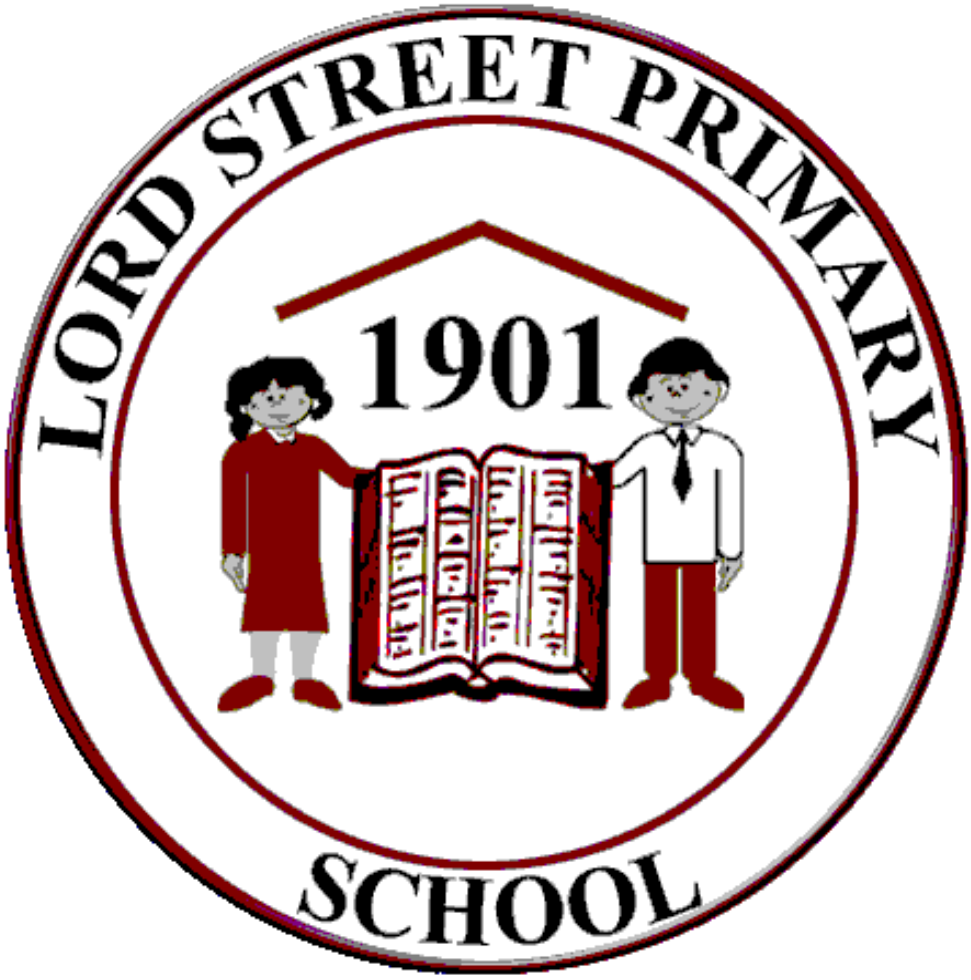


Year 1
Mathematics Policy
Updated 2017

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 one-digit and two-digit numbers to 20, including zero (using concrete objects and pictorial representations).

Children will continue to use practical equipment, combining groups of objects to find the total by counting all or counting on. Using their developing understanding of place value, they will move on to be able to use Base 10 equipment to make teens numbers using separate tens and units.
For example, when adding 11 and 5, they can make the 11 using a ten rod and a unit.

The units can then be combined to aid with seeing the final total, e.g.

so 11 + 5 = 16. If possible, they should use two different colours of base 10 equipment so that the initial amounts can still be seen.

