KS1 Mathematics Workshop

Transition from EYFS

In order to achieve the expected level in EYFS, this is the expectation of children will be able to do by the time they make the transition into KS1.

‘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 quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer. They solve problems, including doubling, halving and sharing.’

How the Curriculum is Implemented

The KS1 curriculum is broken down into strands, each one is progressive throughout the year. These steps are linked to learning objectives that teachers use.

The strands are:

- Number and place value
- Number – addition and subtraction
- Number – multiplication and division
- Fractions
- Measurement
- Geometry
- Position and direction
- Using and applying

Progression Across the Key Stage

In order to ensure that all strands are taught across the year, a yearly overview is in place that supports the planning and teaching of all aspects. These are broken down into half-termly blocks, Autumn 1, Autumn 2, Spring 1 etc.

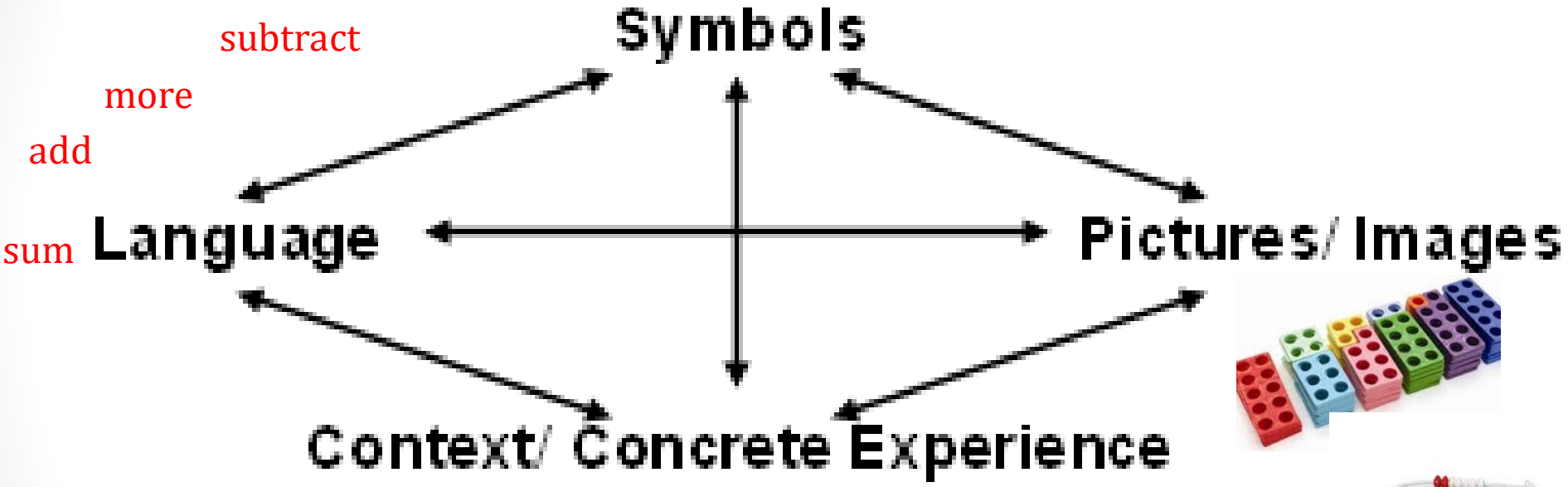
It is from this overview that the teachers will plan their individual lessons, using assessment for learning (AFL) tasks to assess the children's prior knowledge and plan the lessons accordingly.

The teachers use the school's calculation policy to support the teaching of mathematical concepts to ensure that the progression is consistent across the school.

The children receive an hour long Maths lesson every day.

Maths at Thorpedene

= + x %



Here is a receipt for some shopping. How much did I spend? How much change did I get from £20?

The Maths Curriculum

Children should:

- Become **fluent** in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.

- **Reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations and developing an argument, justification or proof using mathematical language.

- **Solve problems** by applying their mathematics to a variety of problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

Year 1 Curriculum Overview

Number and place value
I can read and write numbers from 1 – 20 in numerals and words
I can count to 100 beginning from 0 or 1 or from any given number
I can count in multiples of 2s ,5s and 10s.
I can identify and represent numbers using objects and pictorial representations
I can use the language of more than, less than and equal to.
Addition and Subtraction
I can read, write and interpret mathematical statements involving addition, subtraction and equals signs
I know my number bonds to 20
I can use my number bonds to 20
I can recognise 1 more or 1 less
I know subtraction facts to 20
I can use subtraction facts to 20
I can add and subtract one digit and two digit numbers to 20 including 0
I can solve one step problems that involve addition and subtraction using objects, pictorial representations and missing number problems
Multiplication and Division
I can solve one step problems involving multiplication
I can solve one step problems involving division
Fractions
I can recognise half of objects ,shapes and amounts
I can recognise a quarter of objects, shapes and amounts

