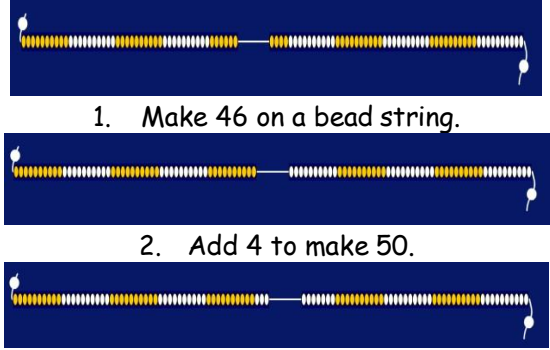
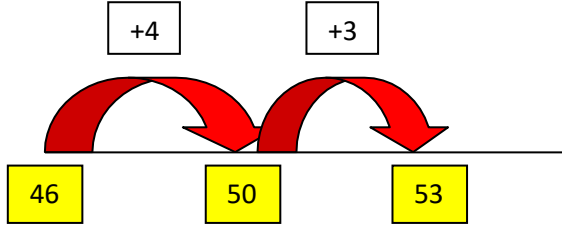
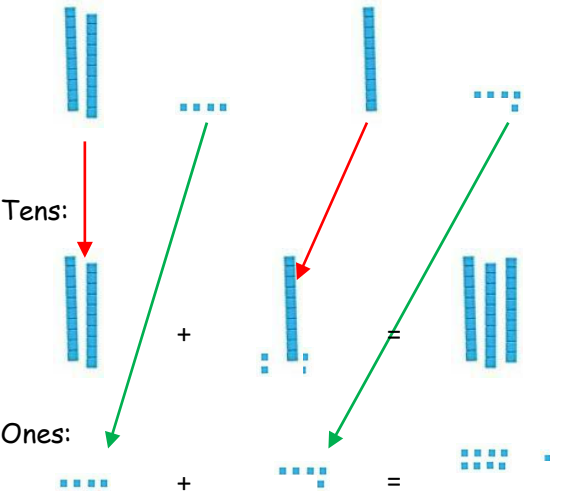
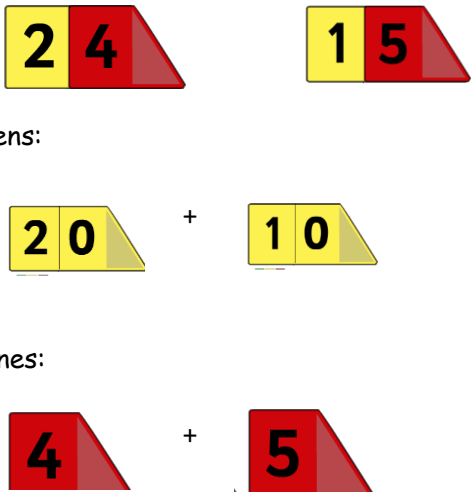




Mental Recall	Strategies
<ul style="list-style-type: none"> <li>Recall all +/- facts to - and within - 20</li> <li>Find different ways to answer (e.g. <math>\square + \square = 15</math>)</li> <li>Recall all multiples of 10 pairs to 100 - e.g. <math>60 + 40</math></li> <li>Recall all doubles within 20 - e.g. double 17</li> <li>Know all doubles of multiples of tens (10 to 50)</li> <li>Family of facts - if <math>30 + 20 = 50</math>, <math>20 + 30 = 50</math>, <math>50 - 30 = 20</math> and <math>50 - 20 = 30</math> (link to the bar model) (see example below)</li> </ul>	<ul style="list-style-type: none"> <li><b>Use known facts</b> - e.g. if I know <math>2 + 3 = 5</math>, then <math>20 + 30 = 50</math>..</li> <li><b>Bridge through 10</b> - e.g. <math>26 + 7 = 26 + 4 + 3</math> (see example below)</li> <li><b>Partition into T &amp; O</b> - e.g. <math>24 + 15 = 20 + 10</math> and <math>4 + 5</math> (see example below)</li> <li><b>Partition the second number</b> - e.g. <math>24 + 15 = 24 + 10 + 5</math> (see example below)</li> <li><b>+ /- a multiple of 10 to/from any 2-digit number</b>- e.g. <math>67 + 20 = 87</math> (T digit changes) (see example below)</li> <li><b>Smile Maths / Magic 10</b> - add 3 1-digit numbers- e.g. <math>3 + 5 + 7</math></li> <li><b>Round and adjust</b>- <math>+9 / +11 / -9 / -11</math> by adding 10 and adjusting - e.g. add 9 by adding 10, subtracting 1 (see example below)</li> </ul>

