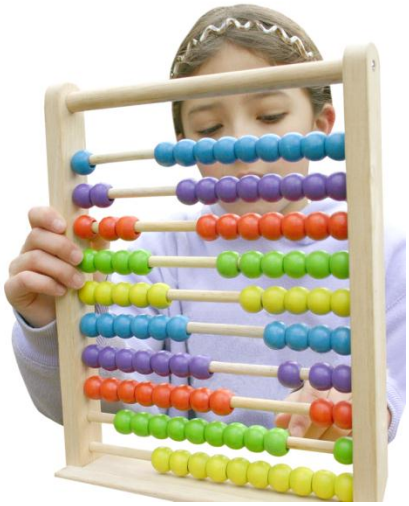
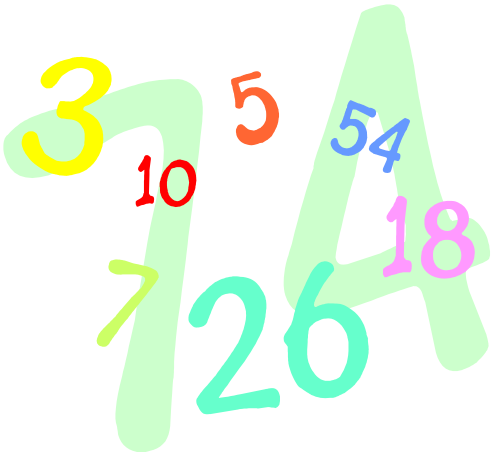
St Andrew's Primary Leasingham

Calculations Policy





To ensure consistency in teaching throughout the school this Calculations Policy has been produced. This policy will give an overview of the different strategies used in our school to teach maths throughout the Primary Maths Curriculum.

As children progress at different rates, some may need to use the strategies from previous or future year groups.

Children are introduced to the processes of calculation through practical, oral and mental activities. As children begin to understand the underlying ideas they develop ways of recording to support their thinking and calculation methods, use particular methods that apply to special cases, and learn to interpret and use the signs and symbols involved. Over time children learn how to use models and images, such as empty number lines, to support their mental and informal written methods of calculation.

There is a considerable emphasis on teaching mental calculation strategies. Informal written recording takes place regularly and is an important part of learning and understanding. More formal written methods follow only when the child is able to use a wide range of mental calculation strategies. As children's mental methods are strengthened and refined, so too are their informal written methods. Some recording takes the form of jottings, which are used to support children's thinking. This may be done on scrap paper and whiteboards and is not always retained as it is for the children's own personal use.

This policy contains the key pencil and paper procedures that will be taught within our school. It has been written to ensure consistency and progression throughout the school and reflects a whole school agreement.

This policy concentrates on the introduction of standard symbols, the use of the empty number line as a jotting to aid mental calculation and on the introduction of pencil and paper procedures. It is important that children do not abandon jottings and mental methods once pencil and paper procedures are introduced. Therefore children will always be encouraged to look at a calculation/problem and then decide which is the best method to choose – pictures, mental calculation with or without jottings, structured recording or a calculator. Our long-term aim is for children to be able to select an efficient method of their choice

(whether this be mental, written or in upper Key Stage 2 using a calculator) that is appropriate for a given task. They will do this by always asking themselves:

- 'Can I do this in my head?'
- 'Can I do this in my head using drawings or jottings?'
- 'Do I need to use a pencil and paper procedure?'
- 'Do I need a calculator?'

Although the focus of the policy is on pencil and paper procedures it is important to recognise that the ability to calculate mentally lies at the heart of the Primary National Strategy for mathematics. The mental methods in the *Primary Framework for teaching mathematics* will be taught systematically from Reception onwards and pupils will be given regular opportunities to develop the necessary skills. However mental calculation is not at the exclusion of written recording and should be seen as complementary to and not as separate from it. In every written method there is an element of mental processing. Sharing written methods with the teacher encourages children to think about the mental strategies that underpin them and to develop new ideas. Therefore written recording both helps children to clarify their thinking and supports and extends the development of more fluent and sophisticated mental strategies.

The overall aim is that when children leave primary school they:

- have a secure knowledge of number facts and a good understanding of the four operations;
- are able to use this knowledge and understanding to carry out calculations mentally and to apply general strategies when using one-digit and two-digit numbers and particular strategies to special cases involving bigger numbers;

- make use of diagrams and informal notes to help record steps and part answers when using mental methods that generate more information than can be kept in their heads;
- have an efficient, reliable, compact written method of calculation for each operation that children can apply with confidence when undertaking calculations that they cannot carry out mentally;
- use a calculator effectively, using their mental skills to monitor the process, check the steps involved and decide if the numbers displayed make sense.

Objectives

The objectives in the revised Framework show the progression in children's use of written methods of calculation in the strands 'Using and applying mathematics' and 'Calculating'.

Using and applying mathematics	Calculating
Foundation Stage • Use developing mathematical ideas and methods to solve practical problems • Match sets of objects to numerals that represent the number of objects • Sort objects, making choices and justifying decisions • Talk about, recognise and recreate simple patterns • Describe solutions to practical problems, drawing on experience, talking about their own ideas, methods and choices	**Foundation Stage** • Begin to relate addition to combining two groups of objects and subtraction to 'taking away' • In practical activities and discussion begin to use the vocabulary involved in adding and subtracting • Count repeated groups of the same size • Share objects into equal groups and count how many in each group
Year 1 • Solve problems involving counting, adding, subtracting, doubling or halving in the context of numbers, measures or money, for example to 'pay' and 'give change' • Describe a puzzle or problem using numbers, practical materials and diagrams; use these to solve the problem and set the solution in the original context	**Year 1** • Relate addition to counting on; recognise that addition can be done in any order; use practical and informal written methods to support the addition of a one-digit number or a multiple of 10 to a one-digit or two-digit number • Understand subtraction as 'take away' and find a 'difference' by counting up; use practical and informal written methods to support the subtraction of a one-digit number from a one-digit or two-digit number and a multiple of 10 from a two-digit number • Use the vocabulary related to addition and subtraction and symbols to describe and record addition and subtraction number sentences

