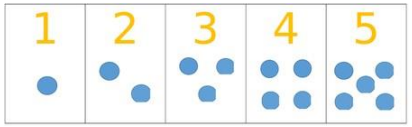
MATHS

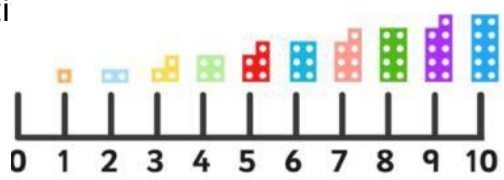
Calculation policy

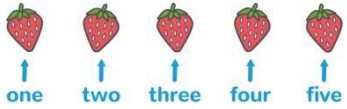
Early Years Foundation Stage: Counting

To count a group of objects children must be able to itemise them and tag each with a number name. There are different 'principles' by which children can learn to count which can help to build understanding and confidence.

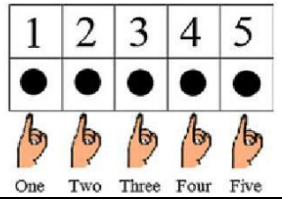
1 to 1 correspondence principle: The ability to match an object to the corresponding number and recognise that numbers are symbols to represent a quanti



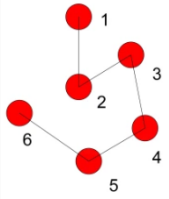




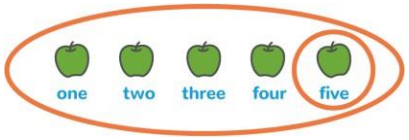
Stable order principle: Saying the number names in the same order every time.

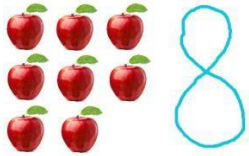


one, two, three, four, five, six, seven, eight, nine ...

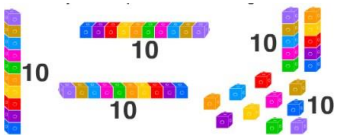


The cardinal principle: The final number represents the size of the set counted. This helps children when counting on.





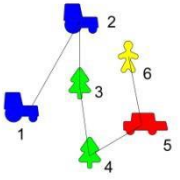
The abstraction principle: As counting develops, children need to know they can count physical things and non-physical, present and not present, similar and not similar.

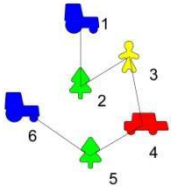


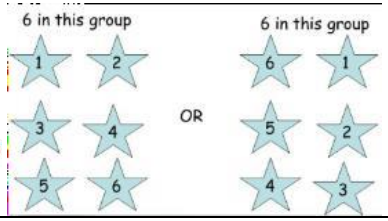
1, 2 beats of the drum

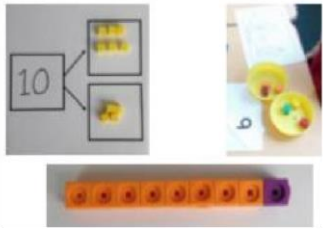
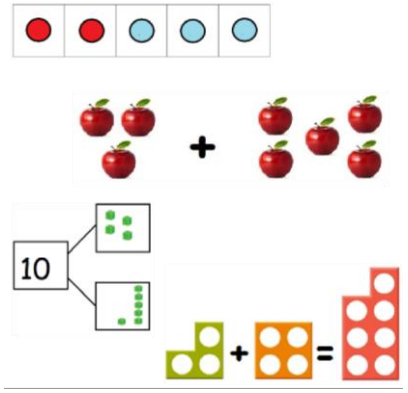
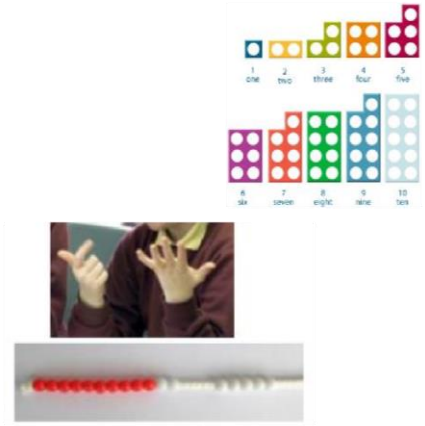
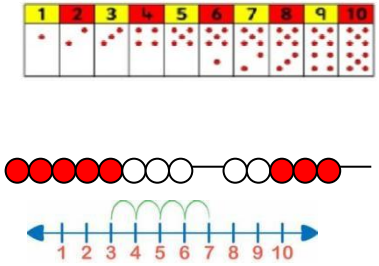
1, 2 bounces of the ball