Year Group objectives:	Concrete	Pictorial	Abstract
	Addition		
solve problems with addition and subtraction  using concrete objects and pictorial representations, including those involving numbers, quantities and measures  applying their increasing knowledge of mental	<p style="text-align: center;">If <math>30 + 20 = 50</math>, then <math>20 + 30 = 50</math>, <math>50 - 30 = 20</math> and <math>50 - 20 = 30</math></p> <div style="text-align: center;"> </div> <p style="text-align: center;">Use of Base 10 equipment to represent 20, 30 and 50 that can be easily manipulated.</p>	<p style="text-align: center;">If <math>30 + 20 = 50</math>, then <math>20 + 30 = 50</math>, <math>50 - 30 = 20</math> and <math>50 - 20 = 30</math></p> <div style="text-align: center;"> </div> <p style="text-align: center;">Use of a bar model progressing to missing numbers:</p>	<p style="text-align: center;">If <math>30 + 20 = 50</math>, then <math>20 + 30 = 50</math>, <math>50 - 30 = 20</math> and <math>50 - 20 = 30</math></p> <div style="text-align: center;"> </div>

<p>and written methods</p> <p>recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100</p> <p>add and subtract numbers using concrete objects, pictorial representations, and mentally, including:</p> <ul style="list-style-type: none"> <li>- a two-digit number and 1s</li> <li>- a two-digit number and 10s</li> <li>- 2 two-digit numbers</li> <li>- adding 3 one-digit numbers</li> </ul> <p>show that addition of 2 numbers can be done in any order (commutative) and</p>	<p>Bridge through 10</p>	<p style="text-align: center;"><math>46 + 7 = 46 + 4 + 3</math></p>  <p style="text-align: center;">1. Make 46 on a bead string.</p> <p style="text-align: center;">2. Add 4 to make 50.</p> <p style="text-align: center;">3. Add 3 to make 53.</p>	<p style="text-align: center;"><math>46 + 7 = 46 + 4 + 3</math></p> 	<p style="text-align: center;"><math>46 + 7 = 46 + 4 + 3</math></p> <p style="text-align: center;"><math>46 + 4 = 50</math></p> <p style="text-align: center;"><math>50 + 3 = 53</math></p>
<p>show that addition of 2 numbers can be done in any order (commutative) and</p>	<p>Partition into T &amp; O</p>	<p style="text-align: center;"><math>24 + 15 = 20 + 10</math> and <math>4 + 5</math></p>  <p>Tens:      +      =</p> <p>Ones:      +      =</p>	<p style="text-align: center;"><math>24 + 15 = 20 + 10</math> and <math>4 + 5</math></p>  <p>Tens:      +      =</p> <p>Ones:      +      =</p>	<p style="text-align: center;"><math>24 + 15 = 20 + 10</math> and <math>4 + 5</math></p> <p style="text-align: center;"><math>20 + 10 = 30</math></p> <p style="text-align: center;"><math>4 + 5 = 9</math></p> <p style="text-align: center;"><math>30 + 9 = 39</math></p>

subtraction of 1 number from another cannot recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems

Partition the second number

$$24 + 15 = 24 + 10 + 5$$



1.  $24 + 10 = 34$



2.  $34 + 5$



Answer = 39

$$24 + 15 = 24 + 10 + 5$$

1. Make 24 and 15 using arrow cards.



2. Partition the 15 into 10 and 5.



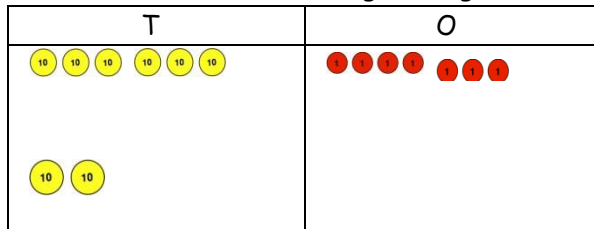
$$24 + 15 = 24 + 10 + 5$$

$$20 + 10 = 30$$

$$30 + 5 = 39$$

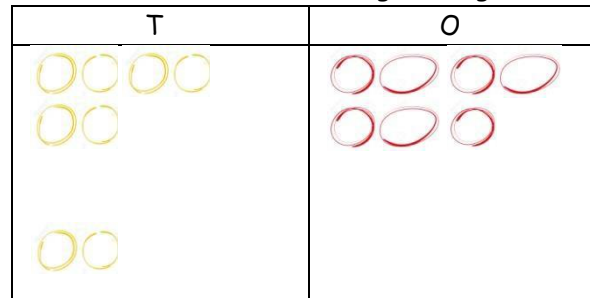
+ /- a multiple of 10 to/from any 2-digit number

$$67 + 20 = 87 \text{ (Tens digit changes)}$$



Use of place value counters to + or - the tens in the correct column.

$$67 + 20 = 87 \text{ (Tens digit changes)}$$



Move into using the place value chart but + or - the tens by drawing the representations in the correct column.

