# Year 3
# Mathematics Policy
# Updated 2017

# Contents

# Progression Towards a Written Method for Addition

In developing a written method for addition, it is important that children understand the concept of addition, in that it is:

- Combining two or more groups to give a total or sum
- Increasing an amount

They also need to understand and work with certain principles, i.e. that it is:

- the inverse of subtraction
- commutative i.e. 5 + 3 = 3 + 5
- associative i.e. 5 + 3 + 7 = 5 + (3 + 7)

The fact that it is commutative and associative means that calculations can be rearranged, e.g.
4 + 13 = 17 is the same as 13 + 4 = 17.

**End of Year Objective**
**Add numbers with up to three digits, using formal written method of columnar addition.***

**Although the objective suggests that children should be using formal written methods, the National Curriculum document states "The programmes of study for mathematics are set out year-by-year for key stages 1 and 2. Schools are, however, only required to teach the relevant programme of study by the end of the key stage. Within each key stage, schools therefore have the flexibility to introduce content earlier or later than set out in the programme of study." p4*

*It is more beneficial for children's understanding to go through the expanded methods of calculation as steps of development towards a formal written method.*

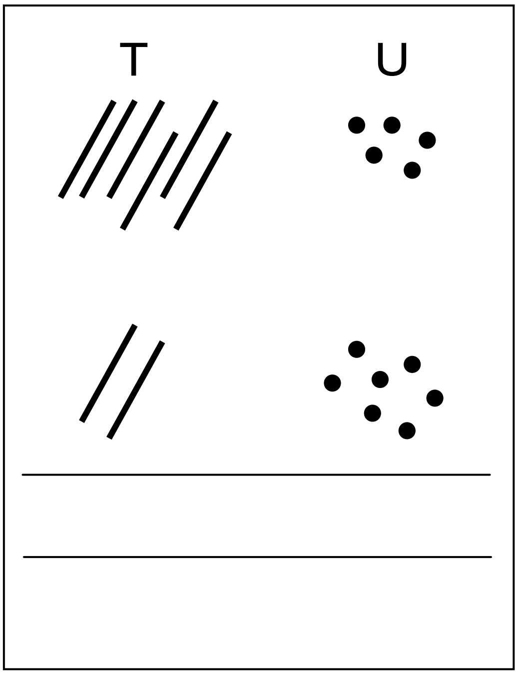
Children will build on their knowledge of using Base 10 equipment from Y2 and continue to use the idea of exchange.

Children should add the **least significant digits** first (i.e. start with the units/ones), and in an identical method to that from year 2, should identify whether there are greater than ten units which can be exchanged for one ten.

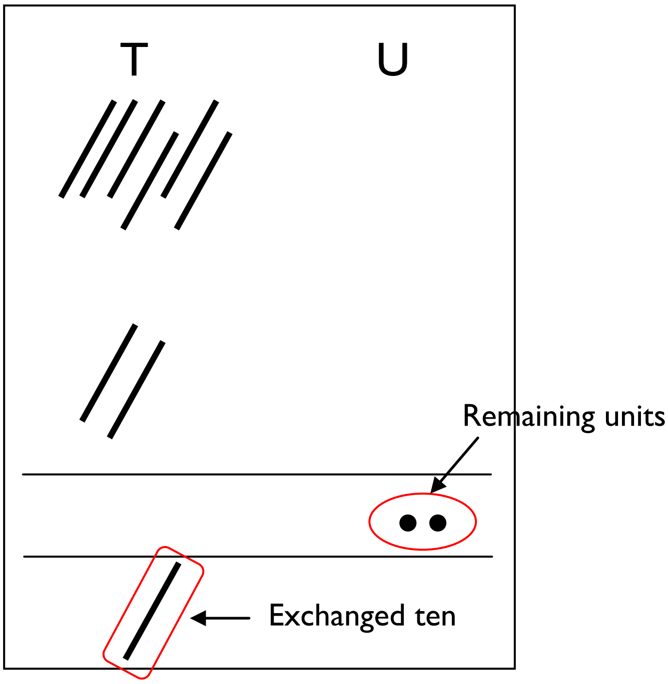
They can use a place value grid to begin to set the calculation out vertically and to support their knowledge of exchange between columns (as in Step 1 in the diagram below).

e.g. 65 + 27

Step 1

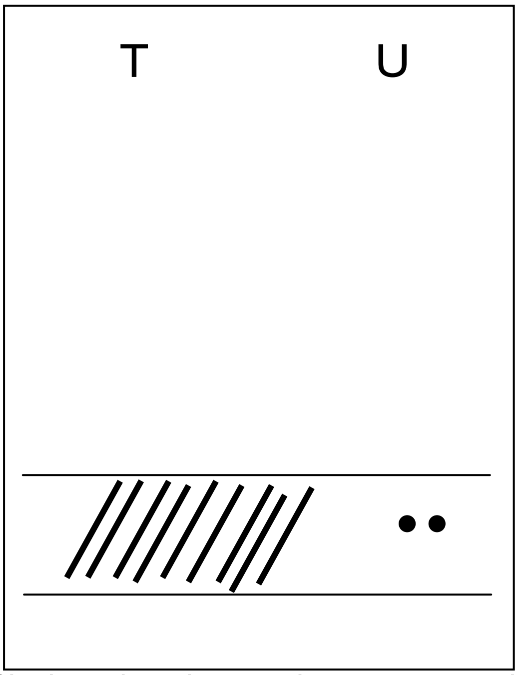



Step 2




Children would exchange ten units/ones for a ten, placing the exchanged ten below the equals sign. Any remaining units/ones that cannot be exchanged for a ten move into the equals sign as they are the units part of the answer (as in the diagram in Step 2 above).
If there are any tens that can be exchanged for a hundred, this can be done next. If not, the tens move into the equals sign as they are the tens part of the answer (as in the diagram in Step 3 below).

Step 3




Written method

Step 1

| | T | U |
|---|---|---|
| | 6 | 5 |
| + | 2 | 7 |
| | | |
| | | |

Step 2

| | T | U |
|---|---|---|
| | 6 | 5 |
| + | 2 | 7 |
| | | 2 |
| | 1 | |

Step 3

| | T | U |
|---|---|---|
| | 6 | 5 |
| + | 2 | 7 |
| | 9 | 2 |
| | 1 | |

Children should utilise this practical method to link their understanding of exchange to how the column method is set out. Teachers should model the written method alongside this practical method initially.

This should progress to children utilising the written and practical methods alongside each other and finally, and when they are ready, to children utilising just the written method.

By the end of year 3, children should also extend this method for three digit numbers.

