

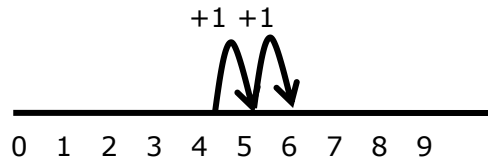
Addition (KS1)

FS

Record using pictures

Teacher model how to use number line
Children use number lines to count on in ones:

$$4 + 2 = 6$$



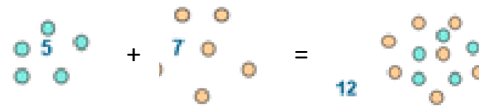
Y1

Children **MUST** understand the concept of equality before using the equals sign. Ensure calculations are written either side of the equals sign e.g.

$$2 = 1 + 1$$

$$3 + 3 = 4 + 2$$

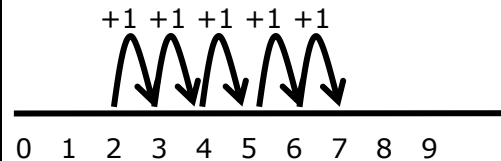
Counting concrete sets of objects:



Understand counting on a number line

Record using number line and jumps in ones

$$2 + 5 = 7$$



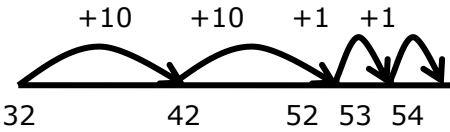
Begin to bridge through ten. Use a bead string to illustrate:

$$7 + 6 = 13 \text{ count on 3 then count on another 3.}$$

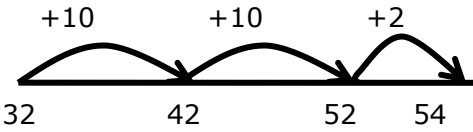
Y2

Counting on in tens and ones:

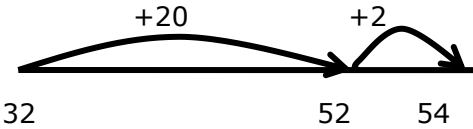
$$32 + 22 = 54$$



Children then move on to more efficient jumps: (using known number facts e.g. $2 + 2 = 4$)

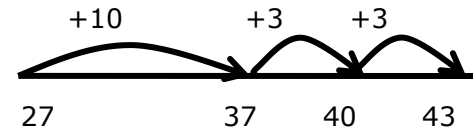


Next group the tens and the units into one jump:



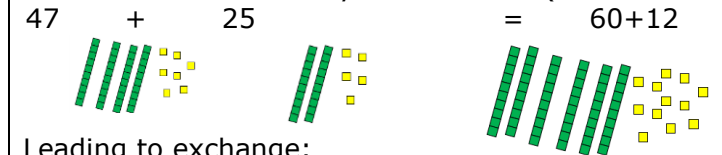
Partitioning and Bridging through ten:

$$27 + 16 = 43$$



Towards a formal written method:

Partition in different ways and recombine (use base ten):



Leading to exchange:



Expanded Written method:

$$47 + 25 = 72$$

$$40 + 20 = 60$$

$$7 + 5 = 12$$

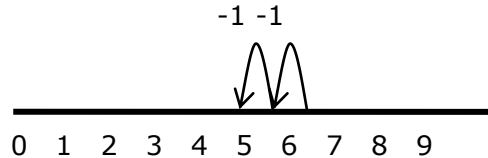
$$60 + 12 = 72$$

Subtraction (KS1)

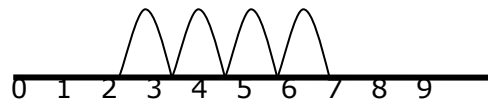
FS

Record using pictures

Teacher model how to use number line
Children use number lines to count on in ones:
 $6 - 2 = 4$



The number line should also demonstrate that $6 - 2$ means the 'difference between 6 and 2' or the 'difference between 2 and 6' and how many jumps they are apart.

