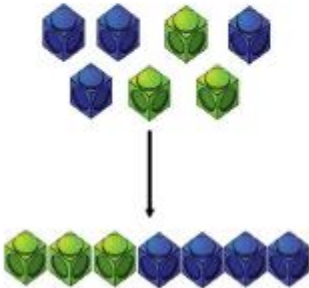
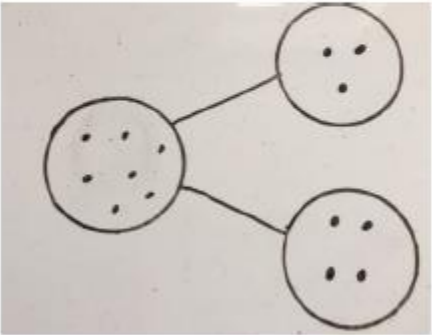
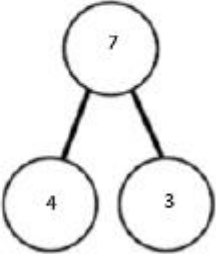


ADDITION

Dia 1

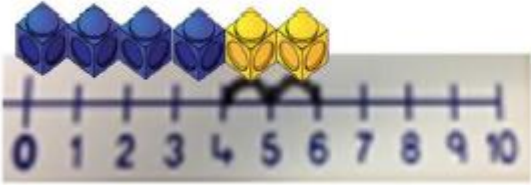
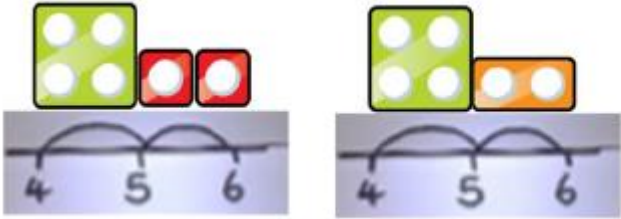
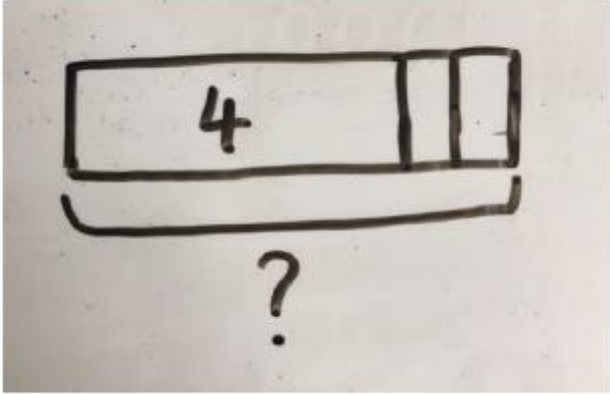

EYFS/Year 1: Combining two parts to make whole

Concrete	Pictorial	Abstract
<p data-bbox="155 482 817 554">Combining two parts to make a whole (use other resources too e.g. eggs, shells, teddy bears, cars).</p>  <p>The diagram shows two groups of cubes at the top: four blue cubes and three green cubes. An arrow points down to a single row of seven cubes, where the four blue cubes are on the left and the three green cubes are on the right, illustrating the combination of two parts into a whole.</p>	<p data-bbox="975 482 1778 554">Children to represent the cubes using dots or crosses. They could put each part on a part whole model too.</p>  <p>The diagram shows a part-whole model consisting of three circles. A large circle on the left contains seven dots, representing the whole. Two lines connect it to two smaller circles on the right. The top-right circle contains four dots, and the bottom-right circle contains three dots, representing the two parts that make up the whole.</p>	<p data-bbox="1811 482 2339 588">$4 + 3 = 7$ Four is a part, 3 is a part and the whole is seven.</p>  <p>The diagram shows a part-whole model with three circles. A top circle is labeled with the number 7. Two lines connect it to two bottom circles. The bottom-left circle is labeled with the number 4, and the bottom-right circle is labeled with the number 3.</p>

ADDITION

Dia 2

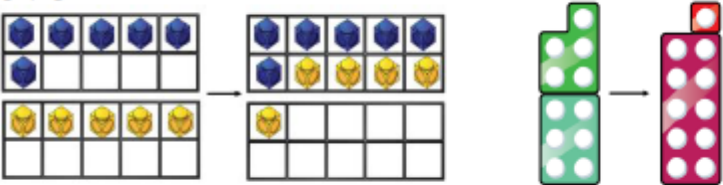
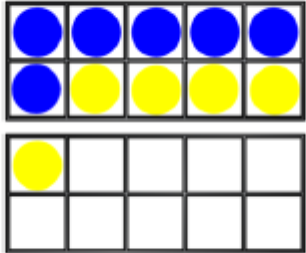
EYFS/Year 1: starting on the larger number and counting on – using cubes

Concrete	Pictorial	Abstract
<p>Counting on using number lines using cubes or Numicon.</p>  <p>The image shows a number line from 0 to 10. Four blue cubes are placed on the numbers 0, 1, 2, and 3. Two yellow cubes are placed on the numbers 4 and 5. A curved arrow starts at 4 and points to 6, indicating a jump of 2 units.</p>  <p>The image shows two Numicon blocks: a green block with 4 dots and a red block with 2 dots. Below them is a number line from 4 to 6. A curved arrow starts at 4 and points to 6, indicating a jump of 2 units.</p>	<p>A bar model which encourages the children to count on, rather than count all.</p>  <p>The image shows a bar model. A rectangle is divided into three sections. The first section is labeled '4'. The second and third sections are empty. A bracket underneath the entire bar is labeled with a question mark '?'.</p>	<p>The abstract number line: What is 2 more than 4? What is the sum of 2 and 4? What is the total of 4 and 2? $4 + 2$</p>  <p>The image shows a number line with points labeled 4, 5, and 6. A curved arrow starts at 4 and points to 5. Another curved arrow starts at 5 and points to 6. This represents a jump of 2 units from 4 to 6.</p>

