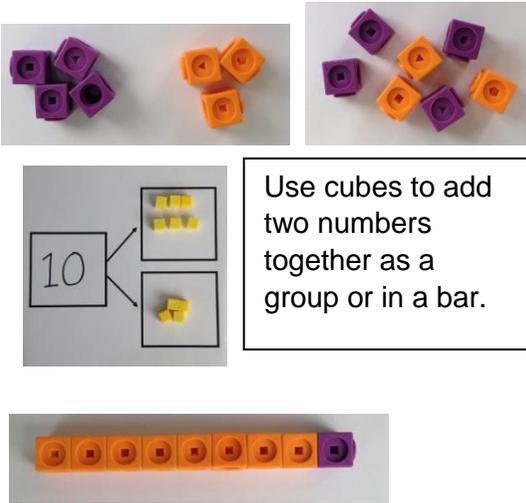
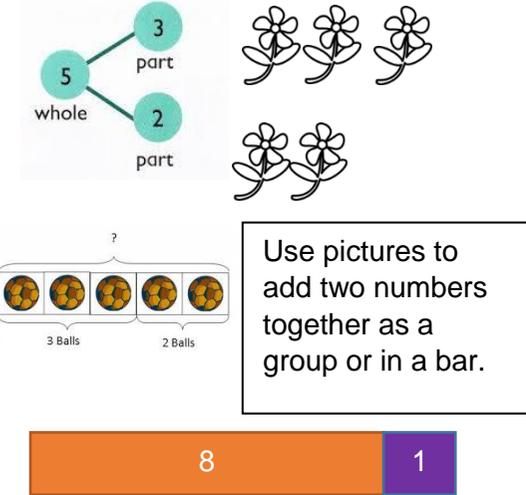
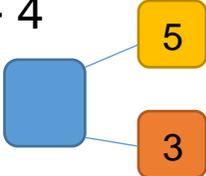


# KS1 Calculation Policy

## Addition

Year 1	Year 2		
Objective and Strategies	Concrete	Pictorial	Abstract
<p>Combining two parts to make a whole: part-whole model</p>	 <p>Use cubes to add two numbers together as a group or in a bar.</p>	 <p>Use pictures to add two numbers together as a group or in a bar.</p>	<p><math>4 + 3 = 7</math></p> <p><math>10 = 6 + 4</math></p>  <p>Use the part-part whole diagram as shown above to move into the abstract.</p>

- read, write and interpret mathematical statements involving addition (+) and equals (=) signs.
- represent and use number bonds within 20
- add one-digit and two-digit numbers to 20, including zero.
- solve one-step problems that involve addition, using concrete objects and pictorial representations, and missing number problems.

- solve problems with addition using concrete objects and pictorial representations, including those involving numbers, quantities and measures and applying their increasing knowledge of mental and written methods
- recall and use addition facts to 20 fluently, and derive and use related facts up to 100 add numbers using concrete objects, pictorial representations, and mentally, including: a two-digit number and ones, a two-digit number and tens, two two-digit numbers, adding three one-digit numbers.
- show that addition of two numbers can be done in any order (commutative)
- recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.

