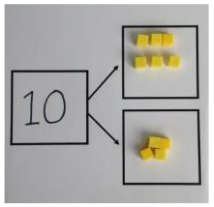
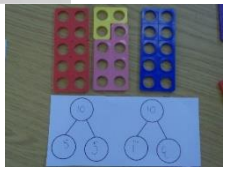
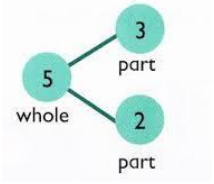
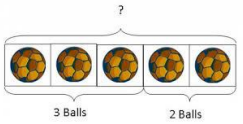
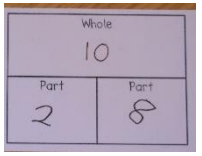
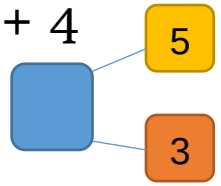
Grange Infant Primary School

Maths Calculation Policy

2020-2021

Progression in Calculations from Year 1 to 2

Addition: sum, total, parts and wholes, plus, add, altogether, more, exchange, 'is equal to' 'is the same as'

Key skills and stem sentences	Concrete (can we make it?)	Pictorial (can we draw it?)	Abstract (can we write the calculation?)
Year 1 Addition			
Combining two parts to make a whole: part-part- whole model _____ is a whole, _____ is a part, _____ is a part. There are _____ in total. First... Then... Now... e.g.	   Use cubes or other resources 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.  Introduce the bar model and the part-whole model to secure number bonds. 	4 + 3 = 7 10= 6 + 4  Use the part-part whole diagram as shown above to move into the abstract.

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Starting at the bigger number and counting on

The bigger number is _____. To find the total, I need to start at the biggest number, then count **on**.

(delete words as chn become more familiar)

First... Then... Now...
E.g. **First** there were 4 children on the bus, **then** 3 children got on, **now** there are 7 children on the bus.
(This will help with the inverse relationship and missing numbers.)

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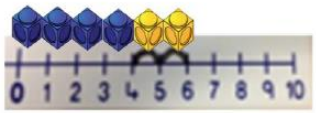
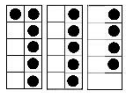
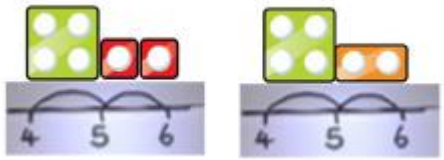
Counting on using number lines using cubes or Numicon.



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

Ten frames will also support this skill





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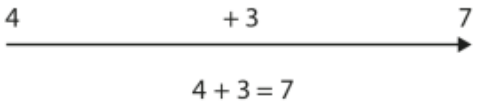
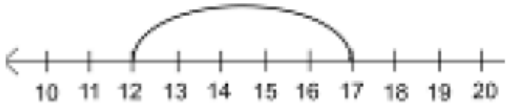


12 + 5 = 17



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

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5 + 12 = 17

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

_____ more than _____ is _____.
The sum of ___ and _____ is_____.
The total of ___ and _____ is _____.

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Making 10.

I need _____ to make ten. I have

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6 + 5 = 11
Start with the bigger number and use the smaller number to make 10.

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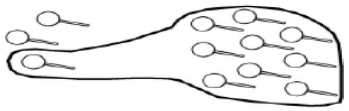

Use pictures.
Regroup or partition the smaller number to make 10.

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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?

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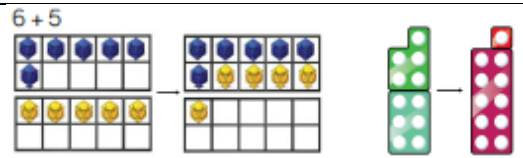
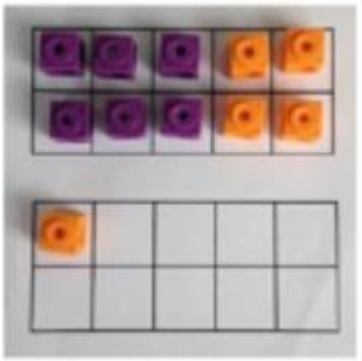
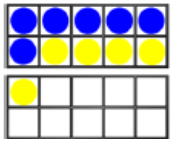
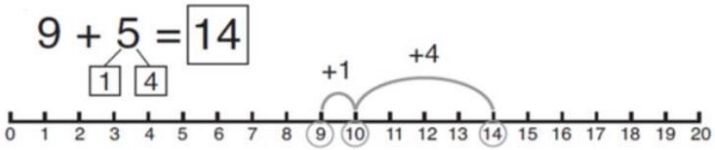
<td>_____ left over. 10 + ___ is _____.</td>
<td> 