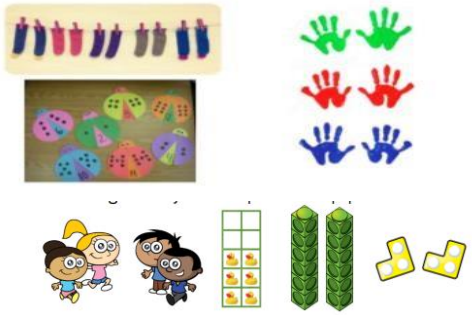
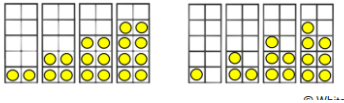
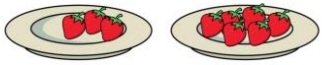
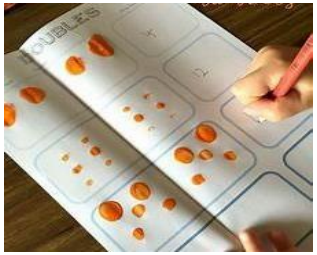
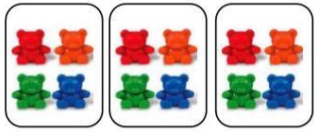
The order irrelevance principle: The order in which items are counted is irrelevant as the same cardinal value will be reached.

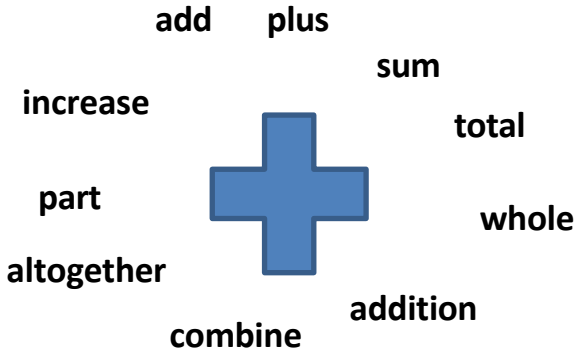


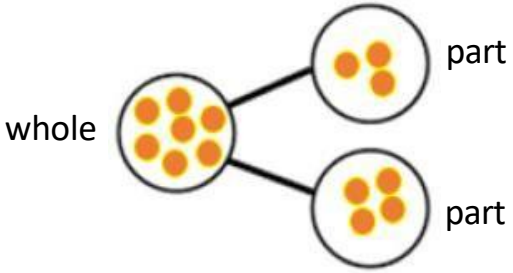
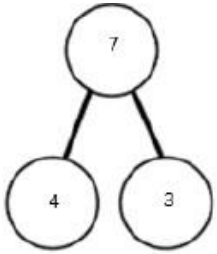
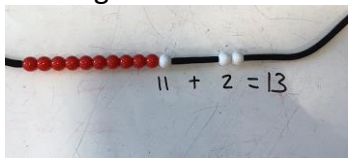
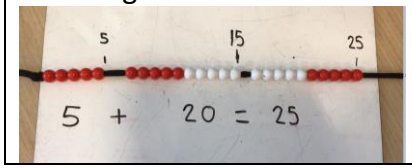
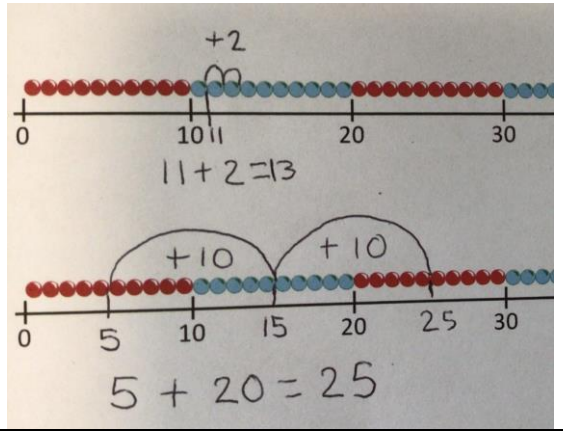




Addition and subtraction			
Strategies	Concrete	Pictorial	Abstract
Add and subtract using quantities and objects Say which number is more or less than a given number - Add one on/take one away - Adding two to make a whole/ explore part, part, whole model - Recalling number facts within 5 and some within 10	 - Exploring number bonds including subtraction facts		I have 4 apples and I pick 3 more, how many have I got altogether? They begin to use +, - and = They are encouraged to develop a mental picture of the number system in their heads to use for calculations. Construct number sentences verbally or using cards. Read number sentences to find out the answer. 2-1= 2+3= 5
Counting with numbers up to 20 - Add one on/take one away - Counting on / counting back - One more one less - Number bonds within 5 Children should be taught to start at the biggest number and count on, using this as an opportunity to introduce commutativity of addition			Encourage recall of number facts to develop fluency in mental calculations 4+1= 5 Reinforce starting from the largest number to count on.