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)

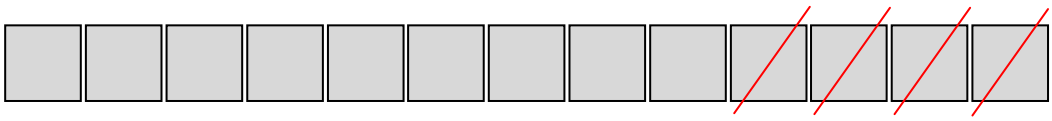
They also need to understand and work with certain principles, i.e. that it is:

- 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)

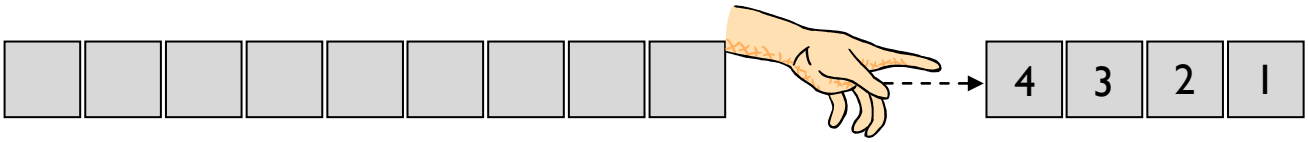
End of Year Objective

Subtract one-digit and two-digit numbers to 20, including zero (using concrete objects and pictorial representations).

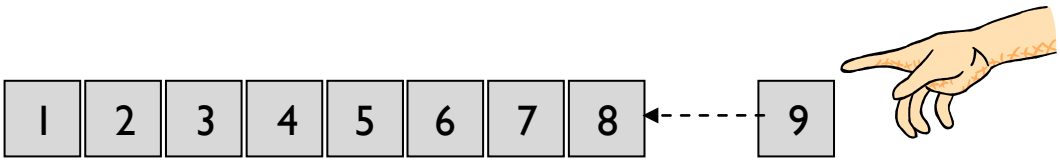
Children will continue to use practical equipment and taking away strategies. To avoid the need to exchange for subtraction at this stage, it is advisable to continue to use equipment such as counters, cubes and the units from the Base 10 equipment, but not the tens, e.g. 13 - 4



Touch count and remove the number to be taken away, in this case 4.



Touch count to find the number that remains.



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

Solve one-step problems involving multiplication by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

In year one, children will continue to solve multiplication problems using practical equipment and jottings. They may use the equipment to make groups of objects. Children should see everyday versions of arrays, e.g. egg boxes, baking trays, ice cube trays, wrapping paper etc. and use this in their learning, answering questions such as 'How many eggs would we need to fill the egg box? How do you know?'

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

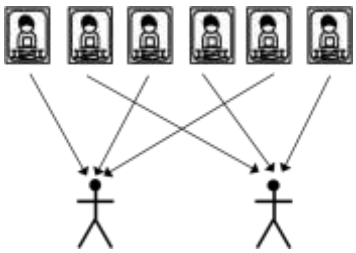
They also need to understand and work with certain principles, i.e. that it is:

- 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

Solve one-step problems involving division by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

In year one, children will continue to solve division problems using practical equipment and jottings. They should use the equipment to share objects and separate them into groups, answering questions such as 'If we share these six apples between the three of you, how many will you each have? How do you know?' or 'If six football stickers are shared between two people, how many do they each get?' They may solve both of these types of question by using a 'one for you, one for me' strategy until all of the objects have been given out.



Children should be introduced to the concept of simple remainders in their calculations at this practical stage, being able to identify that the groups are not equal and should refer to the remainder as '… left over'

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.

End of Year Objective

Add and subtract one-digit and two-digit numbers to 20, including zero.

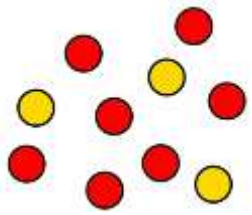
Rapid Recall

Children should be able to:

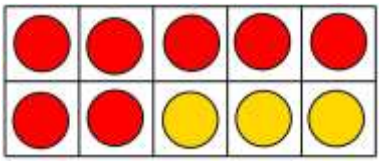
- represent and use number bonds and related subtraction facts within 20

Number bonds can be represented practically using:

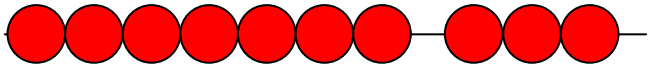
Double sided counters:



Ten frames:



Beadstrings



Mental Strategies

Count on or back in ones (chain count and linked to objects, i.e. 1-1 correspondence)

Initially, children's counting for addition and subtraction should be linked to the objects that they are using to represent the calculation, e.g. cubes, counters etc. It is important that at this stage the counting and calculating are supported by practical equipment and/or be in context so that they support children's developing understanding of the concepts of addition and subtraction in a concrete rather than abstract way.