 </td>
<td>Draw the tens frame and counters

6 + 5

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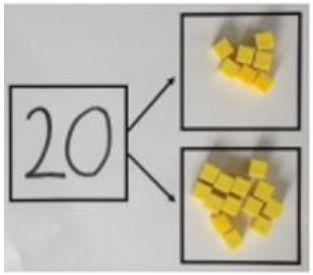
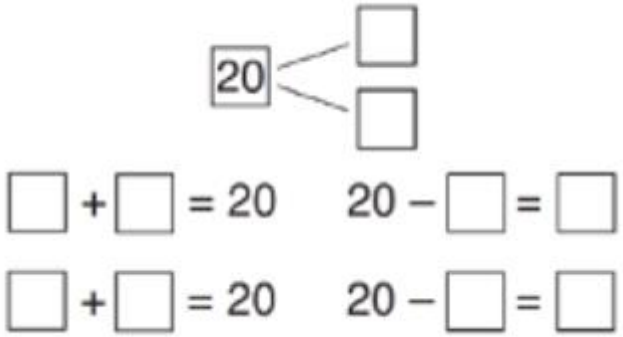
<td>Use known number facts
Part part whole</td>
<td> 

Children explore ways of making numbers within 20</td>
<td> 
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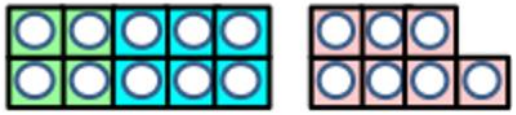
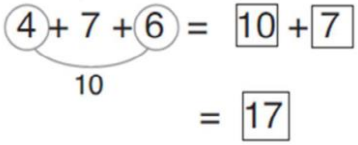
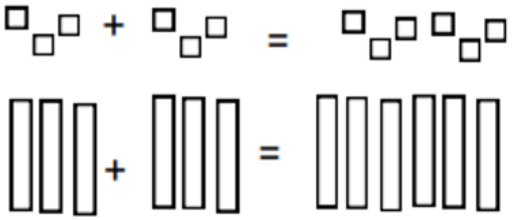
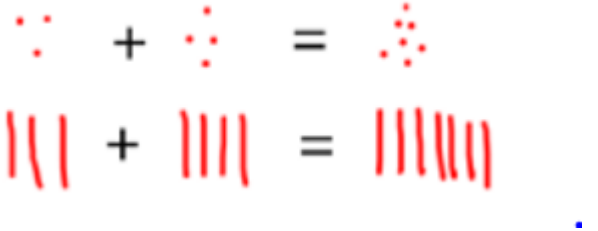
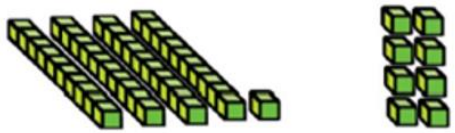
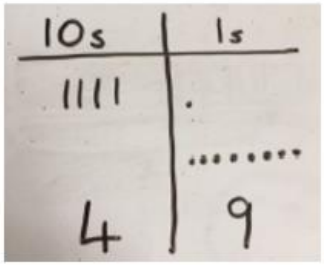
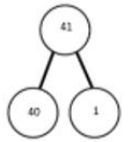
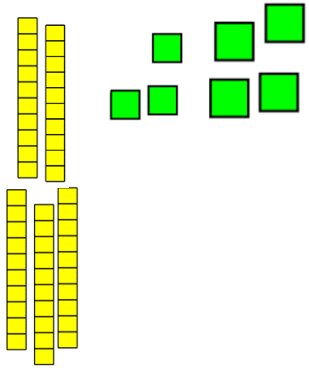
Bar Model	 3 + 4 = 7	 7 + 3 = 10	 6 + 2 = 8 2 + 6 = 8  6 + 4 = 10 4 + 6 = 10
Year 2 Addition			
Adding three single digits (delete words as chn become more familiar) ____ and ____ make ten. Ten add ____ is _____.	Make 10 with 2 of the digits (if possible) then add on the third digit, e.g. put 4 and 6 together to make 10. Add on 7. 	 Regroup and draw representation.  Add together three groups of objects. Draw a picture to recombine the groups to make 10.	 Combine the two numbers that make/bridge 10 and then add on the remainder. Look for ways to make 10 and use this knowledge to solve, e.g. 9 + 3 + 4 = 10 + 2 + 4 = 16