Multiplication and Division			
Strategies	Concrete	Pictorial	Abstract
To explore and represent patterns within numbers up to 10 including evens and odds, doubling facts and how quantities can be disturbed evenly. - Recalling doubles up ie. Double 2 is 4 - Sharing - Grouping - Noticing patterns within odd and even	Using a variety of objects to explore doubling.  Using 10s frames or multilink towers to notice the patterns with odd and even numbers.   Role play with food for sharing equally and grouping.	  Children might record ways of how groups can be shared equally or circling equal groups. 	Recalling doubling facts with numbers up to 10. Starting to talk about odd and even numbers and make links to being able to share those numbers equally.

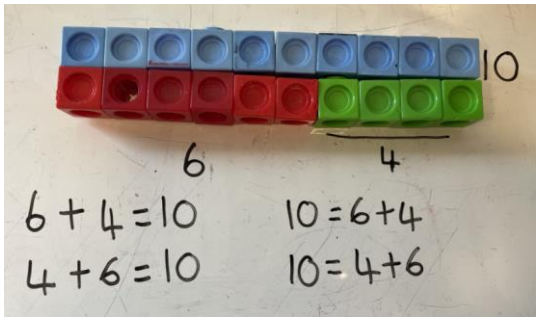


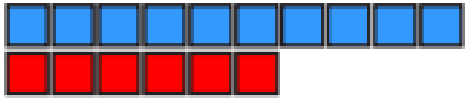
Year 1		
Concrete	**Pictorial**	**Abstract**
Combining two parts to make a whole (You can use other practical resources too e.g. eggs, shells, teddy bears etc.)  		4 + 3 = 7 (four is a part, 3 is a part and the whole is seven). 
Counting on Counting on in ones  Counting on in tens 		Counting on mentally applying place value knowledge: **What is two more than 11?** **11+ 2 = ? (knowing 1 add 2 is 3)** **Add 20 to 5.** **5+ 20 = ? (using counting in ten knowledge)**

Using number facts

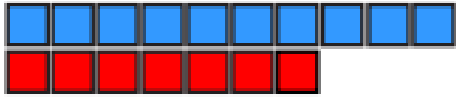
Exploring all the different ways to make numbers e.g 7= 0+7, 6+1, 5+2, 4+3 etc

Number bonds 10 e.g 5+5, 6+4, 7+3 etc



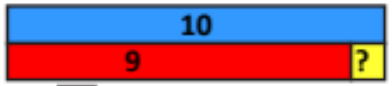


6 + ☐ = 10



7 + ☐ = 10

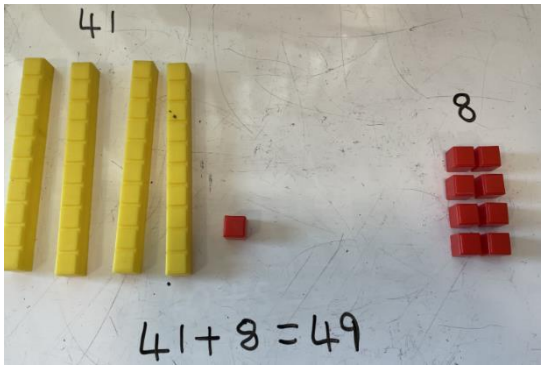
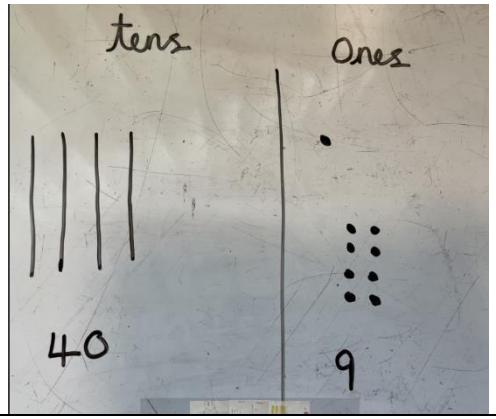
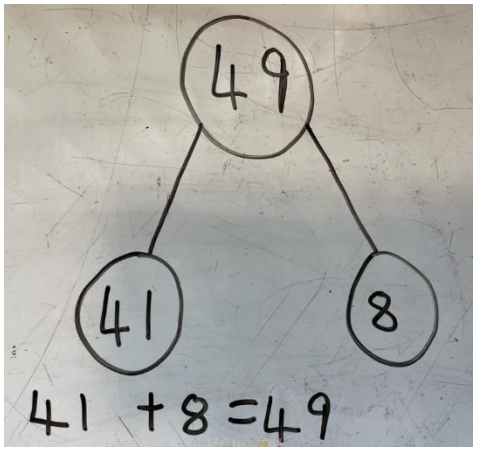
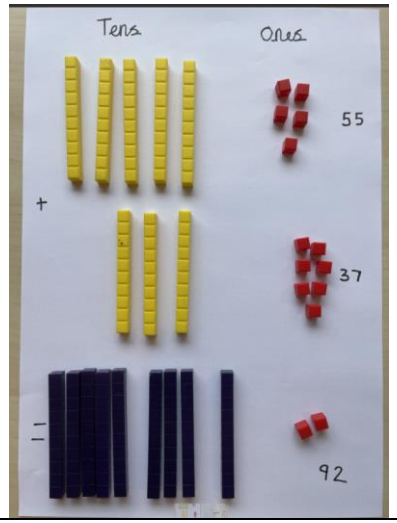
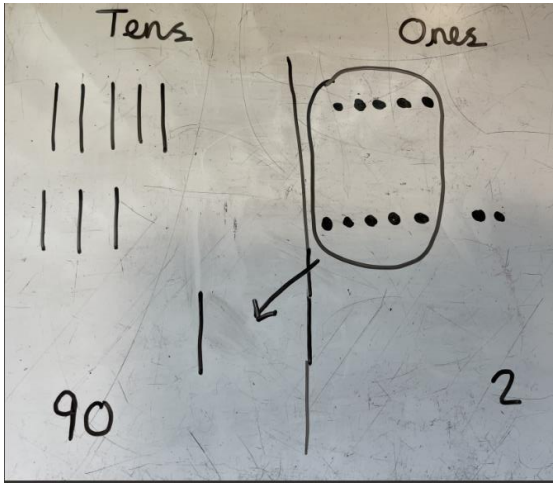
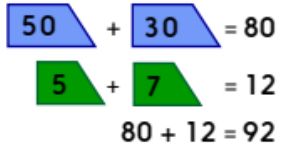
5 + ☐ = 10



