Priory School Calculation Policy

This calculation policy has been written to be used alongside the revised National Curriculum (2014). It is important that the children consolidate the stages before they move onto more challenging concepts. Mathematical understanding is developed by working through several stages. 1) Concrete representations such as: dienes, Numicon and Cuisenaire rods 2) Pictoral such as: arrays and place value counters. 3) Abstract such as: column addition and long multiplication.

Children should be taught to use mental maths whenever possible and this should be taught explicitly. They should not be using written methods for simple calculations. The main aims for this policy is to ensure consistency and allows the children to develop reliable, efficient formal methods to solve calculations using all four operations.

This calculation policy should be used alongside planning to ensure that there is consistency within and across year groups. If children are struggling or making a significant amount of errors then they should return to the previous stage. Teacher's assessment should be used to identify the children's next step. Children should be encouraged to use efficient methods.

At Priory School, we refer to the digits' values as: 100s, 10s, 1s. When teaching place value, teachers should label the calculations to support their understanding. Teachers need to ensure that they use this terminology when teaching place value.

Addition

Early Stages

Children learn through counting, learning songs and play. The children add two groups by combining the two groups together and by counting on from the bigger number. During practical activities, they will use vocabulary used for addition.

Early Learning Goals
• **Find one more or one less from a group of up to five objects then ten objects.** • **Children count reliably with numbers from one to twenty. Place them in order and say which number is one more or one less than a given number.**

- **Using objects, they add and subtract two single- digit numbers and count on or back to find the answer.**

I have three sweets and you have two sweets. How many sweets do we have altogether?

Stage One

National Curriculum Objectives
• **Given a number, identify one more** • **Read, write and interpret mathematical statements involving addition (+) and the equals (=) sign** • **Add one- digit and two-digit numbers within 20, including zero** • **Solve missing number problems e.g. 10 + = 16**

Firstly, children need to use objects to count how many there are altogether. Then they should arrange the objects in a line, draw them and then add together.

Use a number line to count on starting from the largest number

6 +3 = 9

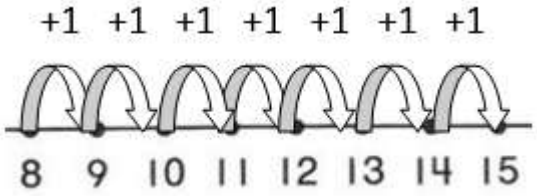
Start at the 6 and use your finger to count on (forward) 3 to 9.

Then use a marked number line:

6 + 6= 12

Put your finger on 6 and count on 6 to 12.

8 + 7 = 15



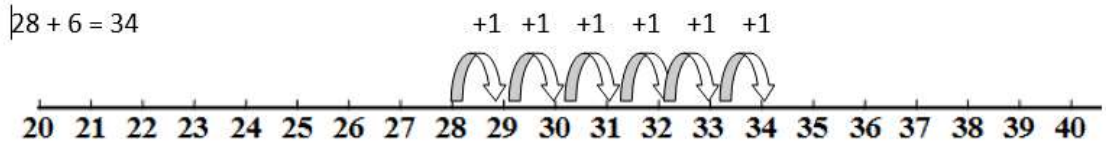
Put your finger on 8 and count on 7 to 15.

Then children can continue to practise this with an unmarked number line.

Stage 2

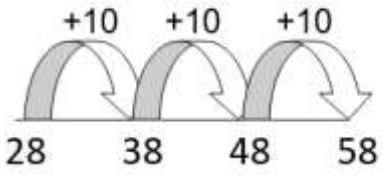
National Curriculum objectives
Add numbers using concrete objects, pictorial representations, and mentally, including: • **A two digit number and ones** • **A two digit number and tens** • **Two two-digit numbers** • **Three one-digit numbers**

Counting on in an empty number line within 100.



And in tens.

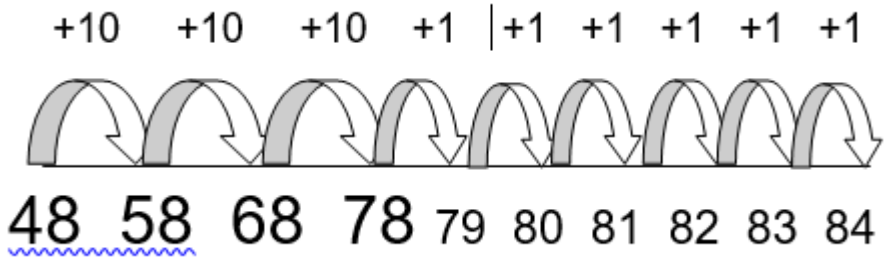
28 + 30 = 58



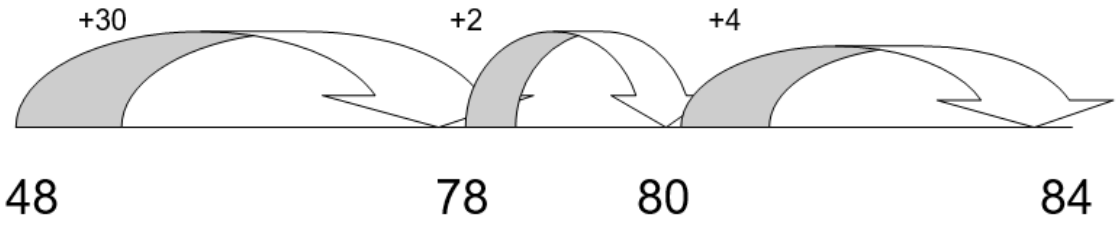
You should use a number square alongside to show the jumps in 10.

48 +36=84

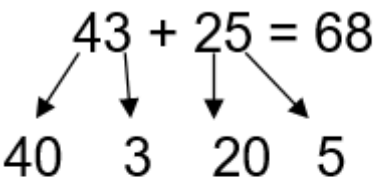
You should put the biggest number first (48) and then partition the smaller number (36=30+6) and count on: 48 + 30 + 6



When the children are ready, they can use more efficient steps +30+2 +4



Use partitioning to add two digit numbers together.



40 + 20 = 60
3 + 5 = 8
60 + 8 = 68

Partition the number into tens and units/ones. Add the tens together and then the units/ones together and then recombine the two to get the answer.

Then move onto calculations that bridge the tens.

48 + 36 = 40 + 8 + 30 + 6
40 + 30 = 70
8 + 6 = 14
70 + 14 = 84
48 + 36 = 84

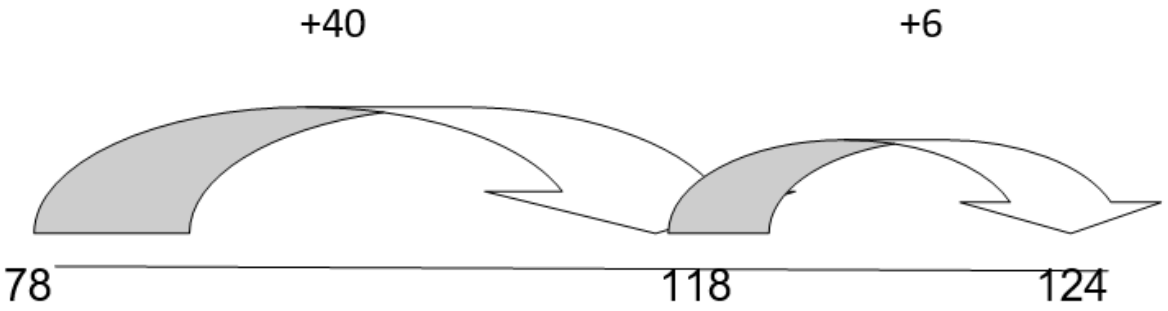
This is a different way to record the partitioning method. You can further develop by using a 200 number square and calculations that bridge 100.