Adding multiples of ten. __ tens and __ tens total. The sum of ___ tens and___ tens is _____.	50= 30 = 20  Model using dienes.	 3 tens + 5 tens = ____ tens 30 + 50 = _____ Use representations for base 10.	20 + 30 = 50 70 = 50 + 20 40 + □ = 60
Using known facts. Use addition facts of 10 to derive facts of 100. If I know that 3 and 3 make 6. Then I know that 30 and 30 makes 60.		 Children draw representations of tens and ones.	3 + 4 = 7 leads to 30 + 40 = 70

Add a two digit number and ones ____ can be partitioned into ____ tens and ____ ones. ___ one and ___ ones makes ____ ones. ___ tens. The total is____. 41 can be partitioned into 4 tens and 1 one. 1 one and 8 ones is 9 ones. We have 4 tens. The total is 49.	**TO + O using base 10.** Continue to develop understanding of partitioning and place value. 41 + 8 	Children to represent base 10 e.g. lines for ten and dots for ones. 	41 + 8  1 + 8 = 9 40 + 9 = 49 4 1 + 8 4 9
Add a two-digit number and tens.	 25 + 10 = 35 Explore how we are adding multiples of ten and the ones digit doesn't change.	27 + 30 = 57  5 7	27 + 10 = 37 27 + 20 = 47 27 + □ = 57

Column method- no exchange

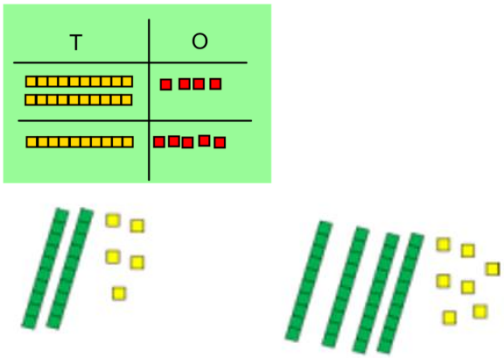
The___ is in the ones column, it represents ___ one(s).

The ___ is in the tens column, it represents ____ ten(s)

- *'First I partition the ___ into ___ and ___, and the ___ into ___ and ___.'* (partitioning the two-digit addends)
- *'___ plus ___ is equal to ___...'* (addition of the tens)
- *'...___ plus ___ is equal to ___...'* (addition of the ones)
- *'...and ___ plus ___ is equal to ___.'* (addition of the totals of tens and ones)
- *'So ___ plus ___ is equal to ___.'* (summary of the overall calculation, including units where appropriate)

24 + 15=

Use base 10 blocks to represent the numbers. Add the ones together and then add the tens.



Draw the base 10 or counters to help them to solve additions. Lines for tens and dots for ones.

24 + 15 =

Add the ones first

4 + 5 = 9

Then add the tens

2 tens add 1 ten = 3 tens

20 + 10 = 30.

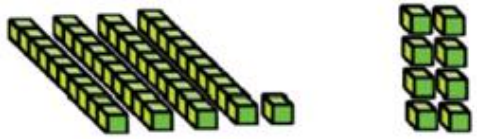
	2	4
+	1	5
	3	9

Column method with exchanging

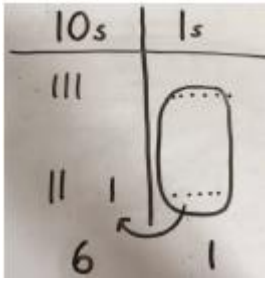
If the ones column sum is equal to ten or more, we must exchange.

TO + O using base 10. Continue to develop understanding of partitioning and place value.

36 + 25

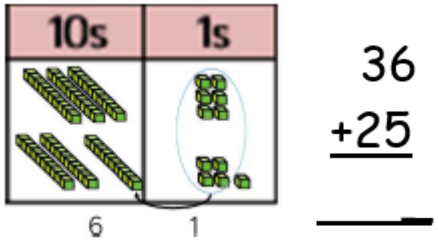


Children can draw a pictoral representation of the base 10 or place value counters to further support their learning and understanding.