ADDITION

Dia 3

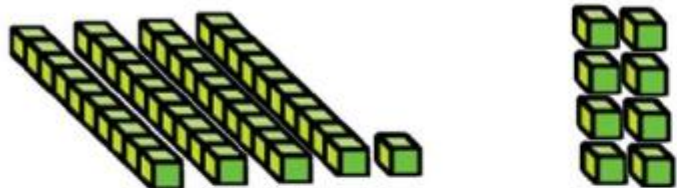
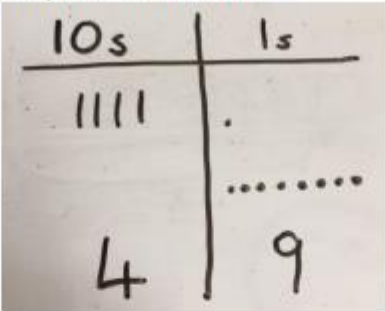
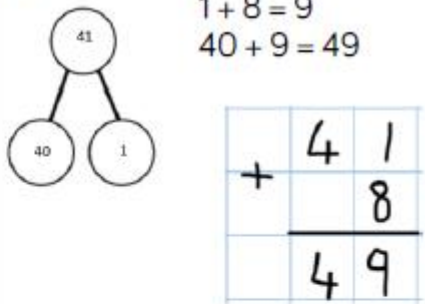
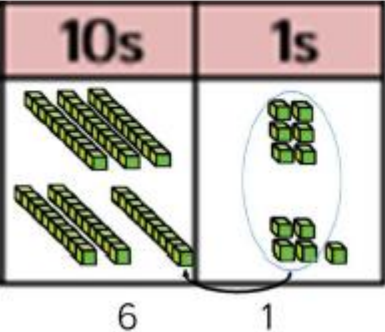
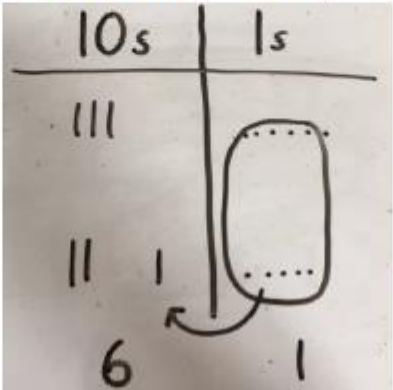
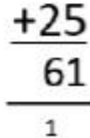
EYFS/Year 1: Regrouping to make 10 using ten frame.

Concrete	Pictorial	Abstract
<p>Regrouping to make 10; using ten frames and counters/cubes or using Numicon.</p> <p>6 + 5</p>  <p>The concrete representation shows two ten frames. The first ten frame has 6 blue counters (5 in the top row, 1 in the bottom left). The second ten frame has 5 yellow counters (all in the top row). An arrow points to a new arrangement where the first ten frame has 1 blue counter and 5 yellow counters, and the second ten frame has 4 yellow counters. To the right, two Numicon blocks are shown: a green block with 6 dots and a red block with 5 dots, with an arrow pointing to a single purple block with 11 dots.</p>	<p>Children to draw the ten frame and counters/cubes.</p>  <p>The pictorial representation shows a ten frame with 6 blue circles (5 in the top row, 1 in the bottom left) and 5 yellow circles (all in the top row of the second ten frame).</p>	<p>Children to develop an understanding of equality e.g.</p> $6 + \square = 11$ $6 + 5 = 5 + \square$ $6 + 5 = \square + 4$

ADDITION

Dia 4

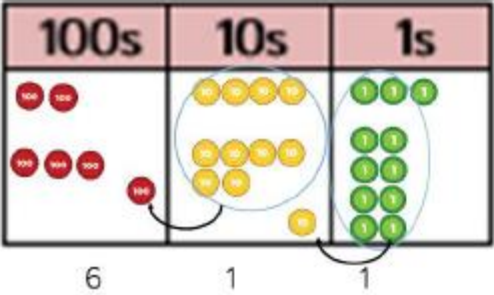
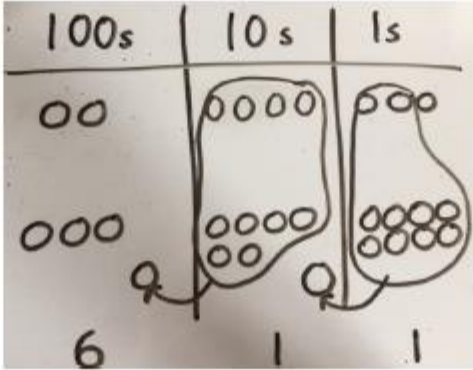
Year 2: use of base 10 to combine two numbers

Concrete	Pictorial	Abstract
<p>TO + O using base 10. Continue to develop understanding of partitioning and place value. 41 + 8</p> 	<p>Children to represent the base 10 e.g. lines for tens and dot/crosses for ones.</p> 	<p>41 + 8</p>  <p>1 + 8 = 9 40 + 9 = 49</p>
<p>TO + TO using base 10. Continue to develop understanding of partitioning and place value. 36 + 25</p> 	<p>Children to represent the base 10 in a place value chart.</p> 	<p>Looking for ways to make 10.</p> <p>36 + 25 =</p> <p>30 + 20 = 50 5 + 5 = 10 50 + 10 + 1 = 61</p> <p>36</p> <p>Formal method:</p> 