Stage 3

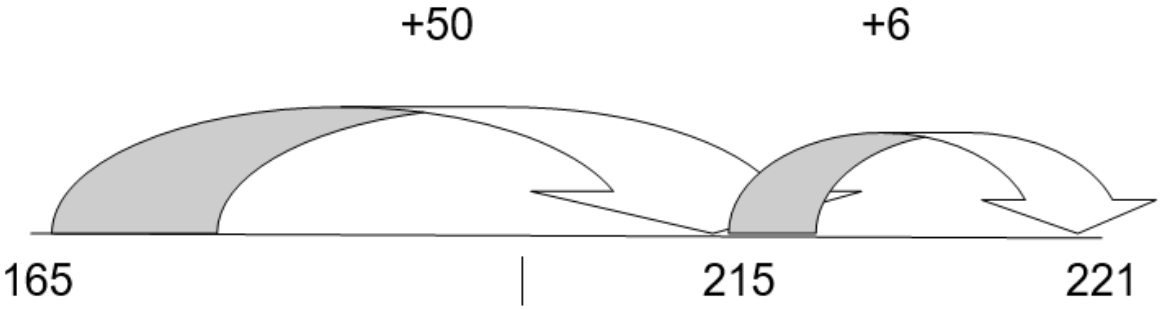
National Curriculum objectives
• Add numbers with up to three digits, using formal written method of columnar addition

Continue to use the number line for calculations that bridge 100.

78 + 46 = 124



Use a 200 number square for counting in tens and bridging over 100.



Use partitioning to add a three digit number and two digit number

$$85 + 37 = 80 + 5 + 30 + 7$$
$$80 + 30 = 110$$
$$5 + 7 = 12$$
$$110 + 12 = 122$$
$$85 + 37 = 122$$

Then move onto the expanded formal method, both vertically and horizontally. Start with calculations that do not bridge 10 or 100.

$$63 + 32 = 95$$

$$\begin{array}{r} 60 + 3 \\ +\ 30 + 2 \\ \hline 90 + 5 \end{array} = 95$$

'Partition the numbers into tens and ones/units. Add the tens together and then add the ones/units together. Recombine to give the answer.'

Then...

$$\begin{array}{r} 6\ 3 \\ +\ 3\ 2 \\ \hline 5\ (3 + 2) \\ +\ 9\ 0\ (60 + 30) \\ \hline 9\ 5 \end{array}$$

'Add the least significant digits (units) together first and then the tens in preparation for the formal written method.

Then…

```
  6 8
+ 2 4
  1 2  (8 + 4)
+ 8 0  (60 + 20)
  9 2
```

'Add the least significant digits (units) together first and then the tens in preparation for the formal written method.

If children are ready, then move onto adding where it is necessary to carry tens from the units to the tens

```
  6 8
+ 2 4
  9 2
  1
```

'Use the language of place value to ensure understanding: 'Eight add four equals 12. Write two in the units column and 'carry' one (10) across into the tens column. 60 add 20 and the ten that we 'carried' equals 90. Write 9 (90) in the tens column. 92 is the answer..

The digit that has been carried should be recorded under the line in the correct column. When children are ready, calculate numbers that bridge over the ten and hundred.

76 + 47 = 123

Partition the numbers into tens and ones/units. Add the tens together and then add the ones/units together. Recombine to give the answer.'

```
  70 + 6
+ 40 + 7
110 +13 = 123
```

Then…

```
  7 6
+ 4 7
  1 3 (7 + 6)
1 1 0 (70 + 40)
1 2 3
```

'Add the least significant digits (units) together first and then the tens in preparation for the formal written method.

Then when the children are ready they should bridge over the 100.

76 + 47 = 123

$$\begin{array}{r} 47 \\ +\ 76 \\ \hline 123 \\ 1\ \ 1 \end{array}$$

'Use the language of place value to ensure understanding: 'Seven add six equals 13. Write three in the units column and 'carry' one (10) across into the tens column. 40 add 70 and the ten that we 'carried' equals 120. Write 2 (20) in the tens column and 'carry' one (100) across into the hundreds column (100).

When the children are ready, they can add a three digit to a two digit number.

178 + 43 = 221

$$\begin{array}{r} 178 \\ +\ \ 43 \\ \hline 221 \\ 1\ \ 1 \end{array}$$

Stage 4

National Curriculum Objectives
• **Add numbers with up to 4 digits using the formal written method of columnar addition where appropriate**

Revisit the expanded method

176 + 147 = 323

```
  1 7 6
+ 1 4 7
  -----
    1 3   (7 + 6)
  1 1 0   (70 + 40)
  2 0 0   (100 + 100)
  -----
  3 2 3
```

Then continue with the formal method.

176 + 147 = 323

```
  1 4 7
+ 1 7 6
  -----
  3 2 3
  -----
  1   1
```

'Use the language of place value to ensure understanding:
'Seven add six equals 13. Write three in the units column and 'carry' one across into the tens column (10). 40 add 70 and the ten that we carried equals 120. Write 2 in the tens column (20) and 'carry' 1 across into the hundreds column (100). 100 add 100 and the 100 that has been carried equals 300. Write 3 in the hundreds column (300).

If the children are confident, then continue to add 4 digits to 3 digits.

1845 + 526 = 2371

$$\begin{array}{r} 1\,8\,4\,5 \\ +\quad 5\,2\,6 \\ \hline 2\,3\,7\,1 \end{array}$$

Stage 5

National Curriculum Objectives
• **Add whole numbers with more than 4 digits, including using formal written method (columnar addition)**

Cotinue to use empty number lines to add large numbers and decimals when required. Continue to develop the use of the formal method adding four and more digits.

If children are struggling with a stage then they should go back to the previous stage that they understand.

21848 + 1523 = 23371

$$\begin{array}{r} 21848 \\ +\ 1523 \\ \hline 23371 \\ \hline {\scriptstyle 1\quad 1} \end{array}$$

Use the formal method for the addition of decimal numbers. Ensure that the decimals line up!

£154.75 + £233.82 :

$$\begin{array}{r} 154{\cdot}75 \\ +\ 233{\cdot}82 \\ \hline 388{\cdot}57 \\ \hline {\scriptstyle 1} \end{array}$$

Continue to use the language of place value to ensure understanding.

Year 6

There are no official objectives for Year 6 addition. However, throughout they should continue to add decimals and use the expanded addition method to add three and four digits to improve accuracy.

Children should be encouraged to use mental methods and write jottings when needed. However, when it is not possible to calculate in their head, they should use the formal methods.

Subtraction

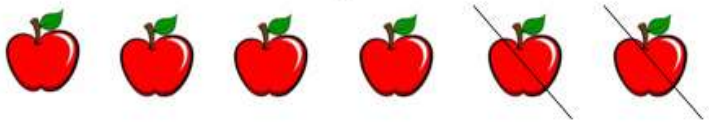
Early Stages

Children learn through songs, rhymes and practical activities. Through these activities, they will begin to use vocabulary for subtraction. For example, they will find one less than a certain number. They will begin to understand the concept of subtracting and counting how many are left after some have been taken away.

Early Learning Goals
• To halve a number • To know one less than a number • To subtract two single digit numbers • To take one away • To begin to use vocabulary relating to subtraction • To begin to solve problems and apply

If you have six apples and take two away, how many are left?

$6 - 2 = 4$



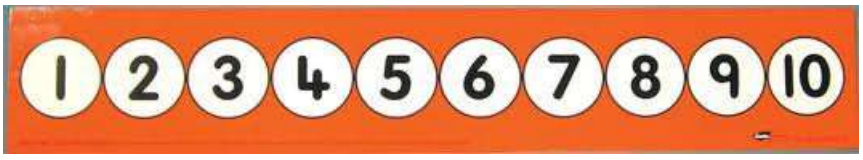
Introduce standard notation only when children have a solid grasp of practical concepts

Stage One

National Curriculum Objectives
• Given a number, identify one less • Read, write and interpret mathematical statements involving subtraction (-) and the equals (=) sign • Subtract one- digit and two-digit numbers within 20, including zero • Solve missing number problems eg 20 -□= 15

Firstly, children should use physical objects to take away. Then they should draw objects and cross out the objects to find out how many are left.

Practise counting back from a given number. Children should use a number track at the beginning to help them

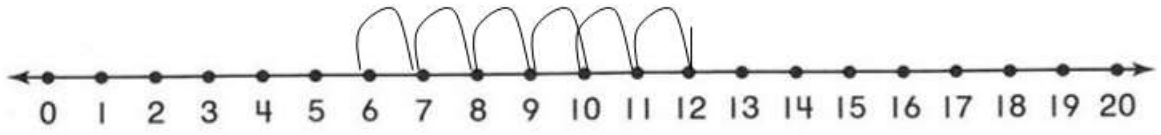


7- 3 =4

‘Put your finger on the 7 and count back 3 to 4.’

