

Year 1 - addition

Objective/s

Concrete

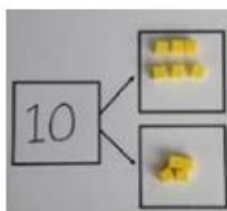
Pictorial

Abstract

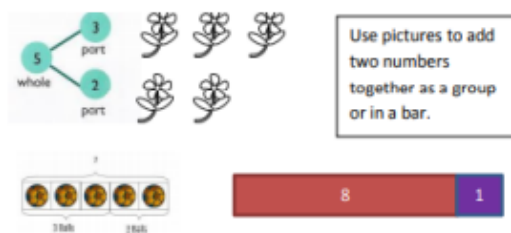
To combine two parts to make a whole: part-whole mode.



Use cubes to add two numbers together as a group or in a bar.



Use part whole models with cubes or counters to help represent parts and the whole.



The Bar Model will be continued from EYFS as a method to support problem solving involving addition, continuing with the concrete representations and moving onto using pictorial representations of objects. Some children will also move onto the abstract.



Use the bar model with pictorial representation of objects.



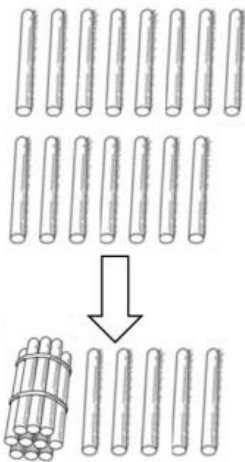
Use the part-part whole diagram as shown above to move into the abstract.

$$4 + 3 = 7$$

$$10 = 6 + 4$$

Use the part part whole model to help move to the abstract.

To use addition of one-digit and two-digit numbers to 20 including 0.



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

$$6 + 3 = 9$$



Start at the larger number on the number line and count on in ones.

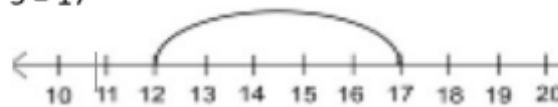
$$5 + 12 = 17$$

$$17 = 12 + 5$$

To start at the bigger number and counting on.

Start with the larger number on the bead string and then count of to the smaller number 1 by 1 to find the answer.

$$12 + 5 = 17$$



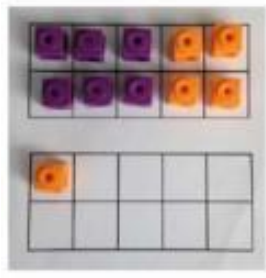
Start at the larger number on the number line and count on in ones or in one jump to find the answer.

Place the larger number in your head and count on the smaller number to find your answer.

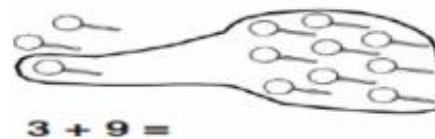
To regroup to make 10.



$$6 + 5 = 11$$

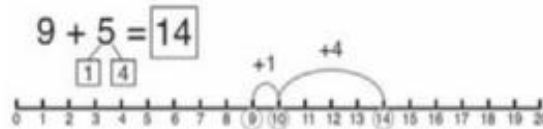


Ensure the children start with the biggest number and use the smaller number to make 10. Use a tens frame to support seeing this visually.

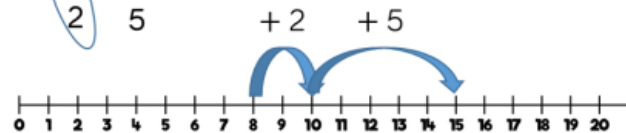


$$3 + 9 =$$

Use pictures or a number line. Regroup or Partition the smaller number using the part part whole model to make 10.