Using and applying mathematics	Calculating
Year 2 • Solve problems involving addition, subtraction, multiplication or division in contexts of numbers, measures or pounds and pence • Identify and record the information or calculation needed to solve a puzzle or problem; carry out the steps or calculations and check the solution in the context of the problem	**Year 2** • Represent repeated addition and arrays as multiplication, and sharing and repeated subtraction (grouping) as division; use practical and informal written methods and related vocabulary to support multiplication and division, including calculations with remainders • Use the symbols +, −, ×, ÷ and = to record and interpret number sentences involving all four operations; calculate the value of an unknown in a number sentence (e.g. ☐ ÷ 2 = 6, 30 − ☐ = 24)
Year 3 • Solve one-step and two-step problems involving numbers, money or measures, including time, choosing and carrying out appropriate calculations • Represent the information in a puzzle or problem using numbers, images or diagrams; use these to find a solution and present it in context, where appropriate using £.p notation or units of measure	**Year 3** • Develop and use written methods to record, support or explain addition and subtraction of two-digit and three-digit numbers • Use practical and informal written methods to multiply and divide two-digit numbers (e.g. 13 × 3, 50 ÷ 4); round remainders up or down, depending on the context • Understand that division is the inverse of multiplication and vice versa; use this to derive and record related multiplication and division number sentences

Using and applying mathematics	Calculating
Year 4 • Solve one-step and two-step problems involving numbers, money or measures, including time; choose and carry out appropriate calculations, using calculator methods where appropriate • Represent a puzzle or problem using number sentences, statements or diagrams; use these to solve the problem; present and interpret the solution in the context of the problem	**Year 4** • Refine and use efficient written methods to add and subtract two-digit and three-digit whole numbers and £.p • Develop and use written methods to record, support and explain multiplication and division of two-digit numbers by a one-digit number, including division with remainders (e.g. 15 × 9, 98 ÷ 6)

Using and applying mathematics	Calculating
Year 5 • Solve one-step and two-step problems involving whole numbers and decimals and all four operations, choosing and using appropriate calculation strategies, including calculator use • Represent a puzzle or problem by identifying and recording the information or calculations needed to solve it; find possible solutions and confirm them in the context of the problem	**Year 5** • Use efficient written methods to add and subtract whole numbers and decimals with up to two places • Use understanding of place value to multiply and divide whole numbers and decimals by 10, 100 or 1000 • Refine and use efficient written methods to multiply and divide HTU × U, TU × TU, U.t × U and HTU ÷ U
Year 6 • Solve multi-step problems, and problems involving fractions, decimals and percentages; choose and use appropriate calculation strategies at each stage, including calculator use • Represent and interpret sequences, patterns and relationships involving numbers and shapes; suggest and test hypotheses; construct and use simple expressions and formulae in words then symbols (e.g. the cost of c pens at 15 pence each is $15c$ pence)	**Year 6** • Use efficient written methods to add and subtract integers and decimals, to multiply and divide integers and decimals by a one-digit integer, and to multiply two-digit and three-digit integers by a two-digit integer

Written methods for addition of whole numbers

Vocabulary-: Add, addition, total, plus, more than, and, altogether, increase, equals, make, sum etc.

The aim is that children use mental methods when appropriate, but for calculations that they cannot do in their heads they use an efficient written method accurately and with confidence. Children are entitled to be taught and to acquire secure mental methods of calculation and one efficient written method of calculation for addition which they know they can rely on when mental methods are not appropriate.

To add successfully, children need to be able to:

- recall all addition pairs to 9 + 9 and complements in 10;
- add mentally a series of one-digit numbers, such as 5 + 8 + 4;
- add multiples of 10 (such as 60 + 70) or of 100 (such as 600 + 700) using the related addition fact, 6 + 7, and their knowledge of place value;
- partition two-digit and three-digit numbers into multiples of 100, 10 and 1 in different ways.
- know the inverse of addition is subtraction (from Y1 onwards).

Foundation Stage

Children are taught to say numbers in familiar contexts such as number rhymes or in role-play. This will develop into the counting of everyday objects. The children will be taught to say the number names in order and recognise the numerals from 1-9. Children will be taught to recognise, count and order numbers up to 20. Wherever possible they will be given the opportunity to solve simple problems involving the use of the skills listed above.

The children will be taught to use the vocabulary involved in addition through practical activities and discussion e.g. more, and, add, sum, total, altogether.

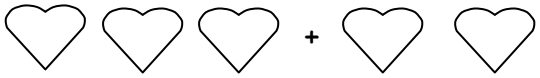
They will be taught to recognise differences in quantity in everyday objects and to find one more. This will be taught in practical contexts that relate to the children's experiences using various resources. From the very first stages, the children will be introduced to number lines and encouraged to visualise the calculation.

Addition

Year 1

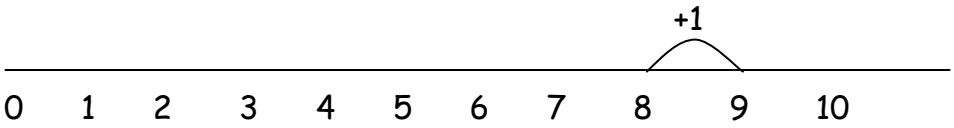
- To count and add together sets of real objects and pictures.

3+2 = 5



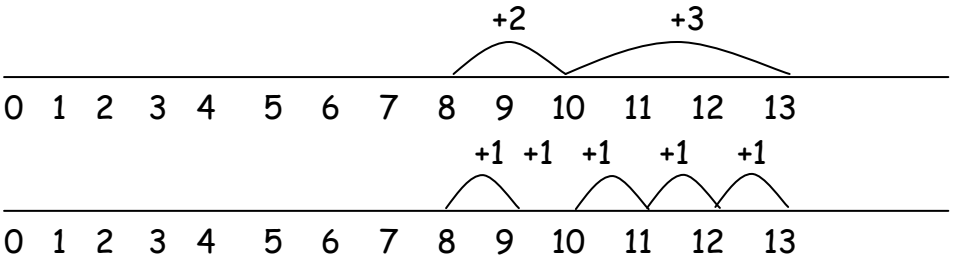
- To add one or several more onto a number line.

