

Objective and	Concrete	Pictorial	Abstract
Strategies  ADDITION Year 1 Number bonds within 20	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.  3 part whole 2 part 3 part 4 part 6 part 7 part 8 1	Use the part-part whole diagram as shown above to move into the abstract.  4 + 3 = 7  10 = 6 + 4  5
ADDITION Year 1 Counting	Start with the larger number on the bead string and then count on to the smaller number 1 by 1 to find the answer.	6+3=9  0 1 2 3 4 5 6 7 8 9 10  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.
ADDITION Year 1 Regrouping to make 10.	6 + 5 = 11  Start with the bigger number and use the smaller number to make 10.	Use pictures or a number line. Regroup or partition the smaller number to make 10.  3 + 9 = 9 + 5 = 14 + 4 + 4 + 4 + 4 + 4 + 4 + 4 + 4 + 4	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?

Commented [tk1]: Clearer number line?



ADDITION Year 2 Adding three single digits	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.	4+7+6 = 10+7 = 17  Combine the two numbers that make 10 and then add on the remainder.
ADDITION Year 2 Column method - no regrouping	Add together the ones first then add the tens. Use the Base 10 blocks first before moving onto place value counters.  44 + 15	(:	24 + 15 = 39 24 + 15 39
ADDITION Year 2 Column method - regrouping	49 + 23 = 10s 1s  Make both numbers on a place value grid.	Move from using place value counters to children drawing the counters to help them to solve additions.  49 + 23 =	40 + 9 <u>20 + 3</u> 60 + 12 = 72

Commented [tk2]: Tens and ones -example from a child



			Create, discover and succeed together
	Add up the units and exchange 10 ones for 1 ten.	Also, model how to draw 10s and 1s to help work out a calculation.	
Year 3/4 Column method — regrouping  Year 5/6 Consolidate understanding using numbers with more than 4 digits and extend by adding numbers with up to 3 decimal places.	Make both numbers on a place value grid.  146 +527  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.  146 +527  This can also be done with Base 10 to help children clearly see that 10 ones equal 1 ten and 10 tens equal 100.  As children move on to decimals, money and decimal place value counters can be used to support learning.	Children can draw a pictoral representation of the columns and place value counters to further support their learning and understanding  100s 10s 1s	Start by partitioning the numbers before moving on to clearly show the exchange below the addition. $ \begin{array}{cccccccccccccccccccccccccccccccccccc$



#### Order of Operations

Children will come across calculations with multiple operations, so the 'order of operations' are taught to enable children to calculate these correctly.



In the below calculation, the brackets take priority, therefore 6+4 needs to be calculated first, to give 10. Then  $30 \div 10$  can be done to give the answer 3.

$$30 \div (6 + 4) =$$



In the below calculation, the multiplication takes priority, so 5x3 is calculated first, which makes 15. Then 4+15 can be done, making 19

$$4 + 5 \times 3 =$$

4	+	1	5	=	1	9	

**Commented [tk3]:** This is currently not an approach used. Would you like this to be used?

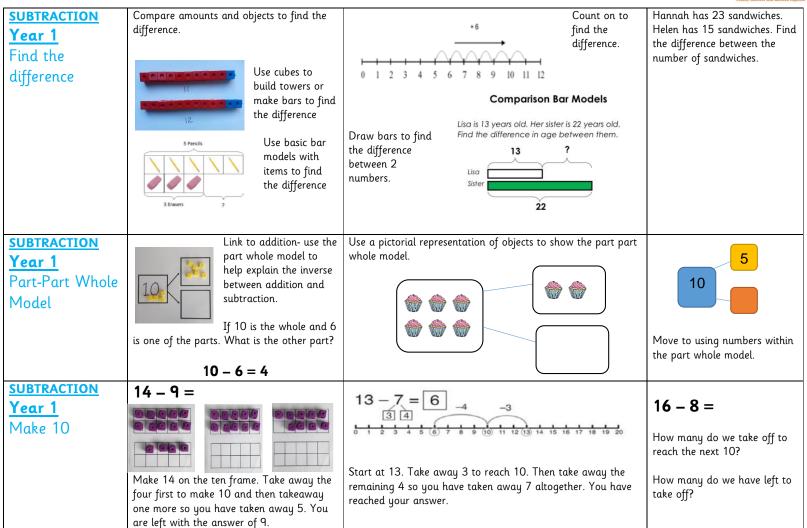
Commented [tk4R3]: https://www.mathsgenie.co.uk/primary /C9ans.pdf good examples from SATs papers here.