$$8 + 7 = 15$$



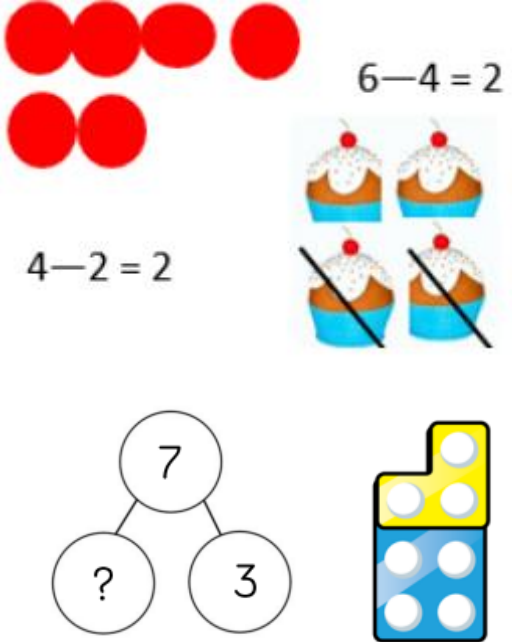
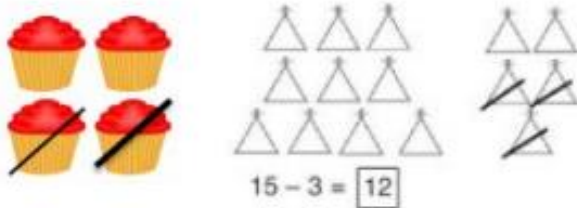
$$7 + 4 = 11$$

If I am at seven, how many more do I need to make 10. How many more do I add on now?

Key Vocabulary

add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, balancing, part, part, whole

Year 1 - subtraction

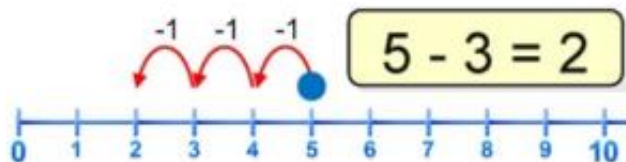
Objective/s	Concrete	Pictorial	Abstract
<p>To subtract one-digit and two-digit numbers to 20, including 0. Taking away ones.</p>	 <p> $6 - 4 = 2$ $4 - 2 = 2$ </p> <p> $7 - 3 = 4$ </p> <p>Children should use physical objects to show how objects can be used to take away. Resources such as counters, cubes, Numicon, classroom resources, etc.</p>	<p>Cross out drawn objects to show what has been taken away.</p>  <p> $15 - 3 = 12$ </p> <p>Children should learn to cross out pictures to represent what number has been taken away.</p>	<p> $7 - 4 = 3$ $16 - 9 = 7$ </p>

To count back.

Use counters and move them away from the group as you take them away counting backwards as you go.



Children should use counters, multilink and other physical resources to take them away from the group. This will support with counting backwards.

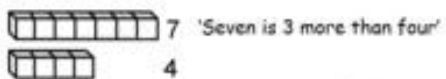


When counting back on a number line, ensure that the children start with the biggest number and count back the smallest number. They must show the jumps on the number line.

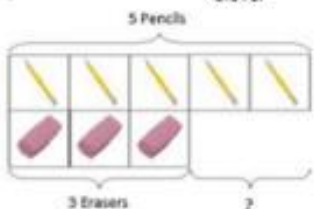
Put 13 in your head, count back 4. What number are you at? (Use your fingers to help you)

To find the difference.

Compare objects and amounts

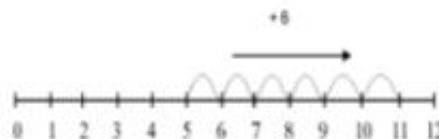


'I am 2 years older than my sister'



Lay objects to represent bar model.

Children should compare amounts to find the difference. Using cubes to make towers will help represent the

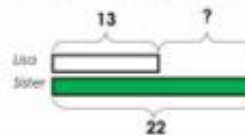


Count on to find the difference.

Comparison Bar Models

Draw bars to find the difference between 2 numbers.

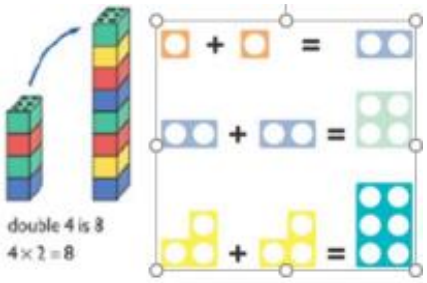

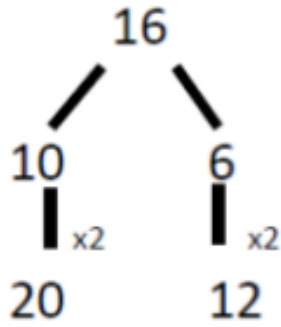

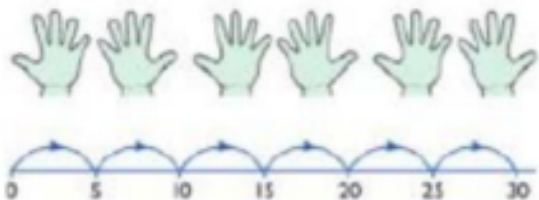
Lisa is 13 years old. Her sister is 22 years old. Find the difference in age between them.