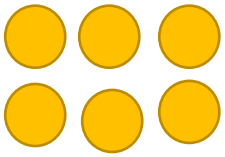
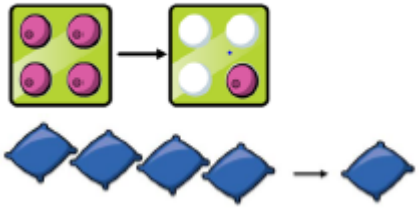
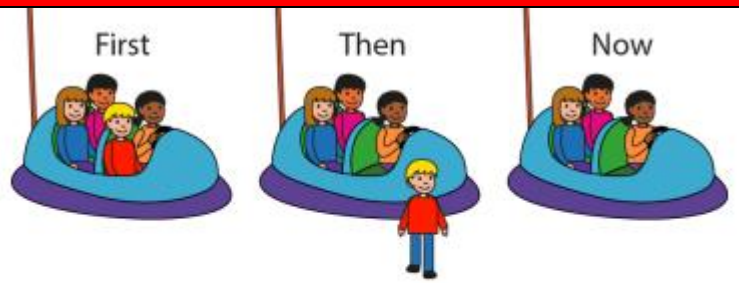
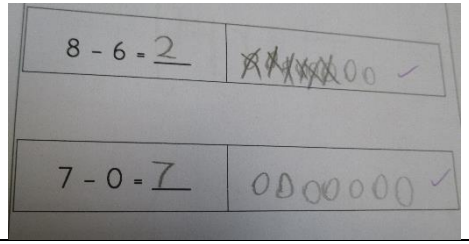
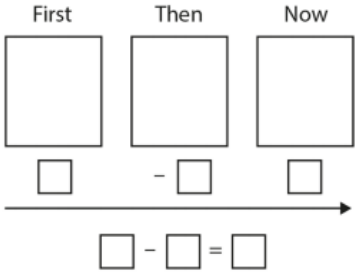
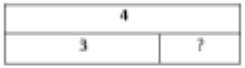
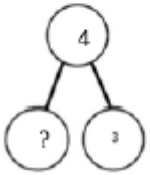


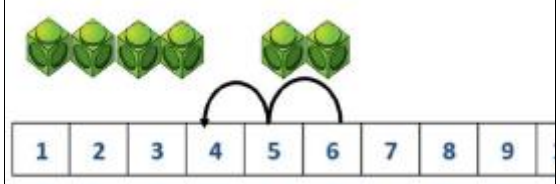
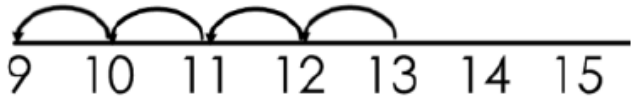
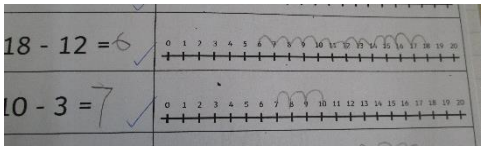
Formal method:

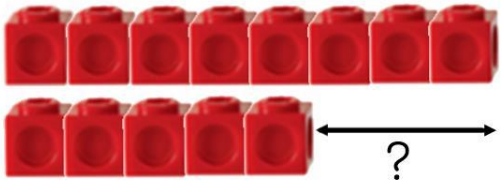
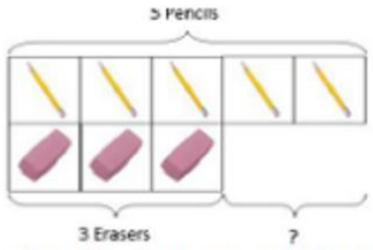
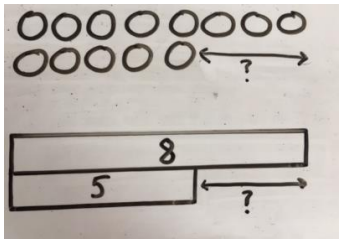
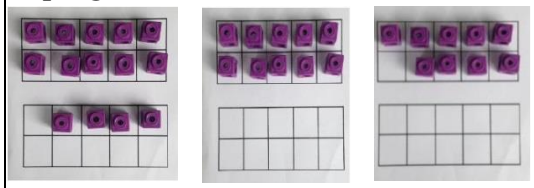
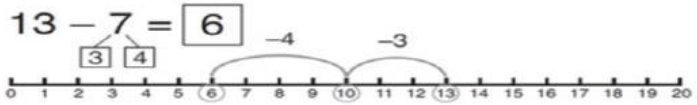
$$\begin{array}{r} 36 \\ +25 \\ \hline 61 \\ \hline 1 \end{array}$$