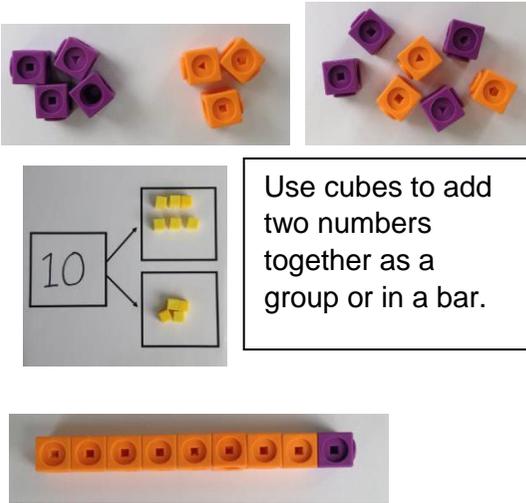
### Objective and Strategies

### Concrete

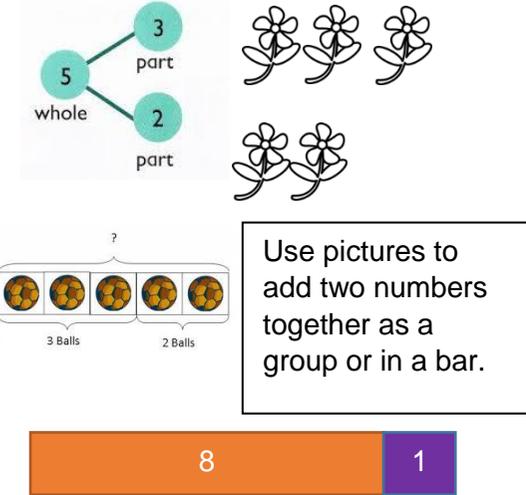
### Pictorial

### Abstract

Combining two parts to make a whole: part-whole model



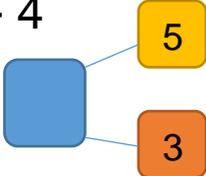
Use cubes to add two numbers together as a group or in a bar.



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

$4 + 3 = 7$

$10 = 6 + 4$



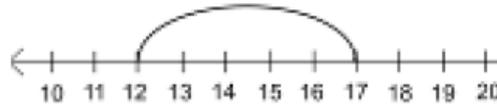
Use the part-part whole diagram as shown above to move into the abstract.

Starting at the bigger number and counting on



Start with the larger number on the bead string and then count on 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.

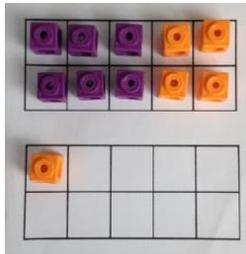
$$5 + 12 = 17$$

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

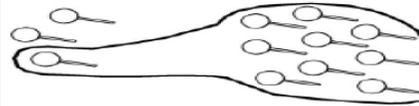
Regrouping to make 10.



$$6 + 5 = 11$$

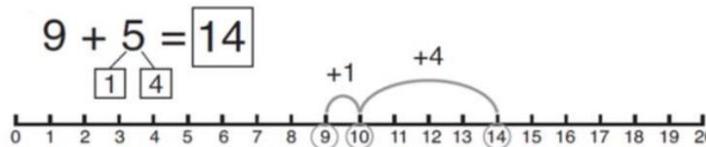


Start with the bigger number and use the smaller number to make 10.



$$3 + 9 =$$

Use pictures or a number line. Regroup or partition the smaller number to make 10.



$$7 + 4 = 11$$

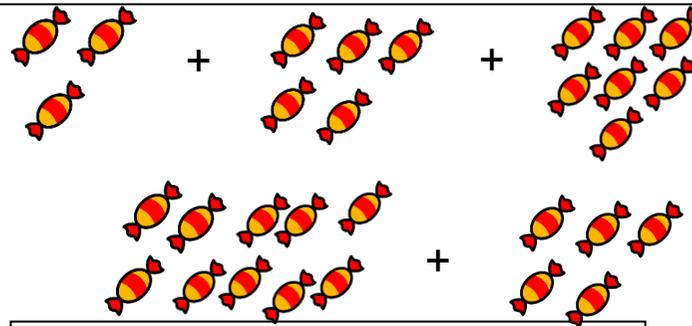
If I am at seven, how many more do I need to make 10. How many more do I add on now?

Adding three single digits

$4 + 7 + 6 = 17$   
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.



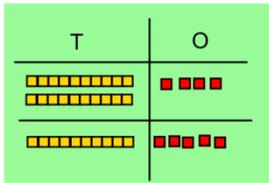
Add together three groups of objects. Draw a picture to recombine the groups to make 10.

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

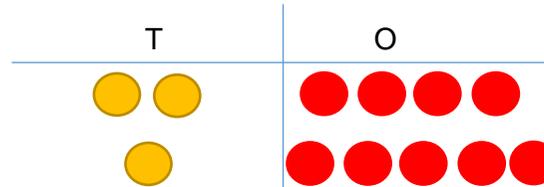
Combine the two numbers that make 10 and then add on the remainder.