Children can also use arrow cards:



Notice that only the tens column changes.

$$67 + 20 = 87 \text{ (Tens digit changes)}$$


TO TO

$$67 + 20 = 87$$

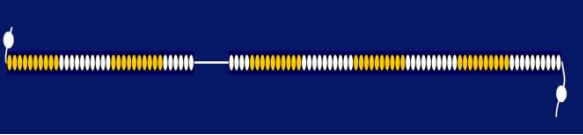
Round and adjust

+9 / +11 / -9 / -11 by adding 10 and adjusting - e.g. add 9 by adding 10, subtracting 1  
26 + 9 (26 add 10, subtract 1)


1. Make 26 on a bead string.



2. Add 10 to make 36

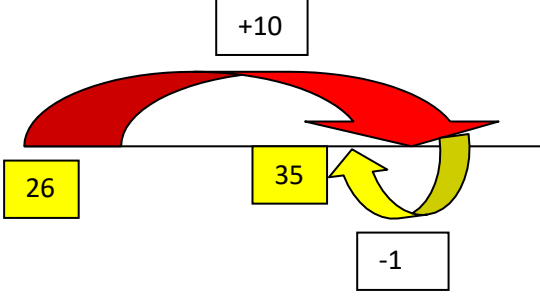


3. Subtract one to make 35



+9 / +11 / -9 / -11 by adding 10 and adjusting - e.g. add 9 by adding 10, subtracting 1  
26 + 9 (26 add 10, subtract 1)

Use of a number line:



+9 / +11 / -9 / -11 by adding 10 and adjusting - e.g. add 9 by adding 10, subtracting 1  
26 + 9 (26 add 10, subtract 1)

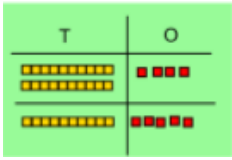
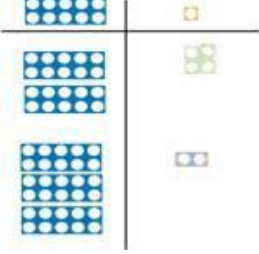
$$26 + 10 = 36$$

$$36 - 1 = 35$$

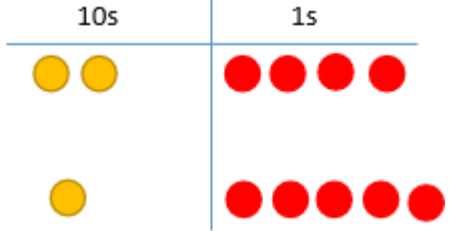
Column method without regrouping  
 (non-statutory - transition to Y3)

Add together the ones first then add the tens.  
 Use the Base 10 blocks /numicon plates first before moving onto place value counters

24 + 15 =                      24 + 32 =

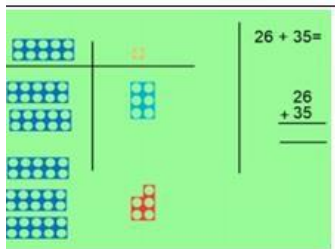



After physically using the base 10 blocks and place value counters, children can draw the counters to help them to solve additions.



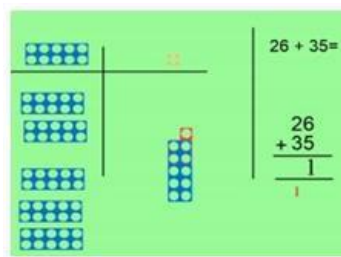
TO	TO
<b>24 + 15 = 39</b>	
20 + 4	
+ 10 + 5	
-----	
<b>30 + 9 = 39</b>	

Column method with regrouping  
(non-statutory - transition to Y3)

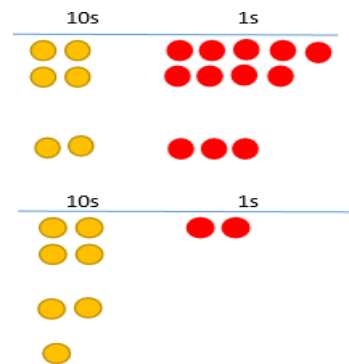


Make both numbers on a place value grid

Add up the units and exchange 10 ones for one 10.