ADDITION

Dia 4

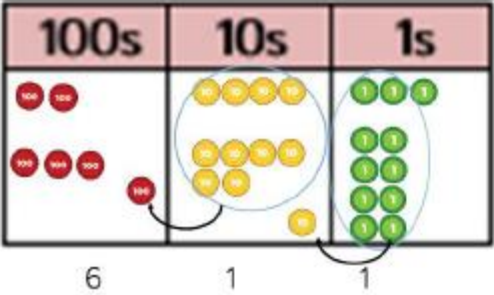
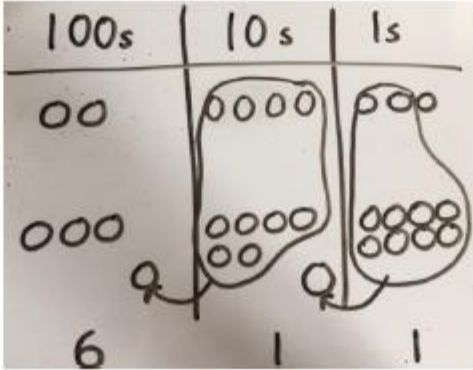
Year 3: column method – regrouping with partitioning.

Concrete	Pictorial	Abstract
<p>Use of place value counters to add HTO + TO, HTO + HTO etc. When there are 10 ones in the 1s column- we exchange for 1 ten, when there are 10 tens in the 10s column- we exchange for 1 hundred.</p>  <p>6 1 1</p>	<p>Children to represent the counters in a place value chart, circling when they make an exchange.</p>  <p>6 1 1</p>	$\begin{array}{r} 243 \\ +368 \\ \hline 611 \\ \hline 1 \quad 1 \end{array}$

ADDITION

Dia 5

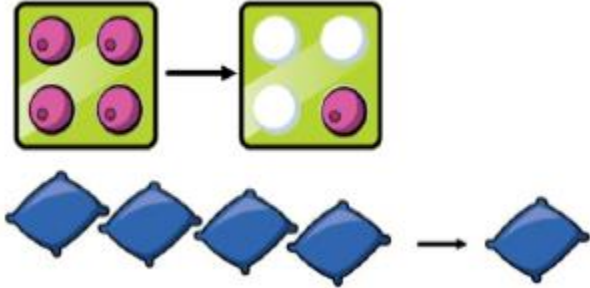
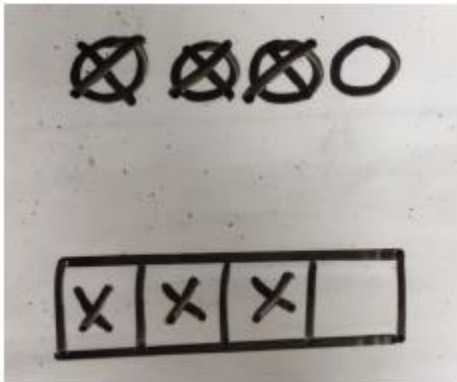
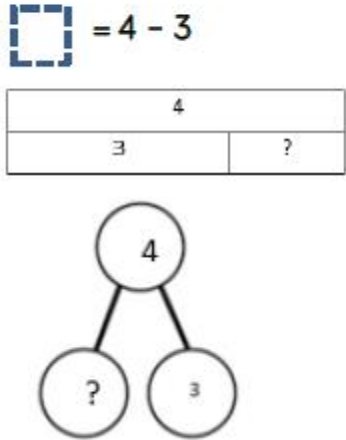
Year 4/5/6: column method – with regrouping.

Concrete	Pictorial	Abstract
<p>Use of place value counters to add HTO + TO, HTO + HTO etc. When there are 10 ones in the 1s column- we exchange for 1 ten, when there are 10 tens in the 10s column- we exchange for 1 hundred.</p>  <p>6 1 1</p>	<p>Children to represent the counters in a place value chart, circling when they make an exchange.</p>  <p>6 1 1</p>	$\begin{array}{r} 243 \\ +368 \\ \hline 611 \\ \hline 1 \quad 1 \end{array}$

SUBTRACTION

Dia 6

EYFS/Year 1/2: take away ones

Concrete	Pictorial	Abstract
<p>Physically taking away and removing objects from a whole (ten frames, Numicon, cubes and other items such as beanbags could be used).</p> <p>$4 - 3 = 1$</p>  <p>The concrete representation shows two stages. In the first stage, a green ten frame is filled with four pink circular objects. Below it, four blue beanbags are arranged in a row. An arrow points to the second stage, where the ten frame now contains only one pink object and three empty spaces, and only one blue beanbag remains in the row.</p>	<p>Children to draw the concrete resources they are using and cross out the correct amount. The bar model can also be used.</p>  <p>The pictorial representation shows hand-drawn objects. At the top, there are four circles; the first three are crossed out with an 'X', and the fourth is empty. Below this, there is a horizontal bar divided into four equal sections. The first three sections each contain an 'X', and the fourth section is empty.</p>	<p>$4 - 3 =$</p> <p><p>The abstract representation includes a number sentence $\square = 4 - 3$ where the square is a dashed box. Below it is a bar model: a rectangle divided into two parts. The top part is labeled '4' and the bottom part is divided into two sections labeled '3' and '?'. At the bottom is a part-whole diagram with a top circle labeled '4' and two bottom circles labeled '?' and '3'.</p></p>