Hannah has 12 sweets and her sister has 5. How many more does Hannah have than her sister?

	children's work in the bar model for them to see the different. Alternatively, use Numicon shapes to see the difference.		
Key Vocabulary	equal to, take, take-away, less, minus, subtract, leaves, distance between, how many more, how many fewer/less than, most, least, count back, how many left, how much less is...		

Year 1 - multiplication

Objective/s	Concrete	Pictorial	Abstract
<p>To be able to double.</p>	<p>Use practical activities using manipulatives including cubes and Numicon to demonstrate doubling.</p> 	<p>Draw pictures to show how to double numbers.</p> <p style="text-align: center;">=</p> <p style="text-align: center;">Double 4 is 8</p> 	<p>Partition a number and then double each part before recombining it back together.</p> 
<p>To count in multiples.</p>	<p>Count in multiples supported by concrete objects in equal groups.</p> 	<p>Use a number line or pictures to continue support in counting in multiples.</p> 	<p>Count in multiples of a number aloud. Write sequences with multiples of numbers.</p> <p style="text-align: center;">2, 4, 6, 8, 10</p> <p style="text-align: center;">5, 10, 15, 20, 25, 30</p>

To use repeated addition.

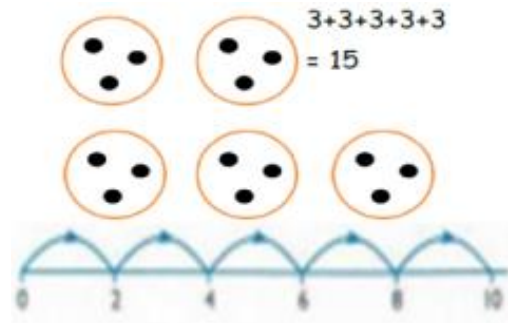


Use different objects to add equal groups.

There are 3 plates. Each plate has 2 star biscuits on. How many biscuits are there?



Use pictorials including number lines to solve problems.



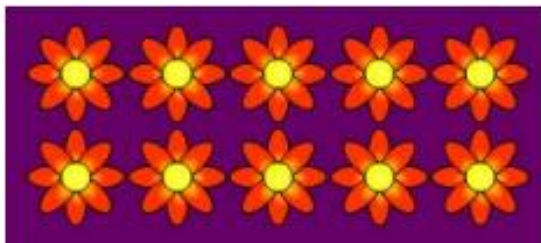
There are three sweets in one bag. How many sweets are in 5 bags altogether?

Write addition sentences to describe objects and pictures.



To understand arrays.

Use objects laid out in arrays to find the answers to 2 lots of 5, 3 lots of 2 etc.



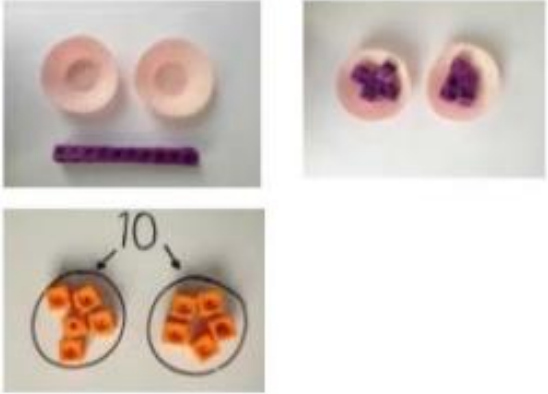
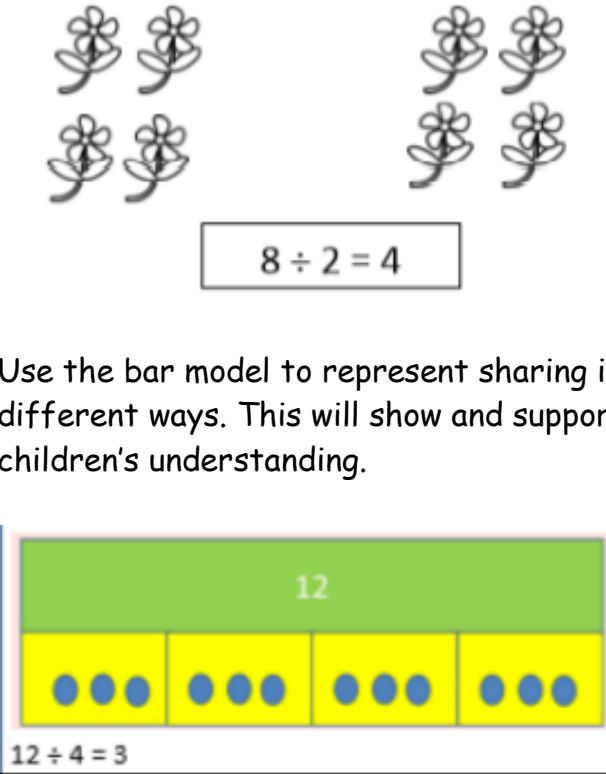
$$3 \times 2 = 6$$