8+1 = 9



- To be able to add through 10.

8+5 = 13



- To know that addition can be done in any order.
  Use knowledge by starting with biggest number.

3+9=9+3
= 12

3+7+2=7+3+2
= 10+2
= 12

- To be able to add 10 to any number up to 100.

9+10 = 10+9
= 19

Year 2

- When adding 2 digit numbers use 100 square, find number and move down column vertically. Eventually this will be done mentally.

  34+10 = 44

- To be able to add 11 or 21 to a 2 digit number up to 100.
  Add 10 and then 1 or 20 then 1 to a 2 digit number. First use 100 square by moving down vertically and across horizontally.

  45+11 = 45+10+1
  = 55+1
  = 56

  45+21 = 45+20+1
  = 65+1
  = 66

- To be able to add 9 or 19 to a 2 digit number by adding 10 or 20 and subtracting 1. Use a 100 square by moving down vertically then horizontally. Eventually this will be done mentally.

- To be able to add 11 or 21 to a 2 digit number up to 100.
  Add 10 and then 1 or 20 then 1 to a 2 digit number. First use 100 square by moving down vertically and across horizontally.

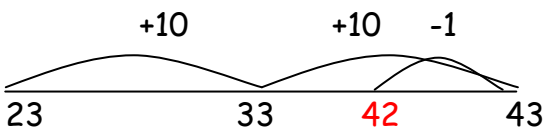
  45+11 = 45+10+1
  = 55+1
  = 56

  45+21 = 45+20+1
  = 65+1
  = 66

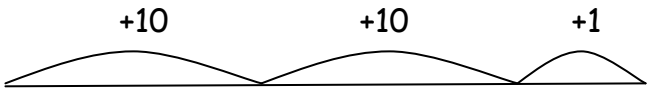
- To be able to add 9 or 19 to a 2 digit number by adding 10 or 20 and subtracting 1. Use a 100 square by moving down vertically then horizontally. Eventually this will be done mentally.

  23+9 = 23+10-1
  = 33-1
  = 32

  23+19 = 23+20-1
  = 43-1
  = 42



- To be able to add 2 two digit numbers on an empty number line.



23 33 43 44

23 43 44

- To be able to add two digit numbers by partitioning

23+41 = 20+3+40+1
= 40+20+3+1
= 60+4
= 64

or

23+41
20+40 = 60
3 + 1 = 4
= 64

- To be able to add 3 two digit numbers by partitioning.

23+21+34 = 20+20+30+3+1+4
= 70+8
= 78

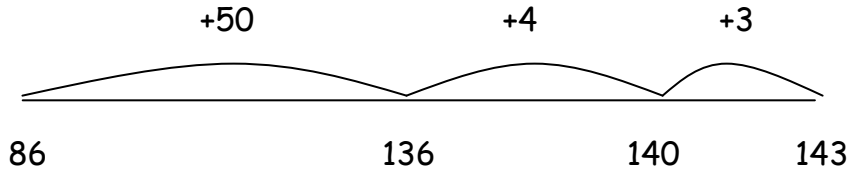
or

20+20+30 = 70
3 + 1 + 4 = 8
78

Year 3

- To be able to add 2 two digit numbers over 100 on an empty number line

86+57 = 143



- Partitioning

80+6+50+7 = 130+13 = 143

Or

80+50 = 130
6 + 7 = 13
143

Or

$$\begin{array}{r} 47 = 40 + 7 \\ +\,76 \quad\;\; 70 + 6 \\ \hline 110 + 13 = 123 \end{array}$$

Year 4

- To be able to add two digit numbers in vertical layout

86
+57
13 (6+7)
130 (50+80)
143

- To be able to add three digit numbers in vertical layout-expanded written method

236
+ 167
13
90
300
393

Year 5/ Year 6

- To be able to use the method taught in Year 4 and extend for larder more complex numbers including decimals

```
  24.68
+17.94
  00.12
  01.50
  11.00
  30.00
  42.62
```

Children will be encouraged to choose an effective and efficient method which they understand and works for them.

- The following method (SHORT ADDITION/CARRYING) can be taught to the children if they are working securely in level 4 and the teacher uses his/her professional judgement. To be able to add three and four digit numbers in a standard written method.

```
  236        347        45.24
+ 167      + 267      + 26.59
  403        614        71.83
  1 1        1 1          1  1
```

How can parents help?

Be positive-show interest and enthusiasm
Remember to make activities fun!
Use the same method being used in school.

Activities parents can do at home

Things to think about: Can they work it out mentally?
Do they need to write it down?
Do they need to approximate first?
Do they need to use a calculator?

Mental maths

- Number bond rap
- Ping pong
- Treasure hunt -find number bond partners or find answers to questions hidden around house.
- Bingo-Children write 6 numbers on paper and you give calculations for them to solve if they have answer they cross it off.

- Thumb cards-see example
- Play count down- Give chn selection of numbers and they have to make target number.
- Play addition games- snakes and ladders, dominoes, cards-pontoon, yahtzee
- Use different objects to add- dice totals, domino totals, playing card totals,

Use ***real life contexts***-eg adding money, shopping, adding measurements-length, weights, capacities
Look for ***numbers in the environment***-bus no.s, car registrations numbers
Use ***real life objects*** to support with adding eg pasta, buttons, coins, lego

Use web-sites:
Number bonds:
http://www.patana.ac.th/Students/mathspupils/gb2cd.swf
Addition:
http://www.primarygames.co.uk
http://www.mathszone.co.uk
http://www.topicbox.com
http://www.woodlands-junior.kent.sch.uk
Revision:
http://www.bbc.co.uk/schools/ks2bitesize/maths

Activities
Mental starters
Number bond rap-auditory
Find your number bond partner-kinaesthetic

Written methods for subtraction of whole numbers

Vocabulary-: Subtract, subtraction, take away, minus, less than, difference, decrease, leave, how many left etc.