# Progression Towards a Written Method for Subtraction

In developing a written method for subtraction, it is important that children understand the concept of subtraction, in that it is:

- Removal of an amount from a larger group (take away)
- Comparison of two amounts (difference)

They also need to understand and work with certain principles, i.e. that it is:

- the inverse of addition
- not commutative i.e. 5 - 3 is not the same as 3 - 5
- not associative i.e. 10 - 3 - 2 is not the same as 10 - (3 - 2)

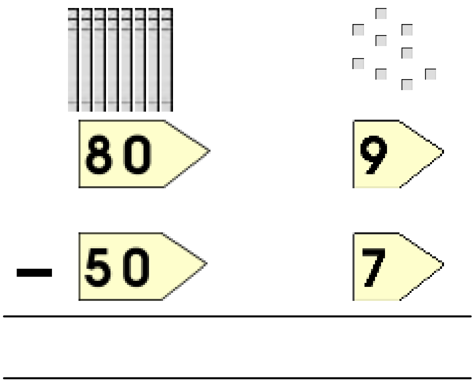
**End of Year Objective**
**Subtract numbers with up to three digits, using formal written method of columnar subtraction.***

**Although the objective suggests that children should be using formal written methods, the National Curriculum document states "The programmes of study for mathematics are set out year-by-year for key stages 1 and 2. Schools are, however, only required to teach the relevant programme of study by the end of the key stage. Within each key stage, schools therefore have the flexibility to introduce content earlier or later than set out in the programme of study." p4*

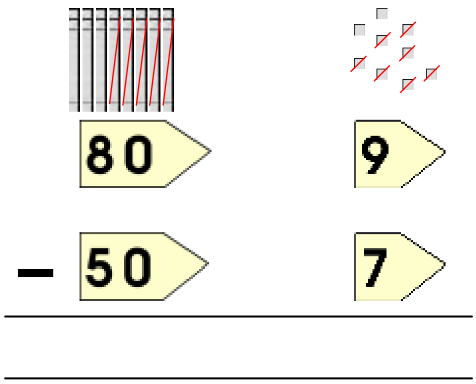
*It is more beneficial for children's understanding to go through the expanded methods of calculation as steps of development towards a formal written method.*

Children will build on their knowledge of using Base 10 equipment from Y2 and continue to use the idea of exchange. This process should be demonstrated using arrow cards to show the partitioning and Base 10 materials to represent the first number, removing the units and tens as appropriate (as with the more informal method in Y2).

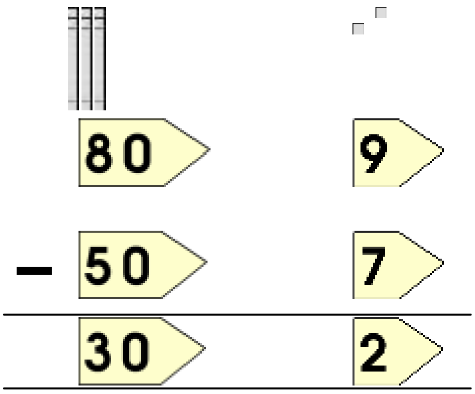
Step 1




Step 2




Step 3




*Emphasise that the second (bottom) number is being subtracted from the first (top) number rather than the lesser number from the greater.*

This will be recorded by the children as:

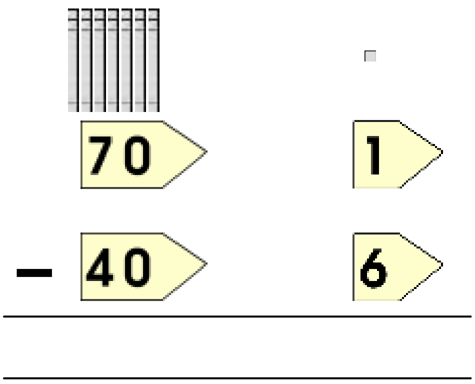
| | | | | | | |
|---|---|---|---|---|---|---|
| | 80 | → | 9 | | |
| - | 50 | → | 7 | | |
| | 30 | → | 2 | = | 32 |

Children can also use jottings of the Base 10 materials (as in Year 2) to support with their calculation, as in the example below.

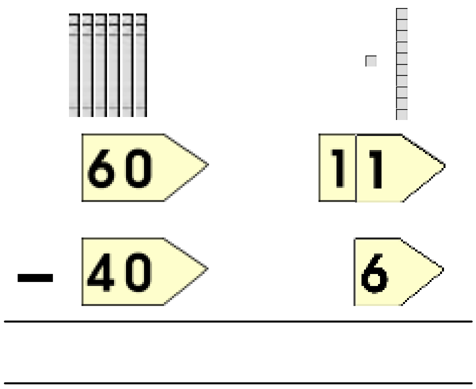
| | | | | | |
|---|---|---|---|---|---|
| | 80 | → | 9 | | |
| - | 50 | → | 7 | | |
| | 30 | → | 2 | = | 32 |

From this the children will begin to solve problems which involve exchange. Children need to consider whether there are enough units/ones to remove 6. In this case there are not (Step 1) so they need to exchange a ten into ten ones to make sure that there are enough, as they have been doing in the method for Year 2 (Step 2). They should be able to see that the number is just partitioned in a different way, but the amount remains the same (71 = 70 + 1 = 60 + 11).

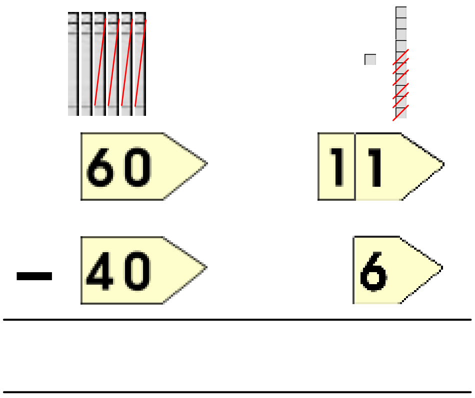
Step 1



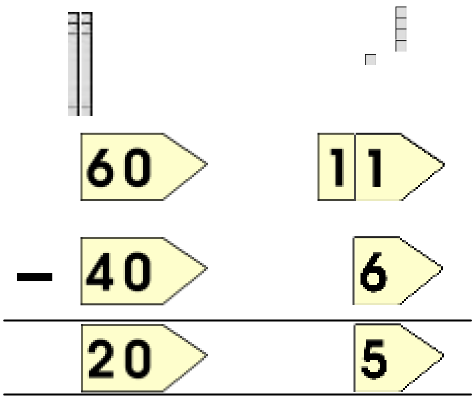

Step 2




Step 3




Step 4




This will be recorded by the children as:

| | | | | | |
|---|---|---|---|---|---|
| | ~~70~~ (60) | → | [1]1 | | |
| - | 40 | → | 6 | | |
| | 20 | → | 5 | = | 25 |

By the end of year 3, children should also extend this method for three digit numbers.