Using place value counters, children can draw the counters to help them to solve additions.



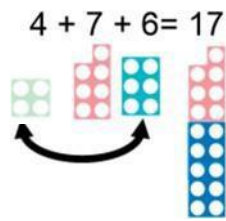
$$\begin{array}{r} \text{TO} \quad \text{TO} \\ 49 + 23 = 72 \end{array}$$

$$\begin{array}{r} 40 + 9 \\ + 20 + 3 \end{array}$$

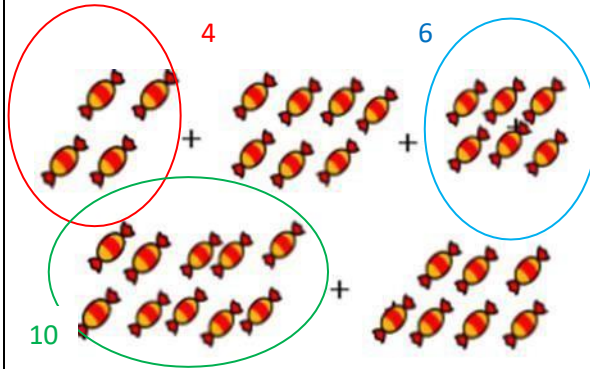
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$$60 + 12 = 72$$

Adding three single digit



Put 4 and 6 together to make 10. Add on 7. Following on from making 10, make 10 with 2 of the digits (if possible) then add on the third digit



Add together three groups of objects. Draw a picture to recombine the groups to make 10.

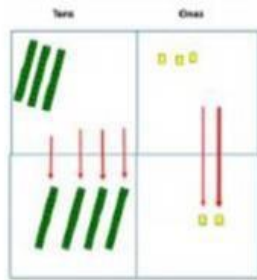
### 'Smile maths'

Combine the two numbers that make 10 and then add on the remainder.

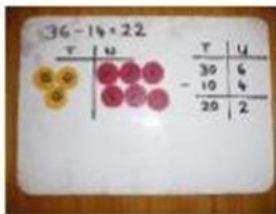
$$\begin{aligned} \textcircled{4} + \textcircled{7} + \textcircled{6} &= \boxed{10} + \boxed{7} \\ \text{10} & \\ &= \boxed{17} \end{aligned}$$

Column method without regrouping (non-statutory - transition to Y3)

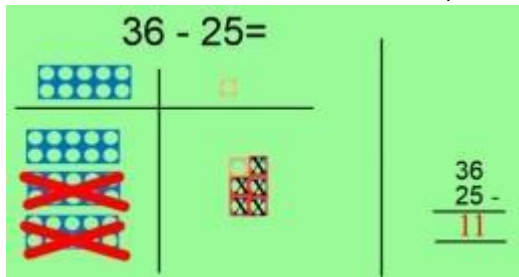
$$74 - 42 = 32$$



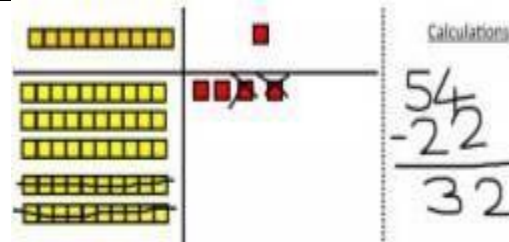
Use Base 10 to make the bigger number then take the smaller number away.



Show how you partition numbers to subtract. Again make the larger number first



### Subtraction

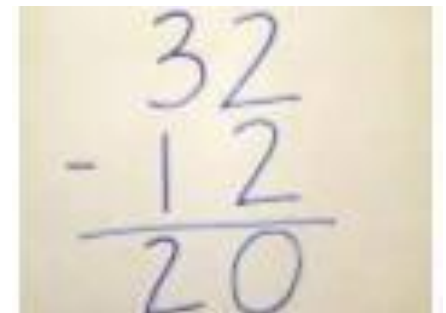


Draw the Base 10 or place value counters alongside the written calculation to help to show working