Year 1 Curriculum Overview

Measurement
I can compare, describe and solve practical problems for time
I can measure and begin to record time
I can sequence events in chronological order
I can tell the time to the hour and half past the hour and draw the hands on a clock face to show these times
I can compare describe and solve practical problems for lengths and heights
I can measure and begin to record lengths and heights
I can compare describe and solve practical problems for mass/weight
I can measure and begin to record mass/weight
I can compare describe and solve practical problems for capacity and volume
I can measure and begin to record capacity and volume
I can recognise and know the value of different denominations of coins and notes
Geometry
I can recognise and name common 2D shapes
I can recognise and name common 3D shapes
I can describe position, direction and movement including whole, half, quarter and three-quarter turns

Year 2 Curriculum Overview – Working Towards Expected

Working Towards the Expected Standard:

The pupil can, after discussion with the teacher:
Number and place value
Read and write numbers in numerals up to 100
Partition a two-digit number into tens and ones to demonstrate an understanding of place value, though they may use structured resources to support them
Count in twos, fives and tens from 0 and use this to solve problems
Addition and Subtraction
Recall at least four of the six number bonds for 10 and reason about associated facts
Add and subtract two-digit numbers and ones and two-digit numbers and tens, where no regrouping is required, explaining their method verbally, in pictures or using apparatus
Measurement
Know the value of different coins
Geometry
Name some common 2D and 3D shapes from a group of shapes or from pictures of the shapes and descried some of their properties.

Working at Expected Level

Working at the Expected Standard:

The pupil can, after discussion with the teacher:
Number and place value
Partition any two-digit number into different combinations of tens and ones, explaining their thinking verbally, in pictures or using apparatus
Addition and Subtraction
Recall all number bonds to and within 10 and use these to reason with and calculate bonds to and within 20, recognising other associated additive relationships
Add and subtract any two-digit numbers using an efficient strategy, explaining their method verbally, in pictures or using apparatus
Multiplication and Division
Read scales in divisions of ones, twos, fives and tens
Recall multiplication and division facts for 2, 5 and 10.
Use multiplication and division facts to solve simple problems, demonstrating and understanding of commutativity as necessary
Fractions
Identify ¼, 1/3, ½, 2/4, ¾ of a number or shape, and know that all parts must be equal parts of the whole
Measurement
Use different coins to make the same amount
Read the time on a clock to the nearest 15 minutes
Geometry
Name and describe properties of 2D and 3D shapes, including number of sides, vertices, edges, faces and lines of symmetry.

Working at Greater Depth

Working at Greater Depth within the Expected standard:

The pupil can, after discussion with the teacher:
Addition and Subtraction
Solve unfamiliar word problems that involve more than one step
Use reasoning about numbers and relationships to solve more complex problems and explain their thinking
Multiplication and Division
Recall and use multiplication and division facts for 2, 5 and 10 and make deductions outside known multiplication facts
Measurement
Read the time on a clock to the nearest 5 minutes
Read scales where not all numbers on the scale are given and estimate points in between
Geometry
Describe similarities and differences of 2D and 3D shapes, using their properties

Number Sense!

Children need to understand our number system, starting with counting numbers, building an understanding of how our numbers work and fit together. This includes exploring place value and comparing and ordering numbers then applying this understanding
in different contexts.

Recalling Facts

- It is important that children recognise number bonds, different pairs of numbers with the same total.

7 + 3

10

6 + 4

6 + 2

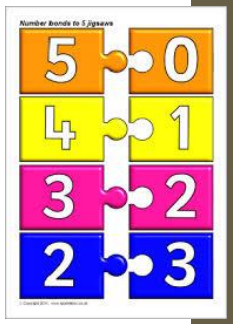
8

5 + 3

3 + 2

5

1 + 4



6 + 1

7

3 + 4

6 + 3

9

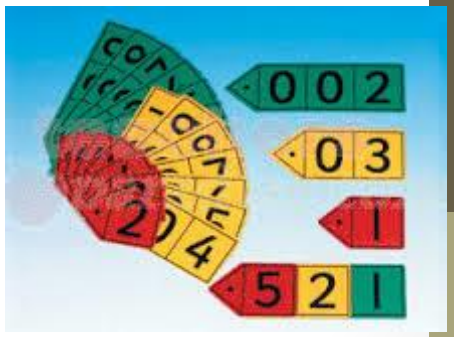
5 + 4

6

3 + 3

Place Value

- Place value is at the heart of the number system. All digits have a value and a secure understanding of this will enable children to use and understand different calculation methods.