Column method- no regrouping

24 + 15 =  
Add together the ones first then add the tens. Use the Base 10 blocks first before moving onto place value counters.



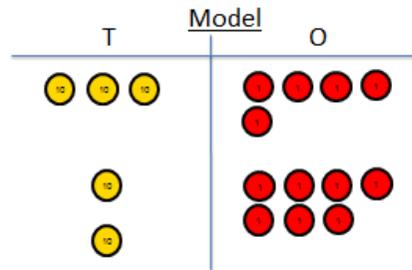
After practically using the base 10 blocks and place value counters, children can draw the counters to help them to solve additions.



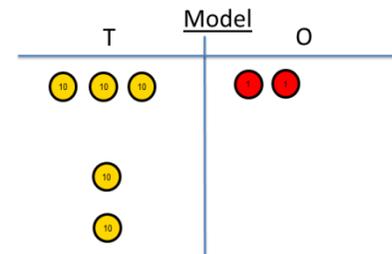
$$\begin{array}{r} 24 \\ + 15 \\ \hline 39 \end{array}$$

Column method- regrouping

Make both numbers on a place value grid.

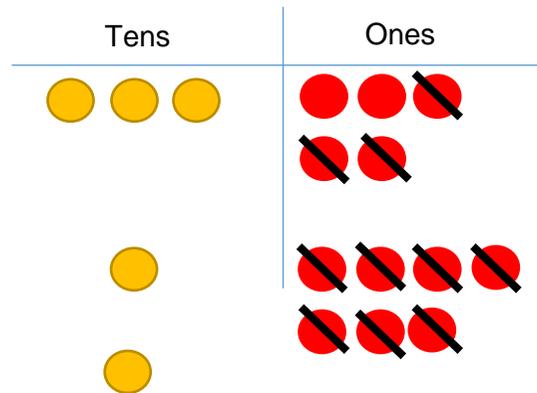


Add up the units and exchange 10 ones for one 10.



Add up the rest of the columns, exchanging the 10 counters from one column for the next place value column until every column has been added. This can also be done with Base 10 to help children clearly see that 10 ones equal 1 ten and 10 tens equal 100.

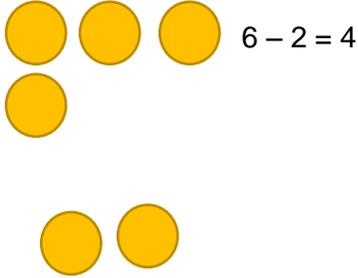
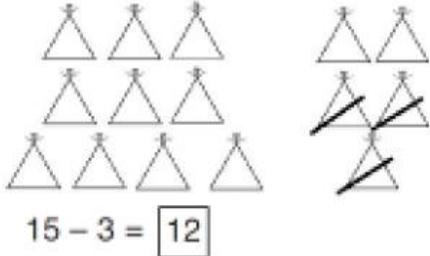
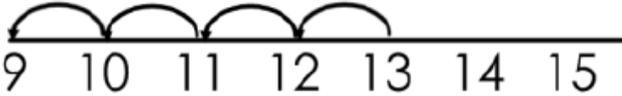
Children can draw a pictorial representation of the columns and place value counters to further support their learning and understanding.