# Progression Towards a Written Method for Multiplication

In developing a written method for multiplication, it is important that children understand the concept of multiplication, in that it is:

- repeated addition

They should also be familiar with the fact that it can be represented as an array

They also need to understand and work with certain principles, i.e. that it is:

- the inverse of division
- commutative i.e. 5 x 3 is the same as 3 x 5
- associative i.e. 2 x 3 x 5 is the same as 2 x (3 x 5)

**End of Year Objective**
**Write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, progressing to formal written methods.***

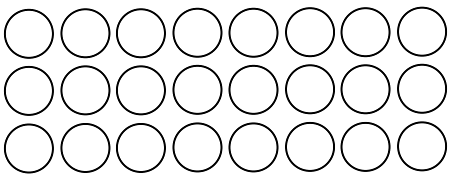
**Although the objective suggests that children should be using formal written methods, the National Curriculum document states "The programmes of study for mathematics are set out year-by-year for key stages 1 and 2. Schools are, however, only required to teach the relevant programme of study by the end of the key stage. Within each key stage, schools therefore have the flexibility to introduce content earlier or later than set out in the programme of study." p4*

*It is more beneficial for children's understanding to go through the expanded methods of calculation as steps of development towards a formal written method.*

Initially, children will continue to use arrays where appropriate linked to the multiplication tables that they know (2, 3, 4, 5, 8 and 10), e.g.

3 x 8

They may show this using practical equipment:



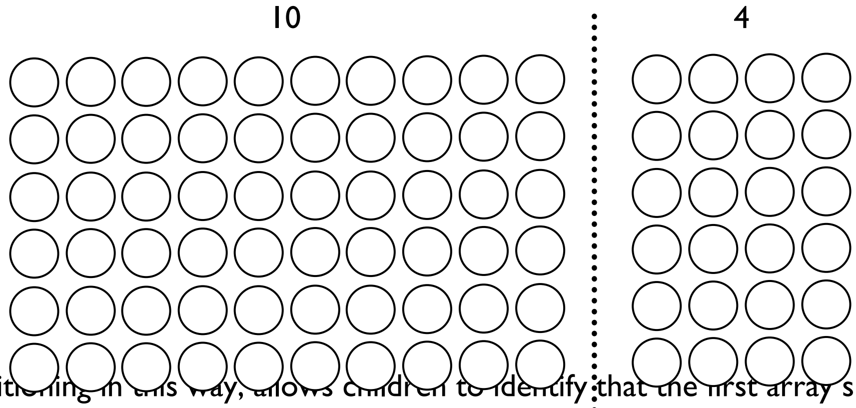
3 x 8 = 8 + 8 + 8 = 24

or by jottings using squared paper:

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | x | x | x | x | x | x | x | x | |
| | x | x | x | x | x | x | x | x | |
| | x | x | x | x | x | x | x | x | |
| | | | | | | | | | |

3 x 8 = 8 + 8 + 8 = 24

As they progress to multiplying a two-digit number by a single digit number, children should use their knowledge of partitioning two digit numbers into tens and units/ones to help them. For example, when calculating 14 x 6, children should set out the array, then partition the array so that one array has ten columns and the other four.




Partitioning in this way, allows children to identify that the first array shows 10 x 6 and the second array shows 4 x 6. These can then be added to calculate the answer:

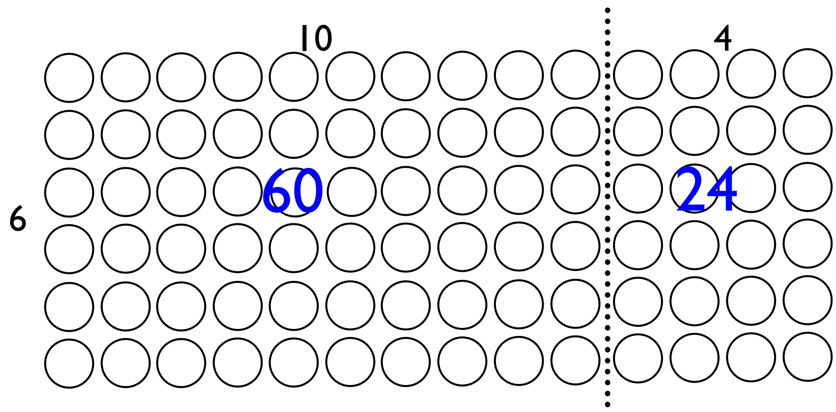
(6 x 10) + (6 x 4)

= 60 + 24

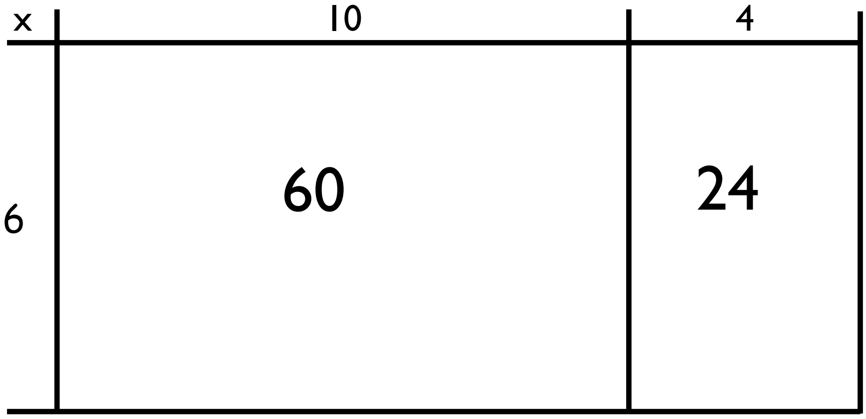
= 84

NB There is no requirement for children to record in this way, but it could be used as a jotting to support development if needed.

This method is the precursor step to the grid method. Using a two-digit by single digit array, they can partition as above, identifying the number of rows and the number of columns each side of the partition line.




By placing a box around the array, as in the example below, and by removing the array, the grid method can be seen.



It is really important that children are confident with representing multiplication statements as arrays and understand the rows and columns structure before they develop the written method of recording.

From this, children can use the grid method to calculate two-digit by one-digit multiplication calculations, initially with two digit numbers less than 20. Children should be encouraged to set out their addition in a column at the side to ensure the place value is maintained. When children are working with numbers where they can confidently and correctly calculate the addition mentally, they may do so.

13 x 8

| x | 10 | 3 |
|---|---|---|
| 8 | 80 | 24 |

$$\begin{array}{r} 80 \\ +\ 24 \\ \hline 104 \end{array}$$

When children are ready, they can then progress to using this method with other two-digit numbers.

37 x 6

| x | 30 | 7 |
|---|---|---|
| 6 | 180 | 42 |

$$\begin{array}{r} 180 \\ +\ 42 \\ \hline 222 \end{array}$$

Children should also be using this method to solve problems and multiply numbers in the context of money or measures.