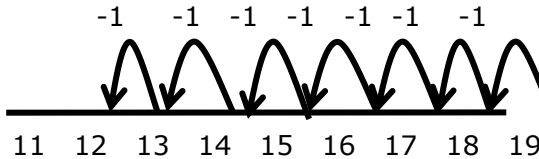


Y1

Record using Pictures

Understanding subtraction as take away:

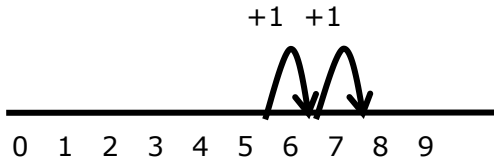
$$19 - 7 = 12$$



Understanding subtraction as finding the difference

Counting on: If the numbers are close together or near to multiples of 10 it can be more efficient to count on. The number line should still be used in this instance.

$$7 - 5 = 2$$



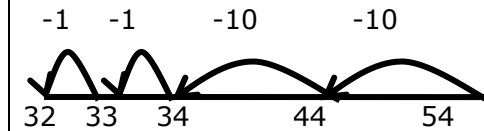
Begin to bridge through ten. Use a bead string to illustrate:
 $12 - 7 = 5$ count back 2 then count back another 5.

Y2

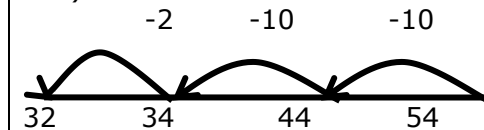
Number Lines:

Counting back in tens and ones:

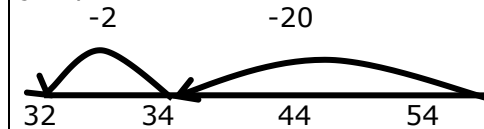
$$54 - 22 = 32$$



Children then move on to more efficient jumps: (using known number facts e.g. $2 + 2 = 4$)



Next group the tens and the units into one jump:



Written method alongside practical resources

Using **base ten** to model expanded column. To prepare children for working with larger numbers.

$$75 - 42 =$$

$$\begin{array}{r} 70 + 5 \\ -40 + 2 \\ \hline 30 + 3 \end{array}$$

Multiplication (KS1)

FS

Y1

Y2

Children will experience equal sets of objects.

They will count in twos and tens

Work with practical resources involving groups or sets of objects, in or to solve problems

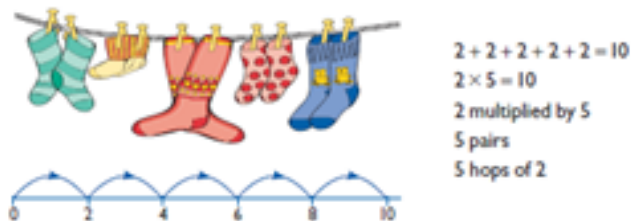
Children will experience equal sets of objects.

They will count in twos and tens and begin to count in 5s

Work with practical resources involving groups or sets of objects, in or to solve problems. Record using pictures

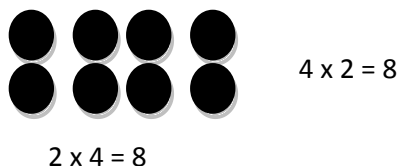
Repeated addition:

Repeated addition can be shown using number lines and concrete objects:



Arrays: With support of teacher

Children can begin to represent a problem using an array and work out the answer:



Repeated addition:

$3 + 3 + 3 = 9$ or 3 lots of 3

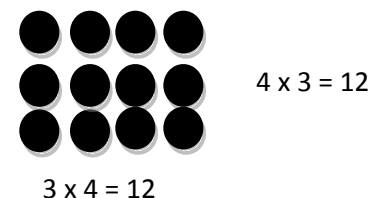
Repeated addition can be shown using number lines and bead strings.

Commutativity:

Children should understand that 3×4 has the same answer as 4×3

Arrays:

Children should be able to represent a problem using an array and work out the answer:



Division (KS1)

FS

Y1

Y2

Children will understand the concept of equal grouping.

During play and problem solving they will share out objects into equal sets/groups

They will count in 2s and 10s

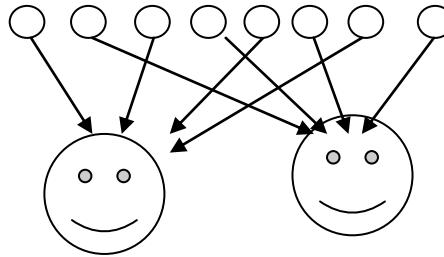
Children will understand the concept of equal grouping.

During play and problem solving they will share out objects into equal sets/groups

They will count in 2s and 10s and 5s

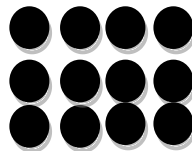
Sharing equally:

8 sweets are shared between 2 people how many to they each get?