$$2 \times 5 = 10$$

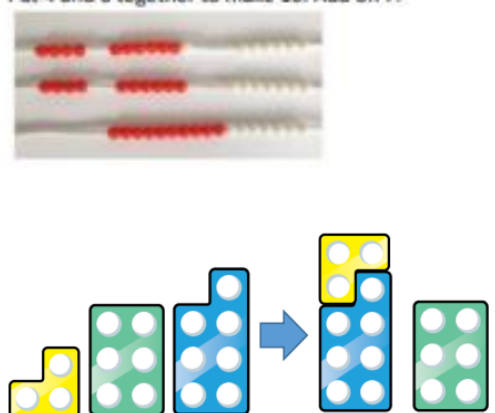
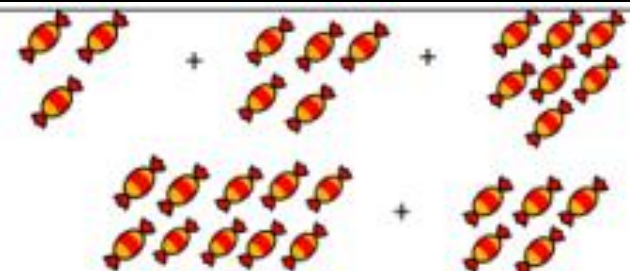
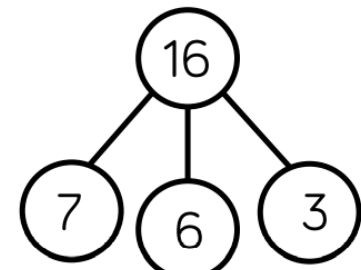
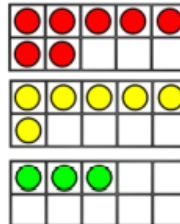
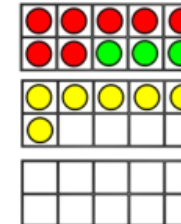
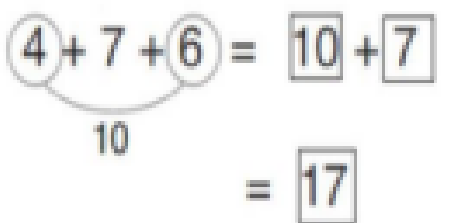

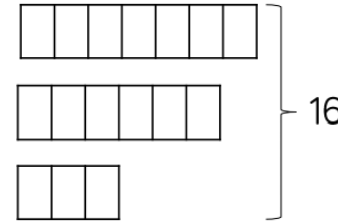
Key Vocabulary

groups of, lots of, times, array, altogether, multiply.