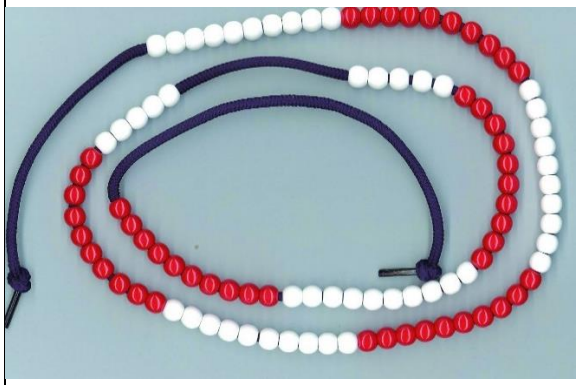
9 + ☐ = 10

Patterns using known facts, e.g. 4 + 3 = 7 so we know 24 + 3, 44 + 3, 74 + 3, etc.

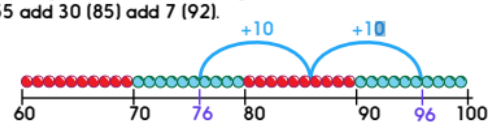
Year 2

Using place value  using dienes continue to develop understanding of partitioning and place value: 41 + 8	Children to represent the concrete using a particular symbol e.g. lines for tens and dot/crosses for ones.  	
Using place value Continue to develop understanding of partitioning and place value and use this to support addition. 55+ 37  	 	Partitioning, e.g. 55 + 37 as 50 + 30 and 5 + 7 finally combining the two totals: 80 + 12. 

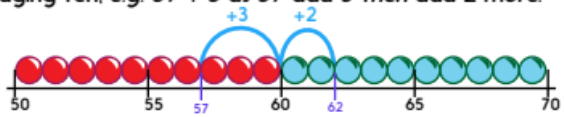
Counting on and using number facts using bead strings



Add ten and mupltiples of ten, e.g. 76 + 20 as 76 , 86, 96 or in one hop 76 + 20. Add two 2-digit numbers by counting on in tens and then in ones, e.g. 55 + 37 as 55 add 30 (85) add 7 (92).



Bridging ten, *e.g. 57 + 5 as 57 add 3 then add 2 more.*



76+ 20 = ? (using counting in ten knowledge)

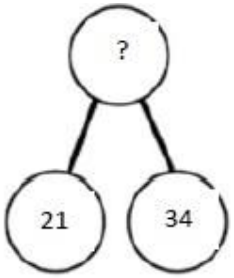
Applying number facts mentally to answer addition:

Bridging ten, *e.g. 57 + 5 as 57 add 3 then add 2 more.*

Using number facts

Know pairs of numbers which make the numbers up to and including 10, e.g. *8 = 4&4, 3&5, 2&6, 1&7 and 10 = 5&5, 4&6, 3&7, 2&8, 1&9, 0&10.*
Patterns of known facts, *e.g. 6 + 3 = 9, so we know 36 + 3 = 39, 66 + 3 = 69, 53 + 6 = 59.*

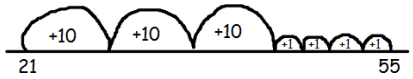
Fluency variation, different ways to ask children to solve 21 + 34 =



Sam saved £21 one week and £34 another. How much did he save in total?