$$47 - 24 = 23$$

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

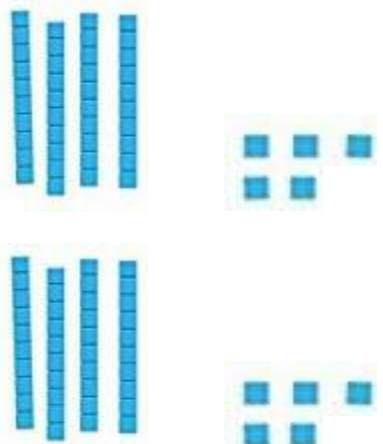
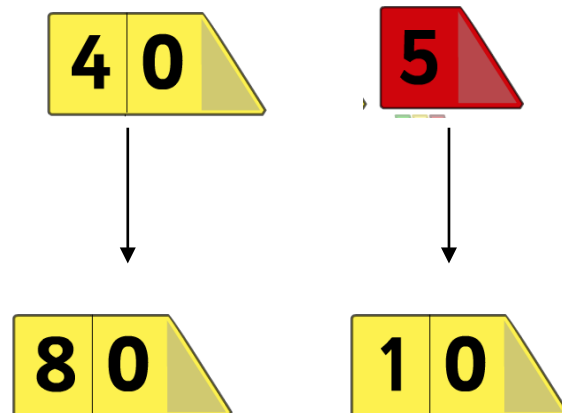
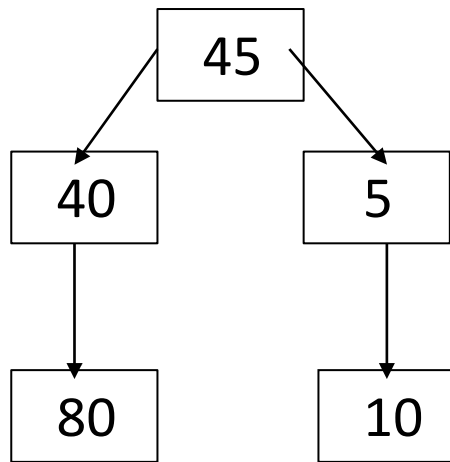
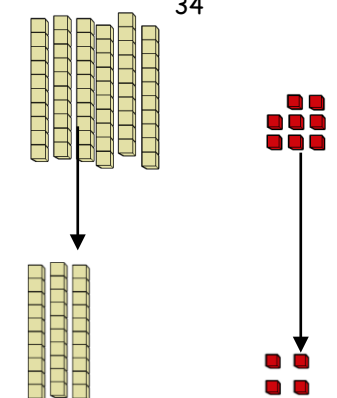
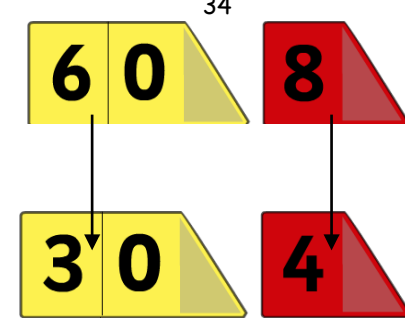
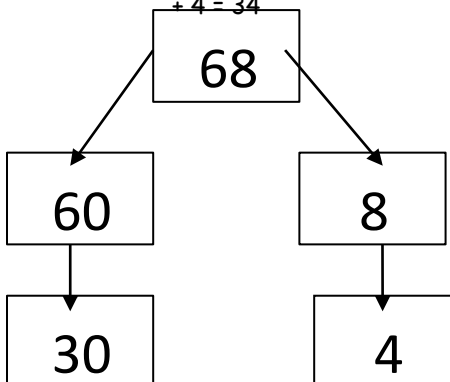
This will lead to clear written subtraction.