Objective and	Concrete	Pictorial	Abstract
Strategies			
SUBTRACTION Year 1 Taking away ones	Use physical objects, counters, cubes etc to show how objects can be taken away. $6 - 2 = 4$	Cross out drawn objects to show what has been taken away.	Encourage visualisation of the 'whole' number, then subtracting the given number. Encourage the idea of 'counting back' from the larger number at the start.
	77	15 – 3 = 12	18 – 3 = 15
	4 – 2 = 2		8-2=6
SUBTRACTION Year 1 Counting back	Make the larger number in your subtraction. Move the beads along your bead string as you count backwards in ones.	Count back on a number line or number track  9 10 11 12 13 14 15  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.
	13 – 4 = 9		
	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.	

**Commented [TA5]:** There're no instructions for taking away 1s -above

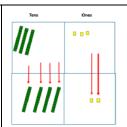






#### **SUBTRACTION** Year 2

Column method without regrouping



Show how you

subtract. Again

make the larger

partition

numbers to

number first.

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

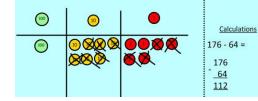
Draw the Base 10 or place value counters alongside the written calculation to help to show working.



234

234

- 88



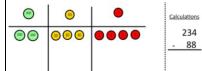
This will lead to a clear written column

subtraction.

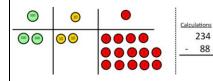
**SUBTRACTION** Year 3-6

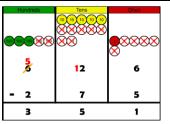
Column method with regrouping Use Base 10 to start with before moving on to place value counters. Start with one exchange before moving onto subtractions with 2 exchanges.

Make the larger number with the place value counters



Start with the ones, can I take away 8 from 4 easily? I need to exchange one of my tens for ten ones.





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.

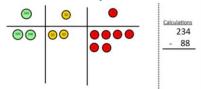


Moving forward the children use a more compact method. Ensure the larger number is at the top, and that the place value is correctly in line.

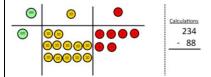




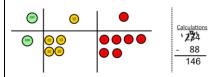
Now I can subtract my ones.



Now look at the tens, can I take away 8 tens easily? I need to exchange one hundred for ten tens.



Now I can take away eight tens and complete my subtraction



Show children how the concrete method links to the written method alongside your working. Cross out the numbers when exchanging and show where we write our new amount.

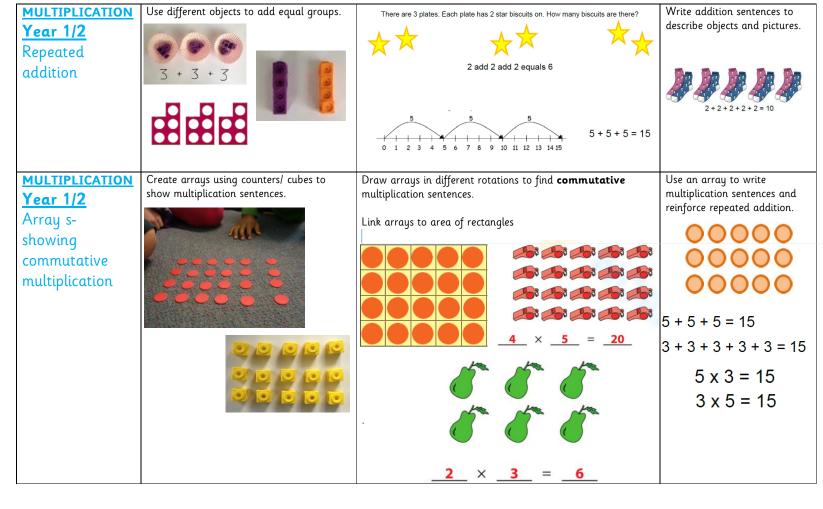
Just writing the numbers as shown here shows that the child understands the method and knows when to exchange/regroup.