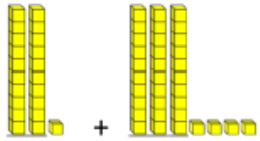
21+34=55. Prove it! (reasoning but the

children need to be fluent in representing this)



21 + 34 =

□ = 21 + 34



Count back

Difference between

less

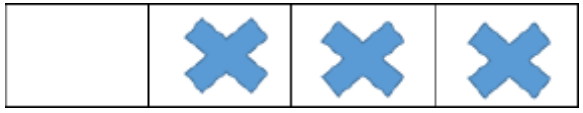
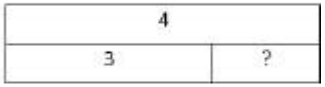
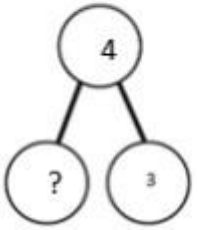
Take away

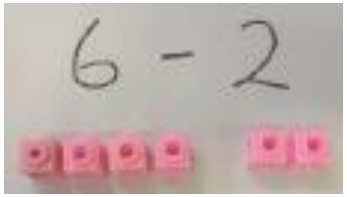
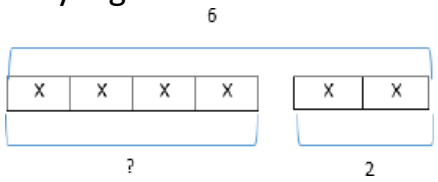
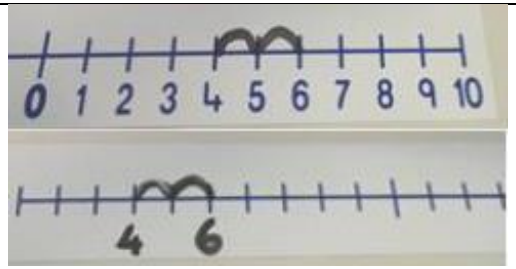
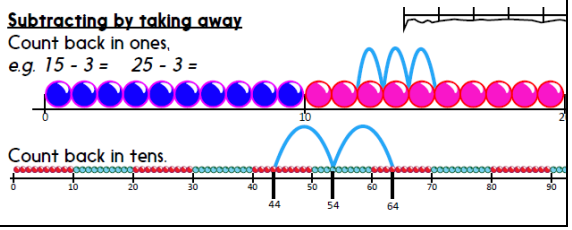
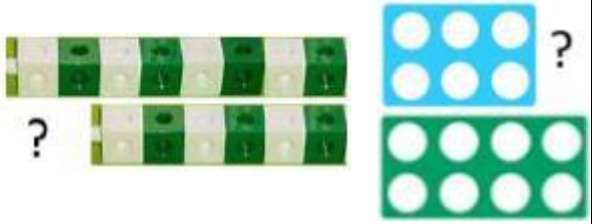
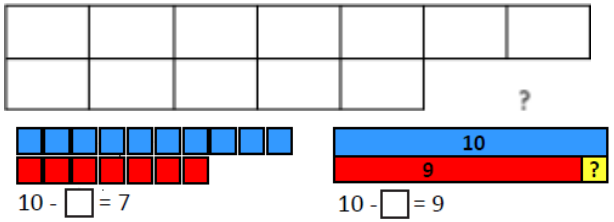
fewer

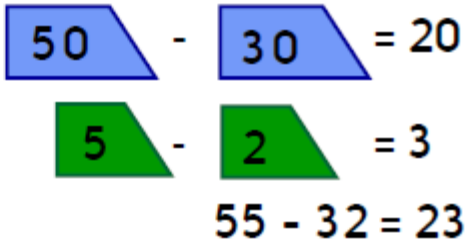
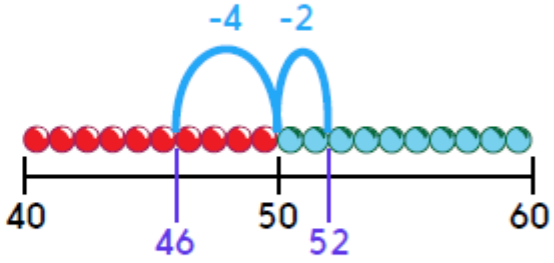
decrease

minus

subtract

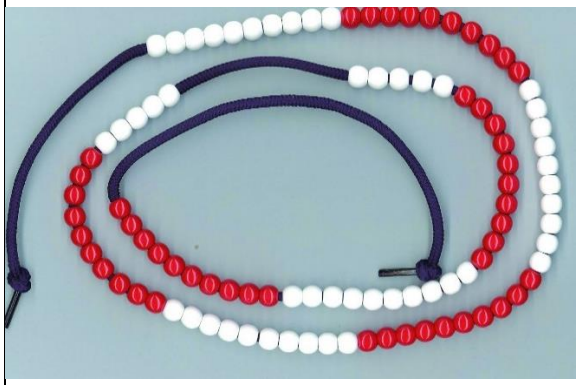
Year 1		
Concrete	**Pictorial**	**Abstract**
Physically taking away and removing objects from a whole (use various objects too) rather than crossing out- children will physically remove the objects. 4 – 3 = 1  	Children to draw the concrete resources they are using and cross out.  Use of the bar model: 	4- 3 = □ = 4 - 3  