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	 	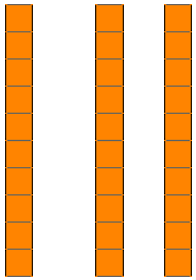	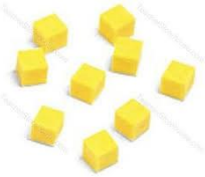

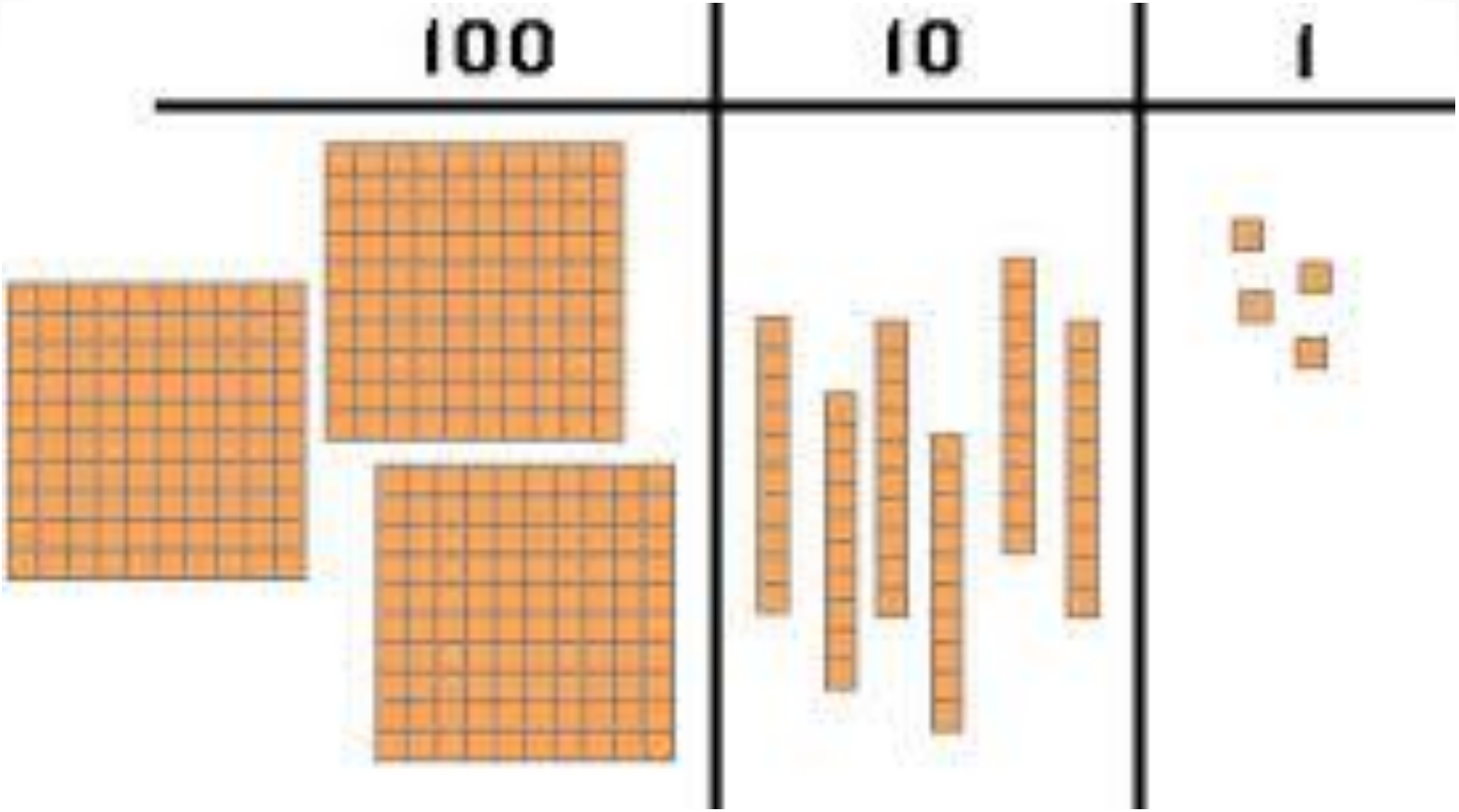
100
10
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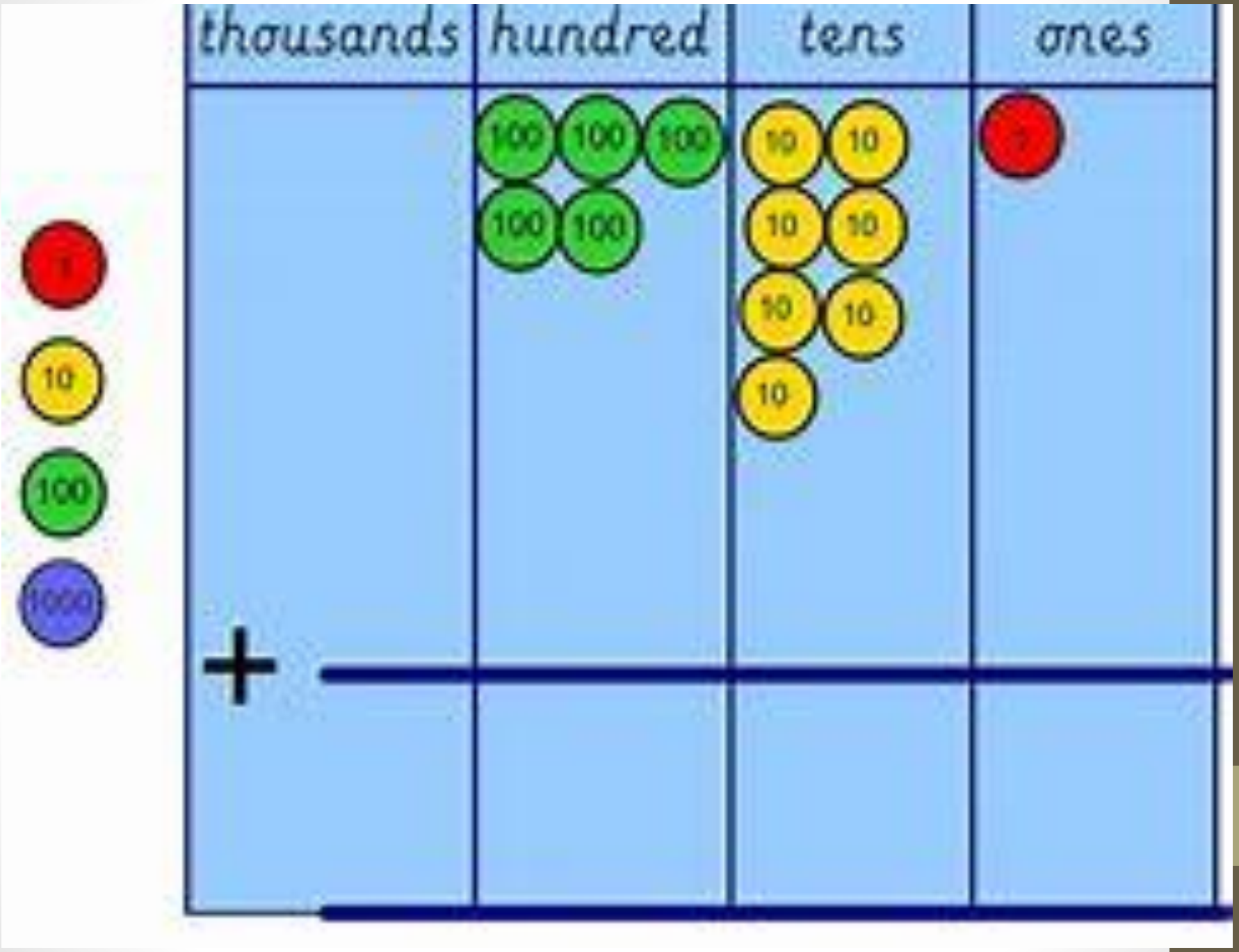
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Addition – Year 1