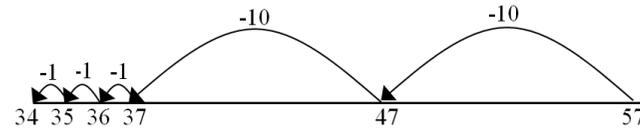
Line the digits in the columns and clearly show the exchanges.

$$\begin{array}{r} 35 \\ + 17 \\ \hline 52 \\ \hline 1 \end{array}$$

## Subtraction

Year 1	Year 2		
Objective and Strategies	Concrete	Pictorial	Abstract
<p><b>Taking away ones</b></p>	<p>Use physical objects, counters, cubes etc to show how objects can be taken away.</p>  <p><math>6 - 2 = 4</math></p>	<p>Cross out drawn objects to show what has been taken away.</p>  <p><math>15 - 3 = 12</math></p>	<p><math>18 - 3 = 15</math></p> <p><math>8 - 2 = 6</math></p>
<p><b>Counting back</b></p>	<p>Make the larger number in your subtraction. Move the beads along your bead string as you count backwards in ones.</p>  <p><math>13 - 4</math></p>	<p>Count back on a number line or number track</p>  <p>Start at the bigger number and count back the smaller number showing the jumps on the number line.</p>	<p>Put 13 in your head, count back 4. What number are you at? Use your fingers to help.</p>

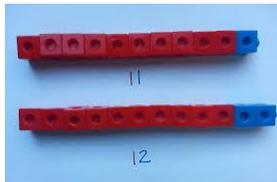
Use counters and move them away from the group as you take them away counting backwards as you go.



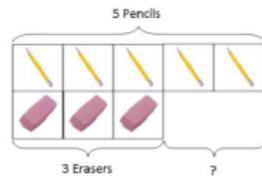
This can progress all the way to counting back using two 2 digit numbers.

## Find the difference

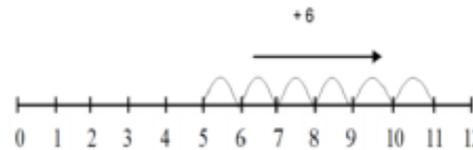
Compare amounts and objects to find the difference.



Use cubes to build towers or make bars to find the difference



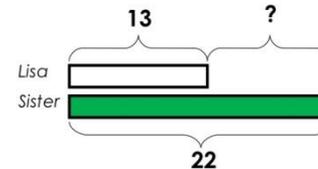
Use basic bar models with items to find the difference



Count on to find the difference.

### Comparison Bar Models

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



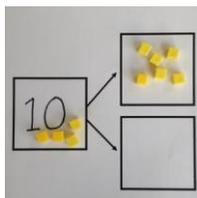
Draw bars to find the difference between 2 numbers.

Hannah has 23 sandwiches, Helen has 15 sandwiches. Find the difference between the number of sandwiches.

$$23 - 15 = 8$$

The difference between 23 and 15 is 8.

## Part Part Whole Model

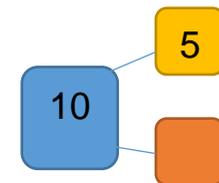
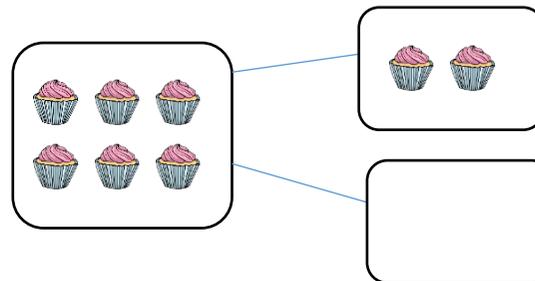


Link to addition- use the part whole model to help explain the inverse between addition and subtraction.

If 10 is the whole and 6 is one of the parts. What is the other part?

$$10 - 6 =$$

Use a pictorial representation of objects to show the part whole model.



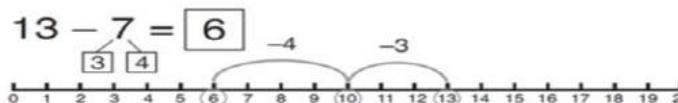
Move to using numbers within the part whole model.

### Make 10

$14 - 9 =$



Make 14 on the ten frame. Take away the four first to make 10 and then take away one more so you have taken away 5. You are left with the answer of 9.



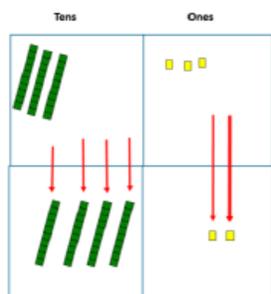
Start at 13. Take away 3 to reach 10. Then take away the remaining 4 so you have taken away 7 altogether. You have reached your answer.