# Progression Towards a Written Method for Division

In developing a written method for division, it is important that children understand the concept of division, in that it is:

- repeated subtraction
- sharing into equal amounts

They also need to understand and work with certain principles, i.e. that it is:

- the inverse of multiplication
- not commutative i.e. 15 ÷3 is not the same as 3 ÷ 15
- not associative i.e. 30 ÷ (5 ÷ 2) is not the same as (30 ÷ 5) ÷ 2

**End of Year Objective**

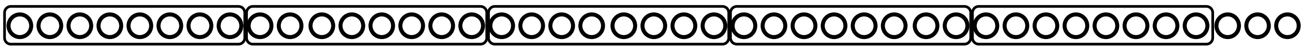
**Write and calculate mathematical statements for division using the multiplication tables that they know, including for two-digit numbers divided by one-digit numbers, progressing to formal written methods.***

**Although the objective suggests that children should be using formal written methods, the National Curriculum document states "The programmes of study for mathematics are set out year-by-year for key stages 1 and 2. Schools are, however, only required to teach the relevant programme of study by the end of the key stage. Within each key stage, schools therefore have the flexibility to introduce content earlier or later than set out in the programme of study." p4*

*It is more beneficial for children's understanding to go through the expanded methods of calculation as steps of development towards a formal written method.*

Initially, children will continue to use division by grouping (including those with remainders), where appropriate linked to the multiplication tables that they know (2, 3, 4, 5, 8 and 10), e.g.

43 ÷ 8 =



43 ÷ 8 = 5 remainder 3

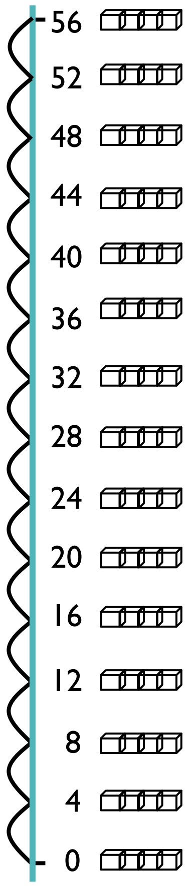
In preparation for developing the 'chunking' method of division, children should first use the repeated subtraction on a vertical number line alongside the continued use of practical equipment.  There are two stages to this:

Stage 1 – repeatedly subtracting individual groups of the divisor
Stage 2 – subtracting multiples of the divisor (initially 10 groups and individual groups, then 10 groups and other multiples in line with tables knowledge)

After each group has been subtracted, children should consider how many are left to enable them to identify the amount remaining on the number line.

Stage 1

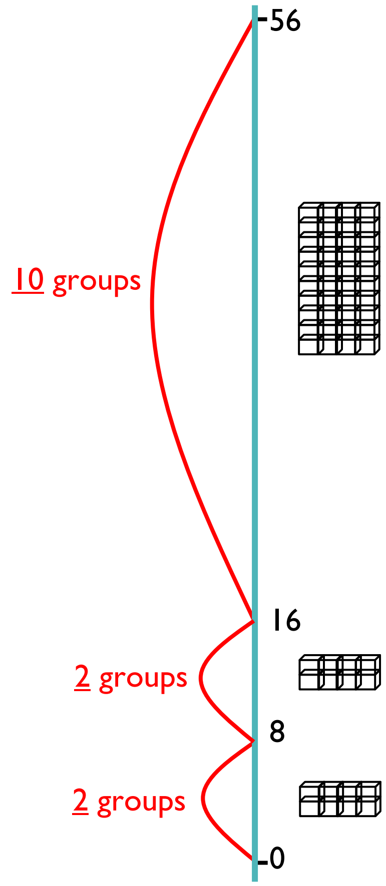
56 ÷ 4 = 14 (groups of 4)




Stage 2

56 ÷ 4 = 10(groups of 4) + 2(groups of 4) + 2(groups of 4)

= 14(groups of 4)




Children should be able to solve real life problems including those with money and measures. They need to be able to make decisions about what to do with remainders after division and round up or down accordingly.

# Progression Toward Mental Calculation Strategies
# (Addition and Subtraction)

The ability to calculate mentally is an essential skill, but, as with written methods of calculation, children need to be taught. **It is important to ensure that when teaching particular strategies, children have the appropriate prerequisite skills and are guided as to how and when that strategy is appropriate.**

Children should be taught and encouraged to ask themselves the following questions when faced with a calculation:

- Do I know the answer?
- Can I work it out in my head?
- Do I need to do a jotting?
- Do I need to use a written method?

When using a jotting, there is no requirement to follow a particular method of recording.

A feature of mental calculation is that a type of calculation can often be worked out in several different ways. Which method is best will depend on the numbers involved, the age of the children and the range of methods that they are confident with.

In developing a progression through mental calculation strategies for addition and subtraction, it is important that children understand the relevant concepts, in that addition is:

- combining two or more groups to give a total or sum
- increasing an amount

and subtraction is:

- removal of an amount from a larger group (take away)
- comparison of two amounts (difference)

They also need to understand and work with certain principles, that:

- addition and subtraction are inverses
- addition is commutative i.e. 5 + 3 = 3 + 5 but subtraction is not 5 - 3 is not the same as 3 - 5
- addition is associative i.e. 5 + 3 + 7 = 5 + (3 + 7) but subtraction is not 10 - 3 - 2 is not the same as 10 - (3 - 2)

Commutativity and associativity mean that calculations can be rearranged, e.g. 4 + 13 = 17 is the same as 13 + 4 = 17.

**<u>End of Year Objective</u>**
***Add and subtract numbers mentally, including: a three-digit number and ones; a three-digit number and tens; a three-digit number and hundreds.***

## Rapid Recall

Children should be able to:

- recall and use addition and subtraction facts for 100 (multiples of 5 and 10)
- derive and use addition and subtraction facts for 100
- derive and use addition and subtraction facts for multiples of 100 that total 1000

## Mental Strategies

***Partition and combine multiples of hundreds, tens and ones***

Partitioning numbers is a core strategy for adding and subtracting pairs of numbers. Children can either partition both of the numbers in the calculation, or keep the first number the same and just partition the second. *(See Y2 for more information).*

*Examples of calculations:*

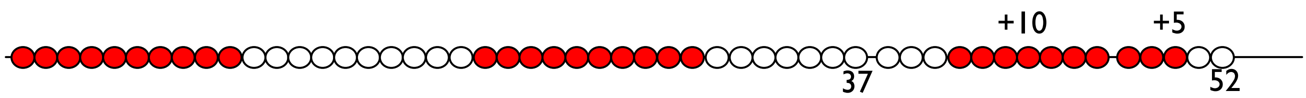
| | |
|---|---|
| 526 + 200 | counting on in hundreds |
| 137 + 40 | counting on in tens |
| 272 + 8 | counting on in ones |
| 428 - 200 | counting back in hundreds |
| 323 - 70 | counting back in tens |
| 693 - 8 | counting back in ones |
| 37 + 15 | 37 add 10 and 5 = 37 add 10 add 5 (crossing tens boundaries) |
| 42 – 25 | 42 take away 20 and 5 = 42 take away 20 take away 5 (crossing tens boundaries) |

