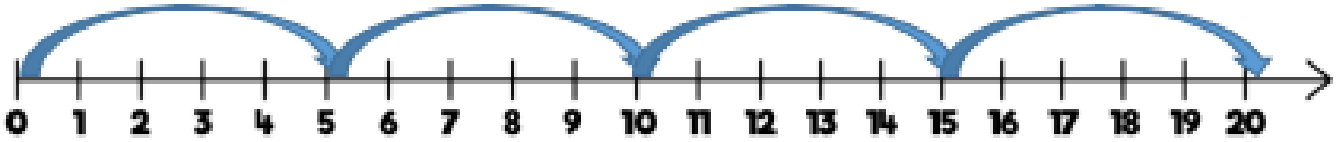


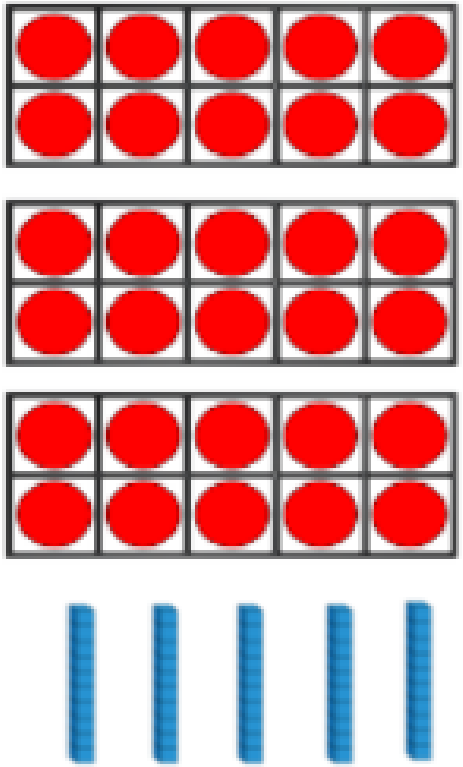
A blue car travels 12 miles.
A red car 4 times less.
How far does the red car travel?

Times Tables

Skill	Year	Representations and models	
Recall and use multiplication and division facts for the 2-times table	2	Bar model Number shapes Counters Money	Ten frames Bead strings Number lines Everyday objects
Recall and use multiplication and division facts for the 5-times table	2	Bar model Number shapes Counters Money	Ten frames Bead strings Number lines Everyday objects
Recall and use multiplication and division facts for the 10-times table	2	Hundred square Number shapes Counters Money	Ten frames Bead strings Number lines Base 10

Skill: 2 times table	Year: 2
       	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.

Skill: 5 times table	Year: 2
        	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.