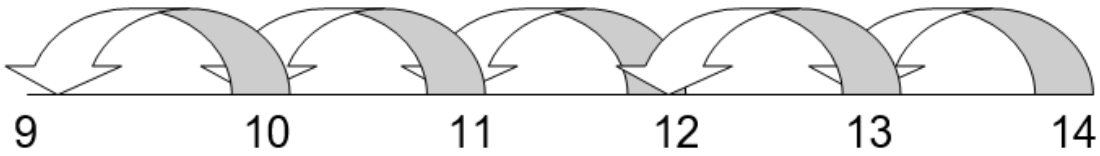
Then move onto a marked number line.

12-6=6



‘Put your finger on 12 and count back 6.’

14-5=9



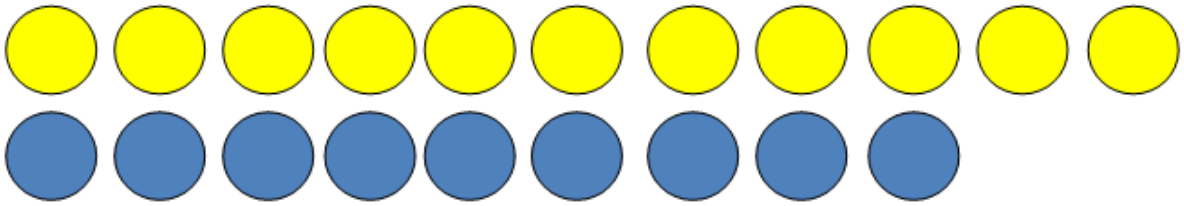
‘Put your finger on 14 and count back 5 to 9.’

Make sure that children are confident using a marked number line before moving to using an unmarked number line. Continue to count back for subtraction within 20.

Then teach the children to count on to find small differences between two numbers. It is important that this method is not used for big differences but it is important for children to understand the term ‘difference’.

Count up from the smallest to the largest number using resources for examples cubes, dienes, counters, number lines.

11-9=2



'The difference between 9 and 11 is 2. Count up from 9 to 11.'

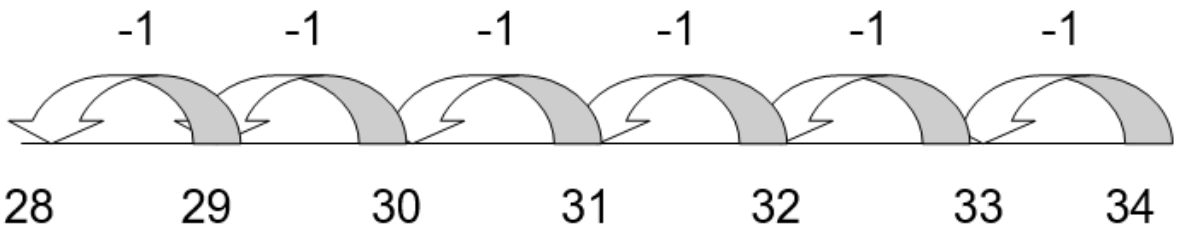
Remember if children consistently make errors then you should take them back to the previous stage.

Stage Two

National Curriculum Objectives
• Subtract numbers using concrete objects, pictorial representations, and mentally, including: • A two digit number and ones • A two digit number and ten • Two two-digit numbers

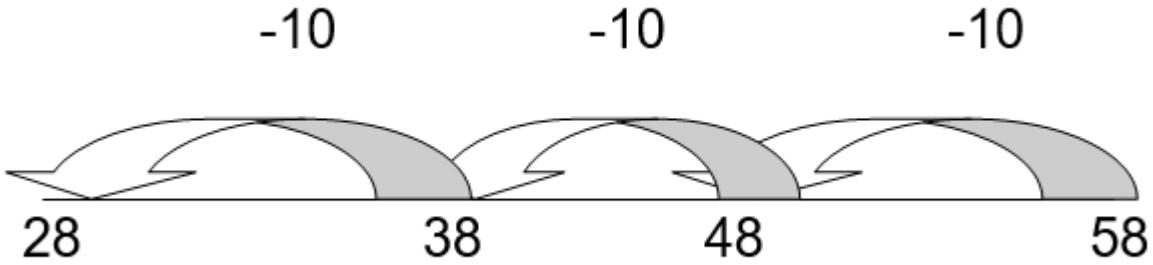
Counting back within 100 on an unmarked number line in ones.

34-6 =28



Then in tens

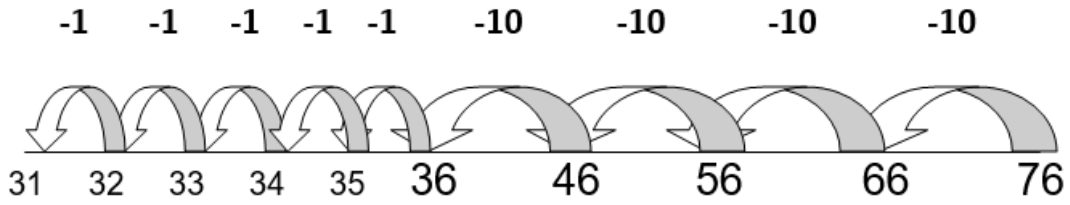
58-30= 28



Use in conjunction with 100 number square to show the jumps of ten.

Subtraction, using partitioning on an empty number line.

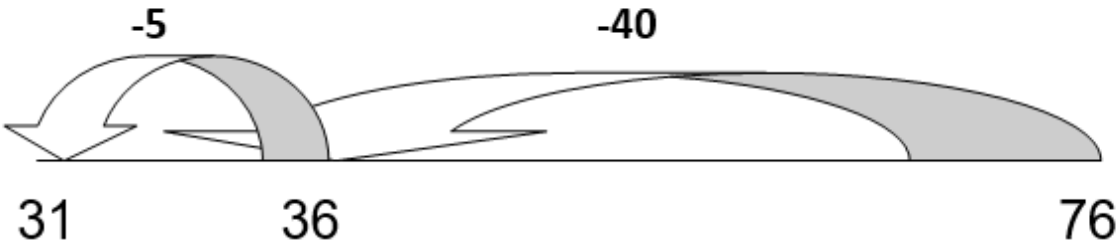
76-45 = 31



Use in conjunction with a 100 number square to show jumps of tens and ones.

If children are confident with this method, then show children how they can make quicker steps.

76-45=31



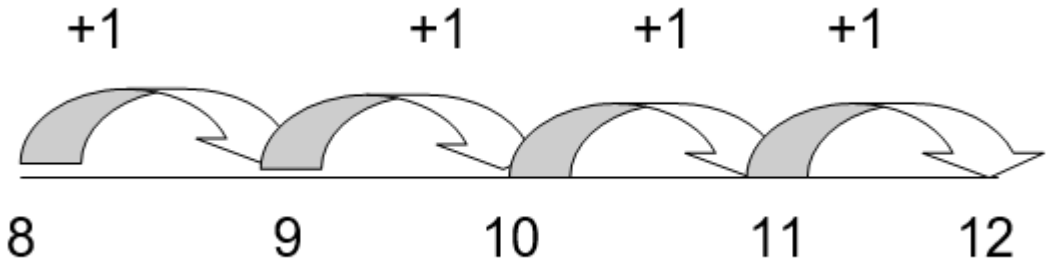
Use in conjunction with a 100 number square to show jumps of tens and ones.

Counting on to find a small difference

See Year 1 guidance to help understand the term 'difference'.

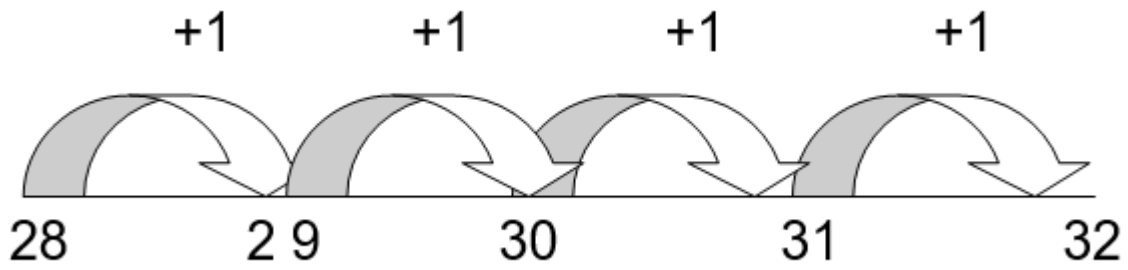
Count up from the smallest number to the largest number to find the difference.

