



Calculation Policy 2017

Useful vocabulary

Complements or Bonds: Children are encouraged to learn different ways to make a number. For example: 10 can be made in these ways: $8 + 2 = 10$, $10 = 1 + 3 + 6$ or 100 can be made in these ways: $80 + 20 = 100$, $100 = 10 + 30 + 60$.

Inverse: Addition and subtraction are inverse (opposite) operations, e.g. $3 + 7 = 10$ so $10 - 3 = 7$. Doubling/halving and multiplying/dividing are also inverse operations.

Partitioning: Splitting a number to help calculate. For example, $56 = 50 + 6$, $123 = 100 + 20 + 3$. A single digit number can also be split, e.g. $7 = 4 + 3$.

sum of
count on
total
plus
Addition
more
together
than

Skills to be able to add successfully:

- Recall all addition pairs that equal numbers to 10
- Add mentally a series of one digit numbers
- Add multiples of 10 or 100 e.g $60 + 70$
- Partition 2 and 3 digit numbers e.g $76 = 70 + 6$

First steps

The children will be introduced to addition through combining groups of objects, starting with one more.



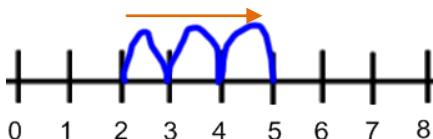
$$4 + 1 = 5$$

Using number lines

Counting up in

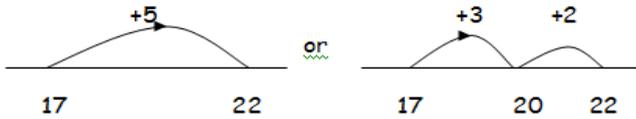
ones

$$2 + 3 = 5$$

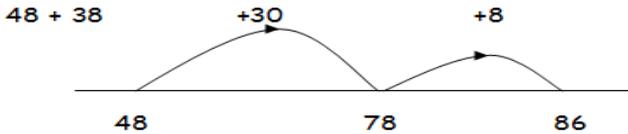


Using a blank number line.

$17 + 5 = 22$



Moving on to



Partitioning column method

Then, the children will use partitioning to split the numbers into tens and ones and add each part separately.

$67 + 38$

$$\begin{array}{r} 60 \quad 7 \\ + 30 \quad 8 \\ \hline 90 \quad 15 = 105 \end{array}$$

$138 + 233$

$$\begin{array}{r} 100 \quad 30 \quad 8 \\ + 200 \quad 30 \quad 3 \\ \hline 300 \quad 60 \quad 11 = 371 \end{array}$$

↙ ↘
Add these together mentally

Column method

When the children understand this then the traditional compact method of addition is taught. Carry digits are recorded below the line, using the words "carry ten" or "carry one hundred" not "carry one"

$$\begin{array}{r} 47 \\ + 76 \\ \hline 123 \\ \hline 11 \end{array}$$

It is important that the children write the digits in the correct column and add the ones first.

minus count back take away

Subtraction

decrease less than difference

- To subtract successfully children need to be able to:
- Count backwards in ones and tens.
 - Recall addition and subtraction facts to 20;
 - Subtract multiples of 10 (e.g 160–70) using the related subtraction facts 16–7;
 - Partition 2 and 3 digit numbers.

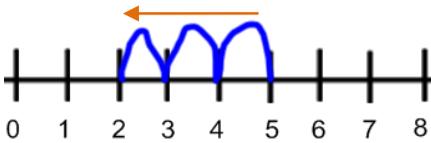
First steps

The children will be introduced to subtraction through taking away groups of objects, starting with one less.

Using number lines.

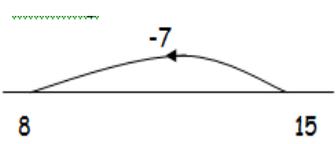
Counting back in ones

$5 - 3 = 2$

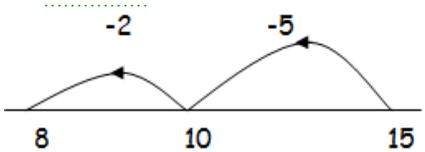


Using blank number lines

$15 - 7 = 8$

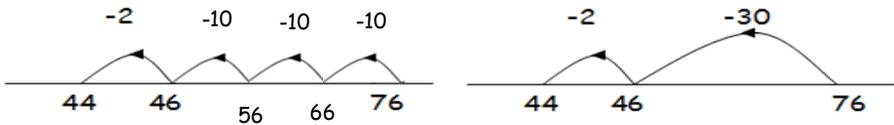


or



Moving onto

Taking away the tens first



Children are also taught to find the difference. For example, what is the difference between 76 and 44 ($76 - 44$)? So children could count on from 44 up to 76 using a blank number line.

When the children are ready they will use partitioning to split the number into tens and ones, then subtract. Always starting the calculation from the ones

$$\begin{array}{r} 67 - 23 = 60 \quad 7 \\ - \quad 20 \quad 3 \\ \hline 40 \quad 4 = 44 \end{array}$$

Moving onto decomposition in the column method:

$$\begin{array}{r} 73 - 36 = 70 \quad 3 \\ - \quad 30 \quad 6 \\ \hline \end{array}$$

becomes

$$\begin{array}{r} 60 \\ \cancel{70} \quad 1 \quad 3 \\ - \quad 30 \quad 6 \\ \hline 30 \quad 7 \quad 73 - 36 = 37 \end{array}$$

Next, the traditional compact method of subtraction is taught.