To subtract successfully, children need to be able to:

- recall all addition and subtraction facts to 20, 100, 1000;
- subtract multiples of 10 (such as 160 – 70) using the related subtraction fact,16 – 7, and their knowledge of place value;
- partition two-digit and three-digit numbers into multiples of one hundred, ten and one in different ways (e.g. partition 74 into 70 + 4 or 60 + 14).
- know the inverse of subtraction is addition (from Y1 upwards).

Foundation Stage

The children will be taught to use the vocabulary involved in subtraction through practical activities and discussion e.g. take away, leave, how many left? How many more to make?

They will be taught to recognise differences in quantity in everyday objects and to find one less. This will be taught in practical contexts that relate to the children's experiences using various resources. From the very first stages, the children will be introduced to number lines and encouraged to visualise the calculation.

How do we do it?

Subtraction

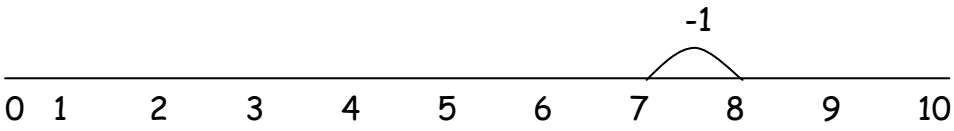
Year 1

- To be able to take away real objects.

5-2 = 3

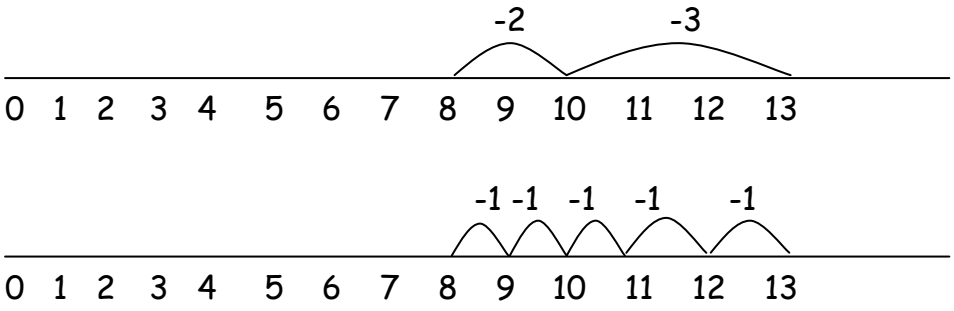
- To be able to subtract/take away one less on a number line.

8-1 = 7



- To be able to subtract through 10.

13-5 = 8

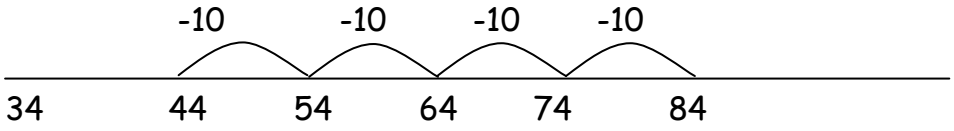


- To be able to subtract 10 from any number up to 100.
  When subtracting 10 from 2 digit numbers use 100 square, find number and move up column vertically. Eventually this will be done mentally.

  34-10=24

- To be able to subtract multiples of 10 from any number up to 100. When subtracting 2 digit numbers use 100 square, find number and move up column vertically. This can be recorded on a given number line jumping in back in steps of 10. Eventually this will be done mentally.

84-40=44 to begin with then progressing on to:

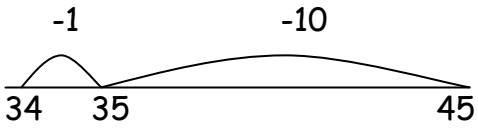


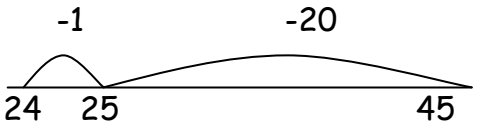
Year 2 and Year 3

- To be able to subtract 11 or 21 from a 2 digit number up to 100. Subtract 10 and then 1 or 20 then 1 from a 2 digit number. First use 100 square by moving up vertically and across horizontally.

45-11 = 45-10 -1
= 35-1
= 34

45-21 = 45-20-1
= 25-1
= 24





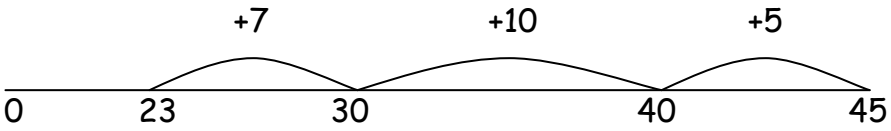
- To be able to subtract 9 or 19 from a 2 digit number by subtracting 10 or 20 and adding 1. Use a 100 square by moving up vertically then moving one horizontally. Eventually this will be done mentally.

23-9 = 23-10+1
= 13+1
= 14

63-19 = 63-20+1
= 43+1
= 44

- To be able to subtract 2 two digit numbers by finding the difference through counting on an empty number line. This can be refered to as the 'Shop Keeper' method of counting on particularly when linking this to money problems.

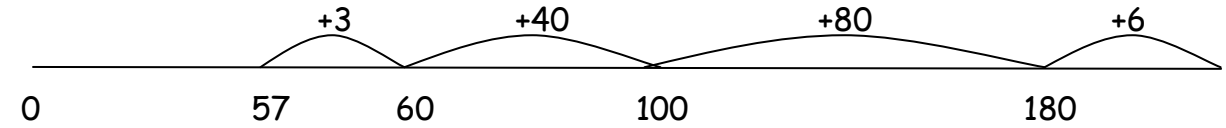
45-23=



10+7+5=22

- To be able to subtract 2 two digit numbers over 100 by finding the difference through counting on an empty number line.