SUBTRACTION

Dia 7

EYFS/Year 1/2: counting backwards

Concrete

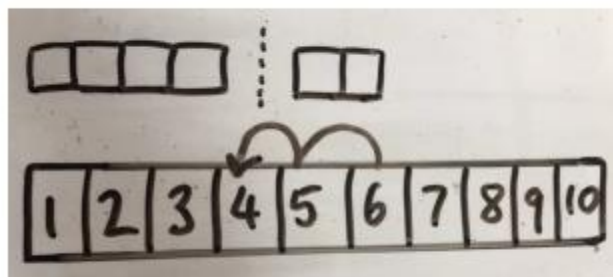
Counting back (using number lines or number tracks)
children start with 6 and count back 2.

$$6 - 2 = 4$$



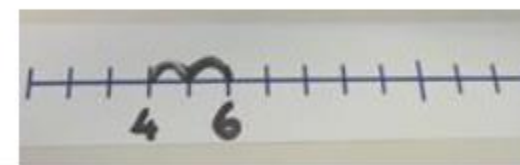
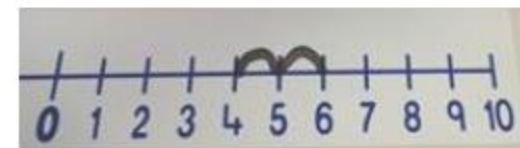
Pictorial

Children to represent what they see pictorially e.g.



Abstract


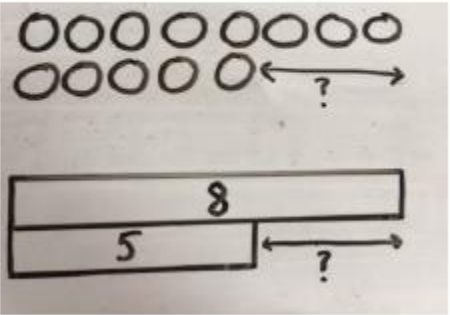
Children to represent the calculation
on a number line or number track and
show their jumps. Encourage children
to use an empty number line



SUBTRACTION

Dia 8

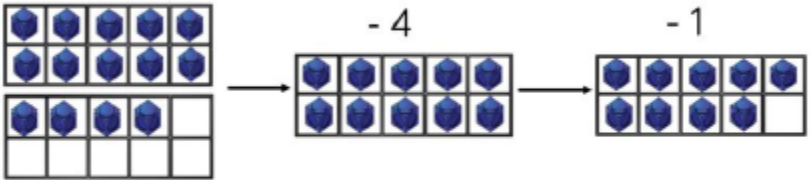

EYFS/Year 1/2: find the difference

Concrete	Pictorial	Abstract
<p>Finding the difference (using cubes, Numicon or Cuisenaire rods, other objects can also be used).</p> <p>Calculate the difference between 8 and 5.</p> 	<p>Children to draw the cubes/other concrete objects which they have used or use the bar model to illustrate what they need to calculate.</p> 	<p>Find the difference between 8 and 5.</p> <p>$8 - 5$, the difference is <input data-bbox="2122 606 2193 668" type="text"/></p> <p>Children to explore why $9 - 6 = 8 - 5 = 7 - 4$ have the same difference.</p>

SUBTRACTION

Dia 9

EYFS/Year 1/2: making 10 using ten frames

Concrete	Pictorial	Abstract
<p>Making 10 using ten frames. $14 - 5$</p> 	<p>Children to present the ten frame pictorially and discuss what they did to make 10.</p> 	<p>Children to show how they can make 10 by partitioning the subtrahend.</p> $\begin{array}{r} 14 - 5 = 9 \\ \swarrow \quad \searrow \\ 4 \quad \quad 1 \end{array}$ $\begin{array}{l} 14 - 4 = 10 \\ 10 - 1 = 9 \end{array}$

SUBTRACTION

Dia 10

Year 3/4/5/6: column method – regrouping with partitioning

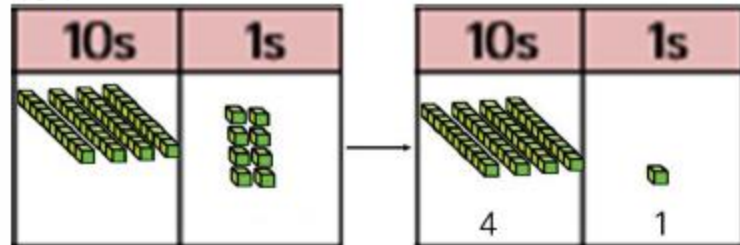
Concrete

Pictorial

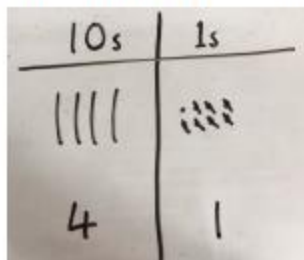
Abstract

Column method using base 10.

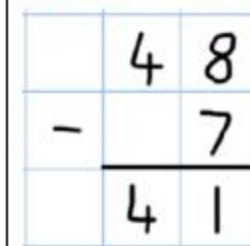
48-7



Children to represent the base 10 pictorially.



Column method or children could count back 7.