*Prerequisite skills:*

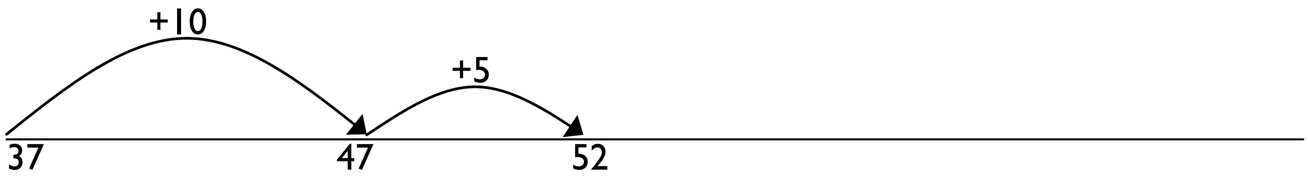
- Count forwards and backwards in ones, tens and hundreds from any one-, two- or three-digit number
- Understand place value and understand which digit changes if one, ten or hundred is added or subtracted
- Partition numbers into hundreds, tens and ones

## Addition

37 + 15 = 52 (shown using a beadstring)




37 + 15 = 52 (shown using a numberline)

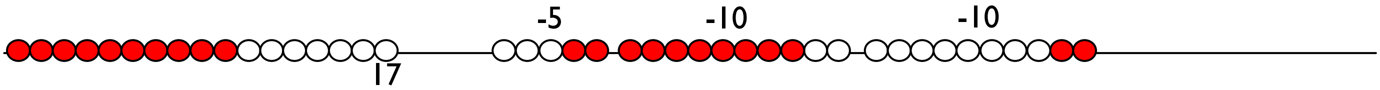



37 + 15 = (shown using number sentences)

37 + 10 = 47
47 + 5 = 52

**<u>Subtraction</u>**

42 - 25 = 17 (shown using a beadstring)




42 – 25 = 17 (shown using a numberline)


42 – 25 = 17 (shown using number sentences)

42 – 20 = 22
22 – 5 = 17

***Reorder numbers in a calculation***

In Y3, children need to build on their knowledge gained in Y2 and continue to reorder calculations to make them more efficient. *(See Y2 for more information).*

*Examples of calculations:*

| | |
|---|---|
| 23 + 54 | 54 + 23 |
| 12 + 19 + 12 | 12 + 12 + 19 (using knowledge of doubles) |
| 6 + 8 + 4 | 6 + 4 + 8 (using knowledge of number bonds to 10) |
| 70 + 50 + 30 | 70 + 30 + 50 (using knowledge of number bonds to 100) |

*Prerequisite skills:*

- Understand the place value of numbers to identify which number is the greater

- Understand that reordering works for addition but not subtraction* *(because children are not at the level when they are solving calculations such as 16 – 3 – 6, when reordering would be appropriate).*

***Identify and use knowledge of number bonds within a calculation***

Number bonds to 10 and 100 can be used to make calculations more efficient when combined with other strategies such as reordering and partitioning.

*Examples of calculations:*

| | |
|---|---|
| 42 + 38 | 42 + 30 + 8 (recognising that 2 and 8 is a number bond to 10, so the answer will be a multiple of 10) |
| 60 – 28 | 60 – 20 – 8 (utilising knowledge that 10 – 8 = 2, so 40 – 8 = 32) |
| 120 – 50 | 120 – 20 – 30 (utilising knowledge of number bonds to 100, leaving an answer of 70) |

*Prerequisite skills:*
- Know, or quickly derive, number bonds to 10 and 100
- Identify number bonds within other numbers, e.g. identifying 7 + 3 within the calculation 57 + 33
- Identify that when adding two two-digit numbers, that 57 + 43 = 100 but 57 + 53 does not and why

***Find differences by counting up through the next multiple of 10 or 100***

In Y3, children need to build on their knowledge and understanding gained in Y2 to find larger differences that cross 10 and 100 boundaries. Some of these calculations are preparing children for time and money calculations throughout KS2.

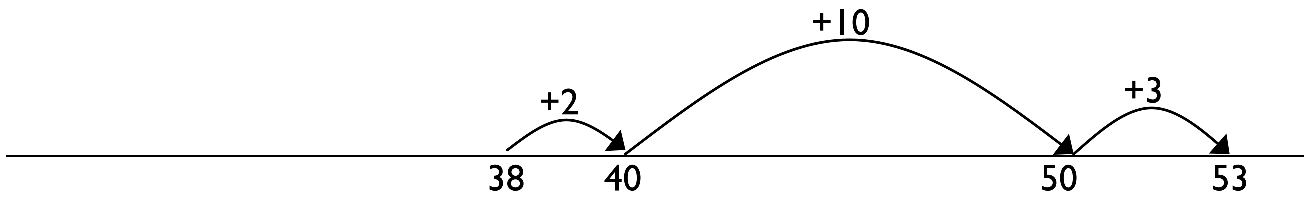
*Examples of calculations:*

| | |
|---|---|
| 60 – 43 | useful for time calculations, e.g. a journey time from 2:43 until 3:00 |
| 53 – 38 | efficient because the numbers are close to each other |
| 104 – 95 | efficient because the numbers are close to each other |
| 200 – 86 | useful for money calculations, e.g. change from £2 when spending 86p |

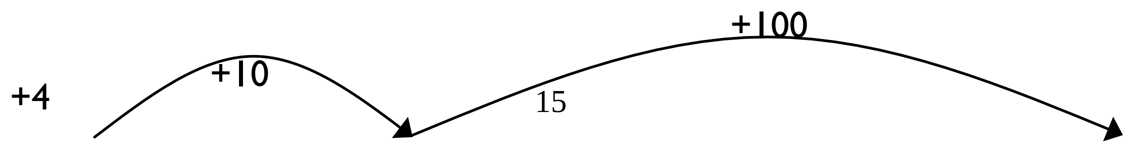
*Prerequisite skills:*
- Understand the place value of numbers to identify which number is the greater or lesser
- Establish whether numbers are close together or near to multiples of 10 or 100
- Place numbers appropriately on an unmarked numberline
- Count forwards and backwards in ones and tens

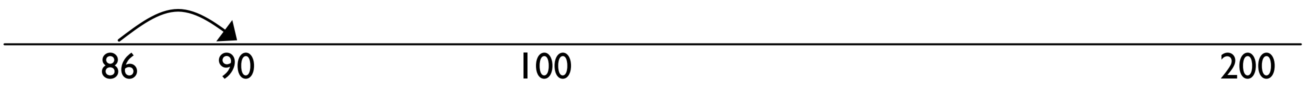
Children could use empty numberlines to record the calculation.