12-8=4



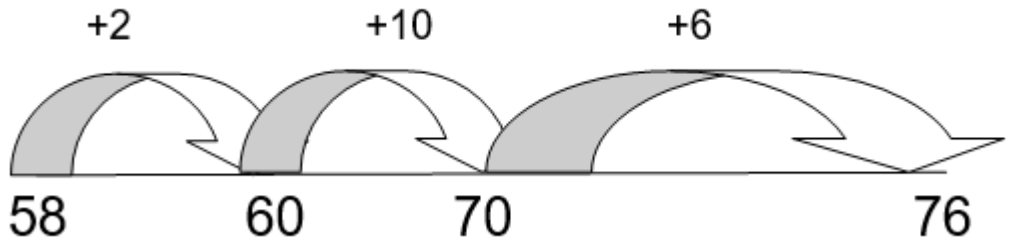
Count up from 8 to 12. The difference between 8 and 12 is four.

32-28=4



The difference between 28 and 32 is 4.

If the children are confident with this method, then you can develop. 76-58 = 18



'The difference between 58 and 76 is 18. Count up from 58 to 76.'

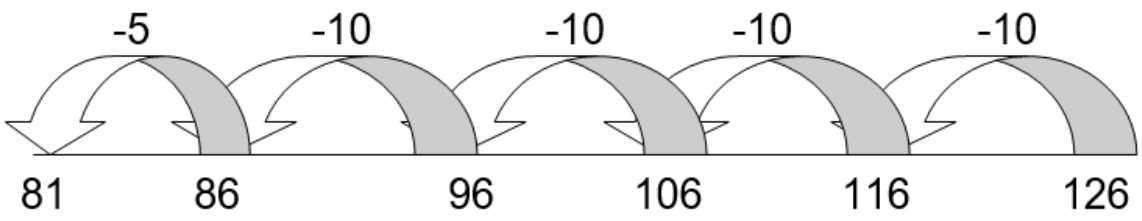
You can develop using subtraction that bridges 100 and you can support this using a 200 number square. If the children are struggling, then take them back to a previous stage.

Stage Three

National Curriculum Objectives
• Subtract numbers with up to three digits, using formal written method of columnar subtraction

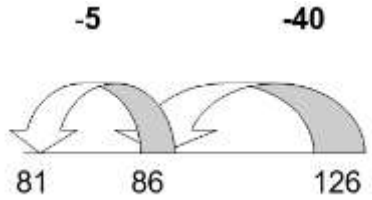
Children should continue to use an empty number line to solve calculations that bridge 100.

126-45=81



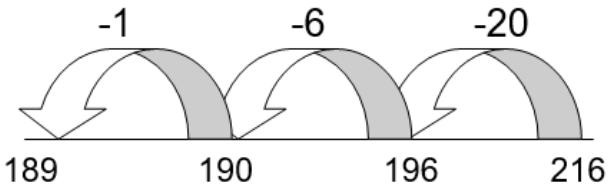
Children can use 200 number square to count back in 10s and bridge 100.

Then the children should learn more efficient steps.

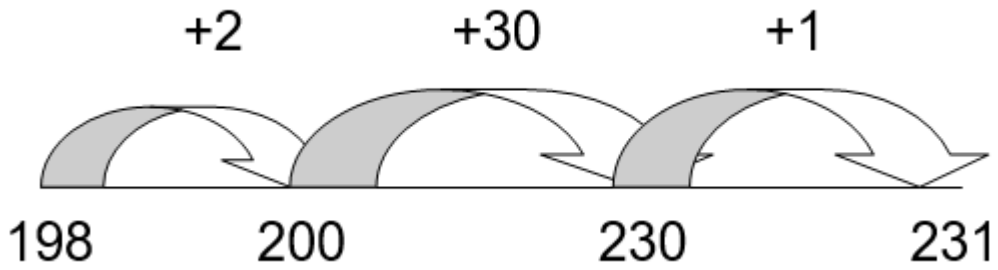


Extend children by using larger numbers to count back.

216 – 27 = 189



And then by counting on to find a small difference.



231-198 = 33

'The difference between 231 and 198 is 33'

Introduce the expanded written method presented horizontally and vertically. Two digits number should be used when this method is introduced.

78 – 23

	70	8
-	20	3
	40	5

= 45

Partition numbers into tens and ones/units. Subtract the ones and then the tens. Recombine the numbers for the answer. Children should not need to use decomposition (exchanging) when they are using this method.

You might need to change the '+' for 'and' to avoid confusion.

This will lead into the formal written method.

$$\begin{array}{r} 78 \\ -\ 23 \\ \hline 55 \end{array}$$

Remember to use the correct language for example eight subtract three and seventy subtract twenty.

You could use a number line for this calculation but use two digit numbers to show this method at the beginning.

Introduce the expanded subtraction where decomposition/ exchange is required.

73 -27=45

	60 ~~70~~	 13
-	20	7
	40	5

Children need to practise partitioning like this and can use resources such as Base Ten to help. When children are confident partitioning like this then introduce the formal written method, involving decomposition/exchange.

73- 27 = 46

$$\begin{array}{r} {}^{6}\cancel{7}\,{}^{13}\cancel{3} \\ -\ 2\ 7 \\ \hline 4\ 6 \end{array}$$

Ensure that you use place value language so that the children are clear what is happening in the process. For example, we can't subtact 3 from 7 so we need to exchange a ten for ten ones to give us 60 + 13.

Children can use Base Ten to help understand this concept.

If children are confident using this method, then they can move on to subtracting with three digit number.

235 – 127 = 108

$$\begin{array}{r} {}^{2}2\,{}^{15}\cancel{3}\cancel{5} \\ -\ 1\ 2\ 7 \\ \hline 1\ 0\ 8 \end{array}$$

Use place value language to help the children's understanding.

In this example, it is only necessary to exchange from the tens column. Base Ten can be used to support children's understanding.

If children are making errors with this method then take them back to the previous stage.

Stage Four

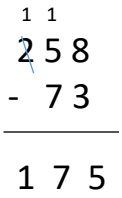
National Curriculum Objectives
• **Subtract numbers with up to 4 digits using the formal written method of columnar subtraction <u>where appropriate</u>**

Ensure that children are confident with the previous methods including using empty number lines for three and four digits when it is appropriate. Also, use the formal method by revisiting the expanded method, if necessary. Base Ten should be used to support the children when required.

73 -27=45

60 ~~70~~	13
- 20	7
40	5

This then leads onto decomposition.



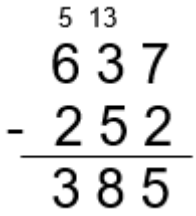
In this example, it has been necessary to exchange from the hundreds.

Then move on to subtracting a three-digit number.

637-252= 385

500 ~~600~~	130	7
200	50	2
300	80	5

Children need to be confident partitioning three digit numbers before moving on to the formal method.



Use place value language to help children understand the concept and use Base Ten when required.

If children are confident then you can expand to four digit numbers and decimals in the context of money and measure. Remember to return children to the previous stage if they are struggling.

Stage Five

National Curriculum Objectives
• **Subtract numbers with more than 4 digits using the formal written**

method of columnar subtraction <u>where appropriate</u>

Ensure that children are confident in the previous stages before moving on to the next stage. Continue to use empty number lines with larger numbers and decimals when necessary.

Continue to practise using a formal method for three and four digit numbers (See Stage 4) and return to the expanded method if required.

503 – 278 = 225

500 + 0 + 3	400 + 90 + 13
– 200 + 70 + 8	– 200 + 70 + 8
	200 + 20 + 5

In this example, the number has to be partitioned into 400 + 90 +13 to do the calculation.

$$\begin{array}{r} {\scriptstyle 4\ \ 9\ 13} \\ \not{5}\not{0}\not{3} \\ -\ 2\ 7\ 8 \\ \hline 2\ 2\ 5 \end{array}$$

There are no tens so we have to exchange one hundred for 10 tens before we can exchange a ten for 10 ones.

Then you move to the formal method. There is a high chance that the children will make errors using this method. You could discuss with the children the effectiveness of a mental method for example, would a blank number line be more effective in this situation?

When the children are more confident extend with larger numbers and decimals numbers. Remember to return to an expanded method if the children are struggling.