186-57

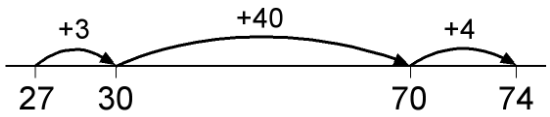


40+80 = 120
3 + 6 = 9

129

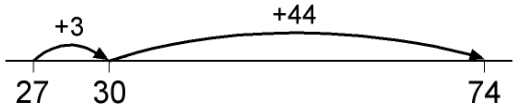
Year 4

- To be able to subtract two digit and three digit numbers (where appropriate) in vertical layout alongside the number line knowing and understanding the connection.
- Use the number line to find differences in money and time!



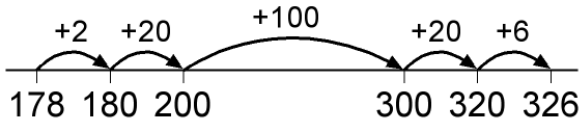
$$\begin{array}{rl} 74 & \\ -\ 27 & \\ 3 & \rightarrow 30 \\ 40 & \rightarrow 70 \\ 4 & \rightarrow 74 \\ \hline 47 & \end{array}$$

or

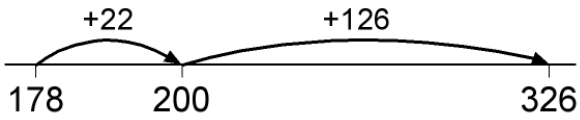


$$\begin{array}{rl} 74 & \\ -\ 27 & \\ 3 & \rightarrow 30 \\ 44 & \rightarrow 74 \\ \hline 47 & \end{array}$$

$$\begin{array}{rl} 326 & \\ -178 & \\ 2 & \rightarrow 180 \\ 20 & \rightarrow 200 \\ 100 & \rightarrow 300 \\ 26 & \rightarrow 326 \\ \hline 148 & \end{array}$$



or:



$$\begin{array}{rl} 326 & \\ -178 & \\ 22 & \rightarrow 200 \\ 126 & \rightarrow 326 \\ \hline 148 & \end{array}$$

- To be able to subtract three digit numbers in vertical layout-expanded written method

Year 5 and Year 6

- To be able to subtract three digit numbers in a vertical layer. Children to be taught both methods below. The partitioning method is in preparation for the decomposition method.

```
 236
-167
   3  (170)
  30  (200)
  36  (236)
  69
```

Partitioned numbers are then written under one another:

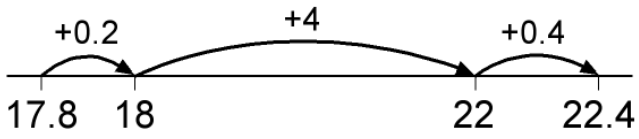
Example: 74 − 27

$$\begin{array}{r} 70+4 \\ -\ 20+7 \\ \hline \end{array} \qquad \begin{array}{r} {\scriptstyle 60}\ {\scriptstyle 14} \\ \cancel{70}+\cancel{4} \\ -\ 20+7 \\ \hline 40+7 \end{array} \qquad \begin{array}{r} {\scriptstyle 6}\ {\scriptstyle 14} \\ \cancel{7}\ \cancel{4} \\ -\ 2\ 7 \\ \hline 4\ 7 \end{array}$$

Example: 741 − 367

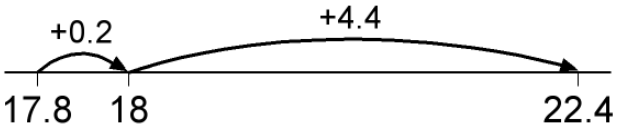
$$\begin{array}{r} 700+40+1 \\ -\ 300+60+7 \\ \hline \end{array} \qquad \begin{array}{r} {\scriptstyle 600}\ {\scriptstyle 130}\ {\scriptstyle 11} \\ \cancel{700}+\cancel{40}+\cancel{1} \\ -\ 300+60+7 \\ \hline 300+70+4 \end{array} \qquad \begin{array}{r} {\scriptstyle 6}\ {\scriptstyle 13}\ {\scriptstyle 11} \\ \cancel{7}\ \cancel{4}\ \cancel{1} \\ -\ 3\ 6\ 7 \\ \hline 3\ 7\ 4 \end{array}$$

- Extending the use of finding the difference on a number line to decimals.

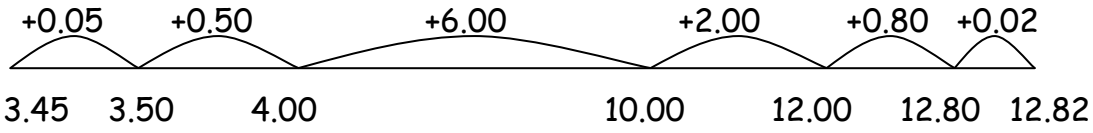



```
 22.4
−17.8
  0.2  → 18
  4.0  → 22
  0.4  → 22.4
  4.6
```

```
 22.4
−17.8
  0.2  → 18
  4.4  → 22.4
  4.6
```



12.82-3.45 =



0.05+0.02 = 0.07
0.50+0.80 = 1.30
6.00+2.00 = 8.00
9.37

- Subtraction by the decomposition method can be taught if the children are working securely in level 4 and have a full understanding of the previous methods. The class teacher will use his/her professional judgement.

What can parents do to help?

Mental activities

- Treasure hunt -find number bond partners or find answers to questions hidden around house.
- Bingo-Children write 6 numbers on paper and you give calculations for them to solve if they have answer they cross it off.
- Thumb cards-see example
- Play count down- Give chn selection of numbers and they have to make target number.
- Use different objects to subtract- dice totals, domino totals, playing card totals.
- Money-If I have 10p and spend 4p, how much do I have left?