$16 - 8 =$

How many do we take off to reach the next 10?

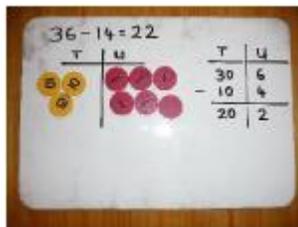
How many do we have left to take off?

### Column method without regrouping

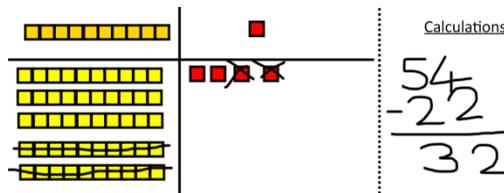


Use Base 10 to make the bigger number then take the smaller number away.

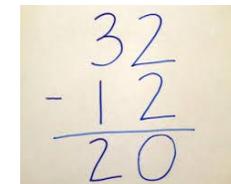
Show how you partition numbers to subtract. Again make the larger number first.



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

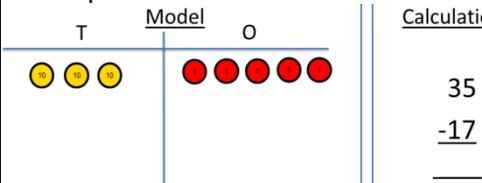


This will lead to a clear written column subtraction.

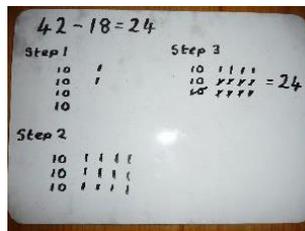


### Column method with regrouping

Use Base 10 to start with before moving on to place value counters.



Draw the counters onto a place value grid and show what you have taken away by crossing the counters out as well as clearly showing the exchanges you make.

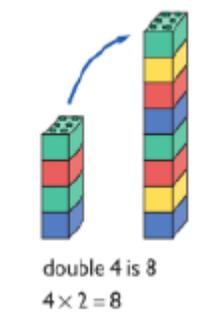
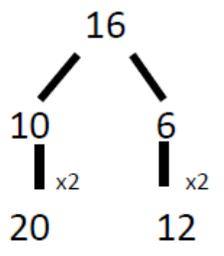


When confident, children can find their own way to record the exchange/regrouping.

Children can start their formal written method by partitioning the number into clear place value columns.

# Multiplication

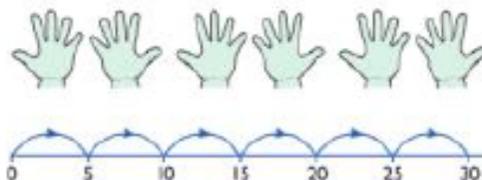
<p><u>Year 1</u></p> <ul style="list-style-type: none"> <li>• solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.</li> </ul>	<p><u>Year 2</u></p> <ul style="list-style-type: none"> <li>• recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers.</li> <li>• calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (<math>\times</math>), division (<math>\div</math>) and equals (=) signs.</li> <li>• show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot.</li> <li>• solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.</li> </ul>
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Objective and Strategies	Concrete	Pictorial	Abstract
<p><b>Doubling</b></p>	<p>Use practical activities to show how to double a number.</p>  <p>double 4 is 8 <math>4 \times 2 = 8</math></p>	<p>Draw pictures to show how to double a number.</p> <p>Double 4 is 8</p> 	 <p>Partition a number and then double each part before recombining it back together.</p>

## Counting in multiples



Count in multiples supported by concrete objects in equal groups.



Use a number line or pictures to continue support in counting in multiples.

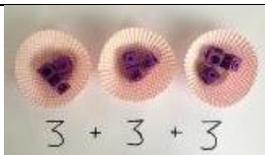
Count in multiples of a number aloud.

Write sequences with multiples of numbers.