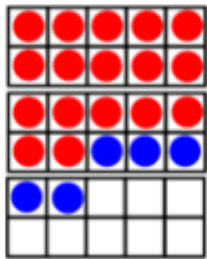
Year 1 - division

Objective/s	Concrete	Pictorial	Abstract
<p>To use division as sharing (sharing objects into groups).</p>	 <p>Use objects to visually represent numbers to share equally. For example, I have 10 cubes, can you share them into two equal groups?</p>	<p>Use pictures or shapes to share quantities.</p>  <p>Use the bar model to represent sharing in different ways. This will show and support children's understanding.</p>	<p>Share 9 buns between three people.</p> $9 \div 3 = 3$ <p>Use written calculations and word problems for children to see and solve calculations.</p>
<p>Key Vocabulary</p>	<p>share, share equally, one each, two each..., group, groups of, lots of, array.</p>		

Year 2 - addition

Objective/s	Concrete	Pictorial	Abstract
<p>To add 3 1-digit numbers.</p>	<p>$4 + 7 + 6 = 17$ Put 4 and 6 together to make 10. Add on 7.</p>  <p>Follow on from making 10, make 10 with 2 of the digits (if possible) then add on the third digit. Alternatively, children should find doubles to add the numbers more efficiently. Children should begin to look for number patterns.</p>	 <p style="text-align: center;">Add together three groups of objects. Draw a picture to recombine the groups to make 10.</p> <div style="text-align: center;">  </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div>	<div style="text-align: center;">  </div> <p style="text-align: center;">Combine the two numbers that make 10 and then add on the remainder.</p> <div style="text-align: center; margin: 10px 0;"> $7 + 6 + 3 = 16$ </div> <div style="display: flex; align-items: center; justify-content: center;"> <div style="text-align: center; margin-right: 20px;"> $7 + 6 + 3 = 16$  </div> <div style="text-align: center;">  </div> </div>

To add a 2-digit number and ones.



$$17 + 5 = 22$$

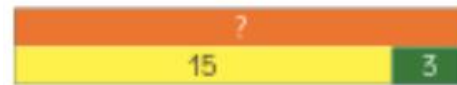
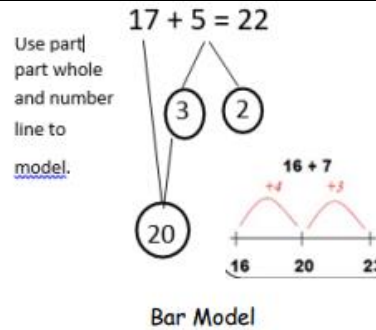
Use ten frame to make 'magic ten'

Children explore the pattern.

$$17 + 5 = 22$$

$$27 + 5 = 32$$

Children to use and explore patterns in numbers. Using a tens frame to show and make tens and looking for ones. Children should identify that if they know what $17 + 5$ equals, they should know what $27 + 5$ equals. **Ensure that the children count on from the largest number.**



$$17 + 5 = 22$$

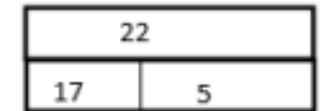
Explore related facts

$$17 + 5 = 22$$

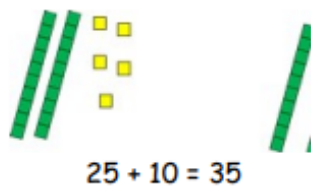
$$5 + 17 = 22$$

$$22 - 17 = 5$$

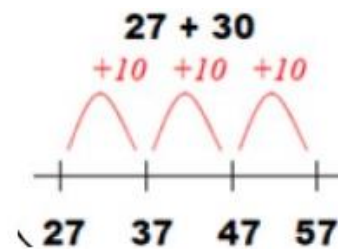
$$22 - 5 = 17$$



To add a 2-digit number and multiples of 10.



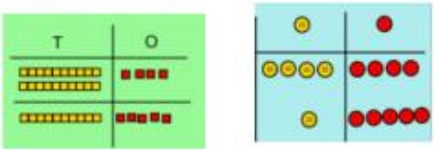

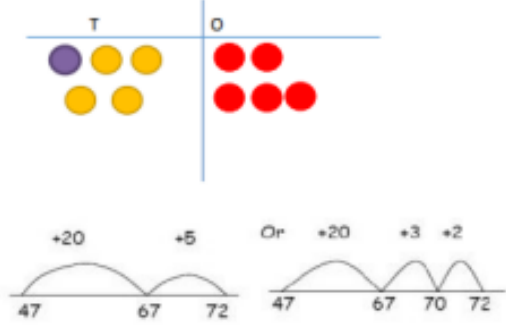
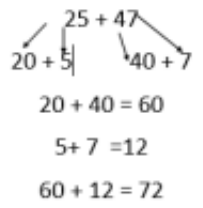
$$25 + 10 = 35$$



