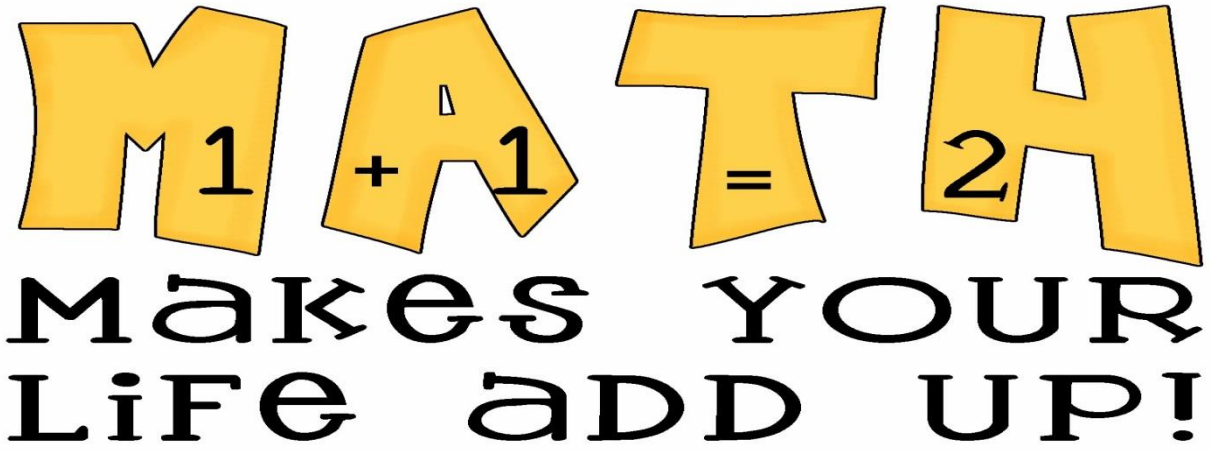
Maths – how we teach it at Murrow and Gorefield



Aims

The national curriculum for mathematics aims to ensure that all pupils:

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

FLUENCY / REASONNING / APPLICATION AND MASTERY

Maths from Reception – Year 6

- Core principles
  - Seeing links - stages
  - Make it practical
  - Assessment before we start each unit
  - Understand the reasons behind
  - Confidence with tables and number bonds
  - Key vocabulary
  - Application
  - Reasoning

Review Calculation policy

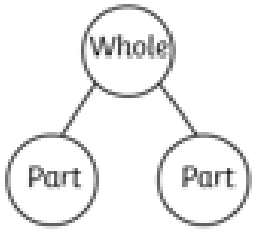
- Comments?

Whole School Initiatives

- Timestables
- Maths sentence stems in classrooms – “I know this because……”
- Maths Talk
- White Rose Scheme – whole school calculation policy
- Formal methods

Sentence Stems

Addition



A whole can be broken into a number of parts.

The sum of the parts is equal to the whole.

We can add the parts in any order.

We can only add things with the same noun.

If you change the order of the addends, the sum remains the same.

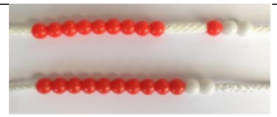
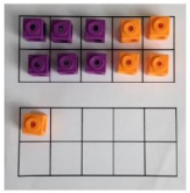
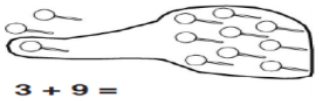
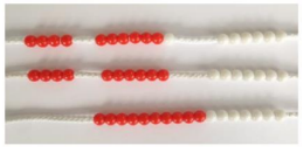
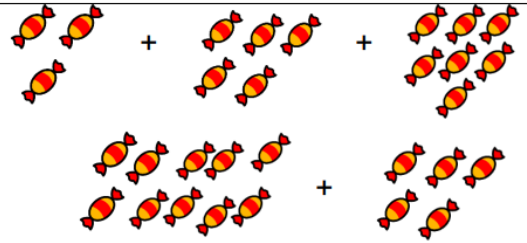
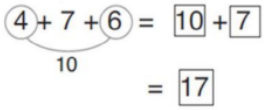
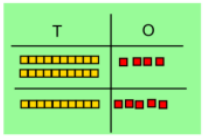
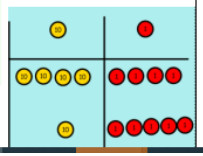
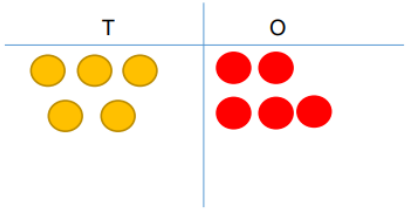
In addition, we can add to one set to make it bigger. The total is the sum.