Subtraction activities

Use ***real life contexts***-Money-Go shopping. How much do you have left if you spend so much?
Subtracting measurements-lengths, weights, capacities-cooking/making drinks, measuring bathroom for tiles, carpet etc
Look for ***numbers in the environment***-bus no.s, car registrations numbers
Use ***real life objects*** to support with subtracting eg pasta, buttons, coins, lego

Use web-sites:
Number bonds:
http://www.patana.ac.th/Students/mathspupils/gb2cd.swf
Subtraction:
http://www.primarygames.co.uk
http://www.mathszone.co.uk
http://www.topicbox.com
http://www.woodlands-junior.kent.sch.uk
http://www.ictgames.co.uk
Revision:
http://www.bbc.co.uk/schools/ks2bitesize/maths

Written methods for multiplication of whole numbers

Vocabulary-: Multiply, times, product, once, twice, three times, double, groups of, repeated addition, lots of, array, row, column, and multiple.

To multiply successfully, children need to be able to:

- recall all multiplication facts to 10 × 10;
- partition number into multiples of one hundred, ten and one;
- work out products such as 70 × 5, 70 × 50, 700 × 5 or 700 × 50 using the related fact 7 × 5 and their knowledge of place value;
- add two or more single-digit numbers mentally;
- add multiples of 10 (such as 60 + 70) or of 100 (such as 600 + 700) using the related addition fact, 6 + 7, and their knowledge of place value;
- add combinations of whole numbers using the column method (see above).
- know the inverse of multiply is division (from Y1 upwards).

Foundation Stage

The children are taught practically to count repeated groups of the same size e.g. If each child has 2 toys, how many altogether?

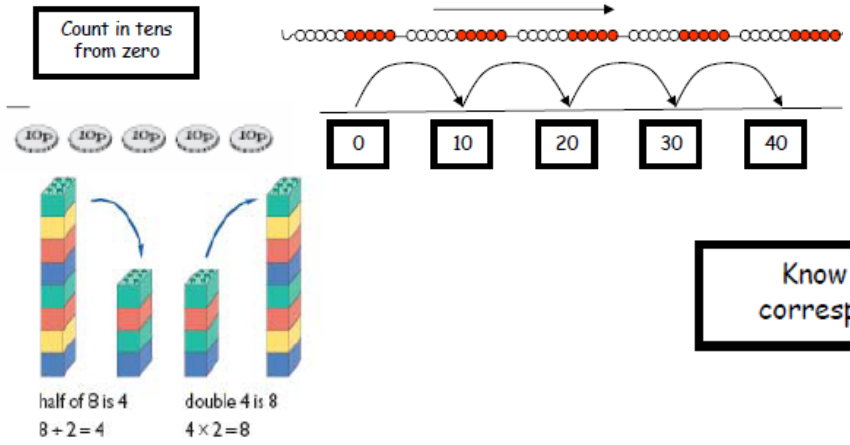
How do we do it?

Year 1

- To be able to double numbers to 10/20

- To be able to practically count repeated groups/sets of the same size – repeated addition on a given number line or drawing sets/groups of a given number.

10 x 5 = 50 ten, 5 times

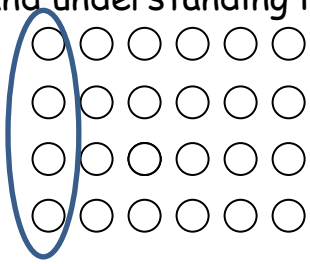


Know doubles and corresponding halves

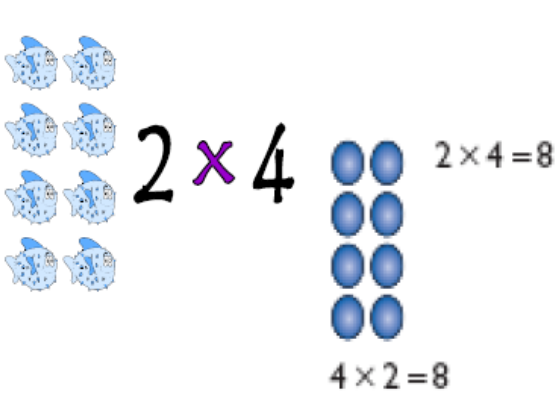
Year 2

- To multiply using arrays and understanding inverse operation

4x6 = 24
6x4 = 24
24÷6 = 4
24÷4 = 6



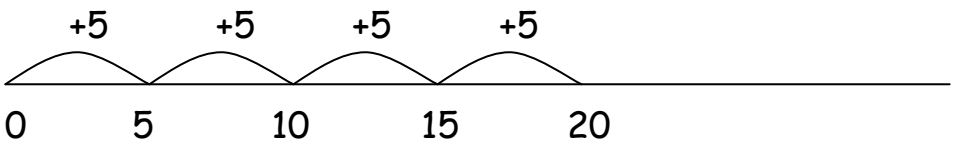
- To be able to display multiplication as an array by drawing or labelling pictures.



Understand multiplication as an array

- To be able to multiply single digits using repeated addition.

5x4 = 5+5+5+5 = 20



Year 3

- To be able to multiply by 10/100

  23x10 = 46x100 =

  230 (Move the digits one place to the left) 4600(Move the digits two places to the left)

- To be able to multiply by 4

  17x4 =

  17x2x2 = 34x2 = 68 (Double the number twice)

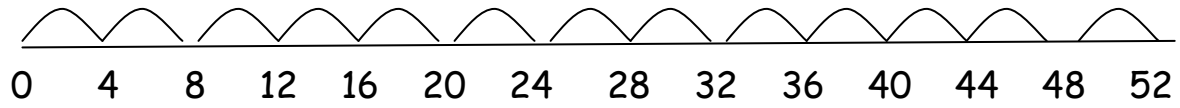
- To be able to multiply by 5

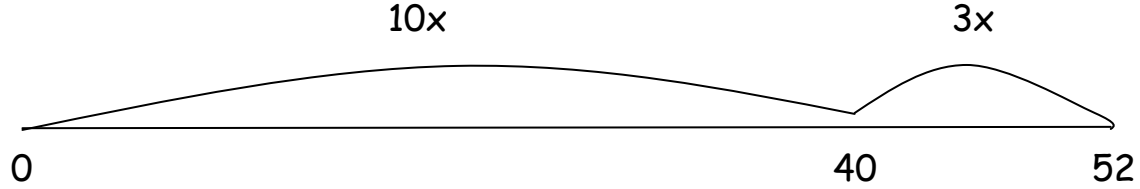
  14x5=

  (14x10)÷2 = 140÷2 = 70 (Move the digits one place to the left then half the number)