With the support of the teacher use arrays:

Use arrays to represent division pictorially



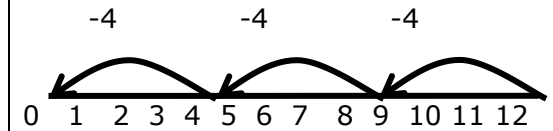
$12 \div 3 = 4$
There are 4 groups of 3

$12 \div 4 = 3$
There are 3 groups of 4

Grouping or repeated subtraction

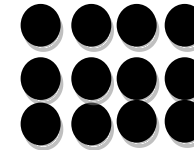
Using a number line jump back in jumps of the divisor until reaching zero

e.g. 12 divided by 4 equals 3



Arrays:

Use arrays to represent division pictorially



$12 \div 3 = 4$
There are 4 groups of 3

$12 \div 4 = 3$
There are 3 groups of 4

Children use arrays to see the relationship between multiplication and division.

Addition (KS2)

Y3

Expanded Column method:

You may wish to introduce this with base ten in columns.

$$352 + 435 = 787$$

$$\begin{array}{r} 300 + 50 + 2 \\ 400 + 30 + 5 \\ \hline 700 + 80 + 7 = 787 \end{array}$$

Move to compact column method when confident with previous.

This should be introduced as a more streamlined version of what they have already been doing NOT introduced as an entirely new method.

Compact column method:

$$352 + 435 = 787$$

$$\begin{array}{r} 352 \\ +435 \\ \hline 7(2+5) \\ 80(50+30) \\ 700(300+400) \\ \hline 787 \end{array}$$

Y4

Expanded column method as with year 3: (progressing onto 4digit numbers)

$$1352 + 1435 = 2787$$

$$\begin{array}{r} 1000 + 300 + 50 + 2 \\ 1000 + 400 + 30 + 5 \\ \hline 2000 + 700 + 80 + 7 = 2787 \end{array}$$

Move to column method when confident with previous:

$$352 + 435 = 787$$

$$\begin{array}{r} 1352 \\ +1435 \\ \hline 7(2+5) \\ 80(50+30) \\ 700(300+400) \\ 2000(100+1000) \\ \hline 2787 \end{array}$$

Compact column method with carrying(4digits)

This should be introduced as a more streamlined version of what they have already been doing NOT introduced as an entirely new method.

$$\begin{array}{r} 2634 \\ + 4517 \\ \hline 7151 \\ 1 \quad 1 \end{array}$$

Y5

As year 4.

When understanding of formal columnar method is secure children move onto addition of whole and decimal numbers.

Y6

Consolidation of year 5

Subtraction (KS2)

Y3

Expanded Column method:

Where no decomposition is required:

$$\begin{array}{r} 100 + 70 + 5 \\ - \quad 40 + 2 \\ \hline 100 + 30 + 3 \end{array}$$

Decomposition:

Use base 10 to model. (remind children that they only need to count out the first number in order to take the second number away from it. E.g. 84 - 27 only count out the 84)

Expanded column method with decomposition:

e.g. 92 - 84 =

$$\begin{array}{r} \overset{80}{\cancel{90}} + \overset{1}{2} \\ \hline 80 + 4 \\ \hline 0 + 8 \end{array}$$

Y4

Expanded Column method:

Take away using expanded column subtraction for larger numbers, progress onto 4 digits.

e.g. 752 - 84 =

600 140 12

$$\begin{array}{r} \cancel{700} + \cancel{50} + \cancel{2} \\ \hline 80 + 4 \end{array}$$

$$600 + 60 + 8 = 668$$

Compact Column Method:

$$752 - 276 = 476$$

$$\begin{array}{r} \overset{6}{\cancel{7}} \quad \overset{14}{\cancel{5}} \quad \overset{1}{\cancel{2}} \\ \hline -2 \quad 7 \quad 6 \end{array}$$

$$4 \quad 7 \quad 6$$

Y5

Compact column method as with year 4 for larger numbers. Progress to subtraction of decimals

Y6

As year 5, focusing on procedural fluency.