$$27 + 10 = 37$$

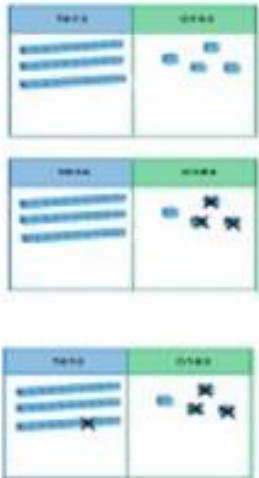

$$27 + 20 = 47$$

$$27 + \square = 57$$

	<p>Explore that the ones digit does not change. Give the children a variety of objects such as dienes and multilink to represent this.</p>	<p>Base 10 may be used above the number line initially. The calculation will be shown alongside the number line to see the connection.</p>	
<p>To add two 2-digit numbers (No re-grouping).</p>	<p style="text-align: center;">24 + 15 =</p> <p style="text-align: center;"><small>Add together the ones first then add the tens. Use the Base 10 blocks first before moving onto place value counters.</small></p>   <p>Some children in Year 2 may not be ready to use place value, Numicon can be used instead.</p> <p>When using place value counters, encourage children to add the ones to make ten first.</p>	<p style="text-align: center;"><small>After practically using the base 10 blocks and place value counters, children can draw the counters to help them to solve additions.</small></p>  <p>If necessary, use number lines and bridge ten using part whole models. Base 10 may be used but must be above the number line.</p> <p>The calculation must be shown alongside the number line to see the connection.</p>	<p style="text-align: center;">Partitioning:</p>  <p style="text-align: center;"><i>Recording addition in columns supports place value and prepares for formal written methods with larger numbers.</i></p> <p style="text-align: center;">Toward the end of the year, children move to more formal recording using partitioning method:</p> <p style="text-align: center;">Recording addition in columns supports place value and prepares for formal written methods with larger numbers.</p>

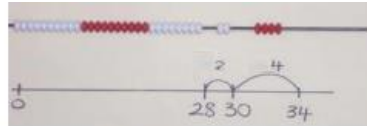
		<table border="1"><thead><tr><th>Model</th><th>Calculation</th></tr></thead><tbody><tr><td></td><td></td></tr></tbody></table> <p>This will be used to support problem solving. Children will focus on using the abstract representation with pictorial to support understanding.</p>	Model	Calculation			
Model	Calculation						
Key Vocabulary	add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, addition, column, tens boundary						

Year 2 - subtraction

Objective/s	Concrete	Pictorial	Abstract				
<p>To subtract a two-digit number and ones, a two-digit number and tens, two two-digit numbers. Partitioning to subtract without regrouping.</p>	<p>$34 - 13 = 21$</p>  <p>Use dienes to show how to partition the number when subtracting without regrouping. Make the biggest number and model how to subtract by moving the dienes.</p> <p>The calculation will be shown alongside the manipulative used</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Model</th> <th style="text-align: center;">Calculation</th> </tr> </thead> <tbody> <tr> <td style="height: 20px;"></td> <td style="height: 20px;"></td> </tr> </tbody> </table>	Model	Calculation			 <p style="text-align: center;">$43 - 21 = 22$</p> <p>Children should draw representations of dienes and cross off when subtracting.</p>	<p>$43 - 21 = 22$</p> <p><i>Recording subtraction in columns supports place value and prepares for formal written methods with larger numbers. Toward the end of the year, children move to more formal recording using partitioning method:</i></p> <p>e.g. $43 - 21 = 22$</p> <p style="margin-left: 20px;"> $\begin{array}{r} 40 \text{ and } 3 \\ -20 \text{ and } 1 \\ \hline 20 \text{ and } 2 \end{array}$ </p> <p>Record subtraction in columns supports place value and prepares for formal written methods with larger numbers.</p>
Model	Calculation						

Consider also using place value counters, Numicon and multilink.

To use the make ten strategy.

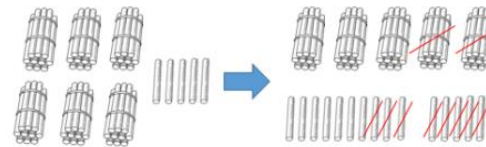
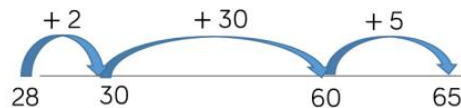


$$34 - 28$$

Use a bead bar or bead strings to model counting to next ten and the rest.