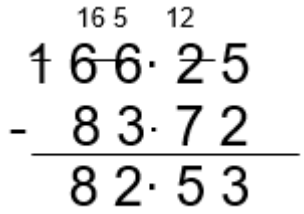
$$\begin{array}{r} {\scriptstyle 6\ \ 12\ 11} \\ 1\ 2\ \not{7}\ 3\ \not{1} \\ -\ \ 1\ 3\ 6\ 7 \\ \hline 1\ 1\ 3\ 6\ 4 \end{array}$$

In this example, you need to exchange the hundreds and the tens.

If children are struggling with this method, then they should do calculations where there is only one exchange.

Introduce subtraction of decimals, in the context of money and measure.

£166.25 – £83.72 = £82.53



Make sure that the decimals line up.

Continue practise subtraction with large numbers and decimals throughout Year 5. If children are struggling with this method, then they should go back to the previous stage.

Stage Six

There are no official objectives for Year 6 subtraction. However, throughout they should continue to use formal method for larger numbers and decimals and use these methods when solving problems.

Children should be encouraged to use mental methods and write jottings when needed. However, when it is not possible to calculate in their head, they should use the formal methods.

Multiplication

Early Stages

Children learn through songs, rhymes and practical activities. Through these activities, they will begin to solve problems that involve doubling.

Early Learning Goals
• Counting up in twos, fives and tens. • Able to sort objects into groups of twos.

Three apples for me and three apples for you. How many apples altogether?

Stage One

National Curriculum Objectives
• Solve one-step problems involving multiplication by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher • Count in multiples of twos, fives and tens (to the 10th multiple)

Children will count repeated groups of the same size in practical contexts. They will use the vocabulary linked with multiplication. They need to solve practical problems that involve combining groups of 2,5 or 10. For example cubes and socks.

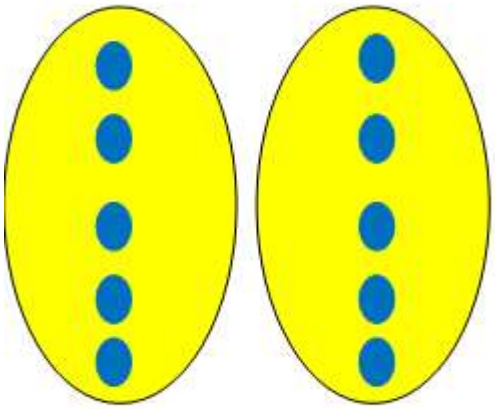
There are six pairs of sock. How many is that altogether? 2,4,6,8,10,12

Three pots of ten crayons. How many crayons altogether? 10,20, 30.

Use arrays to support early multiplication. Arrays should be presented in both ways (two rows of five and five rows of twos) so that the children understand that the answer is the same.

Five groups of two faces. How many faces altogether? 2,4,6,8,10

Two groups of five faces. How many altogether? 5,10



2 groups of 5. How many altogether? 5 +5=10 Double five is ten

Continue to solve problems using practical contexts and develop vocabulary linked with multiplication throughout stage including writing number sentences.

Stage Two

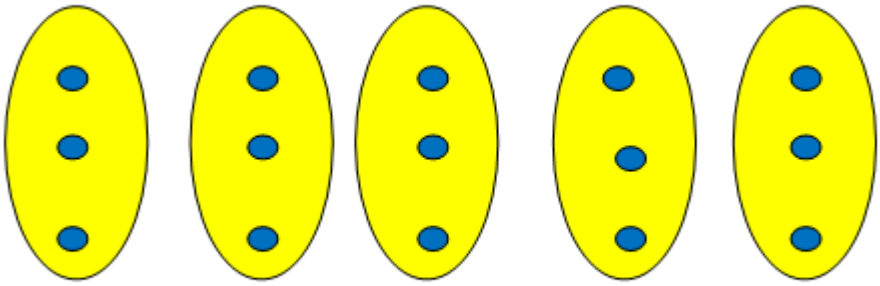
National Curriculum Objectives

- Recall and use multiplication facts for the 2, 5 and 10 multiplication tables
- Calculate mathematical statements for multiplication within the multiplication tables and write them using the multiplication (×) and equals (=) signs
- solve problems involving multiplication, using materials, arrays, repeated addition, mental methods, and multiplication facts, including problems in contexts
- show that multiplication of two numbers can be done in any order (commutative)

Make sure that children are confident with the methods in the previous stage. Children need to continue to use a range of vocabulary to describe multiplication and use practical resources, pictures and diagrams.

Combining Groups (repeated addition)

If there are 3 groups of 10 crayons. How many crayons are there altogether?
10+10+10=30. 3 groups of 10 is 3 times 10. 3 x 10=30, 10 x 3 =30



5 groups of 3, 5 lots of 3, 3+3+3+3+3=15

5 times 3, 3 multiplied by 5, 5x3=15, 3x5=15

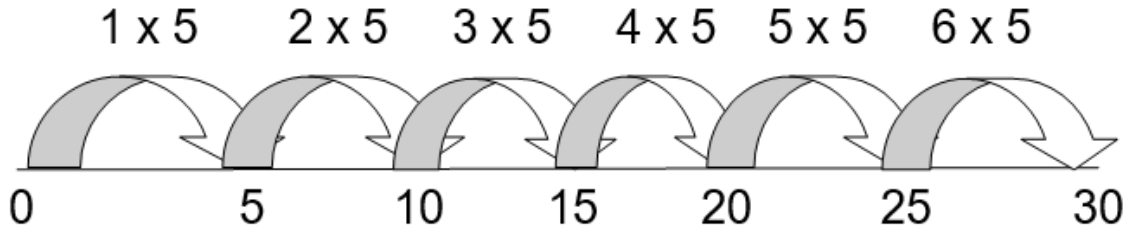
Using arrays to support multiplication:

6 x 5 =30

6 rows of 5. 5 groups of 6. 5 x 6= 30, 6 x 5=30

Use an empty number line

6 x 5 =30



Make the connection to repeated addition. If the children are struggling then return to the previous stage.

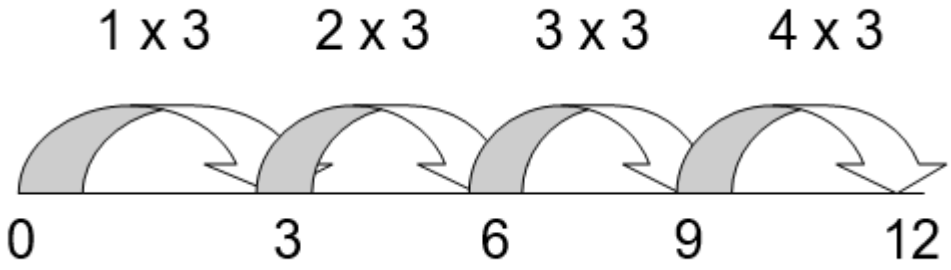
Stage 3

National Curriculum Objectives
• Recall and use multiplication facts for the 3, 4 and 8 multiplication tables (continue to practise the 2, 5 and 10 multiplication tables) • Write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit

numbers times one-digit numbers, using mental and progressing to a formal written method.

Continue to use number lines and arrays to support multiplication.

4 X 3= 12



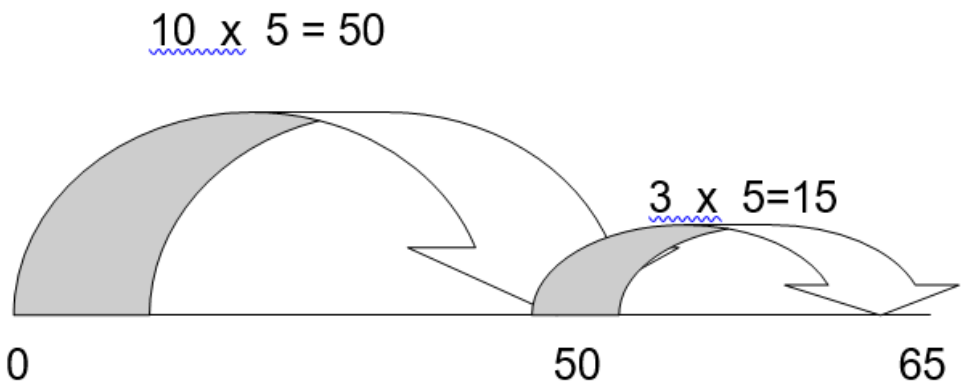
Partitioning method for multiplication

13 x 5 = 65 (Partition 13 into 10 + 3)
10 x 5 = 50
3 x 5 = 15
50 + 15 = 65

x	10	3
5	50	15

Use the partitioning method with a number line for a two digit number less than 20 multiplied by a single digit.