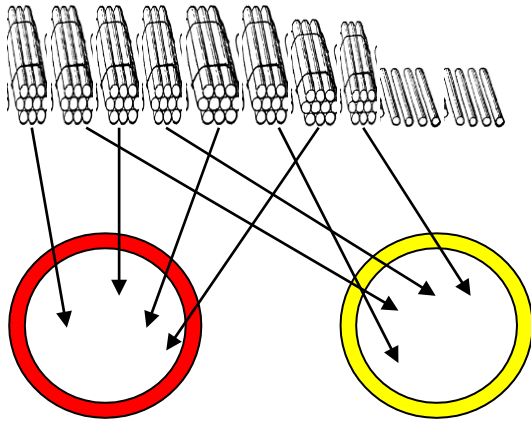
Mental Recall		Strategies		
<ul style="list-style-type: none"> <li>Know odd and even numbers to 100</li> <li>Recall multiplication and corresponding division facts for the 2, 10 and 5 X tables (to the 12 x...)</li> <li>Recall doubles of all numbers within 20 - e.g. double 13 = 26 (inc money examples)</li> <li>Know halves of numbers within 20 - e.g. half of 32 = 16 (inc money examples)</li> <li>Know doubles and corresponding halves of multiples of 10 to 50 - e.g. double 40 = 80 and half of 60 = 30</li> </ul>		<ul style="list-style-type: none"> <li><b>Double any multiple of 5</b> up to and including 50 - e.g. double 35... (see example below)</li> <li><b>...partition, double and recombine</b> - e.g. double 45 = double 40 + double 5 = 80 + 10 = 90 (see example below)</li> <li><b>Find half of an even number - partition, halve, recombine</b> - e.g. half of 68 = half of 60 and half of 8 = 30 + 4 = 34 (see example below)</li> <li><b>Halve any multiple of 10 up to and including 100 - partition, halve, recombine</b> (see example below)</li> <li><b>(x by 10 moves the digit one place to the left and needs '0' as a place holder (?))</b> - e.g. 4 x 10 = 40, so the '4' moves and we need the '0' to make 40...NOT ADD A ZERO!</li> <li><b>Use the inverse</b> - to find missing numbers in number sentences / calculations (see example below)</li> </ul>		
Year Group objectives:		Concrete	Pictorial	Abstract
		Multiplication		
<p>recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers</p> <p>calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (x), division (÷) and</p>	<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Double any multiple of 5 up to and including 50</p>	<p>Double 35 ...</p> <p>Use of Base 10 and other physical resources to represent and calculate two groups of (double) 35</p>	<p>Double 35 ...</p> <p>Draw pictures to show how to double a number (representing the Base 10 or other manipulatives)</p>	<p>Double 35 ...</p> <p>Double 35 is 70</p> <p><math>35 \times 2 = 70</math></p> <p><math>2 \times 35 = 70</math></p> <p>2 groups of 35 equal 70</p>



<p>equals (=) signs</p> <p>show that multiplication of 2 numbers can be done in any order (commutative) and division of 1 number by another cannot</p> <p>solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts</p>	<p>Partition, double and recombine</p>	<p>e.g. double 45 = double 40 + double 5 = 80 + 10 = 90</p> <p>Use of Base 10 and other physical resources to represent and calculate two groups of (double) 45</p> 	<p>e.g. double 45 = double 40 + double 5 = 80 + 10 = 90</p> <p>Use of arrow cards to partition 45 into 40 (4 tens) and 5 (5 ones)</p> 	<p>e.g. double 45 = double 40 + double 5 = 80 + 10 = 90</p>  <p>80 + 10 = 90</p>
	<p>Find half of an even number - partition, halve, recombine</p>	<p>e.g. half of 68 = half of 60 and half of 8 = 30 + 4 = 34</p>  <p>30 + 4 = 34</p>	<p>e.g. half of 68 = half of 60 and half of 8 = 30 + 4 = 34</p>  <p>30 + 4 = 34</p>	<p>e.g. half of 68 = half of 60 and half of 8 = 30 + 4 = 34</p>  <p>30 + 4 = 34</p>

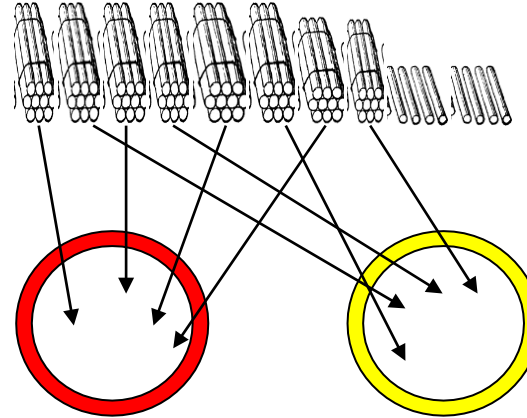
Halve any multiple of 10 up to and including 100  
- partition, halve, recombine

e.g. half of 90 ...  
Use of straws or other resources where a group of ten can be separated. Sharing into two groups:



8 bundles of 10 straws and 10 loose straws are sorted equally into two groups.

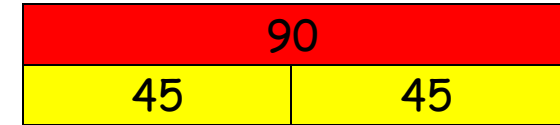
e.g. half of 90 ...  
A drawn illustration of the concrete use of straws or Base 10



8 bundles of 10 straws and 10 loose straws are sorted equally into two groups.