National Curriculum Programme of Study:

Pupils should be taught to:

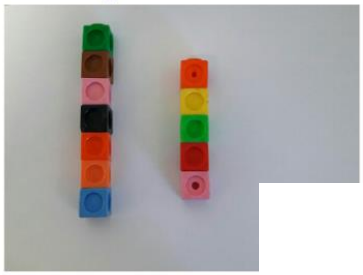
- read, write and interpret mathematical statements involving addition (+) and equals (=) signs
- represent and use number bonds and related addition facts within 20
- add one-digit and two-digit numbers to 20, including zero
- solve one-step problems that involve addition, using concrete objects and pictorial representations, and missing number problems such as 4 = ? + 1

Once secure with counting reliably numbers from one to twenty and adding one more, teachers should demonstrate, combining two sets of concrete objects to find totals to 20.

1

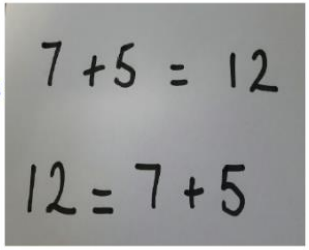
Counters or other classroom counting objects should be used initially. Combining two sets of objects (aggregation - photo 1) which will progress onto adding on to a set (augmentation - photo 2).

2

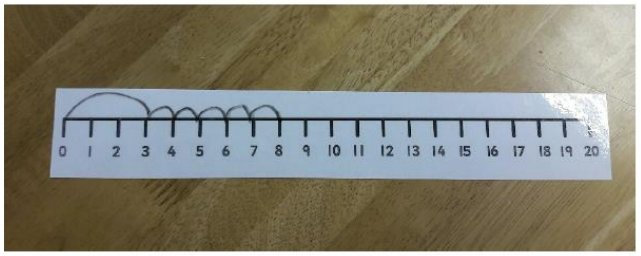


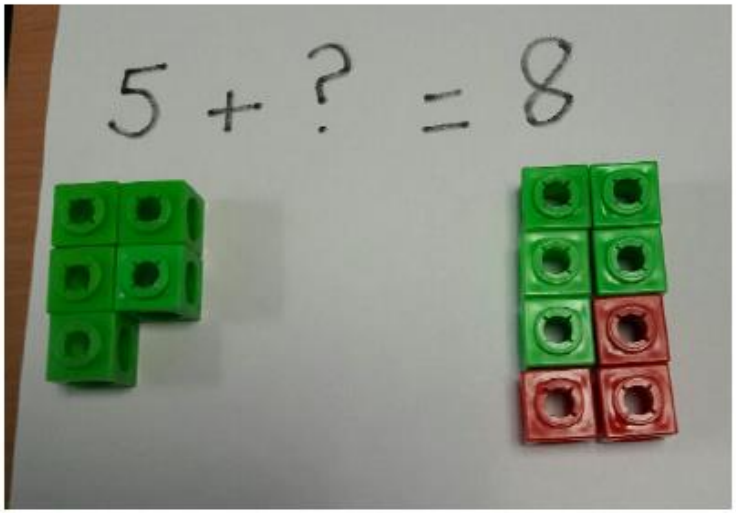
Recording as shown below:

3



3 + 5 = 8





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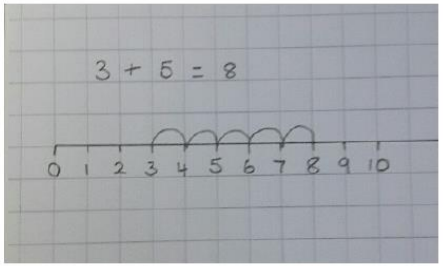


Subtraction – Year 1

National Curriculum Programme of Study:

Pupils should be taught to:

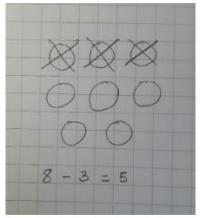
- read, write and interpret mathematical statements involving subtraction (-) and equals (=) signs
- represent and use number bonds and related subtraction facts within 20
- subtract one-digit and two-digit numbers to 20, including zero
- solve one-step problems that involve subtraction, using concrete objects and pictorial representations, and missing number problems such as 4 = ? - 5

Using physical objects for subtraction up to 20

Once secure with counting reliably numbers from one to twenty and subtracting one, teachers should demonstrate taking away concrete objects, from a group, within 20.

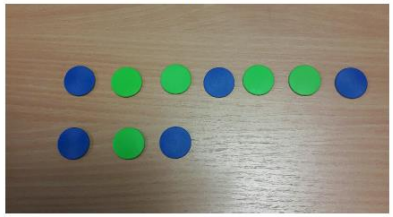
Counters or other classroom counting objects should be used initially. Taking away a given number of objects from a group.

Recording as shown:



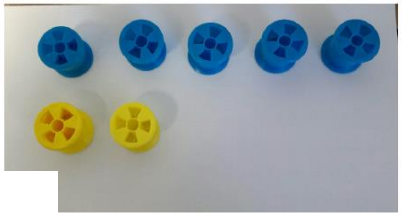
Understanding subtraction as 'finding the difference'

This should be introduced using concrete objects.



What is the difference between 7 and 3?

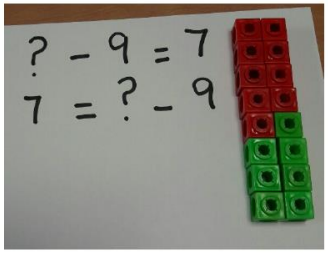
7 - 3 = 4



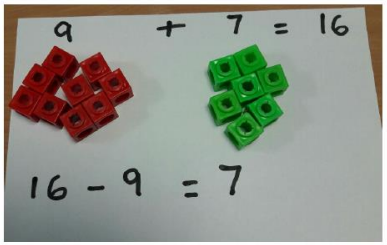
What is the difference between 5 and 2?

5 - 2 = 3

Missing number problems such as:



This problem would require much discussion and posing of questions. *What can you tell me about the first number in a take away calculation? You have 9 red cubes and 7 green cubes, what do you do with them now to solve the problem? (Plausible response: 9-7=2). Two's not big enough, what else could we do?*



Multiplication – Year 1

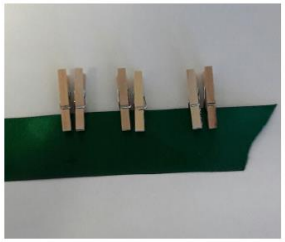
National Curriculum Programme of Study:

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

Using grouped objects for addition, without recombining

With support, children in year 1 should be arranging a variety of physical objects into groups of the same size, counting the number of groups, the amount in each group, and the total.

12 green cotton reels arranged into groups of 3



6 clothes pegs arranged into groups of 2

8 socks arranged into groups of 2, or pairs

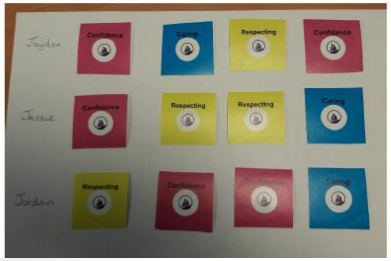
Arranging objects into rectangular arrays

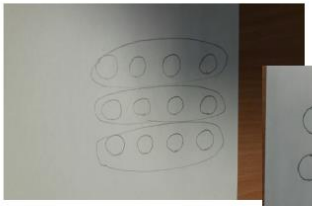
To support the progression towards a formal visual image of multiplication, and into a formal written method in Key Stage 2, children need to be shown how to arrange their objects into a rectangular array.