Children can begin to use chain counting (i.e. unsupported by objects) when they are confident with the concepts of addition and subtraction and have developed their understanding of using counting on or back, rather than counting all, as a strategy for these calculations.

Examples of calculations:

4 + 5	count on in ones from 4 (or in ones from 5)
8 – 3	count back in ones from 8
10 + 7	count on in ones from 10 (or use place value)
13 + 5	count on in ones from 13
17 – 3	count back in ones from 17

Prerequisite skills:

- Count using one to one correspondence
- Count forwards and backwards in ones

To develop an understanding of addition and subtraction, the progression through learning should be:

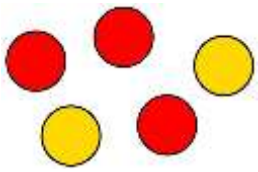
Concrete ⟶ Model ⟶ Abstract

An example of this might be:

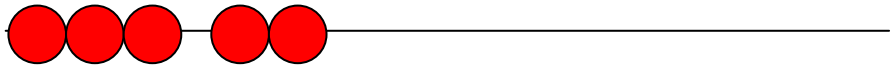
Using counters ⟶ Using a beadstring ⟶ Placing cubes on a number track ⟶ Using a numberline
(Concrete – random) (Concrete – organised) (Model) (Abstract)

Addition

3 + 2 = 5

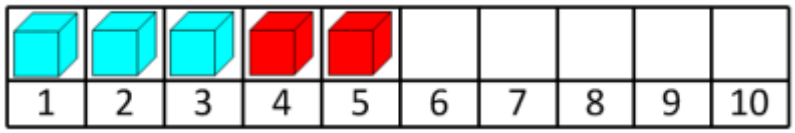


Counters



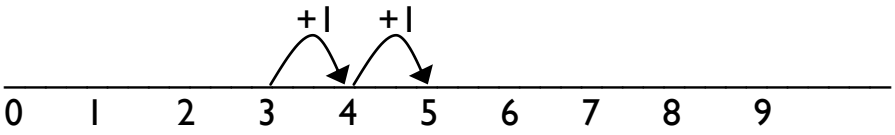
Beadstring

Number track stage 1



Number track stage 2

3 + 2 = 5



Numberline

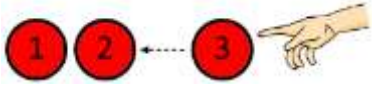
Subtraction

5 – 2 = 3

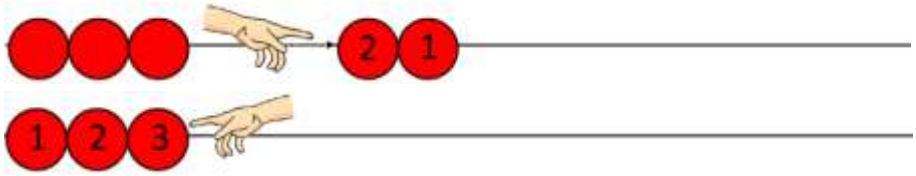
Touch count and remove the number to be taken away, in this case 2.

Counters stage 1

Touch count to find the number that remains.