Multiplication (KS2)

Y3

Partitioning:

When solving 2 digit by 1 digit calculations, child should partition the 2 digit number and the recombine as the last step

e.g.

$$\begin{aligned} 32 \times 5 &= (30 \times 5) + (2 \times 5) \\ &= 150 + 10 \\ &= 160 \end{aligned}$$

These should be continued to be used along with partitioning

Grid Method:

Children will need to partition the numbers in order to use this method

e.g.

$$32 \times 6$$

X	30	2
6	180	12

$$\begin{array}{r} 180 \\ + 12 \\ \hline 192 \end{array}$$

Y4

Grid Method: (Progress onto 3digit by 2digit)

Children will need to partition the numbers in order to use this method

$$32 \times 68$$

X	30	2
60	1800	120
8	240	16

$$\begin{array}{r} 1800 \\ + 120 \\ 16 \\ \hline 240 \\ \hline 2176 \end{array}$$

Short multiplication for 2digit by 1 digit:

Model how this links to the distributive law.

$$\begin{array}{r} 21 \\ \times 7 \\ \hline 140 \\ \hline 147 \end{array}$$

Y5

Grid Method: (Progress onto 4digit by 2digit)

Continue to use the grid method including decimals and larger numbers e.g.

X	60	3
4	240	12
0.3	18	0.9

$$\begin{array}{r} 240 \\ 12 \\ 18 \\ + 0.9 \\ \hline 270.9 \end{array}$$

Long multiplication:

Children need to see the link between grid method and long multiplication. This should be introduced as a streamlined method NOT an entirely new approach.

$$\begin{array}{r} 63 \\ \times 44 \\ \hline 252 \quad (4 \times 3 \text{ and } 4 \times 60) \\ \underline{2520} \quad (40 \times 3 \text{ and } 40 \times 60) \\ 2772 \end{array}$$

Compact Short Multiplication when multiplying by a one digit number.

When children are secure introduce column method with short multiplication

$$\begin{array}{r} 241 \\ \times 3 \\ \hline 723 \end{array}$$

Y6

Continue to refine methods **as in year 5. Fluency** of working with multiplication is the focus

Long multiplication method:

	<small>2</small>	<small>3</small>	<small>1</small>
	1	3	4
	2	0	0
	x	1	8
	1	3	4
	2	0	0
	2	4	1
	5	6	0
	2	4	1
	2	4	1
	5	6	0
	2	4	1
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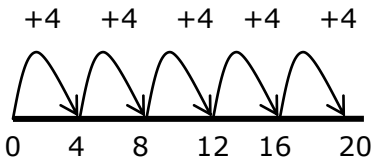
Division (KS2)

Y3

Grouping on number lines

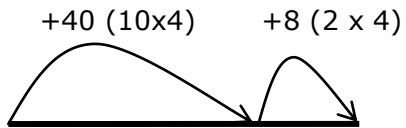
Grouping along a vertical number line. This will aid transition into more formal methods. Begin with adding then move onto subtracting

$$20 \div 4 = 4$$



Become more efficient in this by taking jumps in chunks.

$$48 \div 4 = 12$$

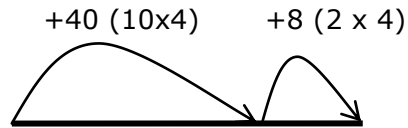


Y4

Continue grouping on number lines:

This should include use of remainders.

$$48 \div 4 = 12$$



When children are **confident** and have a **secure understanding** of division and the idea of 'chunks' move onto...

Short division: 3 or 2 digit divided by 1 digit

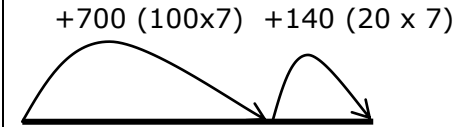
$$\begin{array}{r} 25 \text{ r } 1 \\ 5 \overline{) 126} \\ \underline{10} \\ 26 \\ \underline{25} \\ 1 \end{array}$$

Y5

Continue grouping on number lines larger numbers 3digit by 2digit

This should include use of remainders.

$$840 \div 7 = 120$$



When children are **confident** and have a **secure understanding** of division and the idea of 'chunks' move onto...

Short Division for 4 digit by 1 digit.

$$\begin{array}{r} 239 \text{ r } 1 \\ 6 \overline{) 1435} \\ \underline{12} \\ 23 \\ \underline{18} \\ 53 \\ \underline{48} \\ 5 \end{array}$$

Remainders should be interpreted and recorded in a way appropriate to the problem e.g. rounding, fraction or decimal.

Y6

Short division as in year 5

Long Division:

$$432 \div 15 = 28 \text{ r } 12$$

$$\begin{array}{r} 28 \text{ r } 12 \\ 15 \overline{) 432} \\ \underline{30} \\ 132 \\ \underline{135} \\ 12 \end{array}$$

(15 x 20)

(15 x 8)

St Jude's Church of England Primary School



Calculation Policy FS – Y6

Updated 2014