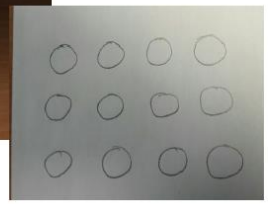
Children in year 1 will be counting in steps of 2, 5 and 10, and so it is useful if these numbers are used initially in any arrays created.

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

Three children get four stickers each during a week.
How many stickers altogether?







3 lots of 4
3 groups of 4

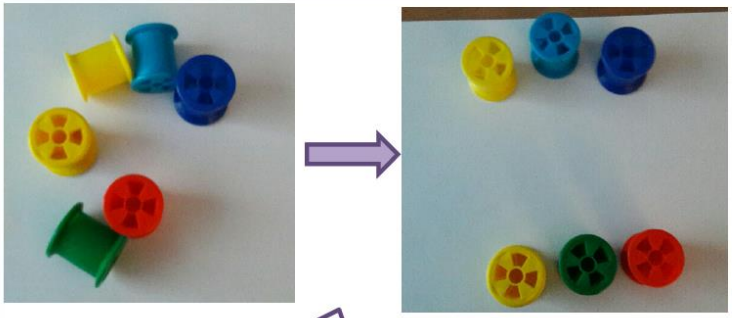
An array showing 3 groups of 4.
3 x 4

Division – Year 1

National Curriculum Programme of Study:

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

Understanding both ‘equal sharing’ and ‘grouping’

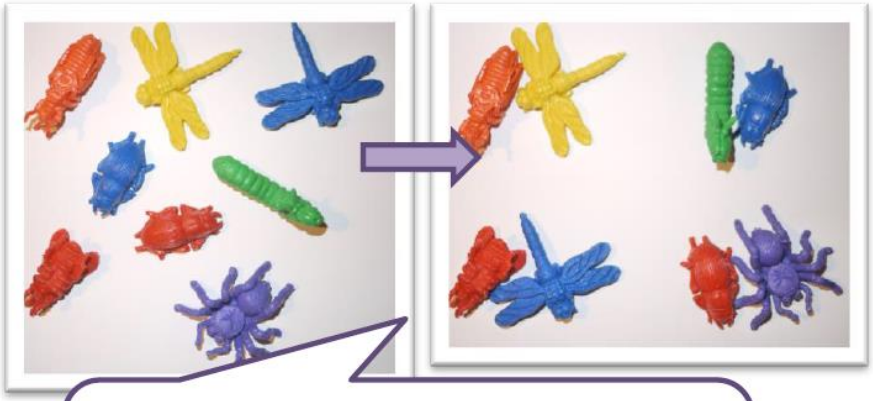


Equal sharing occurs when a quantity is shared out equally into a given number of portions. We find out how many there are in each portion.

When sharing, we know the total number being shared, and the number of sets to share between. We find out how many in each portion.

6 cotton reels shared between 2 children.
How many will they have each? …3
They have half each. Half of 6 is 3.

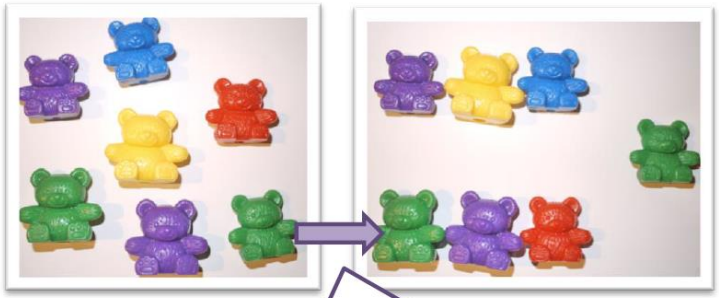
Fractional language can be used alongside sharing, eg. ‘halving’ when sharing between two.



8 minibeasts are put into groups of 2.
How many children can have 2 minibeasts?...4. They have a quarter of the minibeasts each. One quarter of 8 is 2.

Grouping occurs when finding how many groups of the divisor are in the original amount.
When grouping, we know the total number of objects, and the number in each set. We find out how many sets are needed.

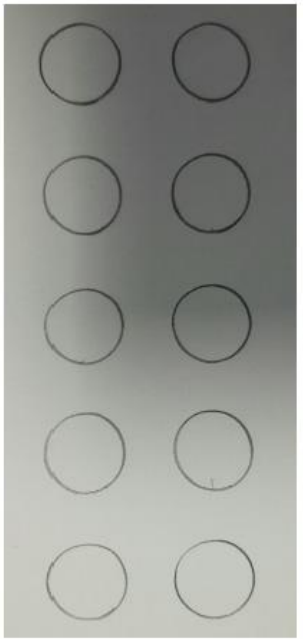
Extension: Introducing remainders when dividing



7 bears are shared between 2 children.
How many will they have each?
They have 3 each with one left over, or a remainder of 1.