SUBTRACTION

Dia 10

Year 3/4/5/6: column method – regrouping with partitioning

Concrete	Pictorial	Abstract
<p>Column method using base 10 and having to exchange. 41 – 26</p>	<p>Represent the base 10 pictorially, remembering to show the exchange.</p>	<p>Formal column method. Children must understand that when they have exchanged the 10 they still have 41 because $41 = 30 + 11$.</p>
<p>Column method using place value counters. 234 – 88</p>	<p>Represent the place value counters pictorially; remembering to show what has been exchanged.</p>	<p>Formal column method. Children must understand what has happened when they have crossed out digits.</p>

Multiplication

Dia 11

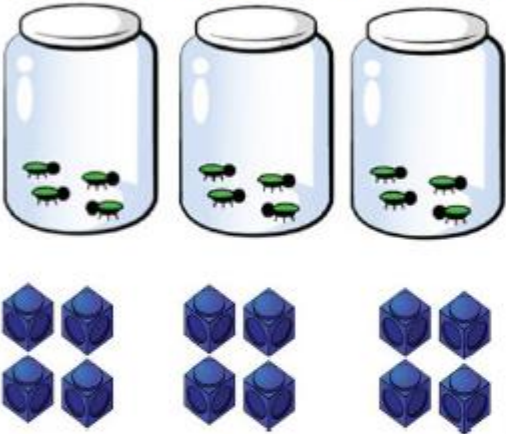
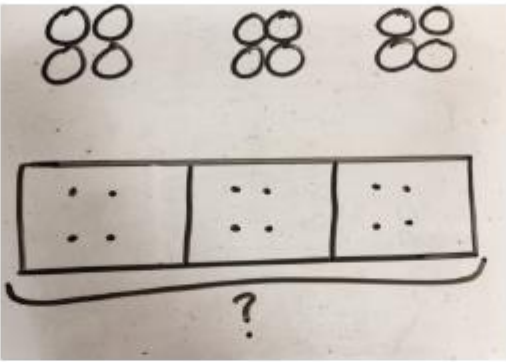
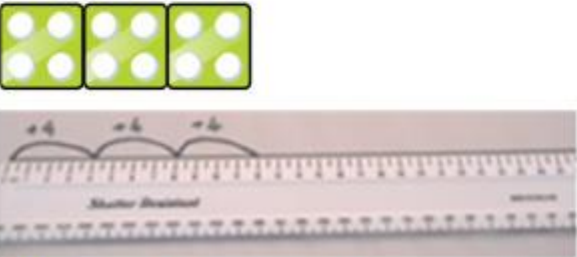
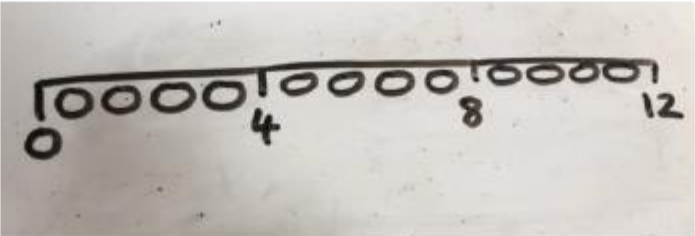
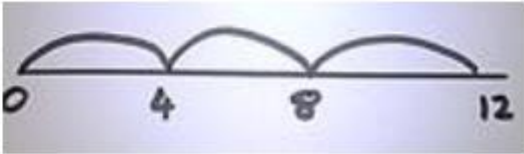
Year 2/3: arrays showing commutative multiplication

Concrete	Pictorial	Abstract
<p>Use arrays to illustrate commutativity counters and other objects can also be used. $2 \times 5 = 5 \times 2$</p> <div data-bbox="147 496 479 678"></div> <p>2 lots of 5 5 lots of 2</p>	<p>Children to represent the arrays pictorially.</p> <div data-bbox="950 428 1426 699"></div>	<p>Children to be able to use an array to write a range of calculations e.g.</p> <p>$10 = 2 \times 5$ $5 \times 2 = 10$ $2 + 2 + 2 + 2 + 2 = 10$ $10 = 5 + 5$</p>

Multiplication

Dia 12

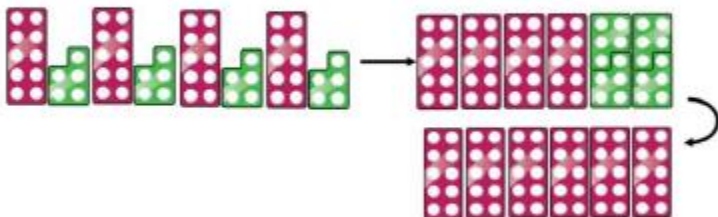
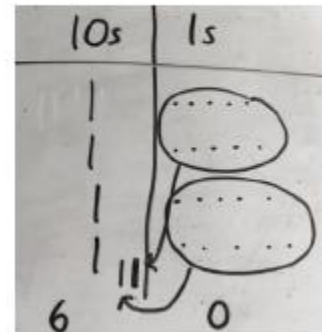
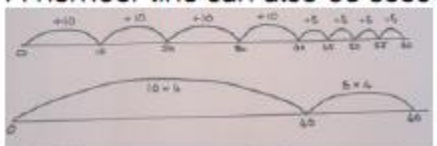
Year 2: repeated addition

Concrete	Pictorial	Abstract
<p>Repeated grouping/repeated addition 3×4 $4 + 4 + 4$ There are 3 equal groups, with 4 in each group.</p> 	<p>Children to represent the practical resources in a picture and use a bar model.</p> 	<p>$3 \times 4 = 12$ $4 + 4 + 4 = 12$</p>
<p>Number lines to show repeated groups- 3×4</p>  <p>Cuisenaire rods can be used too.</p>	<p>Represent this pictorially alongside a number line e.g.:</p> 	<p>Abstract number line showing three jumps of four.</p> <p>$3 \times 4 = 12$</p> 