Counting back (using number lines/bead string). 	Children to represent what they see pictorially e.g. 	 
Finding the difference and using number facts (using cubes, numicon or other objects. 	Children to draw the cubes/other concrete objects which they have used. XXXXXXXX XXXXXX Use of the bar model. 	Find the difference between 8 and 6. 8 – 6, the difference is __? Children to also explore why 9 - 7 = 8 – 6 (the difference, of each digit, has changed by 1 so the difference is the same.) Patterns using known facts, *e.g. 10 - 7 = 3 so we know 30 - 7 = ?* 

Year 2
Using place value **Using place value** Know 1 less or 10 less than any number, e.g. 1 less than 74 or 10 less than 82. Partitioning, e.g. 55 - 32 as 50 - 30 and 5 - 2 combining the answers: 20 + 3. -100 counting   
Using number facts Know pairs of numbers which make the numbers up to and including 10, *e.g. 10 - 6 = 4, 8 - 3 = 5, 5 - 2 = 3, etc.* Patterns of known facts, *e.g. 9 - 6 = 3, so we know 39 - 6 = 33, 69 - 6 = 63, 89 - 6 = 83.* ntences, lition Bridge ten, *e.g. 52 - 6 as 52 subtract 2 then subtract 4 more.*      **Counting up** Find a difference between two numbers on a line, *e.g. 51 - 47.*

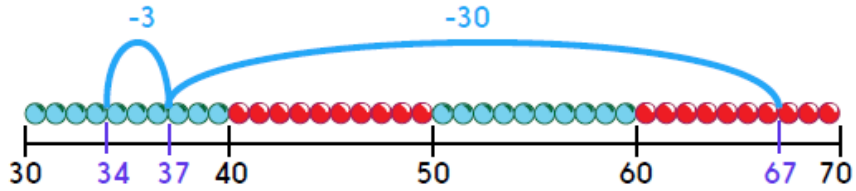
Taking away

Using beaded strings to physically move and subtract from a number



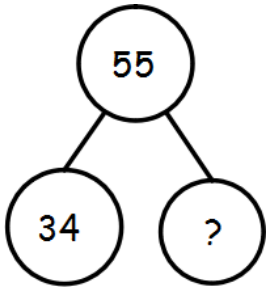
Taking away

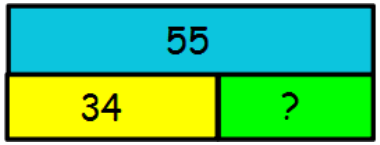
Subtract ten and multiples of ten, *e.g. 76 - 20 as 76, 66, 56 or in one hop 76 - 20 = 56.* Subtract two 2-digit numbers by counting back in tens then in ones, *e.g. 67 - 33 as 67 subtract 30 (37) then count back 3 (34).*



Subtracting near multiples, *e.g. 74 - 21 or 57 - 19.*

Fluency variation, different ways to ask children to solve 55 – 34 =





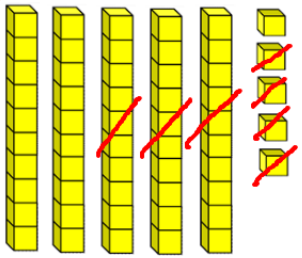
Gary had £55 and spent £34 on a new video game. How much change did he receive?

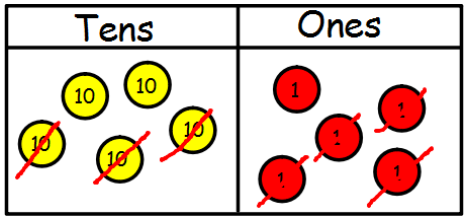
55 – 34 = 21. Prove it! (reasoning but the children need to be fluent in representing this)