53 – 38 = 15




200 – 86 = 114






***Bridge through 10 when adding or subtracting a single digit number (partitioning, e.g. 58 + 5 = 58 + 2 + 3 or 76 – 8 = 76 – 6 - 2)***

In Y3, children need to consolidate their knowledge and understanding gained in Y2. *(See Y2 for more information).*

*Examples of calculations*

| | |
|---|---|
| 35 + 7 | as 35 + 5 + 2 |
| 97 + 6 | as 97 + 3 + 3 |
| 178 + 5 | as 178 + 2 + 3 |
| 42 – 7 | as 42 – 2 – 5 |
| 204 – 6 | as 204 – 4 – 2 |
| 371 – 5 | as 371 – 1 – 4 |

*Prerequisite skills:*

- Partition numbers in different ways, e.g. 5 as 2 + 3 to enable 58 + 5 as 58 + 2 + 3
- Know, or quickly derive, number bonds to 10

Children could use empty numberlines to record the calculation.

198 + 6 = 204


153 – 7 = 146


The bridging strategy can then be linked with the partitioning strategy for efficient addition and subtraction of two two-digit numbers.

***Add or subtract 9, 19, 29 etc by rounding and compensating***

In Y3, children need to build on their knowledge and understanding gained in Y2 *(See Y2 for more information)* to add and subtract one less than a multiple of 10 up to 89 to two and three-digit numbers.

*Examples of calculations*

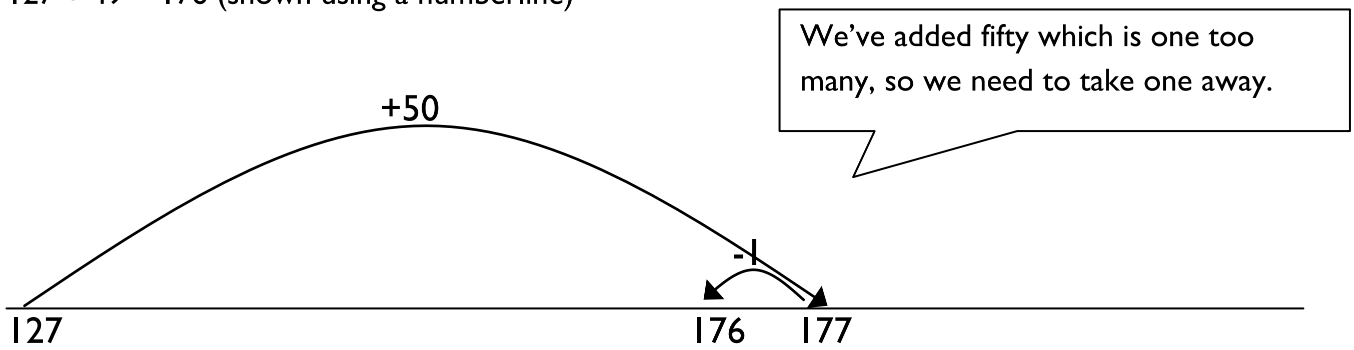
34 + 29 as 34 + 30 - 1

127 + 49 as 127 + 50 - 1
96 - 39 as 96 - 40 + 1
273 - 59 as 273 - 60 + 1

*Prerequisite skills:*

- Identify the difference between the number being added and subtracted and the multiple of 10
- Understand that the adjustment needs to be the opposite of the operation carried out

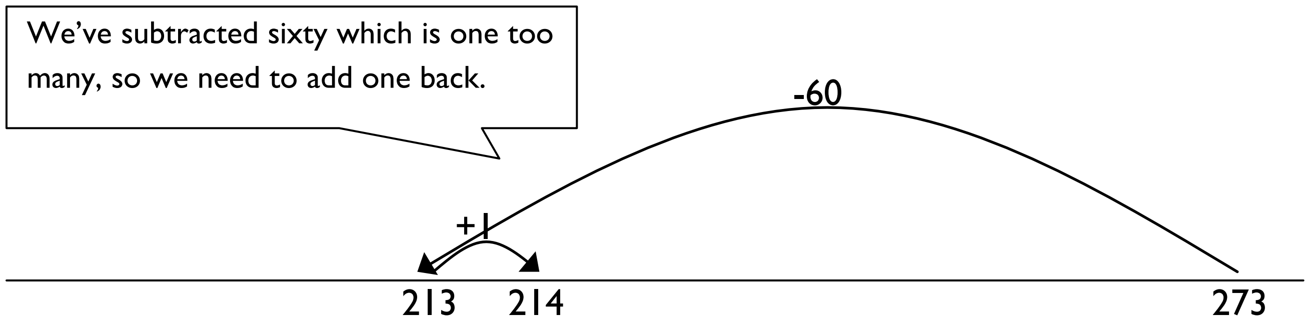
127 + 49 = 176 (shown using a numberline)




127 + 49 = 176 (shown using number sentences)

127 + 50 = 177
177 – 1 = 176

273 - 59 = 214 (shown using a numberline)




273 - 59 = 214 (shown using number sentences)

273 – 60 = 213
213 + 1 = 214

# Progression Toward Mental Calculation Strategies
# (Multiplication and Division)

The ability to calculate mentally is an essential skill, but, as with written methods of calculation, children need to be taught. **It is important to ensure that when teaching particular strategies, children have the appropriate prerequisite skills and are guided as to how and when that strategy is appropriate.**

Children should be taught and encouraged to ask themselves the following questions when faced with a calculation:

- Do I know the answer?
- Can I work it out in my head?
- Do I need to do a jotting?
- Do I need to use a written method?

When using a jotting, there is no requirement to follow a particular method of recording.

A feature of mental calculation is that a type of calculation can often be worked out in several different ways. Which method is best will depend on the numbers involved, the age of the children and the range of methods that they are confident with.

In developing a progression through mental calculation strategies for multiplication and division, it is important that children understand the relevant concepts, in that multiplication is:

- repeated addition
- scaling

and division is:

- repeated subtraction (grouping)
- related to finding a fraction of a number (sharing)

They also need to understand and work with certain principles, that:

- multiplication and division are inverses
- multiplication is commutative (because it is based on addition which is also commutative) i.e. 3 x 5 = 5 x 3 but division is not i.e. 15 ÷3 ≠ 3 ÷ 15
- multiplication is associative i.e. 2 x (3 x 5) = (2 x 3) x 5 but division is not i.e. 30 ÷ (5 ÷ 2) ≠ (30 ÷ 5) ÷ 2
- commutativity and associativity mean that calculations can be rearranged to make them easier to calculate, e.g. (3 x 4) x 5 = 60 is the same as (5 x 4) x 3 = 60

PLEASE NOTE: To be mathematically accurate, 3 x 4 means 4 threes, or 3 + 3 + 3 + 3. Read correctly it means 3 multiplied four times. The first number in the calculation is the value which is being operated on by the second:

3 x 4

However, due to the fact that younger children often refer to the x sign as lots of, or groups of, the calculation is then commonly represented as 4 + 4 + 4. As multiplication is commutative, this is perfectly acceptable. It is a good idea to encourage children to think of any product either way round as this reduces the facts they need to remember by half.