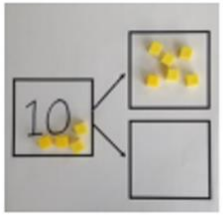
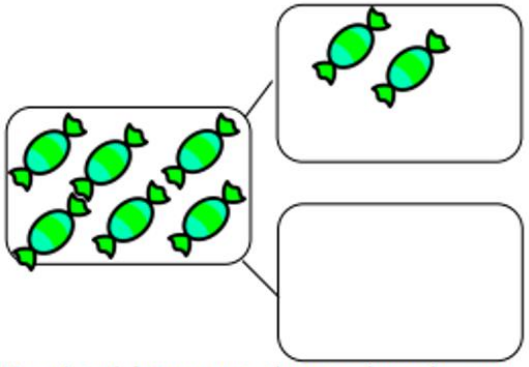
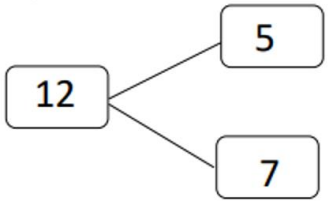
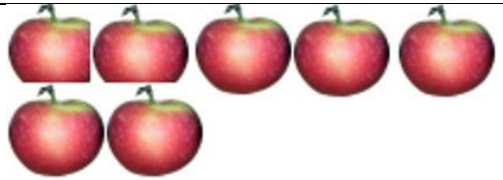
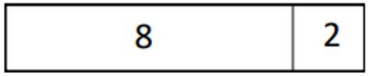
We need to exchange ten ones for one ten.	Make both numbers on a place value grid. 36+25  36 +25 ____ Add up the ones and exchange 10 ones for one 10. Then count how many ones there are and record the answer under the ones column. Count the tens nor forgetting the extra 10 which you exchanged the 10 ones for.		

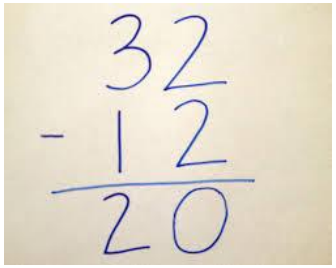
Subtraction: take away, less than, the difference, subtract, minus, fewer, decrease, exchange

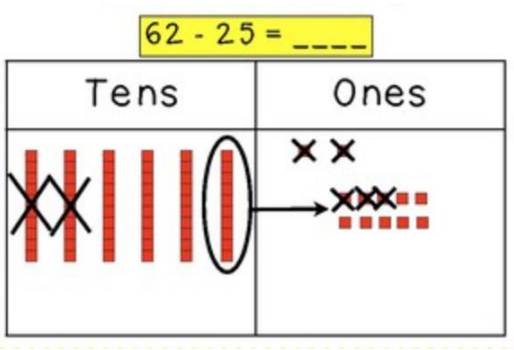
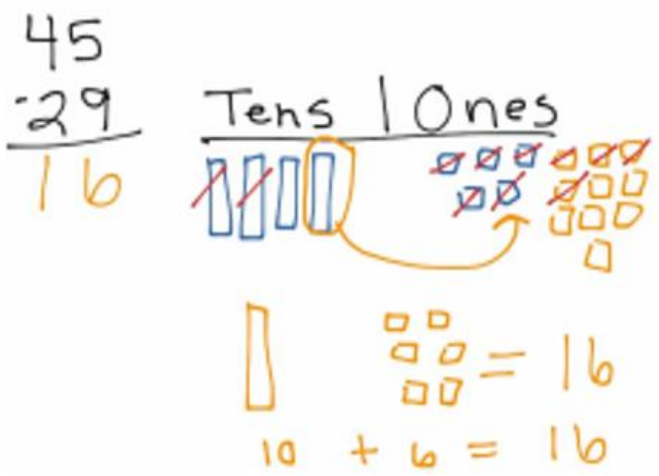
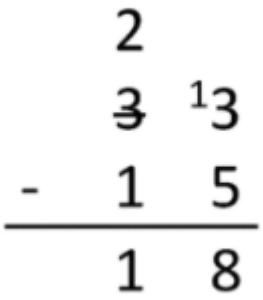
Key skills	Concrete	Pictorial	Abstract
Year 1			
Taking away ones First... Then... Now... e.g. **First** there were 4 children in the car, **then** 1 child got out, **Now** there are 3 children in the car.	Use physical objects, counters, cubes etc to show how objects can be taken away.  6 – 2 = 4 4 - 3 = 1 	 4 – 1 = 3 Cross out drawn objects to show what has been taken away. Children to draw the concrete resources they are using and cross out the correct amount. The bar model can also be used. 	 4- 3 = = 4 - 3  

			7—4 = 3 16—9 = 7
Counting back The whole is ____. The part we are taking away is _____. Start on _____ and count back ____.	**Counting back** (using number lines or tracks) 6-2= Children start at 6 and count back 2 	Count back on a number line or number track 13 – 4 = Start at the bigger number and count back the smaller number showing the jumps on the number line.  	Put 13 in your head, count back 4. What number are you at? Use your fingers to help.