This will lead to an understanding of subtracting any number including decimals, starting with the first (usually largest) number.



Objective and	Concrete	Pictorial	Abstract
Strategies			
<b>MULTIPLICATION</b>	Use practical activities to show how to	Draw pictures to show how to double a number.	
Year 1/2 Doubling	double a number.	Double 4 is 8	<b>1</b> 6
			10 6 $\mathbf{I}_{x2}$ $\mathbf{I}_{x2}$ 20 12
	double 4 is 8 4 × 2 = 8		Partition a number and then double each part before recombining it back together.
Year 1/2 Counting in multiples	ting in	Sus fur Sur fur fur fur	Count in multiples of a number aloud.  Write sequences with multiples of numbers.
		Use a number line or pictures to continue support in counting	2, 4, 6, 8, 10 5, 10, 15, 20, 25
	Count in multiples supported by concrete objects in equal groups.	in multiples.	



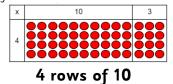


Commented [tk6]: Any clearer images



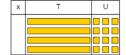
MULTIPLICATION
Year 3/4
Grid Method

Show the link with arrays to first introduce the grid method.



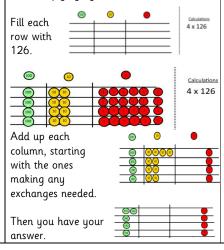
4 rows of 3

Move on to using Base 10 to move towards a more compact method.



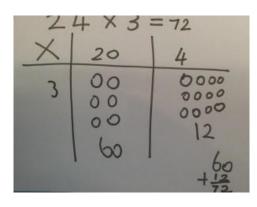
4 rows of 13

Move on to place value counters to show how we are finding groups of a number.We are multiplying by 4 so we need 4 rows.



Children can represent the work they have done with place value counters in a way that they understand.

They can draw the counters, using colours to show different amounts or just use circles in the different columns to show their thinking as shown below.



Start with multiplying by one digit numbers and showing the clear addition alongside the grid.

×	30	5
7	210	35

$$210 + 35 = 245$$

Moving forward, multiply by a 2 digit number showing the different rows within the grid method.

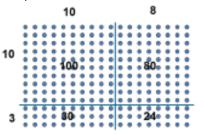
	10	8
10	100	80
3	30	24

Х	1000	300	40	2
10	10000	3000	400	20
8	8000	2400	320	16



# MULTIPLICATION Year 3/4

Expanded Method Show the link with arrays to first introduce the expanded method.

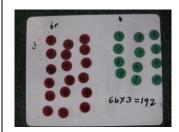


Start with long multiplication, reminding the children about lining up their numbers clearly in columns.

18	
x <u>13</u>	
24	(3 x 8)
30	(3 x 10))
80	(10 x 8)
100	(10 x 10)
234	_

# MULTIPLICATION Year 5/6

Column/ compact method Children can continue to be supported by place value counters at the stage of multiplication.



It is important at this stage that they

always multiply the ones first and note

down their answer followed by the tens

which they note below.

Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods.

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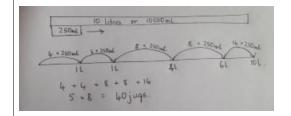
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Start with long multiplication, reminding the children about lining up their numbers clearly in columns.