- To be able to multiply numbers on a number line using repeated addition

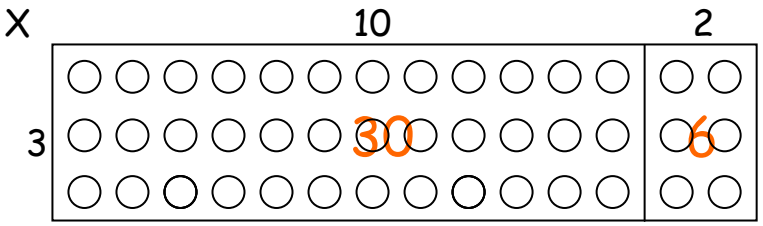
  4x13 = 52





- To know how the grid method is based on arrays and extend the use of arrays to the grid method.

3x12 = (3x10) + (3x2) = 36



30
6
36

X	10	2
3	30	6

30
6
36

- To be able to multiply 2 digit numbers by 1 digit numbers using the grid method

14X3= 42

X	10	4
3	30	12

30
+ 12
2
40
42

Year 4

- To be able to multiply 2 digit numbers by 2 digit numbers.

12X26= (Cover up zeros multiply then put zeros back on)

X	20	6
10	200	60
2	40	12

200
100
10
2
312

Year 5

- To use the Grid Method to multiply HTU × U, TU × TU and U.t × U

	30	3	
10	300	30	= 330 +
4	120	12	= 132
			462

Year 6

Again this is to consolidate the Grid Method to ensure all children are secure. To be able to multiply integers and decimals by a one-digit integer, and to multiply two-digit and three-digit integers by a two-digit integer

32X354=

X	300	50	4
30	9000	1,500	120
2	600	100	8

10 620
+ 708
11 328

9000
1500
\+ 820
8
11328

- To be able to multiply decimals

2.3x4.59

X	2	0.3
4	8	1.2
0.5	1.0	0.15
0.09	0.18	0.027

10.00
00.40
00.15
00.007
10.557

- Long multiplication should only be considered post Year 6 SATs to support children's transition to secondary school.

Written methods for division of whole numbers

Vocabulary-: Divide, division, divided by, share, sharing, equal, equally, how many, remainder etc.

To divide successfully in their heads, children need to be able to:

- understand and use the vocabulary of division – for example in 18 ÷ 3 = 6, the 18 is the dividend, the 3 is the divisor and the 6 is the quotient;
- partition two-digit and three-digit numbers into multiples of 100, 10 and 1 in different ways;
- recall multiplication and division facts to 10 × 10, recognise multiples of one-digit numbers and divide multiples of 10 or 100 by a single-digit number using their knowledge of division facts and place value;
- know how to find a remainder working mentally – for example, find the remainder when 48 is divided by 5;
- understand and use multiplication and division as inverse operations.
- know and understand the inverse of division is multiplication (Y1 onwards)

To carry out written methods of division successful, children also need to be able to:

- understand division as repeated subtraction;
- estimate how many times one number divides into another – for example, how many sixes there are in 47, or how many 23s there are in 92;
- multiply a two-digit number by a single-digit number mentally;
- subtract numbers using the column method.
- know the inverse of division is multiplication.

Foundation Stage

Children are taught to share in all contexts within the foundation stage. The vocabulary is readily heard. Through the PSED area of learning the children will be encouraged to share toys, working stations, pencils etc. Encouraging the children to share a set of objects in familiar contexts and count the object to ensure they have ***the same*** will begin to develop their understanding of division.
e.g. Share the biscuits out so that everyone has the same number.
Share objects into equal groups and count how many in each group.

Year 1

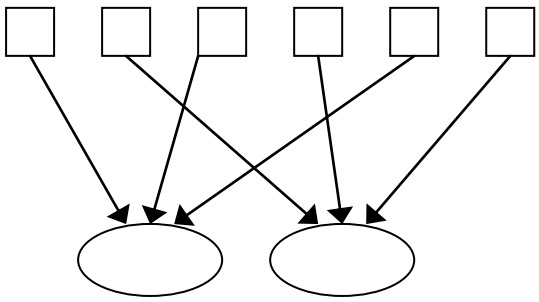
- Children will understand equal groups and share items out in play and problem solving. In the children will be carrying out such activities practically to begin with moving towards recording their thinking through drawings and pictures. They will count in 2s and 10s and later in 5s.

12 shared between 3

Children will develop their understanding of division and use jottings to support calculation.

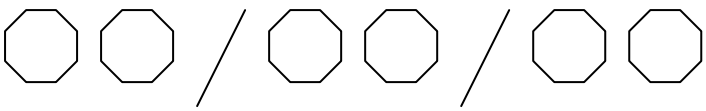
Sharing equally

6 sweets shared between 2 people, how many do they each get?



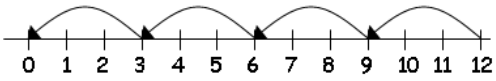
Grouping or repeated subtraction

There are 6 sweets, how many people can have 2 sweets each?



Year 2
Sharing along a number line

12 ÷ 3 = 4



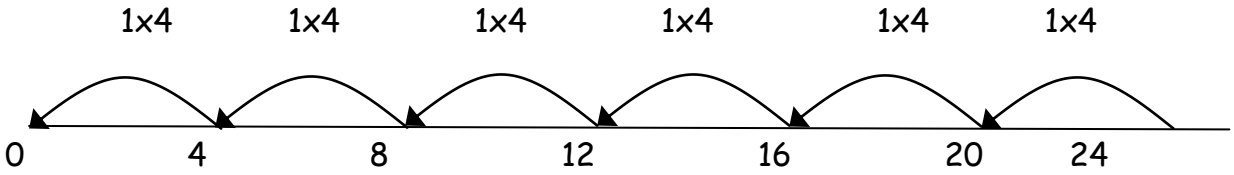
The bead bar will help children with interpreting division calculations such as 10 ÷ 5 as 'how many 5s make 10?'