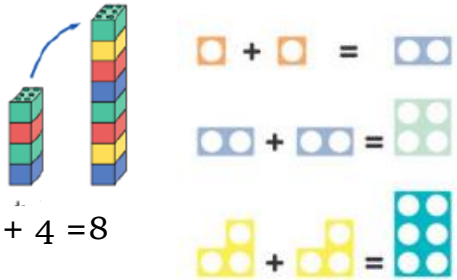
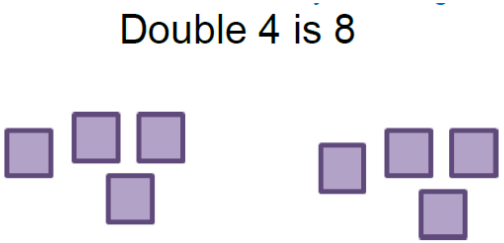
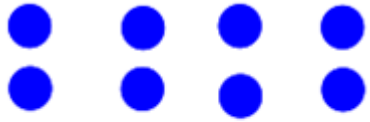
Finding the difference. The difference is the amount between amounts.	**Finding the difference** (using cubes, Numicon or other objects can also be used). Calculate the difference between 8 and 5.   Lay objects to represent bar model.	Children to draw the cubes/other concrete objects which they have used or use the bar model to illustrate what they need to calculate.  	Find the difference between 8 and 5. 8 - 5, the difference is ☐ Hannah has 12 sweets and her sister has 5. How many more does Hannah have than her sister?
Make 10 To reach the next 10 I need to takeaway ____. _____ can be partitioned into ____ and ____. _____ takeaway ____ is 10. 10 takeaway ____ is _____.	14 – 5 =  Make 14 on the ten frame. Take away the four first to make 10 and then takeaway one more so you have taken away 5. You are left with the answer of 9.	 To reach the next 10 I need to takeaway 3. 7 can be partitioned into 3 and 4. 13 takeaway 3 is ten. 10 takeaway 4 is 6.	16 – 8= How many do we take off to reach the next 10? How many do we have left to take off?

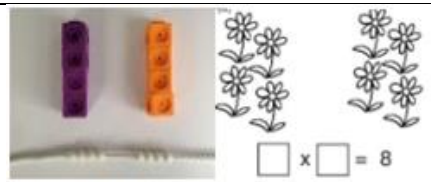
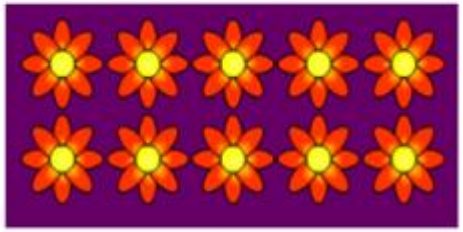
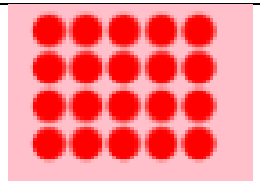
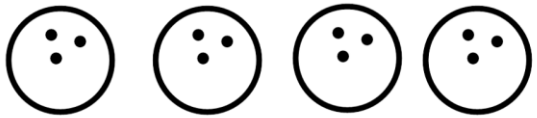
Represent and use number bonds and related subtraction facts within 20. Part / Whole Model ____ is the whole, ____ is a part and _____ is a part.	 Link to addition. Use PPW model to model the inverse. If 10 is the whole and 6 is one of the parts, what's the other part? 10-6 = 4	 Use pictorial representations to show the part.	Move to using numbers within the part whole model. 
Bar Model	 5—2 = 3		 10 = 8 + 2 10 = 2 + 8 10—2 = 8 10—8 = 2