				/	4
If it helps,		×		6	3
children can write				1	2
out what			2	1	0
they are			2	4	0
solving	+	4	2	0	0
next to their		4	6	6	2
answer.					

This moves to the more compact method.

		6	3	2	1
Х				1	5
	3	11	61	0	5
+	6	3	2	1	0
	9	4	8	1	5
		1			

**Commented [tk7]:** I think children are taught to multiply units digit first i.e. 8 first in this instance. I think you should find another image to show long multiplication



Objective and	Concrete	Pictorial	Abstract
Strategies  DIVISION Year 1/2 Sharing objects into groups	I have 10 cubes, can you share them equally in 2 groups?	Children use pictures or shapes to share quantities. $8 \div 2 = 4$	Share 8 buns between two people. $8 \div 2 = 4$
<u>Pivision</u> Year 1/2 Division as grouping	Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding.	Use a number line to show jumps in groups. The number of jumps equals the number of groups.  0 1 2 3 4 5 6 7 8 9 10 11 12  3 3 3 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. Model physically sharing number into the boxes.	28 ÷ 7 = 4  Divide 28 into 7 groups. How many are in each group?
	12 ÷ 3 = 4	20 ? 20 ÷ 5 = ? 5 x ? = 20	



#### DIVISION Year 3/4

Division within arrays

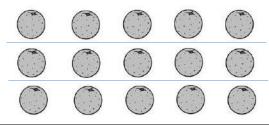


Link division to multiplication by creating an array and thinking about the number

sentences that can be created.

$$E_9$$
 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.



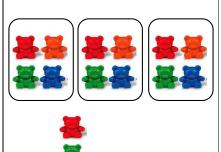
Find the inverse of multiplication and division sentences by creating four linking number sentences.

# DIVISION Year 3

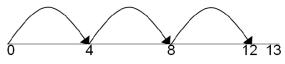
Division with a remainder

 $14 \div 3 =$ 

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.









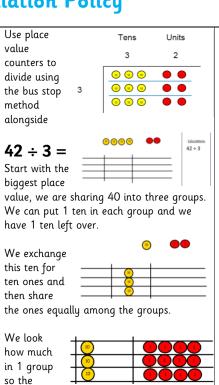
Complete written divisions and show the remainder using r.

answer is 14.

 $364 \div 3 =$ 



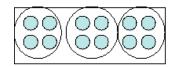
# Year 4-6 Short division



121 rem 1

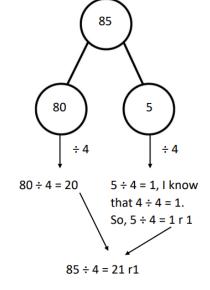
3 364

Students can continue to use drawn diagrams with dots or circles to help them divide numbers into equal groups.



Encourage them to move towards counting in multiples to divide more efficiently.

Use part-whole model to partition number, and then divide the parts by the divisor:



Begin with divisions that divide equally with no remainder.

Move onto divisions with a remainder.

Finally move into decimal places to divide the total accurately (write out times table of divisor to help.)

$$1x35 = 35$$
  
 $2x35 = 70$   
 $3x35 = 105$   
 $4x35 = 140$  etc.

**Commented [tk8]:** You need examples with the divisors written out



DIVISION	Children will use long division
Year 6	to divide numbers with up to 4
Long division	digits by 2 digit numbers.  They will also be taught how
Long atvision	to 'chunk out' sections to find
	the final answer.
	1) 54 ÷ 3
	2 x 3 = 6 2 x 3 = 9 4 x 3 = 2 5 x 3 = 25
	- 3 0 (10 x 3) (33 ± 18 7 3 = 2 5 ± 16 ± 16 ± 16 ± 16 ± 16 ± 16 ± 16 ±
	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$
	$-\frac{24}{0}$ (8 x 3) $\frac{333-35}{1133-33}$ $\frac{323-35}{1233-36}$
	100 x 3 = 300
	15
	2 2 3 3 0
	-220 (22 x 10 = 220)
	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
	000