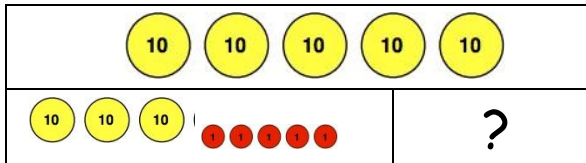
e.g. half of 90 ...

$$\begin{aligned} \text{Half of } 90 &= 45 \\ 90 \div 2 &= 45 \\ 90 \text{ shared between } 2 &= 45 \end{aligned}$$

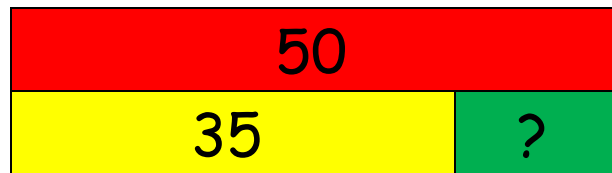


Use the inverse - to find missing numbers in number sentences /

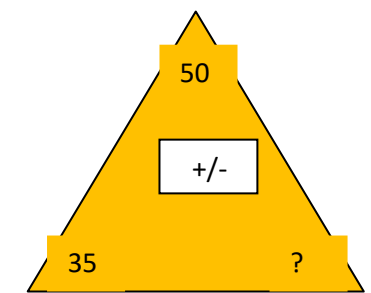
e.g. find the difference between 50 and 35  
Use of place value counters in a concrete bar model



e.g. find the difference between 50 and 35  
Children will move to including numerical values within a bar model



e.g. find the difference between 50 and 35  
Identifying the inter-relationship between the three numbers



Repeated addition



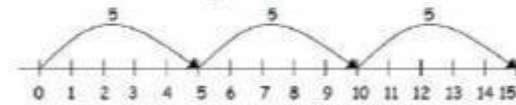
Use different objects

to add equal groups

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



$$2 + 2 + 2 = 6$$



$$5 + 5 + 5 = 15$$

$$3 \times 5 = 15$$

Write addition sentences to describe objects and pictures.

$$2 + 2 + 2 = 6$$



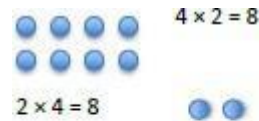
$$3 \times 2 = 6$$

Arrays - showing commutative multiplication

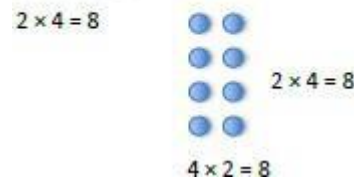
Create arrays using counters/cubes to show multiplication sentences.



Draw arrays in different rotations to find **commutative** multiplication sentences.



$$4 \times 2 = 8$$



$$2 \times 4 = 8$$

$$4 \times 2 = 8$$

Use an array to write multiplication sentences and reinforce repeated addition.



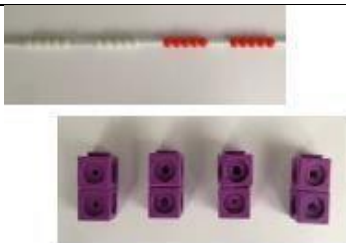
$$5 + 5 + 5 = 15$$

$$3 + 3 + 3 + 3 + 3 = 15$$

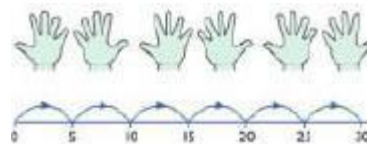
$$5 \times 3 = 15$$

$$3 \times 5 = 15$$

Count in multiples



Count in multiples supported by concrete objects in equal groups.



Use a number line or pictures to continue support in counting in multiple

Count in multiples of a number aloud.

Write sequences with multiples of numbers.