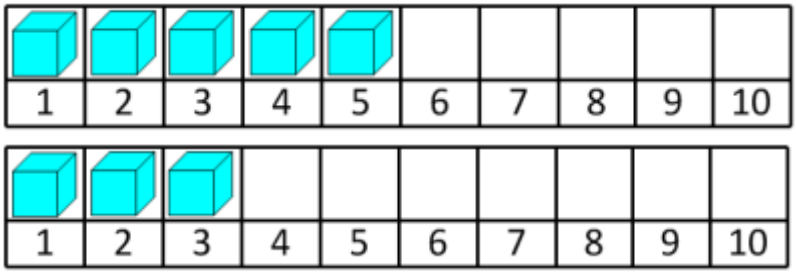


Counters stage 2



Beadstring stage 1

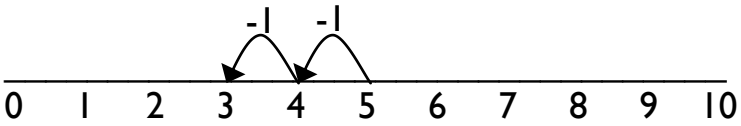
Beadstring stage 2



Number track stage 1

Number track stage 2

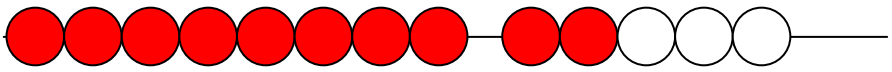
5 – 2 = 3



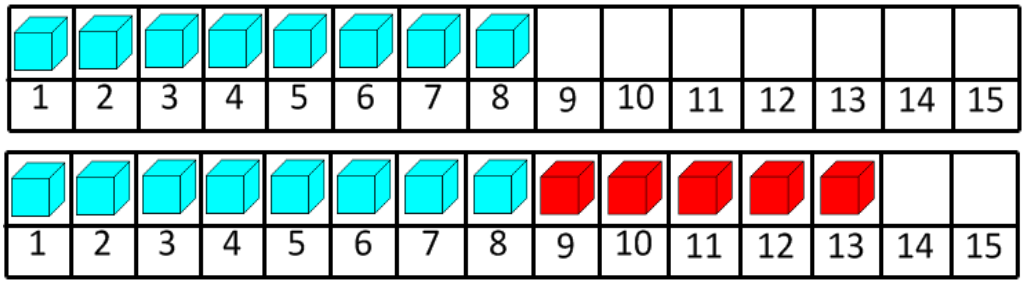
Numberline

Addition

8 + 5 = 13



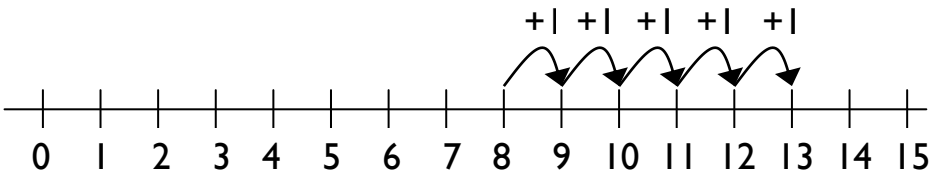
Beadstring



Number track stage 1

Number track stage 2

8 + 5 = 13

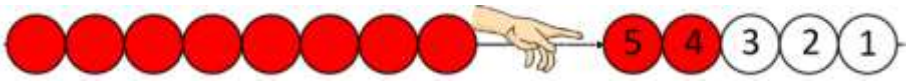


Numberline

Subtraction

13 – 5 = 8

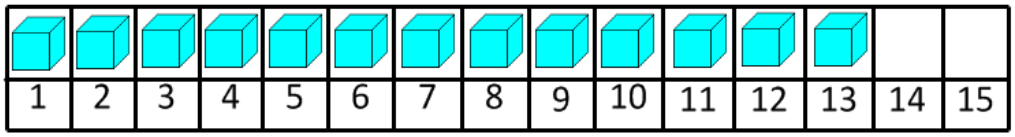
Touch count and remove the number to be taken away, in this case 5.



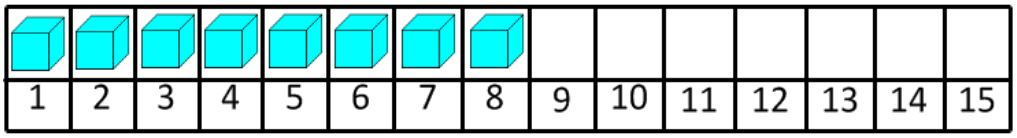
Beadstring stage 1

Touch count to find the number that remains.

Beadstring stage 2

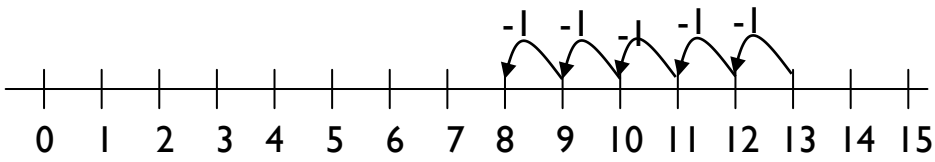


Number track stage 1



Numbertrack stage 2

13 – 5 = 8



Numberline

Reorder numbers in a calculation

In Y1, children need to recognise that they can rearrange an addition, but not a subtraction. They also need to understand that the principle behind reordering a calculation is to make it more efficient, particularly when utilising a counting on strategy. Children need to be encouraged to identify calculations which should be reordered and those that are already in the most efficient format.