✓ **Using symbols to stand for unknown numbers to complete equations using inverse operations**

□ ÷ 2 = 4 20 ÷ △ = 4 □ ÷ △ = 4

Year 3

24 ÷ 4 = 6



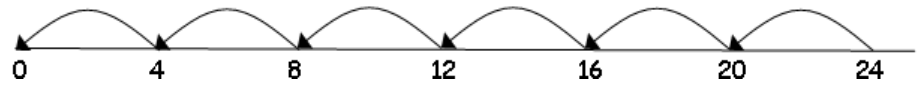
Ensure that the emphasis in Y3 is on grouping rather than sharing.

Children will continue to use:

Repeated subtraction using a number line

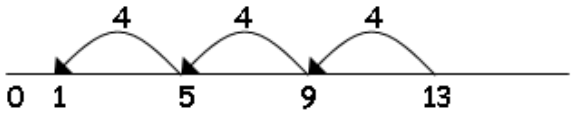
Children will use an empty number line to support their calculation.

24 ÷ 4 = 6



Children should also move onto calculations involving remainders.

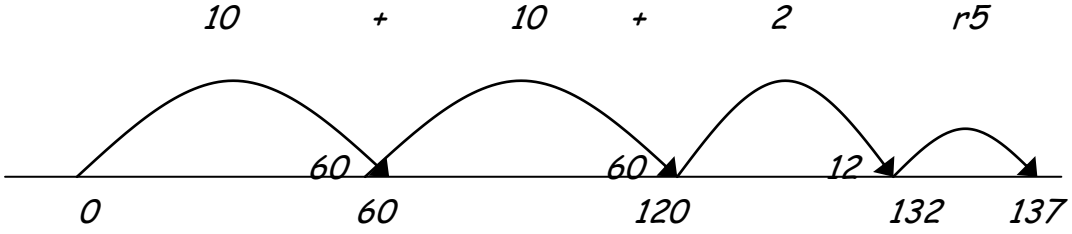
13 ÷ 4 = 3 r 1



Using symbols to stand for unknown numbers to complete equations using inverse operations

26 ÷ 2 = □ 24 ÷ △ = 12 □ ÷ 10 = 8

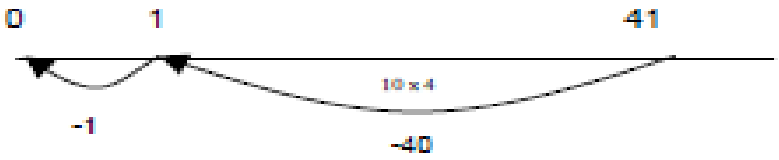
81 ÷ 6 = 22r 5



Year 4

Remainders
41 ÷ 4 = 10 r1

OR



OR 41 = (10 x 4) + 1

Pencil and paper procedures
72 ÷ 5 lies between 50 ÷ 5 = 10 and 100 ÷ 5 = 20

```
   72
-  50   (10 x 5)
   22
-  20    (4 x 5)
    2
```

Answer : 14 remainder 2

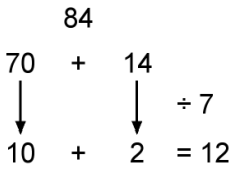
Year 5 and Year 6 - Division using partitioning

Mental methods for dividing TU ÷ U can be based on partitioning and on the distributive law of division over addition. This allows a multiple of the divisor and the remaining number to be divided separately. The results are then added to find the total quotient.

Many children can partition and multiply with confidence. But this is not the case for division. One reason for this may be that mental methods of division, stressing the correspondence to mental methods of multiplication, have not in the past been given enough attention.

Children should also be able to find a remainder mentally, for example the remainder when 34 is divided by 6.

One way to work out TU ÷ U mentally is to partition TU into a multiple of the divisor plus the remaining ones, then divide each part separately.



Or

How many 7's make 84

10 x 7 = 70
2 x 7 = 14
12 84

Children need to be comfortable with 84 ÷ 7 meaning how many sevens in 84.

'Expanded' or Chunking method of HTU ÷ U

This method is based on subtracting multiples of the divisor from the number to be divided, the dividend.

For TU ÷ U there is a link to the mental method.

Once they understand and can apply the method, children should be able to move on from TU ÷ U to HTU ÷ U quite quickly as the principles are the same.

This method, often referred to as 'chunking', is based on subtracting multiples of the divisor, or 'chunks'. Initially children subtract several chunks, but with practice they should look for the biggest multiples of the divisor that they can find to subtract.

Chunking is useful for reminding children of the link between division and repeated subtraction.

However, children need to recognise that chunking is inefficient if too many subtractions have to be carried out. Encourage them to reduce the number of steps and move them on quickly to finding the largest possible multiples.

$$
\begin{array}{rll}
6\overline{)196} & & \\
-\ 60 & 6\times 10 & \\
136 & & \\
-\ 60 & 6\times 10 & \\
76 & & \\
-\ 60 & 6\times 10 & \\
16 & & \\
-\ 12 & 6\times\ 2 & \\
4 & 32 & \\
\text{Answer:} & 32\,\text{R}\,4 &
\end{array}
$$

- The following short (bus stop) method can be taught to the children if they are working securely in level 4 where the teacher uses his/her professional judgement.

For 291 ÷ 3, because 3 × 90 = 270 and 3 × 100 = 300, we use 270 and split the dividend of 291 into 270 + 21. Each part is then divided by 3.

$$
\begin{aligned}
291 \div 3 &= (270 + 21) \div 3 \\
&= (270 \div 3) + (21 \div 3) \\
&= 90 + 7 \\
&= 97
\end{aligned}
$$

The short division method is recorded like this:

$$
3\overline{)290+1} = \overset{90+\ 7}{3\overline{)270+21}}
$$

This is then shortened to:

$$
\begin{array}{r}
9\ 7 \\
3\overline{)2\ 9^{2}1}
\end{array}
$$