In addition, we can combine one or more sets. The total is the sum.

Formal Methods – by Year 6

- Addition
- Subtraction
- Multiplication
- Division

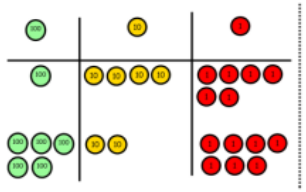
Addition

Regrouping to make 10.	 6 + 5 = 11  Start with the bigger number and use the smaller number to make 10.	 3 + 9 = Use pictures or a number line. Regroup or partition the smaller number to make 10. 9 + 5 = 14 1 4 +1 +4 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	7 + 4= 11 If I am at seven, how many more do I need to make 10. How many more do I add on now?
Adding three single digits	4 + 7 + 6= 17 Put 4 and 6 together to make 10. Add on 7.  Following on from making 10, make 10 with 2 of the digits (if possible) then add on the third digit.	 Add together three groups of objects. Draw a picture to recombine the groups to make 10.	 Combine the two numbers that make 10 and then add on the remainder.
Column method- no regrouping	24 + 15= Add together the ones first then add the tens. Use the Base 10 blocks first before moving onto place value counters.  	After practically using the base 10 blocks and place value counters, children can draw the counters to help them to solve additions. 	Calculations 21 + 42 = 21 + 42

Addition

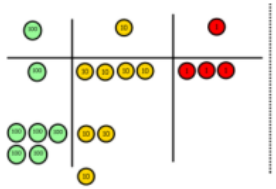
Column method- regrouping

Make both numbers on a place value grid.



146
+ 527

Add up the units and exchange 10 ones for one 10.



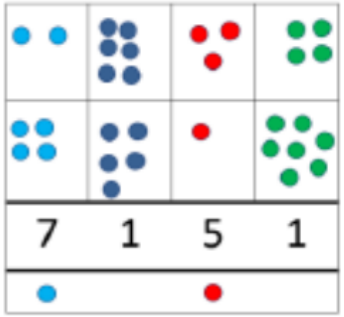
146
+ 527

Add up the rest of the columns, exchanging the 10 counters from one column for the next place value column until every column has been added.

This can also be done with Base 10 to help children clearly see that 10 ones equal 1 ten and 10 tens equal 100.

As children move on to decimals, money and decimal place value counters can be used to support learning.

Children can draw a pictoral representation of the columns and place value counters to further support their learning and understanding.



Start by partitioning the numbers before moving on to clearly show the exchange below the addition.

20 + 5
40 + 8
60 + 13 = 73

As the children move on, introduce decimals with the same number of decimal places and different. Money can be used here.

536
+ 85
621
1 1

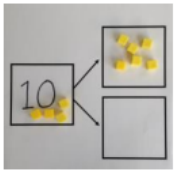
72.8
+ 54.6
127.4
1 1

£ 2 3 . 5 9
+ £ 7 . 5 5
£ 3 1 . 1 4
1 1 1

2 3 . 3 6 1
9 . 0 8 0
5 9 . 7 7 0
+ 1 . 3 0 0
9 3 . 5 1 1
2 1 2

Subtractions

Part Part Whole Model

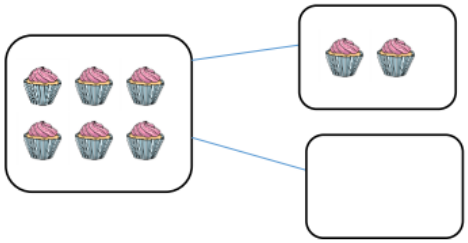


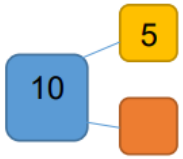
Link to addition- use the part whole model to help explain the inverse between addition and subtraction.

If 10 is the whole and 6 is one of the parts. What is the other part?

10 - 6 =

Use a pictorial representation of objects to show the part part whole model.