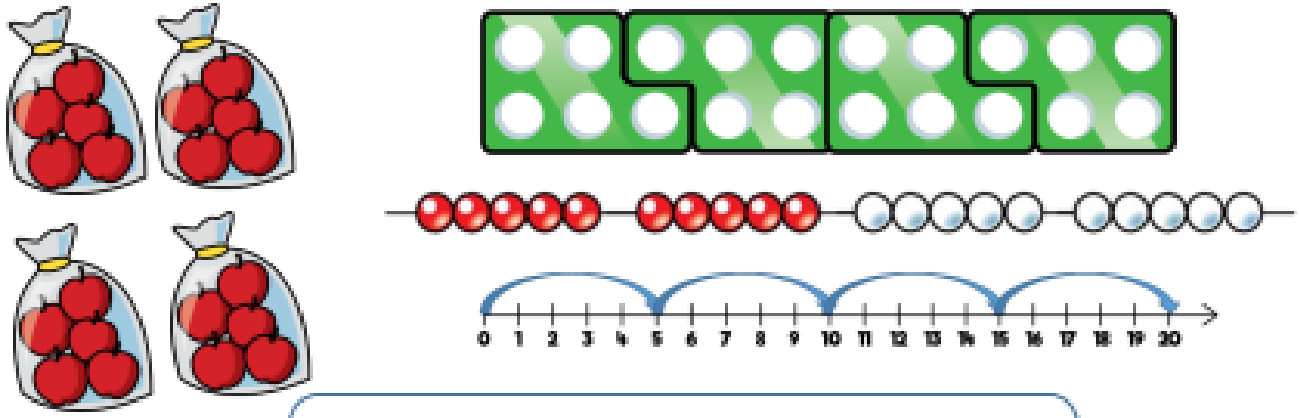
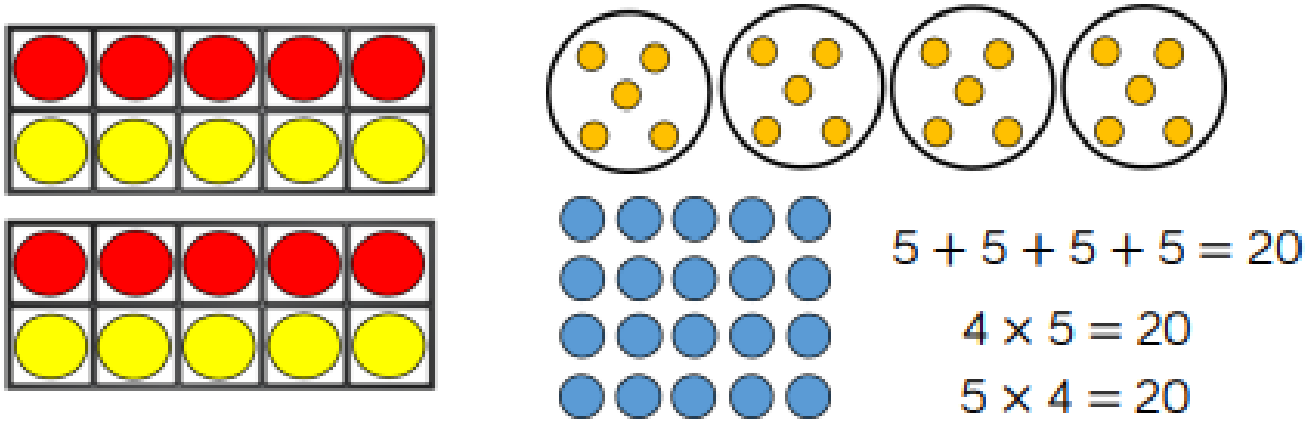
Skill: 10 times table	Year: 2
    	Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square. Look for patterns in the ten times table, using concrete manipulatives to support. Notice the pattern in the digits- the ones are always 0, and the tens increase by 1 ten each time.

0 10 20 30 40 50 60 70 80 90 100

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

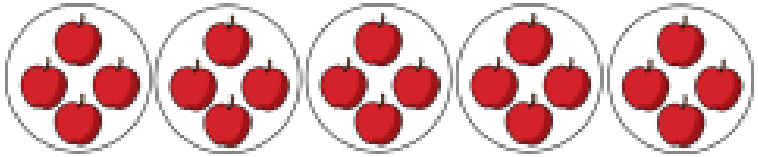
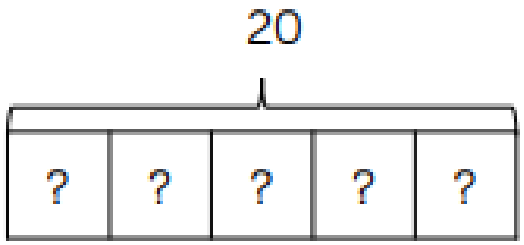
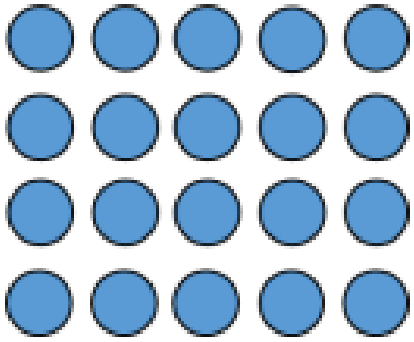
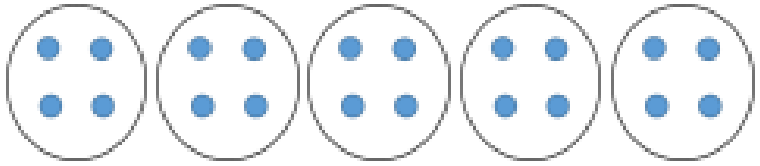
Multiplication