13 x 5 =65



Grid method (two digit number less than twenty multiplied by a one digit number)

13 x 8 =104

x	10	3
8	80	24

80 + 24=104

Partition 13 into 10 + 3 then multiply each number by 8. Add the partial products (80 and 24) together.

This will go into expanded short multiplication.

13 x 8 = 104

```
   10 + 3
x   8
  2 4 (3 x 8)
+ 8 0 (10 x 8)
1 0 4
```

Remember to use an addition symbol to add the partial products together. Model the same calculation using a number line if necessary.

Formal short multiplication:

```
   1 3
x    8
  1 0 4
    2
```

Make sure that the digit carried over is written under the line in the correct column. Continue to develop the formal method throughout Stage Three using two digit numbers less than 20 multiplied by a one digit number. If children are confident they can multiply other two digit numbers by a one digit. If children are making errors then return to the previous stage.

Stage Four

National Curriculum Objectives
• Recall multiplication facts for multiplication tables up to 12 × 12 • Multiply two-digit and three-digit numbers by a one-digit number using formal written layout

Make sure that children are confident with the methods outlined in the previous year's guidance before moving on. Continue to use empty number lines and grid method.

36 x 4 = 144

x	30	6
4	120	24

120 + 24 = 144

Add the partial products.

Then move onto expanded short multiplication (two-digit number by a one digit number)

36 x 4 =144

```
    30 + 6
X     4
    ------
    2 4    (4 x 6 = 24)
+ 1 2 0    ( 4 x 30 = 120)
  -------
  1 4 4
```

Simplify the recording to:

```
   36
X   4
+  24  (4 x 6)
  120  (4 x 30)
  144
```

This then leads onto short multiplication of a two digit number multiplied by a one digit number.

36 x 4 =144

```
   36
x   4
  144
   2
```

Ensure that the digit carried over is written under the line in the correct column.
Continue to practise the formal method of short multiplication of a two digit number by a one digit number throughout Stage Four.

If children are confident then develop to multiply by three digit numbers multiplied by a one digit number. If needed, you can return to the grid method or expanded method first.

127 x 6 =762

x	100	20	7
6	600	120	42

600 + 120 + 42 = 762

Expanded method

```
  1 2 7
x     6
-------
    4 2   (6x7)
+ 1 2 0   (6x20)
  6 0 0   (6x100)
-------
  7 6 2
```

This will lead to short multiplication (formal method):

```
  1 2 7
x     6
-------
  7 6 2
  1   4
```

Ensure that place value language is used to ensure understanding and digits that carried over are written under the line in the correct column. If children are making significant errors, return to the previous stage.

Stage Five

National Curriculum Objectives
• Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers

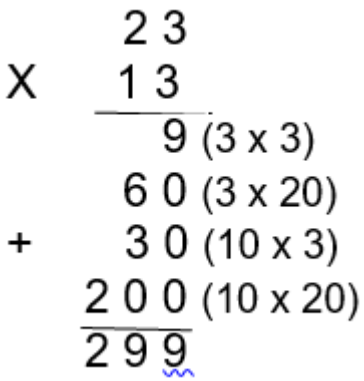
Make sure that the children are confident with the methods outlined in the previous year's guidance before moving on. When children are confident multiplying by one digit then move on to multiplying by two digits (less than 20)

23 x 13 = (20+3) x (10 +3)=299

x	20	3	
10	200	30	**230**
3	60	9	**+ 69**
			299

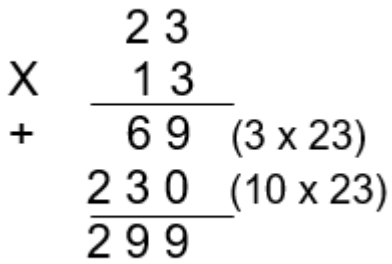
Add the partial products (200 +30)+ (60+9) =299

Expanded long multiplication (two digits multiplied by a number less than 20)



Then compacted long multiplication formal method:

23 x 13 =299



Extend to larger two digit number:

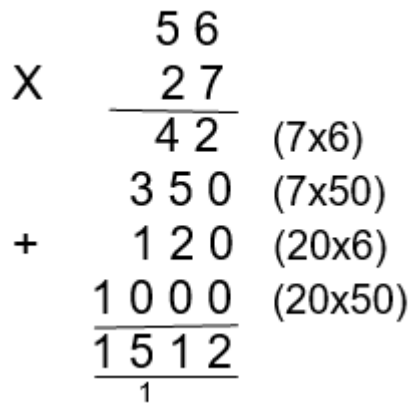
56 x 27= (50 +6) x (20 + 7) =1512

x	50	6	
20	1000	120	1120
7	350	42	392
			1512

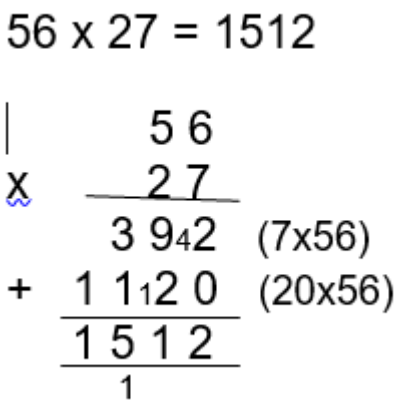
Add the partial products (1000 +120) + (350 +42) =1512

Expanded long multiplication (two-digit numbers multiplied by two-digit numbers):

56 x 27 =1512

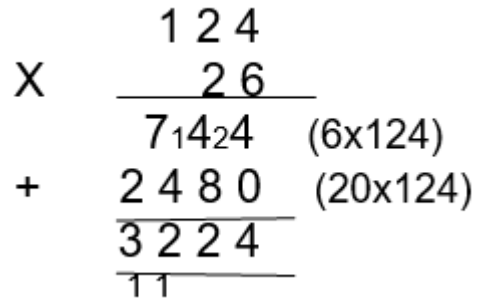


This moves onto compact long multiplication.



Make sure that the digits have been carried over in the partial products. Add the partial products together. When children are confident move onto long multiplication with three digit numbers multiplied by a two digit numbers, returning to the grid method if it is necessary.

124 x 26 = 3224



Extend with short and long multiplication of decimal numbers (in context of money and measure at the beginning) returning to expanded method if necessary. If children are making errors then return to the previous stage.

Stage Six

National Curriculum Objectives
• Recall multiplication facts for multiplication tables up to 12 × 12 • Multiply two-digit and three-digit numbers by a one-digit number using formal written layout

Ensure that children are confident with the methods in the previous stages. Continue to practise the formal short and long multiplication method with larger numbers and decimals. Use the expanded method first if needed.

The grid method (decimal number multiplied by a two-digit number):

53.2 x 24 =1276.8

x	50	3	0·2	
20	1000	60	4	1064·0
4	200	12	0·8	212·8
				1276·8

The formal written method of long multiplication:

$$
\begin{array}{rr}
 & 3{\cdot}2 \\
\times & 2\,4{\cdot}0 \\
\hline
 & 2\,1\,{}^{1}2\,{\cdot}8 \quad (53{\cdot}2 \times 4) \\
 & 1\,0\,6\,4\,{\cdot}0 \quad (53{\cdot}2 \times 20) \\
\hline
 & 1\,2\,7\,6\,{\cdot}8
\end{array}
$$

It is an option to include .0 in this example, but not essential. The prompts can be taken away if children no longer needed them.

If children are making lots of errors then they should go back to the previous stage. By the end of Year 6 children should use mental methods when appropriate. They should a formal method when they cannot do calculations in their heads.

Division

Early Stages

Children learn through practical activities and role play. Through these activities, they will begin to solve problems that involve sharing and halving.

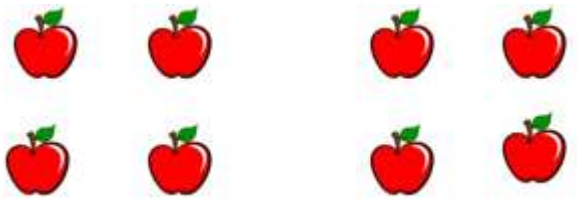
Share the apples between two people. 'Half of the apples are for you and half are for me.'