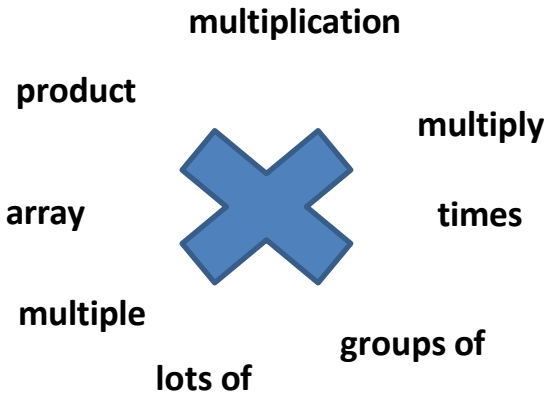
55 - 34 = ☐

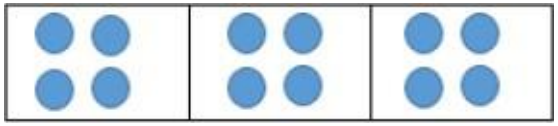
☐ = 55 - 34

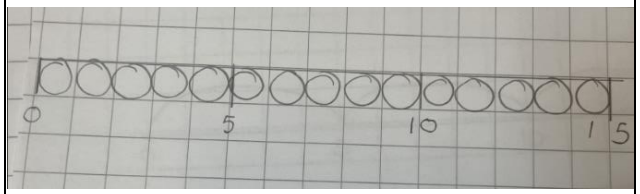
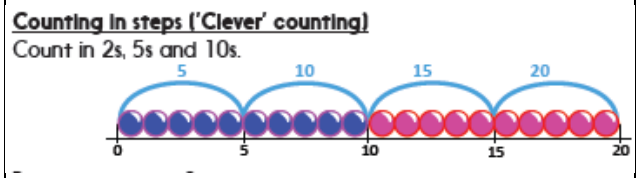
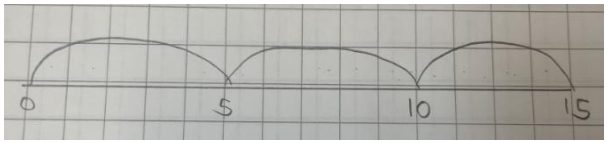
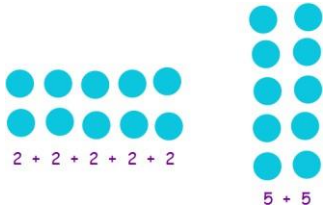
What's the difference between 55 and 34?







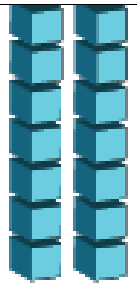
Concrete	Pictorial	Abstract
Year 1 & 2		
Repeated grouping/repeated addition (does not have to be restricted to cubes) 3 x 4 or 3 lots of 4. 	Children to represent the practical resources in a picture e.g. XX XX XX XX XX XX Use of a bar model for a more structured method 	3 x 4 =12 4 + 4 + 4 =12

Use number lines to show repeated groups: 	Represent this pictorially alongside a beaded number line e.g:  	Abstract number line 5 x 3 = 15 
Use arrays to illustrate commutativity (counters and other objects can also be used). 2 x 5 = 5 x 2   	Children to draw the arrays 	Children to be able to use an array to write a range of calculations e.g. 2 x 5 = 10 5 x 2 = 10 2 + 2 + 2 + 2 + 2 = 10 5 + 5 =10

Use number facts

Know doubles to double 20

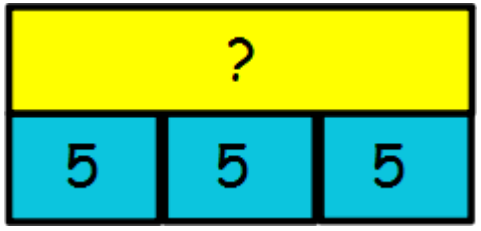
Double 7 = 14



Division, grouping, is the inverse of multiplication.

Start learning 2x, 5x, 10x tables, relating these to 'Clever counting' in 2s, 5s, and 10s, *e.g. 5 x 10 = 50, and 10, 20, 30, 40, 50 is five steps in the tens count.*

Fluency variation, different ways to ask children to solve 5 x 3 =

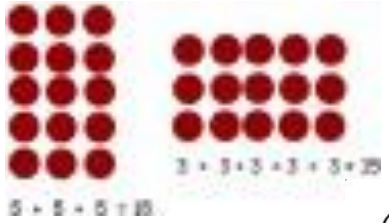


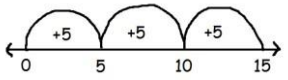
With counters, prove that 5 x 3 = 15

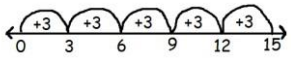
Why is 5 x 3 = 3 x 5?

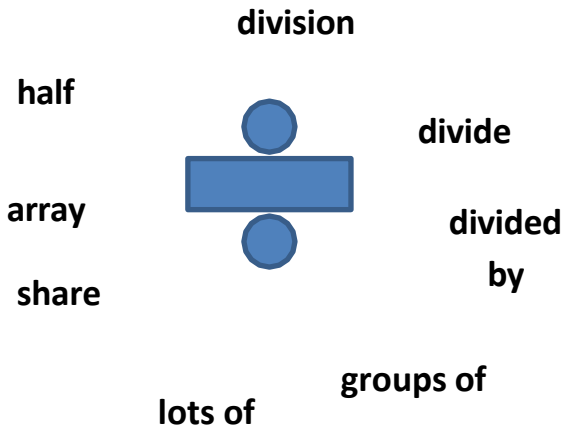
Terry had to swim 5 lengths, 3 times a week. How many lengths did he swim in one week?