2, 4, 6, 8, 10

5, 10, 15, 20, 25, 30

## Repeated addition

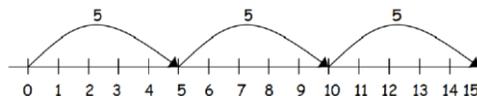


Use different objects to add equal groups.

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



2 add 2 add 2 equals 6



$$5 + 5 + 5 = 15$$

Write addition sentences to describe objects and pictures.



$$2 + 2 + 2 + 2 + 2 = 10$$

## Arrays- showing commutative multiplication

Create arrays using counters/ cubes to show multiplication sentences.



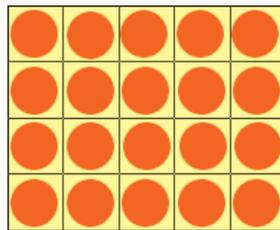
Draw arrays in different rotations to find **commutative** multiplication sentences.

$$\begin{array}{c} \bullet \bullet \bullet \bullet \\ \bullet \bullet \bullet \bullet \end{array} \quad 4 \times 2 = 8$$

$$2 \times 4 = 8$$

$$\begin{array}{c} \bullet \bullet \\ \bullet \bullet \\ \bullet \bullet \\ \bullet \bullet \end{array} \quad 2 \times 4 = 8$$

$$4 \times 2 = 8$$



Link arrays to area of rectangles.

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



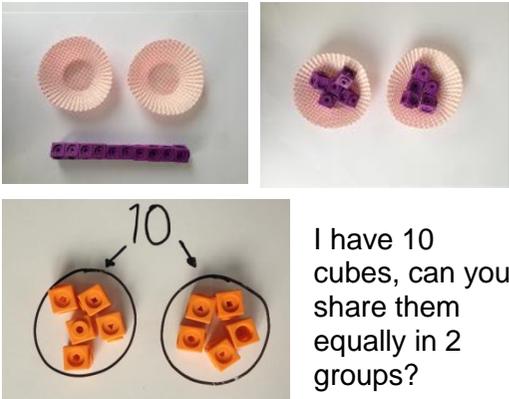
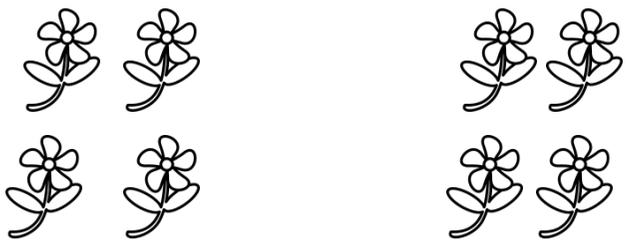
$$5 + 5 + 5 = 15$$

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

$$3 \times 5 = 15$$

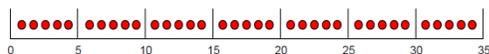
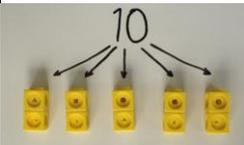
# Division

<u>Year 1</u>	<u>Year 2</u>
<ul style="list-style-type: none"><li>• solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.</li></ul>	<ul style="list-style-type: none"><li>• recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers.</li><li>• calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (<math>\times</math>), division (<math>\div</math>) and equals (=) signs.</li><li>• show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot.</li><li>• solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.</li></ul>

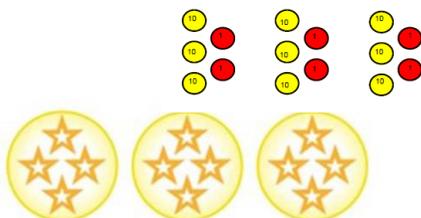
Objective and Strategies	Concrete	Pictorial	Abstract
Sharing objects into groups	 <p>I have 10 cubes, can you share them equally in 2 groups?</p>	Children use pictures or shapes to share quantities.  $8 \div 2 = 4$	Share 9 buns between three people. $9 \div 3 = 3$

## Division as grouping

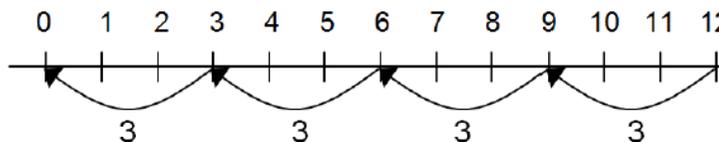
Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding.