As bead strings are not used, dienes, Numicon, place value counters and other resources will support in making strategies.

Use a number line to count on to the next ten and then count the rest. Ensure the children count in jumps of 10 to become more efficient.



$$47 - 24 = 23$$

$$\begin{array}{r} 40 + 7 \\ - 20 + 4 \\ \hline 20 + 3 \end{array}$$

This will lead to a clear subtraction.

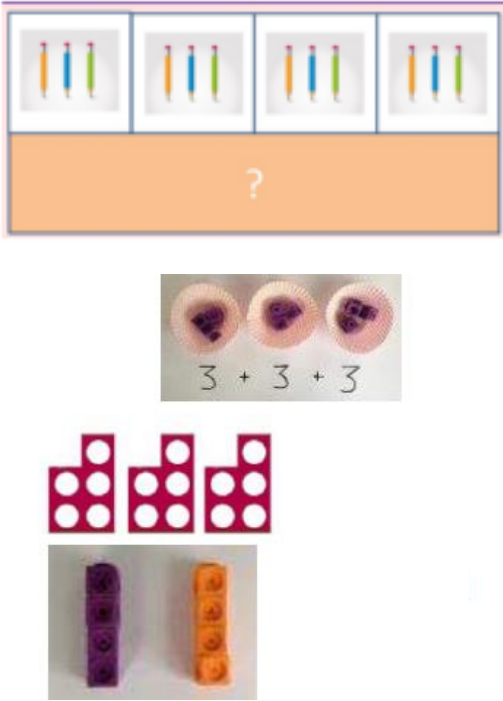
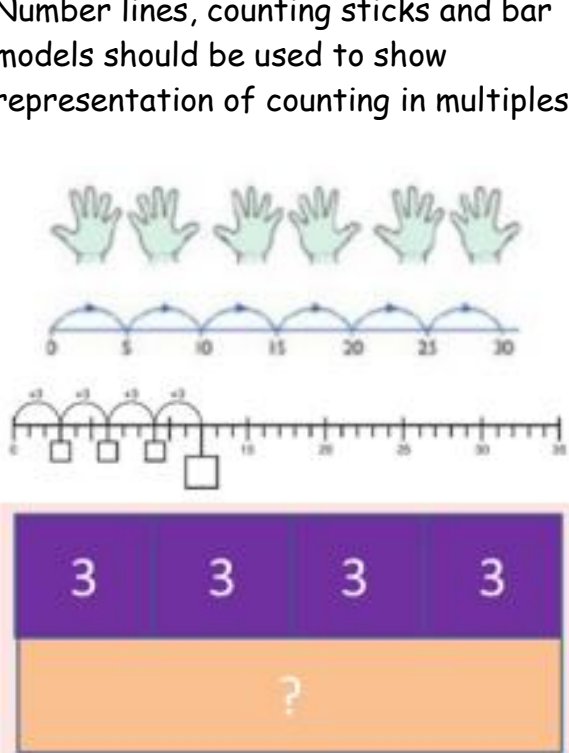
$$\begin{array}{r} 32 \\ - 12 \\ \hline 20 \end{array}$$

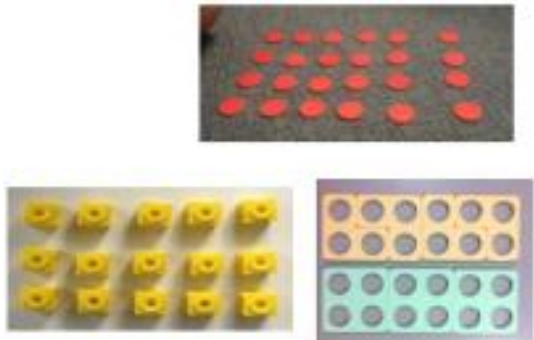
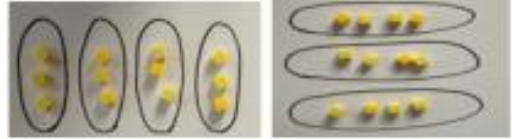
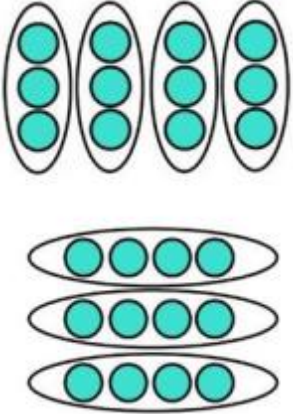


Using the method above, children will be able to clearly see the tens and ones. This will support the children in seeing a clear written column method.