Examples of calculations:

8 + 3	doesn't need reordering as the greater number is first already
2 + 7	reorder as 7 + 2
5 + 13	reorder as 13 + 5
11 + 6	doesn't need reordering as the greater number is first already

Prerequisite skills:

- Understand the place value of numbers to identify which number is the greater
- Understand that reordering works (at this stage) 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).*

Partition small numbers, e.g. 8 + 3 = 8 + 2 + 1

Utilising partitioning in this way is useful as a strategy for bridging across 10 or multiples of 10 to make calculations more efficient.

Examples of calculations:

7 + 5	partitioned as 7 + 3 + 2

9 + 7 partitioned as 9 + 1 + 6
6 + 8 partitioned as 6 + 4 + 4

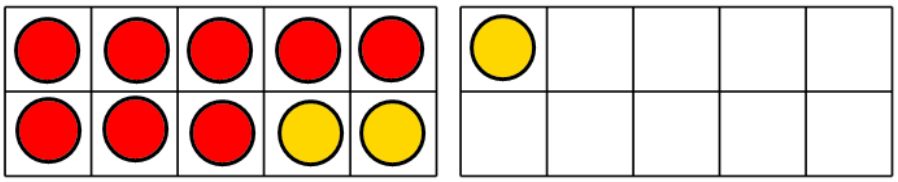
Prerequisite skills:

- Partition numbers in different ways, e.g. 5 as 2 + 3 to enable 8 + 5 as 8 + 2 + 3
- Know, or quickly derive, number bonds for numbers up to and including 10

This method can be supported by the use of practical equipment, e.g.