Stage One

National Curriculum Objectives
• Solve one-step problems involving division by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher • Count in multiples of twos, fives and tens (to the 10th multiple)

Children will start with practical activities that include sharing items. They need to share resources into equal groups. They will begin to use vocabulary associated with division.

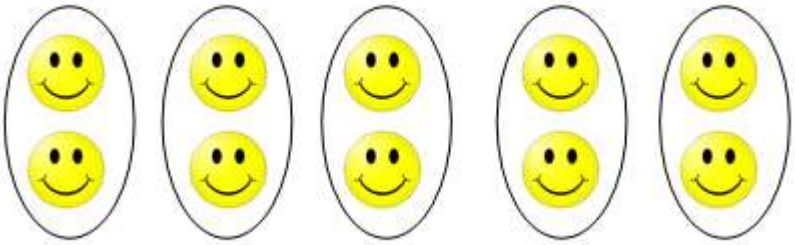
For example, share these apples between two people, how many apples will each person have?



Share 20 crayons between 2 pots. How many crayons are there in each pot?

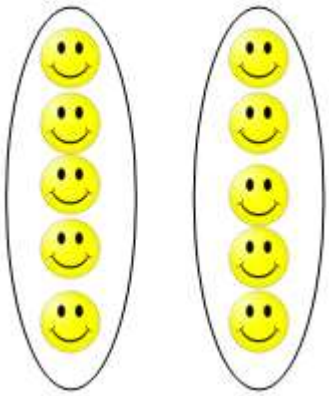
Then the children need to progress from sharing to grouping. You should use arrays to support division in the early stages.

How many faces are there altogether? How many groups of 2?



There are five groups of two.

How many groups of five are there?

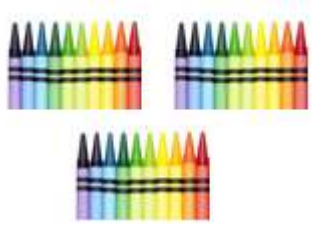


10 split into two groups is five. Half of ten is five

Stage Two

National Curriculum Objectives
• Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables • Calculate mathematical statements for division within the multiplication tables they know and write them using the division (÷) and equals (=) signs • Solve problems involving division, using materials, arrays, repeated subtraction, mental methods, and multiplication and division facts, including problems in context.

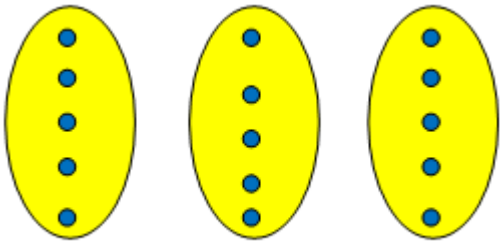
It is important that the children are confident with the previous method before moving on to the next stage.



30 crayons split between three groups. We have three pots and put ten crayons in each pot. How many pots do we need? 30 divided by 10= 3. 30 divided by 3= 10.

30 ÷ 10=3

30 ÷ 3 =10



How many groups of 5? 15 shared equally between 3 people is….?

15 divided by 3 equals 5

15 divided by 5 equals 3

15 ÷ 5 = 3
15 ÷ 3 = 5

Teacher should use arrays to support division.

15 ÷ 5 = 3
15 ÷ 3 = 5

How many groups of 5?

How many groups of 3?

15 shared between 3 people is….?

15 shared between 5 people is…..?

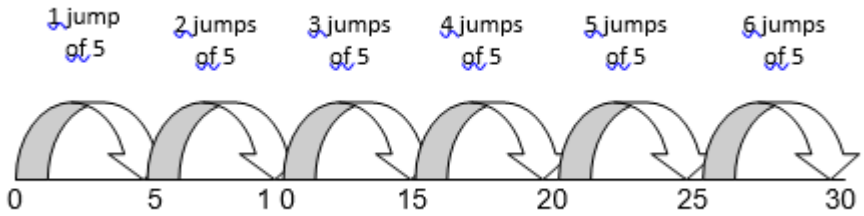
15 divided by 5 =3

15 divided by 3 = 5

When the children are ready, an empty number line can be used to count forwards.

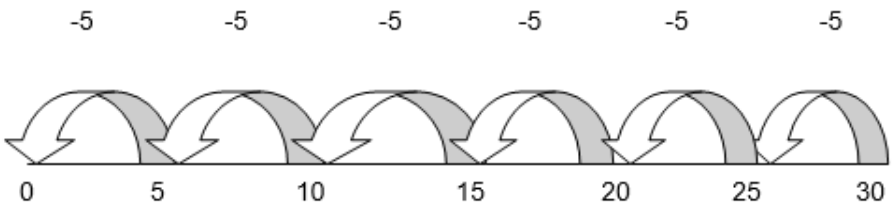
30 ÷ 5 = 6

How many jumps make 30?



Children can also jump back to make the link with repeated subtraction.

30 ÷ 5 = 6
How many groups of 5?



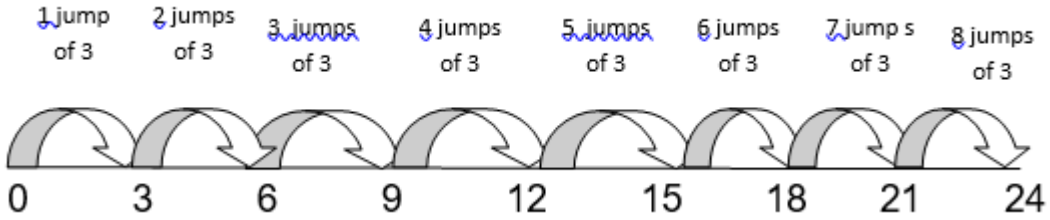
Stage Three

National Curriculum Objectives
• Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables (continue to practise the 2, 5 and 10 multiplication tables) • Write and calculate mathematical statements for division using the multiplication tables that they know, including for two-digit numbers divided by one-digit numbers, using mental and progressing to a formal written method

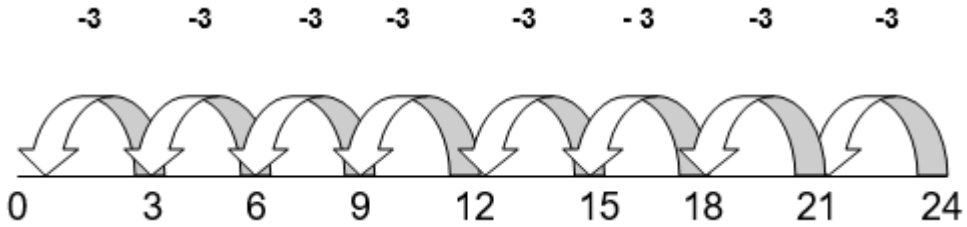
Children should continue to use practical resources when it is necessary. Also, continue to use arrays, pictures, diagrams and number lines when required.

Continue to allow the children to use an empty number line to count forwards…

How many threes in 24?



Also jump back from 24 in 3s to show repeated subtraction.

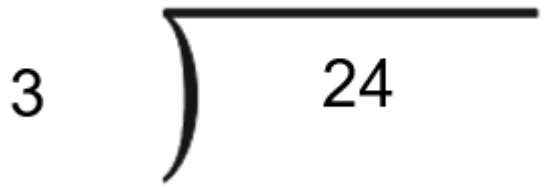


How many groups of 3 in 24?

Then introduce the formal layout using multiplication and division facts that the children know:

24 ÷ 3 = 8

This can be displayed as:



Twenty four divided by three equals eight.'

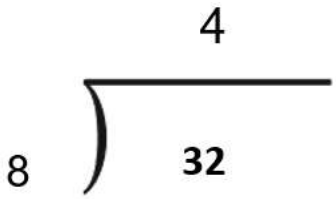
'How many threes are there in twenty four?'

Remember if the children are struggling with the method then take them back to the previous method.

Stage Four

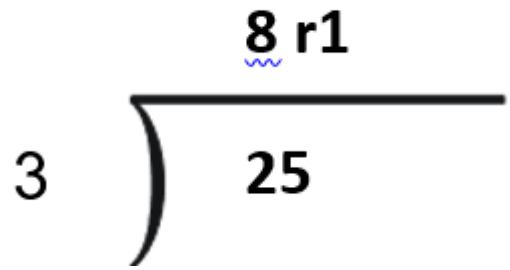
National Curriculum Objectives
• Recall multiplication and division facts for multiplication tables up to 12 × 12 • Use place value, known and derived facts to divide mentally • Divide two-digit and three-digit numbers by a one-digit number using formal written layout (not explicitly stated in the programmes of study but implied in the non-statutory guidance)

Continue to use children's multiplication and division facts to solve calculations. If they are struggling, then take them back to the previous stage.