Key Vocabulary

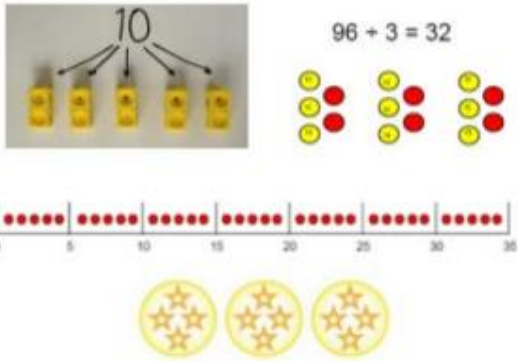
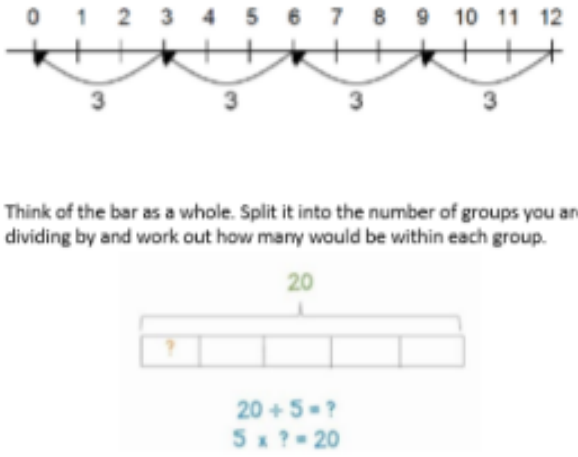
equal to, take, take-away, less, minus, subtract, leaves, distance between, how many more, how many fewer/less than, most, least, count back, how many left, how much less is...difference, count on, strategy, partition, tens units

Year 2 - multiplication

Objective/s	Concrete	Pictorial	Abstract
<p>To count in multiples of 2, 3, 4, 5 and 10 from 0. (Repeated addition).</p>	 <p>Children should use a variety of objects when looking at multiples. Children should understand how to make equal groups each time.</p>	<p>Number lines, counting sticks and bar models should be used to show representation of counting in multiples.</p> 	<p>Count in multiples of a number aloud.</p> <p>Write sequences with multiples of numbers.</p> <p>0, 2, 4, 6, 8, 10</p> <p>0, 3, 6, 9, 12, 15</p> <p>0, 5, 10, 15, 20, 25, 30</p> $4 \times 3 = \square$

<p>To understand multiplication is commutative. (Arrays).</p>	<p>Create arrays using counters, cubes and Numicon.</p>  <p>Pupils should understand that an array can represent different equations and that, as multiplication is commutative, the order of the multiplication does not affect the answer.</p> 	<p>Use representations of arrays to show different calculations and explore commutativity.</p>  <p>$4 \times 2 = 8$</p> <p>$2 \times 4 = 8$</p>  <p>$2 \times 4 = 8$</p> <p>$4 \times 2 = 8$</p>	<p>$12 = 3 \times 4$</p> <p>$12 = 4 \times 3$</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>Use an array to write multiplication sentences and reinforce repeated addition.</p>  <p>$5 + 5 + 5 = 15$</p> <p>$3 + 3 + 3 + 3 + 3 = 15$</p> <p>$5 \times 3 = 15$</p> <p>$3 \times 5 = 15$</p> </div>
<p>Key Vocabulary</p>	<p>groups of, lots of, times, array, altogether, multiply, multiplied by, repeated addition, sets of, equal groups, times as big as, commutative</p>		

Year 2 - division

Objective/s	Concrete	Pictorial	Abstract
<p>To use division as grouping.</p>	<p>Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding.</p> 	<p>Use a number line to show jumps in groups. The number of jumps equals the number of groups.</p>  <p>Think of the bar as a whole. Split it into the number of groups you are dividing by and work out how many would be within each group.</p>	<p style="text-align: center;">$28 \div 7 = 4$</p> <p style="text-align: center;">Divide 28 into 7 groups. How many are in each group?</p>
<p>Key Vocabulary</p>	<p>share, share equally, one each, two each..., group, groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over</p>		