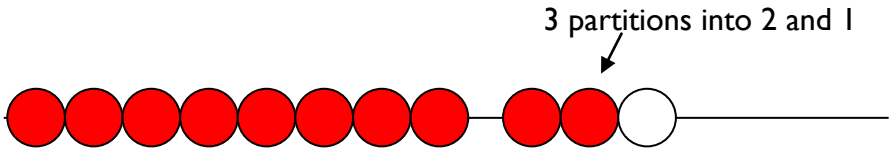
Addition

8 + 3 = 11



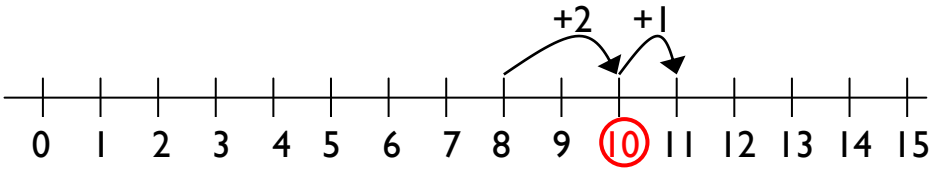
Ten frame

8 + 3 = 11



Beadstring

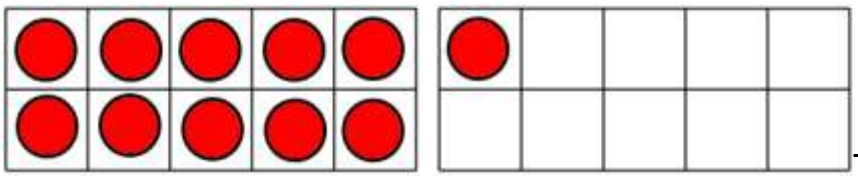
8 + 3 = 11



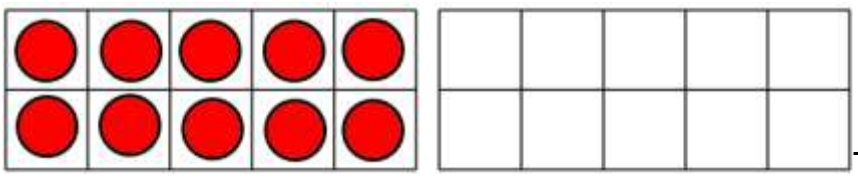
Numberline

Subtraction

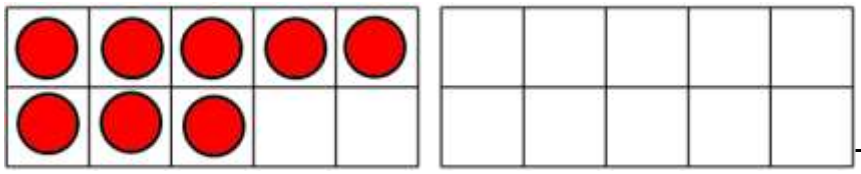
11 – 3 = 8



Ten frame stage 1

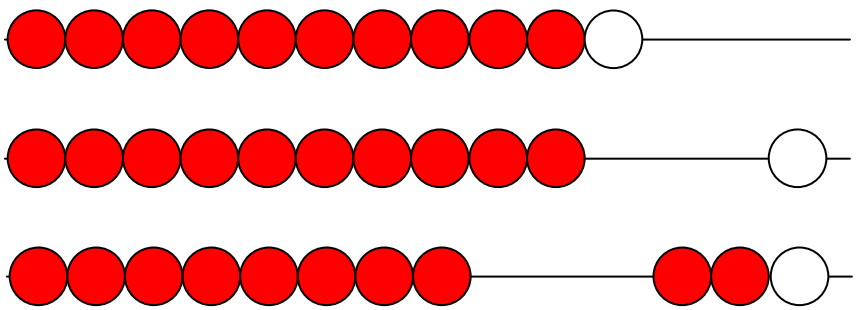


Ten frame stage 2 (take away 1)



Ten frame stage 3 (take away 2)

11 – 3 = 8

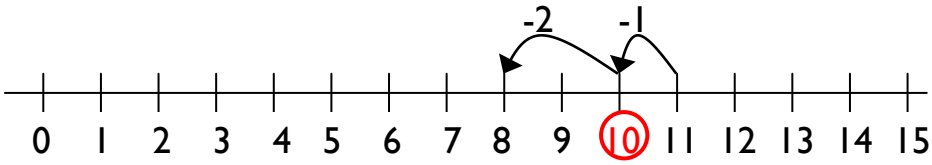


Beadstring stage 1

Beadstring stage 2 (take away 1)

Beadstring stage 3 (take away 2)

11 – 3 = 8



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

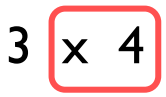
and division is:

- 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. $3 \times 5 = 5 \times 3$ but division is not i.e. $15 \div 3 \neq 3 \div 15$
- multiplication is associative i.e. $2 \times (3 \times 5) = (2 \times 3) \times 5$ but division is not i.e. $30 \div (5 \div 2) \neq (30 \div 5) \div 2$
- commutativity and associativity mean that calculations can be rearranged to make them easier to calculate, e.g. $(3 \times 4) \times 5 = 60$ is the same as $(5 \times 4) \times 3 = 60$

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:



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.

End of Year Objective

Solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with support.

Rapid Recall

Children should be able to:

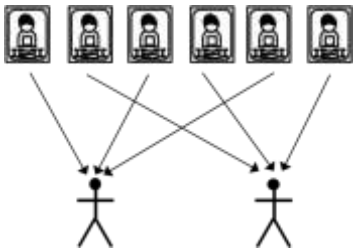
- Count in multiples of twos, fives and tens
- Recall and use doubles of all numbers to 10 and corresponding halves

Solve one-step problems involving multiplication

In Year One, children will continue to solve multiplication problems using practical equipment and jottings. They may use the equipment to make groups of objects. Children should see everyday versions of arrays, e.g. egg boxes, baking trays, ice cube trays, wrapping paper etc. and use this in their learning, answering questions such as 'How many eggs would we need to fill the egg box? How do you know?'

Solve one-step problems involving division

In Year One, children will continue to solve division problems using practical equipment and jottings. They should use the equipment to share objects **equally** and separate them into **equal** groups, answering questions such as 'If we share these six apples between the three of you, how many will you each have? How do you know?' or 'If six football stickers are shared between two people, how many do they each get?' They may solve both of these types of question by using a 'one for you, one for me' strategy until all of the objects have been given out.



Children will also answer questions that involve grouping rather than sharing, such as 'Pip puts two football stickers on each page of his sticker book. How many pages does he need?' This type of problem requires the children to make equal groups from the whole amount.