How many eights are there in 32? Continue the method, introducing remainders.

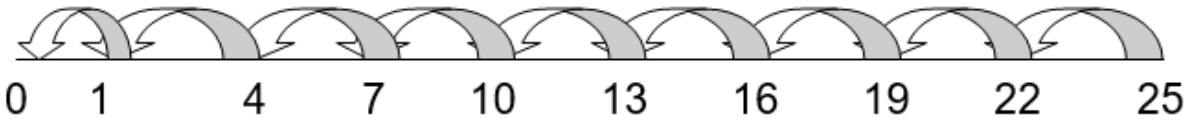
25 ÷ 3 = 8 r1



Remainders are not officially introduced until Stage 5 but it is a good opportunity to help them with their multiplication facts. It could be modelled using an empty number line.

Eight jumps of three and one left over.

25 ÷ 3 = 8 r1



Alternatively you could jump forwards in multiples of three from zero to twenty four ('and one more makes 25')

Division using partitioning (two digits divided by one digit)

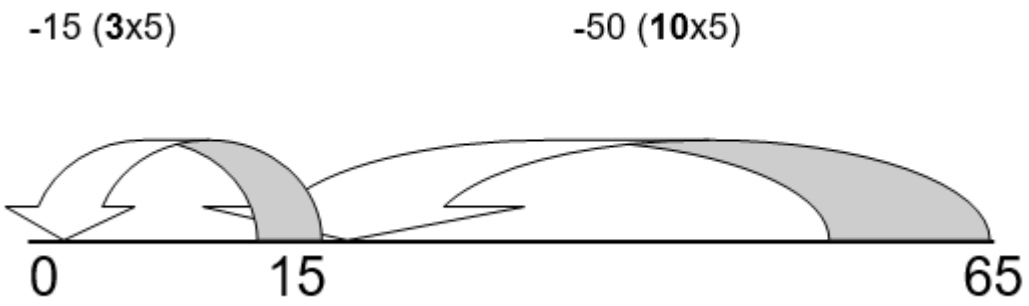
65 ÷ 5 = 13

65 = 50 + 15 Partition 65 into 50 and 15

50 ÷ 5 = 10
15 ÷ 5 = 3
10 + 3 = 13

Continue to use empty number lines using multiples of the divisor.

65 ÷ 5 = 13



98 ÷ 7 = 14

98 = 70 + 28 Partition 98 into 70 and 28

70 ÷ 7 = 10
28 ÷ 7 = 4
10 + 4 = 14

This could be modelled on a number line for deeper understanding.

Children need to practise partitioning in many different ways.

98 ÷ 7 = 14

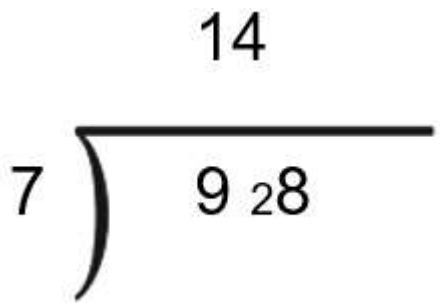
'We have partitioned 98 into 70 and 28 (90 = 70 + 28).
Seven 'goes into' 70 ten times and seven 'goes into' 28 four times.
Ten add four equals 14'

$$7 \overline{)\ 70+28}$$

$$10 + 4 = 14$$

This will lead to the more formal method of division.

98 ÷ 7 = 14



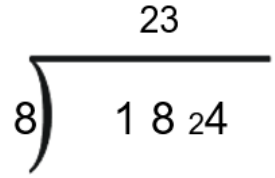
Continue to practise short division throughout Year 4. If you need to develop by dividing three digit by one digit using the formal method with whole numbers and no remainders. Remember to return to the previous stage if you are struggling.

Stage Five

National Curriculum Objectives
• Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context

Make sure that the children are confident with the previous stages before moving on. Continue to use the formal method with whole numbers.

184 ÷ 8 = 23



And with remainders..

432 ÷ 5 = 86 r2

The remainder can also be expressed as a fraction, 2/5 (the remainder divided by the divisor):

$$432 \div 5 = 86\frac{2}{5}$$

```
    0 8 6 r 2
5 ┌──────────
  │ 4 43 3 2
```

Continue to practise the formal method with remainders. Make sure that the children interpret the answer and present the answer in the right context including decimals.

```
    0 8 6. 4
5 ┌──────────
  │ 4 43 3 2 . 2 00
```

Stage Six

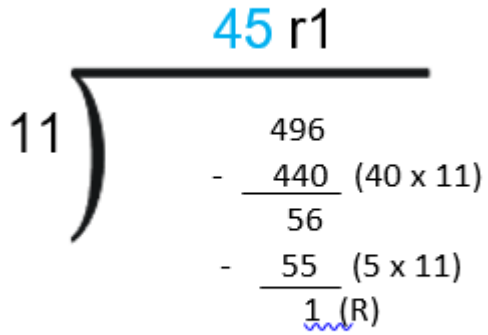
National Curriculum Objectives
• Divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context • Divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context

Make sure that children are confident with the method before moving on. Continue to practise the formal method of division with and without remainders.

496 ÷ 11 = 45 r1

The remainder can also be expressed as a fraction, 1/11 (the remainder divided by the divisor)

Dividing by two digit numbers using a formal method of long division.



Multiples of the divisor (11) have been subtracted from the dividend (496)

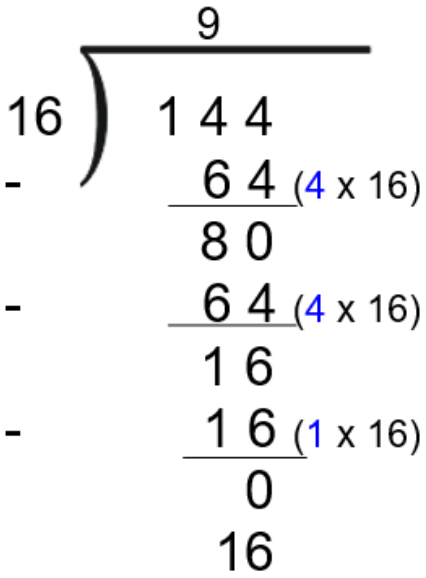
40 (lots of 11) + 5 (lots of 11) = 45
(lots of 11)'

'1 is the remainder'

Answer: 45

Short division does not work to solve this calculation. However, long division will help solve it.

144÷ 16 = 9

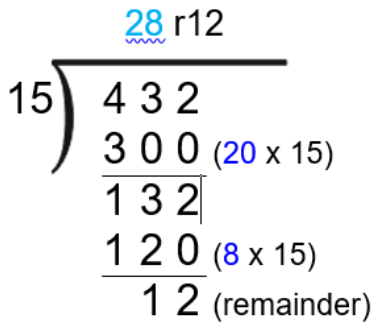


Multiples of the divisor (16) have
been subtracted from the dividend
(144)

'4 (lots of 16) + 4 (lots of 16) + 1 (lot
of 16) = 9 (lots of 16)

There is no remainder

$432 \div 15 = 28$ r12



Multiples of the divisor (15) have been subtracted from the dividend (432)

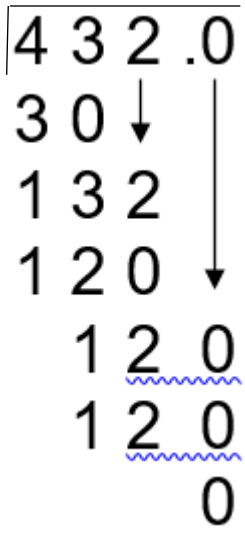
'20 (lots of 15) + 8 (lots of 15) = 28

12 is the remainder

The remainder can also be expressed as a fraction $\frac{12}{15}$ (the remainder divided by the divisor) or as a decimal**, 0.8** (see next example)

The answer is: 28 $\frac{12}{15}$ or 28·8

This is an alternative way to teach division but they must be secure in the previous method before moving on to:



$432 \div 15 = 28{\cdot}8$

The remainder should be expressed as a decimal.

Children should be using mental methods and jotting when appropriate. When they are unable to do the calculation in their head then they should use a formal written method.