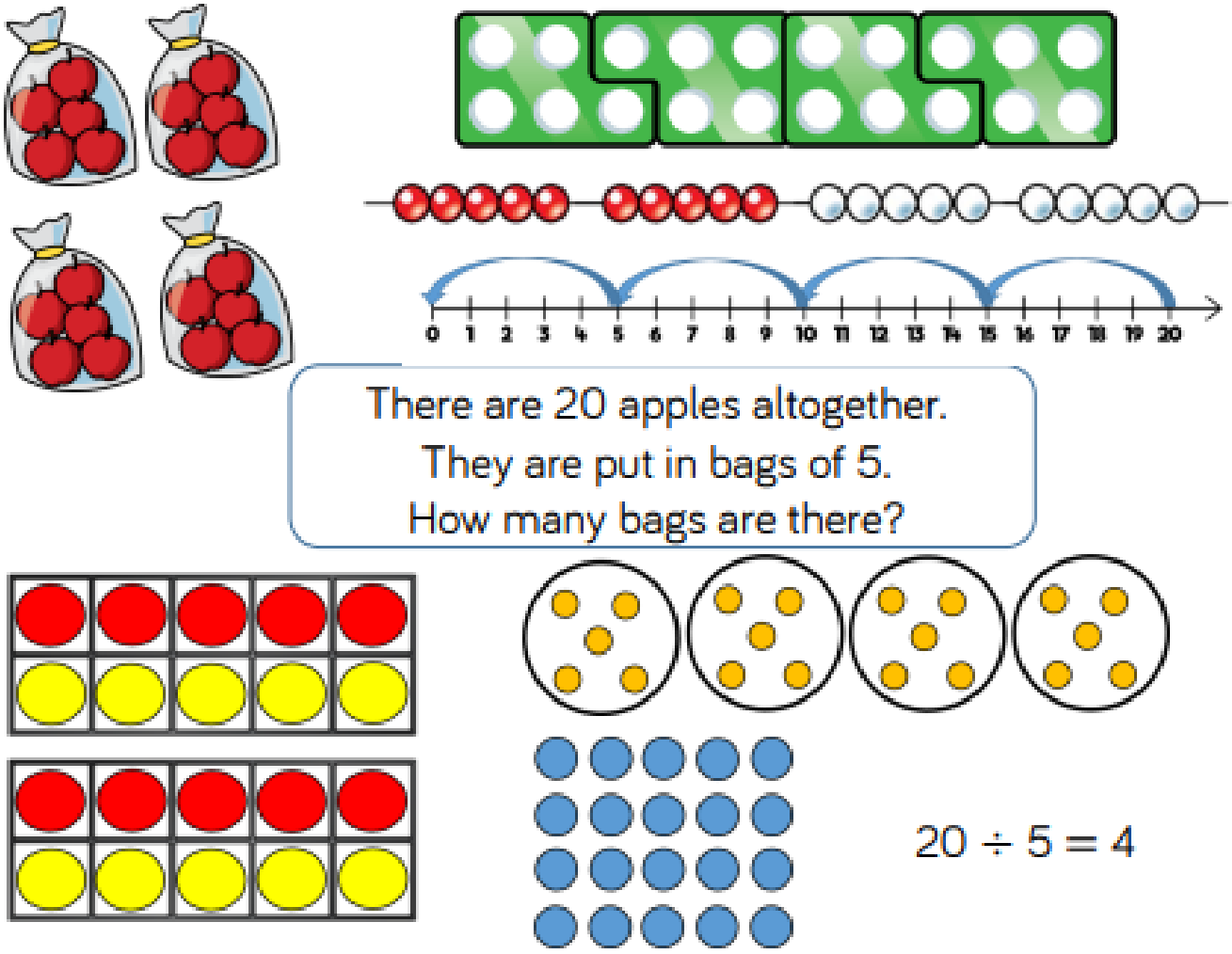
Skill	Year	Representations and models	
Solve one-step problems with multiplication	1/2	Bar model Number shapes Counters	Ten frames Bead strings Number lines

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.

Division

Skill	Year	Representations and models	
Solve one-step problems with division (sharing)	1/2	Bar model Real life objects	Arrays Counters
Solve one-step problems with division (grouping)	1/2	Real life objects Number shapes Bead strings Ten frames	Number lines Arrays Counters

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
	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.