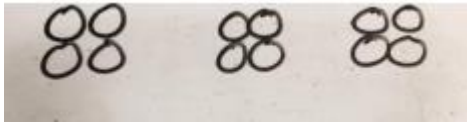
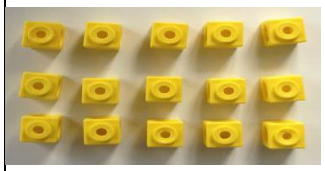
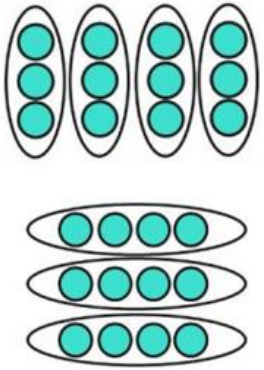
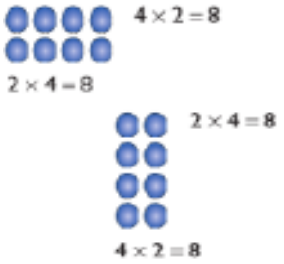
Year 2 Subtraction			
Column method without exchanging Partitioning to subtract without regrouping The bigger number is _____ so that goes at the top. Take away the _____, then takeaway the _____.	34—13 = 21 Use Dienes to show how to partition the number when subtracting without regrouping. 	Children draw representations of Dienes and cross off.  43—21 = 22	written column subtraction. 

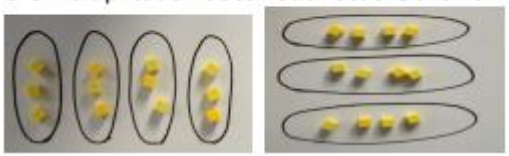
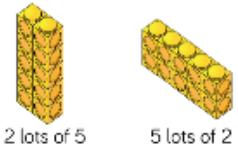
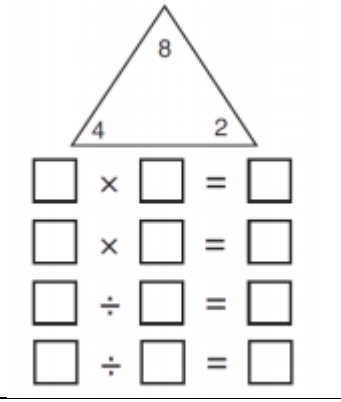
Column subtraction with regrouping.	Base 10  	 Children may draw base ten or PV counters and cross off.	33 – 15 = 

Multiplication double, times, multiplied by, the product of, groups of, lots of, equal groups, exchange

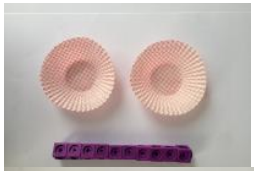
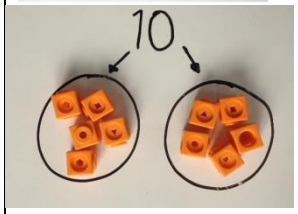
Key Skills	Concrete	Pictorial	Abstract
Year 1			
Doubling Doubling is an amount twice.	Use practical activities to show how to double a number.  4 + 4 =8 2 x 4 = 8	Draw pictures to show how to double a number. 	Double 4 is 4 + 4 = 2 x 4 =
Counting in multiples We are counting in multiples of ____ so we count every ____.	 Count in multiples supported by concrete objects in equal groups.	 Use a number line or pictures to continue support in counting in multiples.  Children make representations to show 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

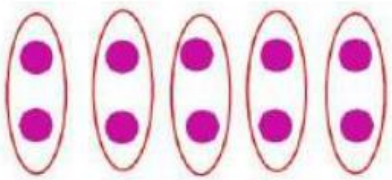
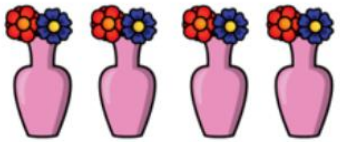
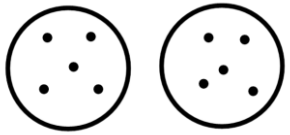
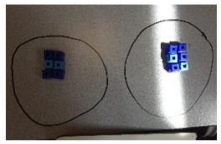
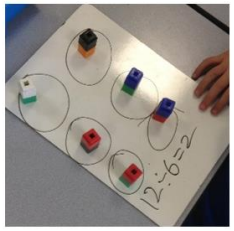
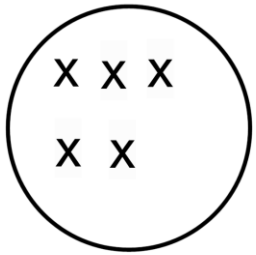
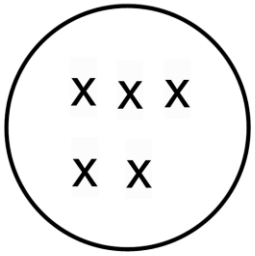
Making equal groups and counting the total.	 Use manipulatives to create equal groups.	Draw ⬭ to show 2x3 = 6 Draw and make representations 	2 x 4 = 8
Understanding arrays	Use objects laid out in arrays to find the answers to 2 lots 5, 3 lots of 2 etc. 	 5 + 5 + 5 + 5 4 + 4 + 4 + 4 + 4	3 x 2 = 6 2 x 5 = 10
Year 2			
Counting in Multiples of 2, 3, 5 and 10 from 0.	Count the groups as children skip coutning. Children may use their fingers as they are skip counting.  3 + 3 + 3	Children to use pictures to help counting in multiples.  	Count in multiples of a number aloud. Write sequences with multiples of numbers. 0, 2, 4, 6, 8, 10 0, 3, 6, 9, 12, 15 0, 5, 10, 15, 20, 25 , 30 4 × 3 = ☐