Remainder (left over) occurs when a group cannot be shared equally without finding a fractional part of an object or quantity. Introduce the concept of remainder to the children, using 'everyday' objects and real life contexts where possible.

10 packs of pegs are put into groups of 2. How many children can have 2 packs each?



Addition – Year 2

National Curriculum Programme of Study:

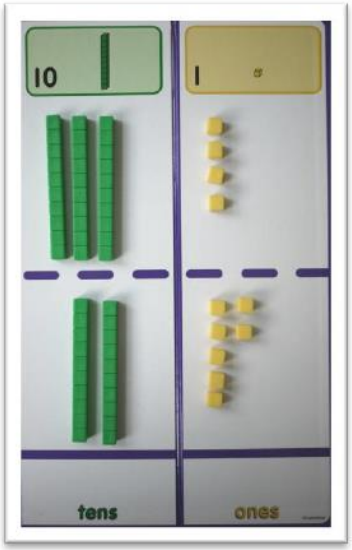
Add numbers using concrete objects and pictorial representations, including:

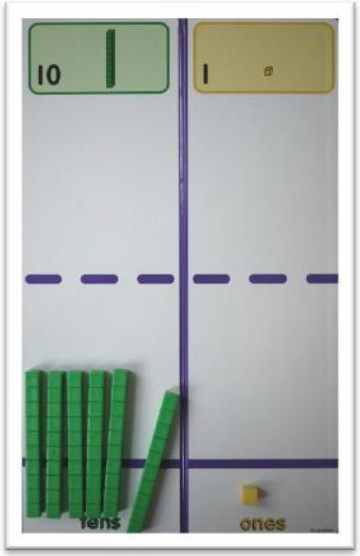
- A two digit number and ones
- A two digit number and tens
- Two two-digit numbers
- Adding three one-digit numbers

Show that addition of two numbers can be done in any order (commutative)

[Non-statutory - Recording addition in columns supports place value and prepares for formal written methods with larger numbers.]

Children working confidently with bundles of straws can move on to using Dienes base-ten equipment. This is also grouped in tens, but cannot be split apart or recombined easily, and requires an understanding of exchange. The Dienes equipment should be introduced alongside the straws, enabling the children to see what is the same and what is different.





The next step is to record the calculation in books, thus:

34 + 22

III ::

\+ II ..

50 + 6 = 56

Subtraction – Year 2

National Curriculum Programme of Study:

Subtract numbers using concrete objects, pictorial representations, and mentally, including:

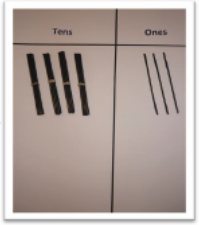
- a two-digit number and ones
- a two-digit number and tens
- two two-digit numbers

[Non-statutory - Recording subtraction in columns supports place value and prepares for formal written methods with larger numbers.]

Using grouped objects for subtraction, with exchanging

Once children are secure with the concept of subtracting the grouped objects for numbers that do not require exchanging (i.e. the ones in the number being subtracted do not exceed those in the starting number), then numbers can be chosen that will require exchanging. Bundles of straws are the next step in the progression of being really secure with base-ten place value. They are easy to manipulate, yet allow the children to still see the 'ten-ness' of ten, allowing for simple regrouping.

1



Show the calculation '43 - 27'. Lay the 43 grouped concrete objects (moving on to straws bundled into tens) onto the grid and discuss the value of the different groups in the same way as above.

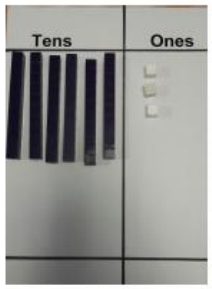
Discuss the fact that 7 ones or single straws need to be removed. *Why is this difficult? Do we have enough straws?* Discourage the children from saying that they '*can't do it*', and explain that they need to split one of the groups of ten into ten separate straws. Demonstrate this by removing the elastic band from one bundle of ten, and move the ten separate straws to the 'ones' column. Emphasise that *43 is now 'thirty and thirteen'*, simply arranged in a different way.

2

Using the same action as previously, model how the 7 'ones' straws can be moved down the grid, followed by the 2 tens bundles. Explain each step carefully to the children.

As understanding develops, children should move onto using grouped base-ten equipment that requires an understanding of exchange, such as 'Dienes'. This new equipment should be introduced alongside the straws, enabling the children to see what is the same and what is different.

63 - 27 =



1 Get 63

2 Exchange a ten for ten ones

3 Take away 27 by moving it down the grid. Place remaining tens and ones from top, in answer box, at the bottom.

Once secure with the understanding of place value for two-digit numbers, teachers should demonstrate, using concrete objects grouped in tens, how numbers can be represented on grids and then used for calculating.

'Familiar' objects should be used initially. Pegs packaged into packs of ten are ideal, and they clearly show the number contained on the labelling. Discuss the contents and count the contents of a pack with the children. Discuss the value of the single pegs as 'ones'.