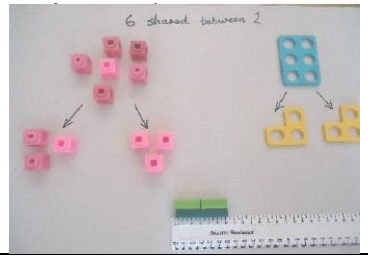
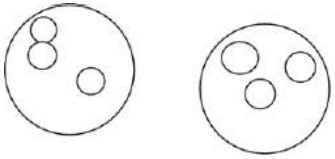
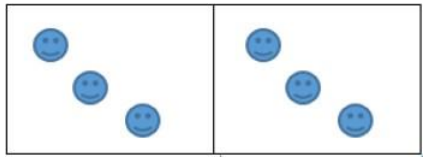
Tammy saved 3p, 5 days a week. How much did he save in 2 weeks?









Year 1 & 2		
Sharing (other concrete objects can also be used e.g. children and hoops, teddy bears, cakes and plates). This can be linked to finding ¼ or ½ of a number. 	 This can also be done in a bar so all 4 operations have a similar structure: 	6 ÷ 2 = 3 What's the calculation? 3 | 3

<table>
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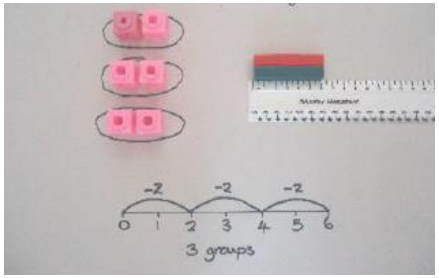
<td>Understand division as subtracting
6 ÷ 2
 
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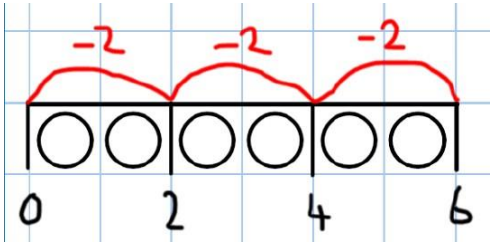
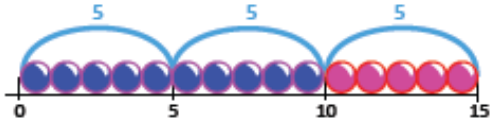
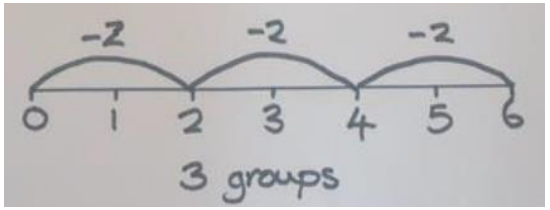
<td> 

 
</td>
<td>Abstract number line
 
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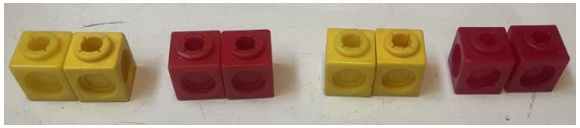
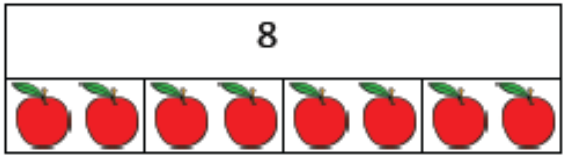
<tr>
<td>Understanding division as grouping
  </td>
<td> 
</td>
<td>How many groups of 2 can you make from 8?

? x 2 = 8 and 8 ÷ 2 = ?

<table>
<tr><td colspan="4">8</td></tr>
<tr><td>2</td><td>2</td><td>2</td><td>2</td></tr>
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</table>

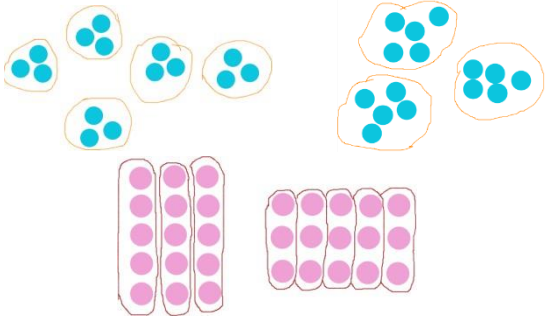
Find half of numbers up to 40, including realising that half of an odd number gives a remainder of 1 or an answer containing a ½.
Begin to know half of multiples of 10 to 100, ***e.g. half of 70 is 35.***

Using number facts
Know halves of even numbers to 24.
Know 2x, 5x and 10x division facts.
Begin to know 3x division facts.

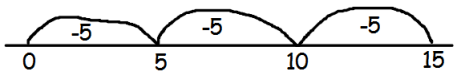
half of 20 is...

20	
?	?

Fluency variation, different ways to ask children to solve 15 ÷ 5 =



I have £15 and share it equally between 5 bank accounts. How much will be in each account?



15 children need to be put into 5 groups.
How many will be in each group?