**<u>End of Year Objective</u>**

***Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including two-digit numbers times one-digit numbers.***

## Rapid Recall

Children should be able to:

- Count in multiples of 4, 8, 50 and 100
- Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
- Derive and use doubles of all numbers to 100 and corresponding halves
- Derive and use doubles of all multiples of 50 to 500

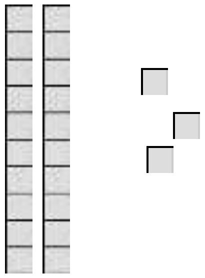
## Mental Strategies

Children should be able to represent multiplication and division calculations, including two-digit numbers multiplied by one-digit numbers. As children learn to recall more multiplication and division facts, they should make a choice about the calculations they need to represent to find the answer, and those they can recall.

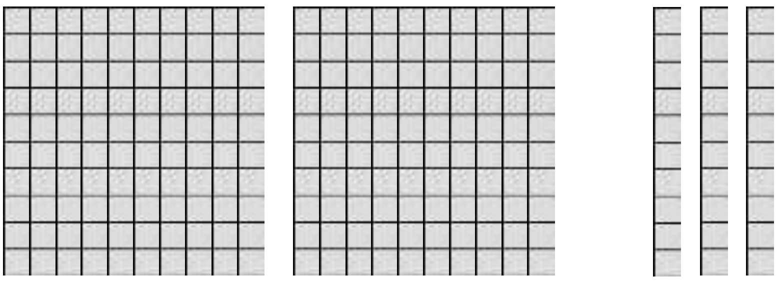
### Calculate mathematical statements for multiplication

***Multiply a one- or two-digit number by 10 and a one-digit number by 100 using base 10 equipment***

Children should initially represent the calculation using base 10 equipment, e.g. 23 x 10



All of the base 10 pieces need to be made ten times greater.



The children should then compare the two numbers in place value columns.

| H | T | U |
|---|---|---|
|  | 2 | 3 |
| 2 | 3 | 0 |

They should notice that each digit has moved one place to the left, i.e. become ten times greater.

***Multiply a one- or two-digit number by 10 and a one-digit number by 100 using a place value chart***

Building on their knowledge from using the base 10 equipment, children can use transparent counters to help them develop their understanding of multiplying by 10 and 100,
e.g. 46 x 10

The children represent 46 on a place value chart using transparent counters.

| | | | | |
|---|---|---|---|---|
| 00000 | 0000 | 000 | 00 | 0 |
| 10000 | 1000 | 100 | 10 | 1 |
| 20000 | 2000 | 200 | 20 | 2 |
| 30000 | 3000 | 300 | 30 | 3 |
| 40000 | 4000 | 400 | 40 | 4 |
| 50000 | 5000 | 500 | 50 | 5 |
| 60000 | 6000 | 600 | 60 | 6 |
| 70000 | 7000 | 700 | 70 | 7 |
| 80000 | 8000 | 800 | 80 | 8 |
| 90000 | 9000 | 900 | 90 | 9 |

They then move each counter one place to the left to multiply the number by 10.

| | | | | |
|---|---|---|---|---|
| 00000 | 0000 | 000 | 00 | 0 |
| 10000 | 1000 | 100 | 10 | 1 |
| 20000 | 2000 | 200 | 20 | 2 |
| 30000 | 3000 | 300 | 30 | 3 |
| 40000 | 4000 | 400 | 40 | 4 |
| 50000 | 5000 | 500 | 50 | 5 |
| 60000 | 6000 | 600 | 60 | 6 |
| 70000 | 7000 | 700 | 70 | 7 |
| 80000 | 8000 | 800 | 80 | 8 |
| 90000 | 9000 | 900 | 90 | 9 |

They then recombine this number to create 460.

*Examples of calculations*

3 x 10

7 x 100

62 x 10

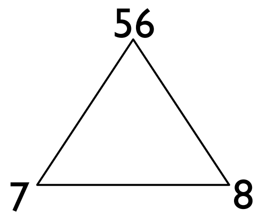
*Prerequisite skills:*

- Represent numbers up to three digits using base 10 equipment
- Partition a two digit number into tens and ones
- Recombine multiples of hundreds and tens

***Within known tables, use related facts to multiply T0 by a one-digit number***

*NB T0 represents a two digit multiple of ten*

Children should be encouraged to identify the **relationships** between numbers in multiplication calculations, e.g. 7 x 8 = 56 could be represented using a multiplication trio as this model allows children to see the **relationships** between the numbers:

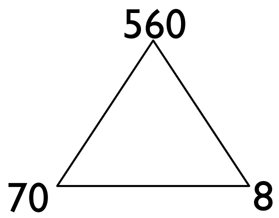



This can be used to derive the following calculations:

7 x 8 = 56

8 x 7 = 56

Children can then use the multiplication trio to derive related facts, e.g. 70 x 8 =




Children should be able to explain that because 70 is ten times greater than 7, the answer to 70 x 8 will be ten times greater than 56. They can then use their understanding of multiplying by 10 to calculate this.

*Examples of calculations*

60 x 3

50 x 4

30 x 8

*Prerequisite skills:*

- Recall 2, 3, 4, 5, 8 and 10 multiplication tables

- Understand the effect of multiplying a one- or two-digit number by 10

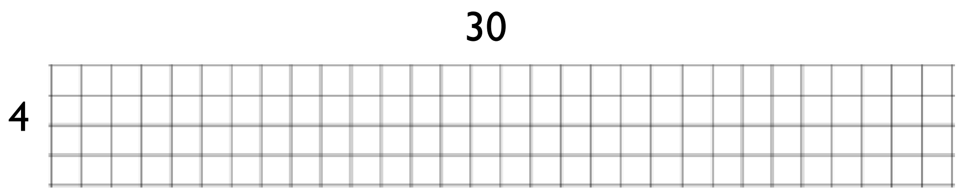
***Within known tables, use partitioning to multiply T1 by a one-digit number***

*NB T1 represents a two digit number with one as the units*

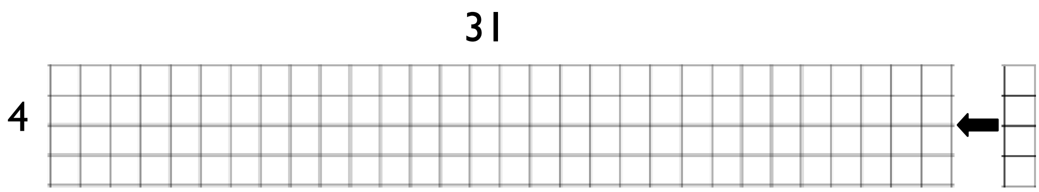
Squared paper can be used to develop children's understanding of this calculation and how it is related to multiplying T0 by a one-digit number.

e.g. 31 x 4

Children make the calculation 30 x 4 using squared paper.