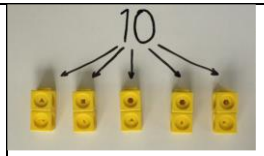
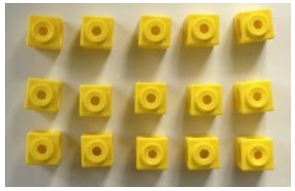
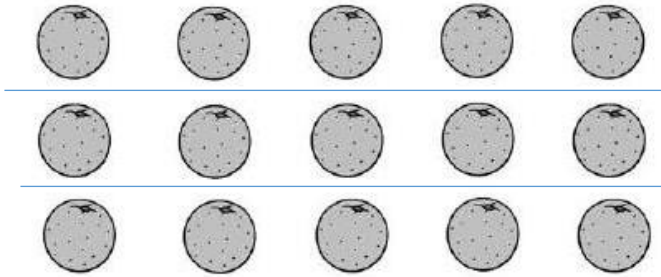
Repeated addition/ repeated grouping. There are ____ in each group. There are ____ groups. We have to add____ ___times	Repeated grouping/repeated addition 7 × 2 2 + 2 + 2 + 2 + 2 + 2 + 2 = There are 7 equal groups, with 2 in each group. 	 3 x 4 = 12  7 x 2 2 + 2 + 2+ 2 + 2 + 2 + 2	Write addition sentences to describe objects and pictures. 5 x 2 
Arrays- showing commutative multiplication ____ lots of ____ is the same as ____ lots of ____.	 Create arrays using counters/ cubes to show multiplication sentences. 	Draw arrays in different rotations to find **commutative** multiplication sentences.  	12 = 3 × 4 12 = 4 × 3 Use an array to write multiplication sentences and reinforce repeated addition.

	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. 		 5 + 5 + 5 = 15 3 + 3 + 3 + 3 + 3 = 15 5 x 3 = 15 3 x 5 = 15
____ lots of ____ is the same as ____ lots of ____. Using the inverse (to be taught alongside division) ____ lots of ____ is ____ so ____ divided by ____ is ____.	**Use arrays to illustrate commutativity** counters and other objects can also be used. 2 × 5 = 5 × 2  2 lots of 5 5 lots of 2	Children to represent the arrays pictorially. 	Children to be able to use an array to write a range of calculations e.g. • 10 = 2 × 5 • 5 × 2 = 10 • 2 + 2 + 2 + 2 + 2 = 10 • 10 = 5 + 5 

Division share, group, divide, divided by, half, remainder

Key skills	Concrete	Pictorial	Abstract
		Year 1	
Sharing objects into groups ____ shared equally between ____ is _____	 	Children use pictures or shapes to share quantities.  8 ÷ 2 = 4	Share 9 buns between three people. 9 ÷ 3 = 3

Division as grouping. ____ shared equally into groups of ____. There are _____ groups.	Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding. 	 There are 8 flowers. 2 flowers in each vase. How many vases? Represent: 10 biscuits. Five on each plate. How many plates? 	$10 \div 5 = 2$ Divide 10 into groups of 5. How many groups are there?
Year 2			
Division as sharing. ____ shared equally between ____ is _____	**Sharing** a range of objects 12 ÷ 2 =  	Represent the **sharing** pictorially $10 \div 2 = 5$  	Children should also be encouraged to use their 2 times table facts. $6 \div 2 = 3$

Division as grouping ____ split into ___ groups means there would be ____ in each group.	 Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding. 12 divided into equal groups of 4 = 3 	 12 ÷ 4 = 3	28 ÷ 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 ÷ 3 = 5 5 x 3 = 15 15 ÷ 5 = 3 3 x 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 x 4 = 28 4 x 7 = 28 28 ÷ 7 = 4 28 ÷ 4 = 7