2, 4, 6, 8, 10

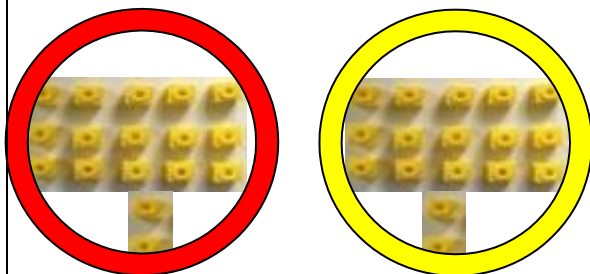
5, 10, 15, 20, 25, 30

3, 6, 9, 12, 15, 18

### Division

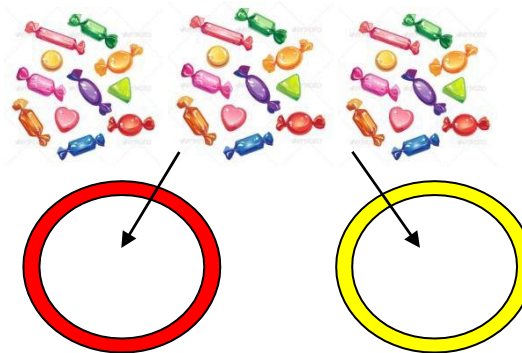
Sharing

I have 34 cubes, can you share them equally in 2 groups?



34 shared between 2 equals 17

Children use pictures or shapes to share quantities.

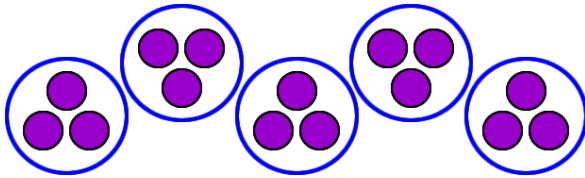


Share 34 buns between two people.

$$34 \div 2 = 17$$

Grouping

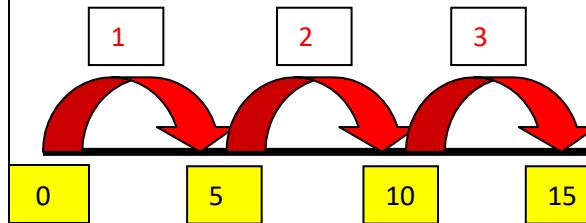
Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding.



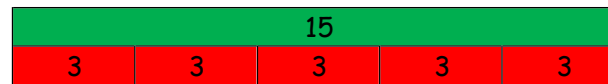
$$15 \div 3 = 5$$

Use of a number line to show jumps in groups. The number of jumps equals the number of groups.

$$15 \div 5 = 3$$




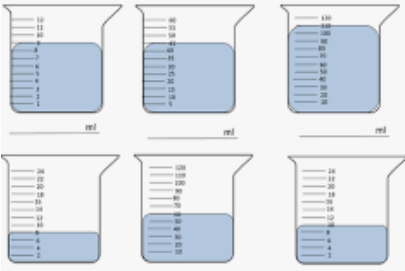



Think of the bar as a whole. Split it into the number of groups you are dividing by and work out how many would be within each group.

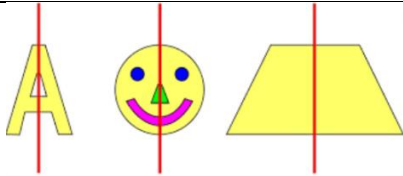

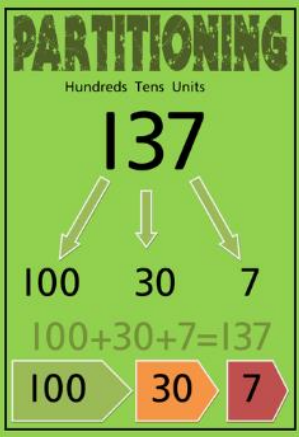


$$30 \div 5 = 6$$

Divide 30 into 5 groups. How many are in each group?



Vocabulary	Definition	Representation
anti-clockwise	A way of indicating the direction of a turn. Anti-clockwise involves a turn to the left, against the direction of a clock's hands.	 <p>Anti-Clockwise</p>
capacity	The amount of space in an object (the amount of liquid or air it contains)	
clockwise	A way of indicating the direction of a turn. Clockwise involves a turn to the right as if following the hands of the clock.	 <p>Clockwise</p>
difference	By how much a number is bigger or smaller than another eg the difference between 10 and 6 is 4.	
division	Is the splitting into equal parts or groups.	
even number	A number that can be shared equally between 2.	
greater than	The symbol used to represent greater than is an arrow pointing towards the	

	smallest number.	
less than	The symbol used to represent less than is an arrow pointing towards the smallest number.	$15 < 23$
line of symmetry	The "line of symmetry" (shown here in red) is the imaginary line where you could fold the image and have both halves match exactly.	
odd number	A number that when divided by two leaves a remainder of one.	
partition	Partitioning is a useful way of breaking numbers up so they are easier to work with. ... The number 23 can be broken down into 2 tens and 3 ones or 10 and 13.	



<b>total</b>	<b>A total is a whole or complete amount</b>	
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