They should be able to calculate, by using related facts, that 30 x 4 = 120. The children should now consider how to change the representation of 30 x 4 into 31 x 4, i.e. by adding one extra column of four:




So 31 x 4 = 30 x 4 add 1 x 4

31 x 4 = 120 + 4

31 x 4 = 124

*Examples of calculations*

51 x 3

61 x 4

31 x 8

*Prerequisite skills:*

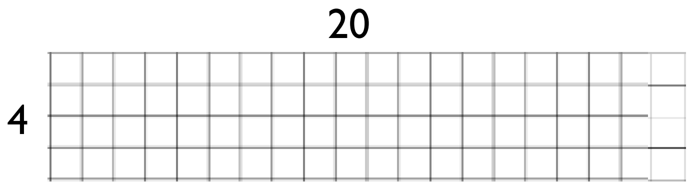
- Recall 2, 3, 4, 5, 8 and 10 multiplication tables
- Create an array to represent a multiplication calculation
- Understand the effect of multiplying a one- or two-digit number by 10
- Use related facts to multiply T0 by a one-digit number within known tables

***Use compensation to multiply 19 by a one-digit number***

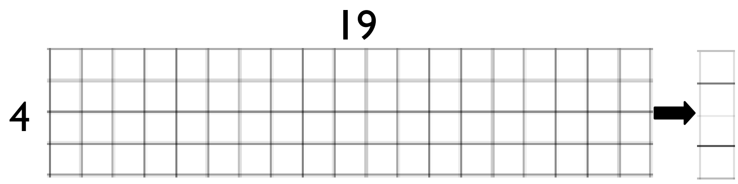
Squared paper can be used to develop children's understanding of this calculation and how it is related to multiplying twenty by a one-digit number.

e.g. 19 x 4

Children make the calculation 20 x 4 using squared paper.




They should be able to calculate, by using related facts, that 20 x 4 = 80. The children should now consider how to change the representation of 20 x 4 into 19 x 4, i.e. by subtracting one column of four:




So 19 x 4 = 20 x 4 subtract 1 x 4

19 x 4 = 80 – 4

19 x 4 = 76

*Examples of calculations*

19 x 3

19 x 5

19 x 8

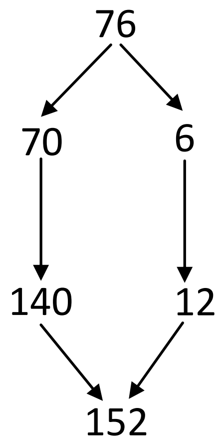
*Prerequisite skills:*

- Recall 2, 3, 4, 5, 8 and 10 multiplication tables
- Create an array to represent a multiplication calculation
- Understand the effect of multiplying a one- or two-digit number by 10
- Use related facts to multiply 20 by a one-digit number within known tables

***Use partitioning to double any two-digit number***

Children should continue to develop their understanding of doubling from Y2. They should use related facts to double two-digit multiples of 10. For example, double 7 is 14 so double 70 (ten times greater than 7) is 140 (ten times greater than 14).

e.g. double 76




The diagram above illustrates the way children should be thinking about doubling using partitioning, but it is not necessary for them to record in this way if it is not helpful to the child.

*Examples of calculations*

Double 39

Double 52

Double 85

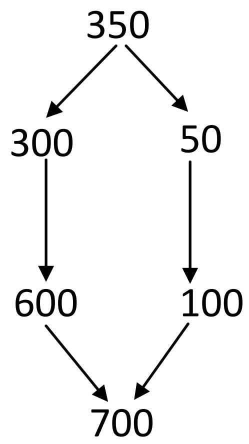
*Prerequisite skills:*

- Count forwards in ones and tens, crossing tens and hundreds boundaries
- Partition a two-digit number into tens and ones
- Use related facts to double a two-digit multiple of 10
- Recombine a multiple of ten and a multiple of one

***Use related facts or partitioning to double any multiple of 50 to 500***

Children should use related facts to double multiples of 100. For example, double 3 is 6 so double 300 is 600.

e.g. double 350




*Examples of calculations*

Double 250

Double 450

Double 150

*Prerequisite skills:*

- Count forwards in tens and hundreds
- Partition a multiple of 50 into hundreds and tens
- Use related facts to double a multiple of 100 which is less than 500

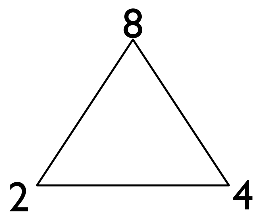
**Calculate mathematical statements for division**

Children in Year 3 are learning division by chunking at this point, so calculations should fit the method being taught.

***Use related facts to divide T0 by a one-digit number***

*NB T0 represents a multiple of ten*

Children should be encouraged to identify the **relationships** between numbers in division calculations, e.g. 8 ÷ 4 = 2 could be represented using a division trio as this model allows children to see the **relationships** between the numbers:

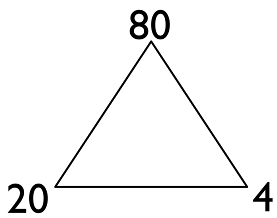



This can be used to derive the following calculations:

8 ÷ 4 = 2

8 ÷ 2 = 4

Children can then use the division trio to derive related facts, e.g. 80 ÷ 4 =




Children should be able to explain that because 80 is ten times greater than 8, the answer to 80 ÷ 4 will be ten times greater than 2.

*Examples of calculations*

60 ÷ 3

80 ÷ 2

90 ÷ 3

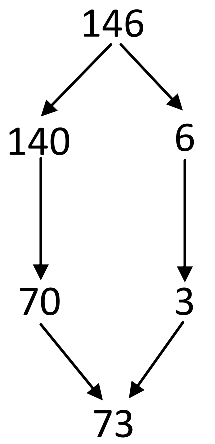
*Prerequisite skills:*

- Recall 2, 3 and 4 multiplication tables
- Understand the effect of multiplying a one-digit number by 10

***Use partitioning to halve even numbers up to 200***

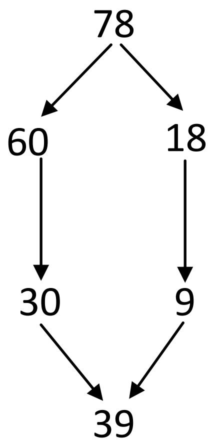
Where the tens digit is even, children can use related facts to halve the multiple of 10. For example, half of 14 is 7 so half of 140 (ten times greater than 14) is 70 (ten times greater than 7).

e.g. Find half of 146




Where the tens digit is odd, children can use partitioning in different ways to help them to calculate, recognising that partitioning the number into an even number of tens and the remainder will help them calculate more efficiently.

e.g. Find half of 78




The diagram above illustrates the way children should be thinking about halving using partitioning, but it is not necessary for them to record in this way if it is not helpful to the child.

*Examples of calculations*

| | |
|---|---|
| Find half of 162 | by partitioning into 160 and 2 |
| Find half of 94 | by partitioning into 80 and 14 |
| Find half of 136 | by partitioning into 120 and 16 |

*Prerequisite skills:*

- Partition a two-digit and three-digit number in different ways
- Use related facts to half a multiple of 10, where the tens digit is even, up to 200
- Recombine a multiple of ten and a multiple of one