Multiplication

Dia 13


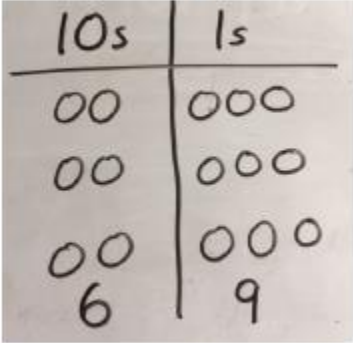
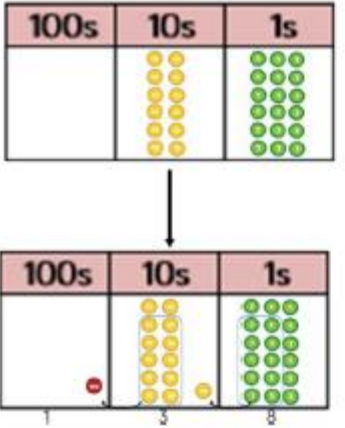
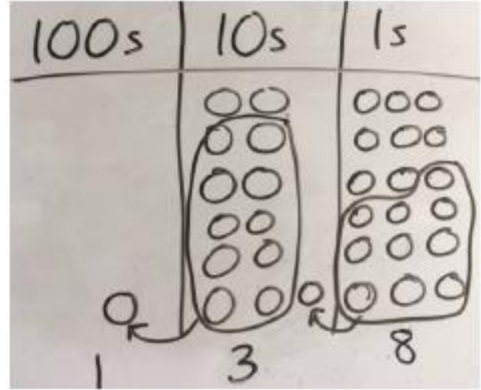
Year 3: 2d x 1d using base 10

Concrete	Pictorial	Abstract
<p>Partition to multiply using Numicon, base 10 or Cuisenaire rods.</p> <p>4×15</p> 	<p>Children to represent the concrete manipulatives pictorially.</p> 	<p>Children to be encouraged to show the steps they have taken.</p> <p>4×15</p> <p>$10 \quad 5$</p> <p>$10 \times 4 = 40$ $5 \times 4 = 20$ $40 + 20 = 60$</p> <p>A number line can also be used</p> 

Multiplication

Dia 14

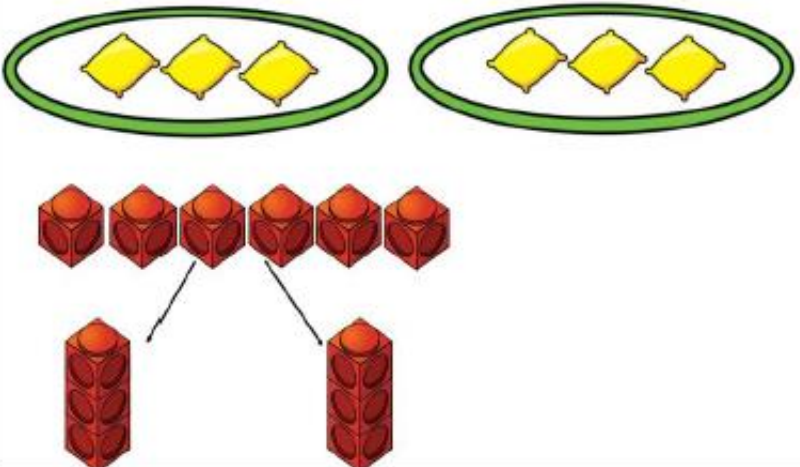
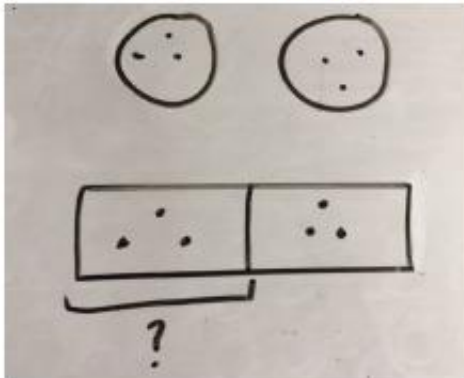
Year 4/5/6: Column multiplication (with counters yr4)

Concrete	Pictorial	Abstract
<p>Formal column method with place value counters (base 10 can also be used.) 3×23</p> 	<p>Children to represent the counters pictorially.</p> 	<p>Children to record what it is they are doing to show understanding.</p> $\begin{array}{r} 3 \times 23 \\ 20 \quad 3 \end{array}$ $\begin{array}{r} 3 \times 20 = 60 \\ 3 \times 3 = 9 \\ 60 + 9 = 69 \end{array}$ $\begin{array}{r} 23 \\ \times 3 \\ \hline 69 \end{array}$
<p>Formal column method with place value counters. 6×23</p> 	<p>Children to represent the counters/base 10, pictorially e.g. the image below.</p> 	<p>Formal written method</p> $6 \times 23 =$ $\begin{array}{r} 23 \\ \times 6 \\ \hline 138 \\ 11 \end{array}$

Division

Dia 15

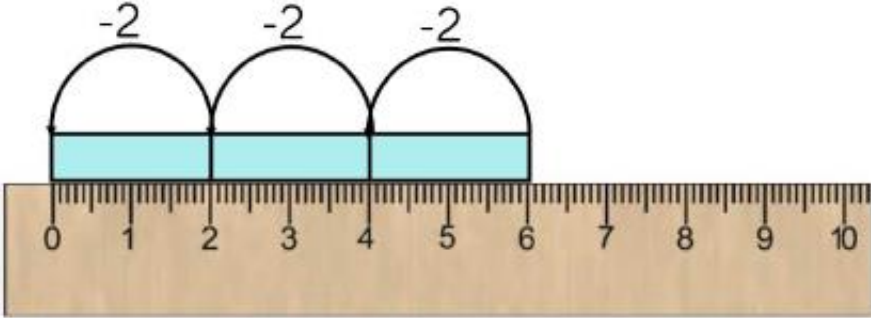
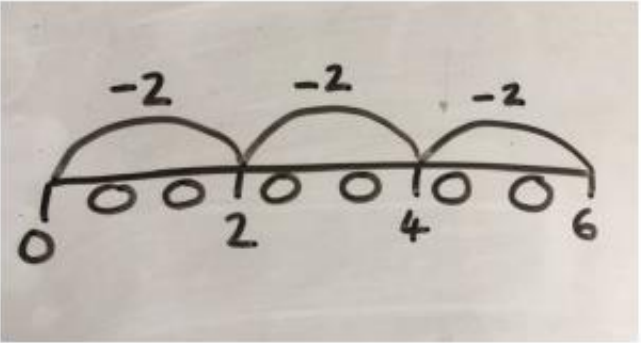
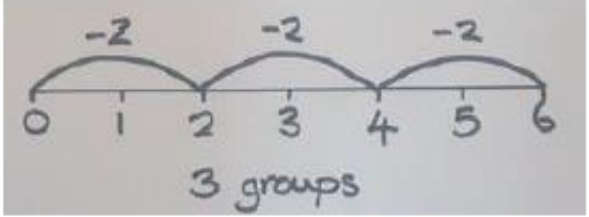
EYFS/Year 1/2: sharing