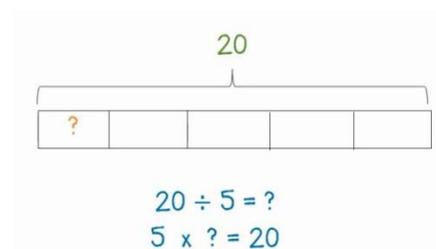
$$96 \div 3 = 32$$



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



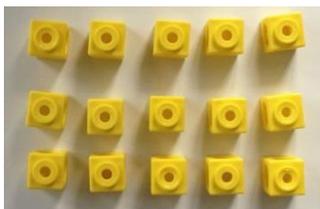
Think of the bar as a whole. Split it into the number of groups you are dividing by and work out how many would be within each group.



$$28 \div 7 = 4$$

Divide 28 into 7 groups. How many are in each group?

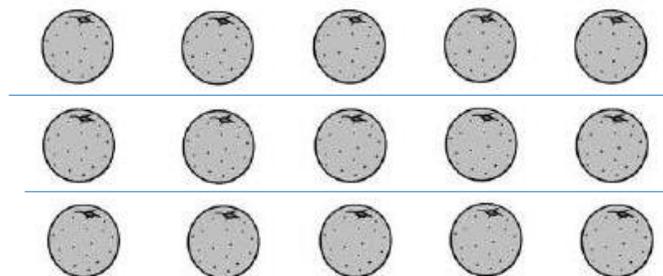
## Division within arrays



Link division to multiplication by creating an array and thinking about the

number sentences that can be created.

Eg  $15 \div 3 = 5$      $5 \times 3 = 15$   
 $15 \div 5 = 3$      $3 \times 5 = 15$



Draw an array and use lines to split the array into groups to make multiplication and division sentences.

Find the inverse of multiplication and division sentences by creating four linking number sentences.

$$7 \times 4 = 28$$

$$4 \times 7 = 28$$

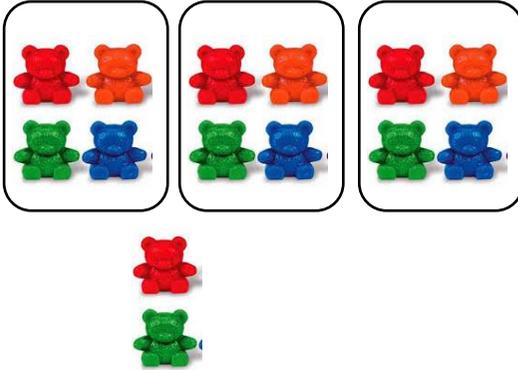
$$28 \div 7 = 4$$

$$28 \div 4 = 7$$

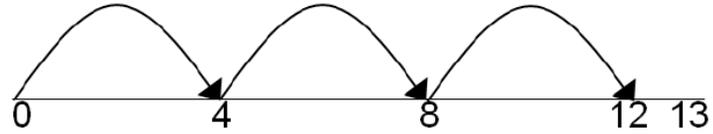
## Division with a remainder

$$14 \div 3 =$$

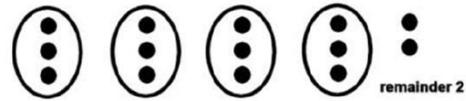
Divide objects between groups and see how much is left over



Jump forward in equal jumps on a number line then see how many more you need to jump to find a remainder.



Draw dots and group them to divide an amount and clearly show a remainder.



Complete written divisions and show the remainder using r.

$$29 \div 8 = 3 \text{ REMAINDER } 5$$

↑   ↑   ↑   ↑  
dividend   divisor   quotient   remainder