Show how a number such as 28 can be represented using the pegs. *How many packs of ten pegs can we use? How many pegs will that be? How many single pegs will we need to make our total?*

Place the pegs on the grid.

1

2

We need to give away 5 pegs, so we will subtract them from the 28. Write the subtraction calculation '28 - 5'. Ensure the units being subtracted do not exceed those in the initial number, i.e. 8, and thus exchanging from tens to ones will not be necessary.

Demonstrate how to subtract the 5 single pegs from the 8, by moving them down on the grid. *Do we need to move any of these packs of 10 away? Why not?* Ensure children understand that the ones digit is changing, but the tens digit is not.

3

Model how the remaining pegs are moved to the 'answer line' at the bottom of the grid. *How many pegs do we have left? How many tens? How many ones?*

Once secure, teachers can annotate alongside the concrete objects. This starts to link to the next stage in the progression towards a formal written method, where calculations are laid out vertically.

Recording: 28 - 5 =

$$\begin{array}{rrcl} & 20 & & 8 \\ - & & & \underline{5} \\ & 20 & + & 3 \quad = 23 \end{array}$$

Multiplication – Year 2

National Curriculum Programme of Study:

- recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
- calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs

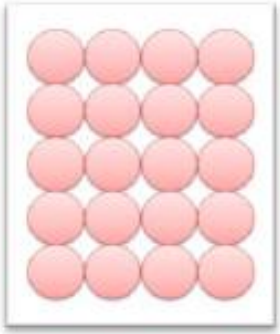
Annotating arrays using repeated addition

Children should be encouraged to see the array as a number of counters repeated in rows.
E.g. 4 + 4 + 4 = 12

3 + 3 + 3 + 3 = 12

N.B. These examples encourage children to see an array being built up from the top row, which links well to later work for division. Arrays are viewed as being built up from top to bottom.

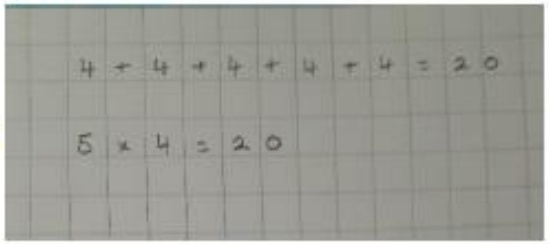
Annotating arrays using multiplication



4 + 4 + 4 + 4 + 4 = 20 5 x 4 = 20

This annotation links to the idea of multiplication as 'scaling'; making a number so many times bigger. Here the starting number is 4 and it is 'scaled up' five times, or by a factor of five.

Children should record as shown:



Division – Year 2

National Curriculum Programme of Study:

- recall and use division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
- calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs
- solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

Introducing arrays for visualisation of division

Sharing and grouping should be formalised into arrays introducing the vocabulary of mathematical statements.

Equal sharing occurs when a quantity is shared out equally into a given number of portions. We find out how many there are in each portion.
When sharing, we know the total number being shared, and the number of sets to share between. We find out how many in each portion.

Grouping occurs when finding how many groups of the divisor are in the original amount. When grouping, we know the total number of objects, and the number in each set. We find out how many sets are needed.

When the children can discuss their division confidently, using the language of both sharing and grouping accurately, the mathematical signs should be introduced for accompanying number sentences, e.g. 8 ÷ 4 = 2 and 8 ÷ 2 = 4

When dividing by 2, use this as an opportunity to link with fractions work.

E.g. 8 ÷ 2…. *How can we read this? How many groups of 2 are there in 8? If I share 8 between 2 people, how many would they each get? What is one half of 2?*

Links should also be made to multiplication work, e.g. 2 x 4 = 8, 4 x 2 = 8, modelling practically using arrays.

Remind the children that multiplication of two numbers can be done in any order and division of one number by another cannot.

Considering remainders when dividing

The children may have been introduced to the concept of division with remainders in Year One.

Continue the use of the 'remainder' vocabulary when arranging objects into an array.

7 ÷ 3 = 2 remainder 1
How many groups of 2 are there in 7? There are three groups of 2, with one left over or remaining

Space, Shape and Measure

Here is a brief outline of the other strands that will taught throughout the year:

- Length – longer/shorter/tall/short
- Mass and weight – heavy/light heavier/lighter than
- Capacity – full/empty more/less than
- Time – sequencing chronological events leading up to telling the time to the hour and half past the hour
- Geometry – 2D/3D shape
- Position and direction – this includes half, quarter and three-quarter turns

What can you do at home?

- Number songs - Jack Hartman is a firm favourite!
- Using their environment – encourage children to think about money in the shop or how long is their favourite TV programme?
- Numbers in the environment – how many 100s, 10s etc
- Playing games such as dominoes to work out doubles and using dice to create numbers
- Websites – BBC bitesize and top marks have a good selection of games
- Practising counting in 2s, 5s and tens
- Practise recalling the number bonds to 10 and 20
- Support and encourage the children with their homework