Concrete	Pictorial	Abstract		
<p>Sharing using a range of objects. 6 ÷ 2</p>  <p>The concrete representation shows two green ovals, each containing three yellow diamonds. Below these, there are six red cubes arranged in a single row. Two arrows point from the first and fourth cubes of this row to two separate vertical stacks of three red cubes each, illustrating the sharing of 6 items into 2 groups of 3.</p>	<p>Represent the sharing pictorially.</p>  <p>The pictorial representation shows two hand-drawn circles, each containing three dots. Below them is a hand-drawn rectangle divided into two equal halves. Each half contains three dots. A bracket is drawn under the first half, with a question mark below it, indicating the problem of sharing 6 items into 2 groups.</p>	<p>6 ÷ 2 = 3</p> <table border="1" data-bbox="1798 416 2318 499"><tr><td>3</td><td>3</td></tr></table> <p>Children should also be encouraged to use their 2 times tables facts.</p>	3	3
3	3			

Division

Dia 16


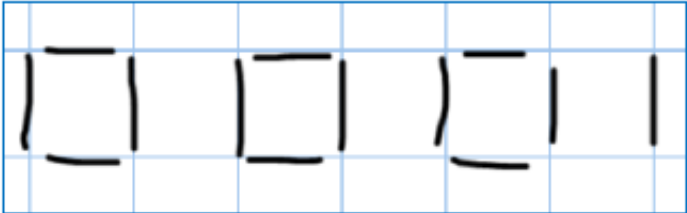
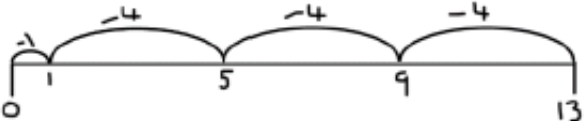
Year 2: repeated subtraction

Concrete	Pictorial	Abstract
<p>Repeated subtraction using Cuisenaire rods above a ruler. $6 \div 2$</p>  <p>3 groups of 2</p>	<p>Children to represent repeated subtraction pictorially.</p> 	<p>Abstract number line to represent the equal groups that have been subtracted.</p> 

Division

Dia 17

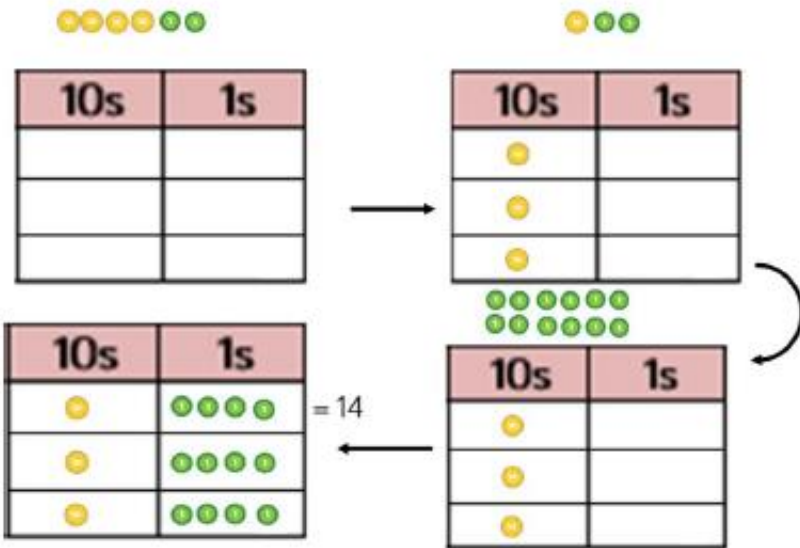
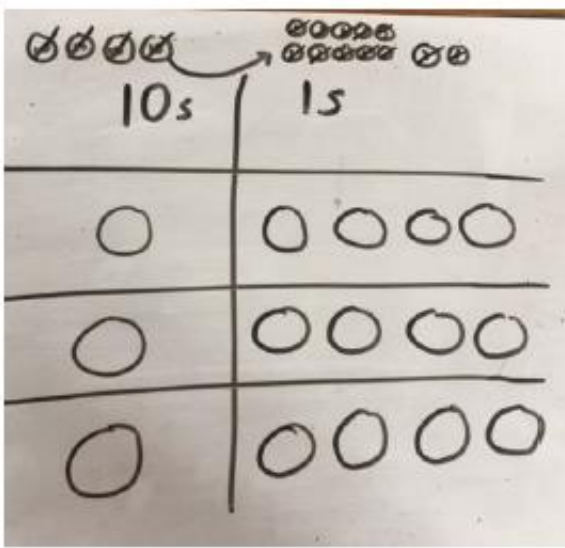
Year 3: 2d by 1d with lollysticks