The children need to write out the calculation ensuring the digits are in the correct columns.

$$\begin{array}{r} \\ 6 \\ - \quad 2 \quad 2 \quad 7 \\ \hline 4 \quad 4 \quad 8 \end{array}$$

Multiplication

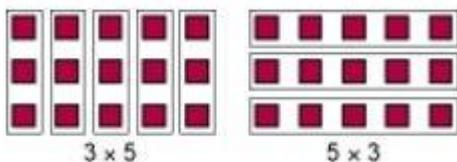
times
product
lots of
groups of

To multiply successfully, children need to be able to:

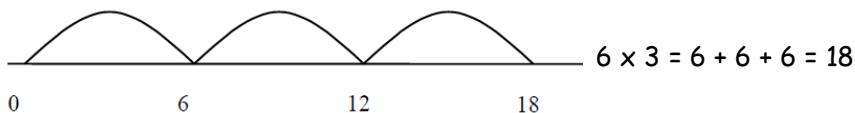
- Recall all times tables facts to 12×12 ;
- Partition numbers;
- Use place value knowledge to work out calculations like 70×5 (use 7×5);
- Add 2 or more single-digit numbers mentally;
- Add multiples of 10 and 100;
- Add combinations of whole numbers.

First steps.

The children learn about multiplying as doubling, and as arrays and repeated addition



Arrays showing 3×5 and 5×3



Then, we will use the grid method of multiplication which utilises the children's knowledge of partitioning.

$$28 \times 3$$

	20	8
3	60	24

$$\begin{array}{r} 60 \\ + 24 \\ \hline 84 \end{array}$$

$$28 \times 35$$

	20	8
30	600	240
5	100	40

$$\begin{array}{r} 840 \\ + 140 \\ \hline 980 \end{array}$$

Next, we will use the more traditional method of column multiplication. The prior use of the grid method will ensure the children understand how each part of the calculation is made.

$$\begin{array}{r} 34 \\ \times 5 \\ \hline 20 \\ + 150 \\ \hline 170 \end{array}$$

$$\begin{array}{r} 53 \\ \times 24 \\ \hline 212 \\ 1060 \\ \hline 1272 \end{array}$$

$$\begin{array}{r} 2.43 \\ \times 7 \\ \hline 17.01 \\ 32 \end{array}$$

Division

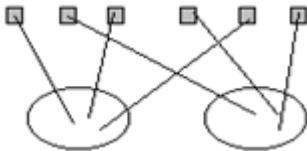
split
share
divide
group

To divide successfully, children need to be able to:

- Understand division as repeated subtraction;
- Use knowledge of multiplication facts;
- Estimate how many times a number divides into another number;
- Multiply a 2 digit number by a single digit mentally.

First steps

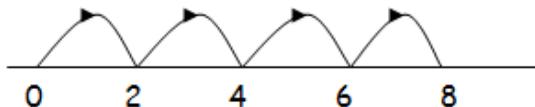
Children learn about division as sharing, e.g 6 sweets are shared equally between 2 people



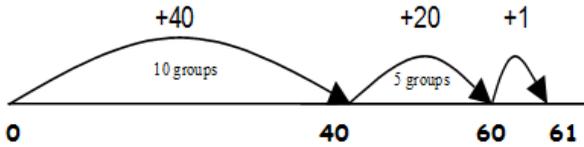
Then, the children learn that division is also about grouping. $8 \div 2$ is how many 2s are there in 8. We can draw a picture,



or draw a number line.



The children continue to develop the idea of grouping to divide 2 digit numbers by single digit numbers
 $61 \div 4 = 15$ remainder 1.



Next, the children will be introduced to the bus stop method of division.

$98 \div 7 =$

$$\begin{array}{r} 14 \\ 7 \overline{) 98} \end{array}$$

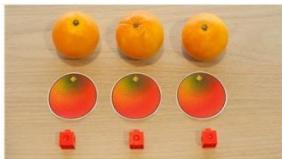
This method continues to be developed so that it includes decimals and fractions in the answers and that eventually children will be able to divide by 2 digit numbers.

$432 \div 15 =$

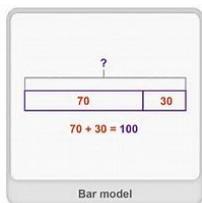
$$\begin{array}{r} 28.8 \\ 15 \overline{) 432.0} \\ \underline{30} \\ 132 \\ \underline{120} \\ 120 \\ \underline{120} \\ 0 \end{array}$$

$$\begin{array}{r} 28.8 \\ 15 \overline{) 432.0} \\ \underline{30} \\ 132 \\ \underline{120} \\ 120 \\ \underline{120} \\ 0 \end{array}$$

Our approach to Maths is to use concrete (real) items, followed by pictorial representations and then move on to the abstract. For example: 3 oranges, 3 pictures of oranges and 3 cubes to represent the 3 oranges.



Children can also use the bar model diagram to help them see the relationship between numbers:

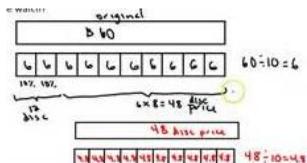


100	75	25
50	?	?

23	28	193	325
?	?	?	?

100	753	125
92	?	?

213	223	?
50	?	?



We use a range of practical resources to help children to learn maths. Such as:

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