Concrete	Pictorial	Abstract
<p>$2d \div 1d$ with remainders using lollipop sticks. Cuisenaire rods, above a ruler can also be used.</p> <p>$13 \div 4$</p> <p>Use of lollipop sticks to form wholes- squares are made because we are dividing by 4.</p>  <p>There are 3 whole squares, with 1 left over.</p>	<p>Children to represent the lollipop sticks pictorially.</p>  <p>There are 3 whole squares, with 1 left over.</p>	<p>$13 \div 4 = 3 \text{ remainder } 1$</p> <p>Children should be encouraged to use their times table facts; they could also represent repeated addition on a number line.</p> <p>'3 groups of 4, with 1 left over'</p> 

Division

Dia 18

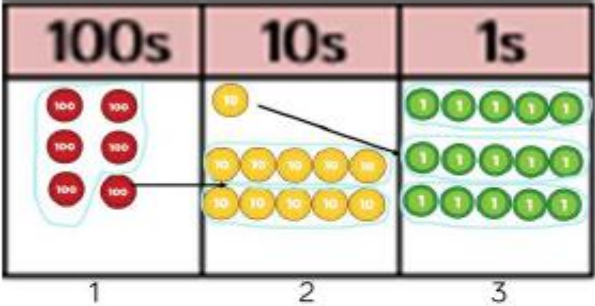
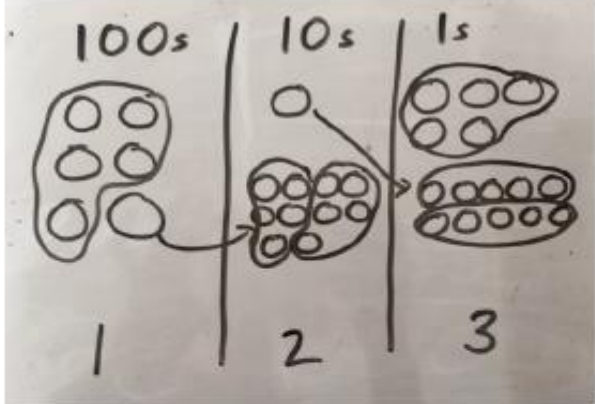
Year 3: 2d by 1d place value counters

Concrete	Pictorial	Abstract
<p>Sharing using place value counters. $42 \div 3 = 14$</p>  <p>Concrete representation of 42 divided by 3 using place value counters. The diagram shows two 10s blocks and two 1s blocks (42) being shared into three groups. The first group gets one 10s block and two 1s blocks (33), leaving one 10s block and two 1s blocks (12). The second group gets one 10s block and two 1s blocks (33), leaving one 10s block and two 1s blocks (12). The third group gets one 10s block and two 1s blocks (33), leaving one 10s block and two 1s blocks (12). The final result is 14 (one 10s block and four 1s blocks).</p>	<p>Children to represent the place value counters pictorially.</p>  <p>Pictorial representation of 42 divided by 3 using circles. The diagram shows two 10s blocks and two 1s blocks (42) being shared into three groups. The first group gets one 10s block and two 1s blocks (33), leaving one 10s block and two 1s blocks (12). The second group gets one 10s block and two 1s blocks (33), leaving one 10s block and two 1s blocks (12). The third group gets one 10s block and two 1s blocks (33), leaving one 10s block and two 1s blocks (12). The final result is 14 (one 10s block and four 1s blocks).</p>	<p>Children to be able to make sense of the place value counters and write calculations to show the process.</p> $42 \div 3$ $42 = 30 + 12$ $30 \div 3 = 10$ $12 \div 3 = 4$ $10 + 4 = 14$

Division

Dia 19

Year 4/5/6: short division

Concrete	Pictorial	Abstract
<p>Short division using place value counters to group. $615 \div 5$</p>  <p>1. Make 615 with place value counters. 2. How many groups of 5 hundreds can you make with 6 hundred counters? 3. Exchange 1 hundred for 10 tens. 4. How many groups of 5 tens can you make with 11 ten counters? 5. Exchange 1 ten for 10 ones. 6. How many groups of 5 ones can you make with 15 ones?</p>	<p>Represent the place value counters pictorially.</p> 	<p>Children to the calculation using the short division scaffold.</p> $\begin{array}{r} 123 \\ 5 \overline{) 615} \\ \underline{5} \\ 11 \\ \underline{10} \\ 15 \\ \underline{15} \\ 0 \end{array}$

Division

Dia 20




Year 4/5/6: long division

Long division using place value counters

$$2544 \div 12$$




1000s	100s	10s	1s
			

We can't group 2 thousands into groups of 12 so will exchange them.

1000s	100s	10s	1s
			




We can group 24 hundreds into groups of 12 which leaves with 1 hundred.

$$\begin{array}{r} 02 \\ 12 \overline{) 2544} \\ \underline{24} \\ 1 \end{array}$$

1000s	100s	10s	1s
			

After exchanging the hundred, we have 14 tens. We can group 12 tens into a group of 12, which leaves 2 tens.

$$\begin{array}{r} 021 \\ 12 \overline{) 2544} \\ \underline{24} \\ 14 \\ \underline{12} \\ 2 \end{array}$$

1000s	100s	10s	1s
			

After exchanging the 2 tens, we have 24 ones. We can group 24 ones into 2 groups of 12, which leaves no remainder.

$$\begin{array}{r} 0212 \\ 12 \overline{) 2544} \\ \underline{24} \\ 14 \\ \underline{12} \\ 24 \\ \underline{24} \\ 0 \end{array}$$