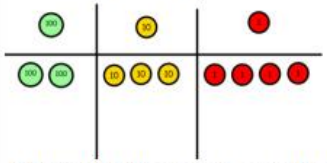


Move to using numbers within the part whole model.

Column method with regrouping

Use Base 10 to start with before moving on to place value counters. Start with one exchange before moving onto subtractions with 2 exchanges.

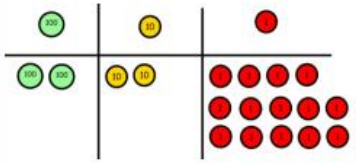
Make the larger number with the place value counters



Calculations

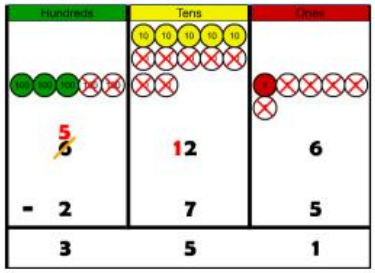
234
- 88

Start with the ones, can I take away 8 from 4 easily? I need to exchange one of my tens for ten ones.

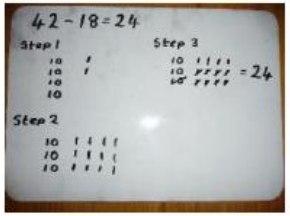


Calculations

234
- 88

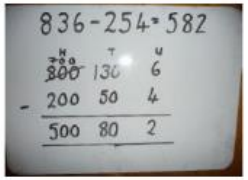


Draw the counters onto a place value grid and show what you have taken away by crossing the counters out as well as clearly showing the exchanges you make.



When confident, children can find their own way to record the exchange/regrouping.

Just writing the numbers as shown here shows that the child understands the method and knows when to exchange/regroup.



Children can start their formal written method by partitioning the number into clear place value columns.

Moving forward the children use a more compact method.

Pure Arithmetic

- KS1 Question

54 − 8 =

+ 8 = 12

- KS2 Question

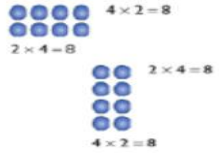
424 − 51 =

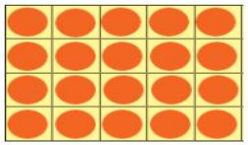
Multiplication

Arrays- showing commutative multiplication

Create arrays using counters/ cubes to show multiplication sentences.

Draw arrays in different rotations to find **commutative** multiplication sentences.





Link arrays to area of rectangles.

Use an array to write multiplication sentences and reinforce repeated addition.

5 + 5 + 5 = 15

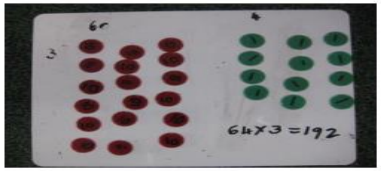
3 + 3 + 3 + 3 + 3 = 15

5 x 3 = 15

3 x 5 = 15

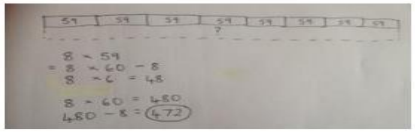
Column multiplication

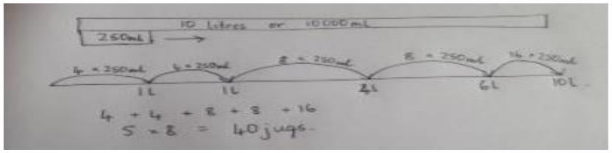
Children can continue to be supported by place value counters at the stage of multiplication.



It is important at this stage that they always multiply the ones first and note down their answer followed by the tens which they note below.

Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods.



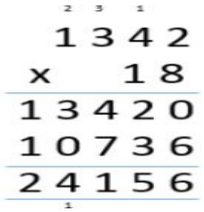


Start with long multiplication, reminding the children about lining up their numbers clearly in columns.

If it helps, children can write out what they are solving next to their answer.

```
  32
× 24
   8    (4 x 2)
 120    (4 x 30)
  40    (20 x 2)
 600    (20 x 30)
 768
```

This moves to the more compact method.



Pure Arithmetic

- KS1 Question

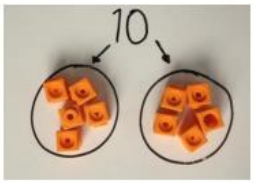
$7 \times 4 =$

- KS2 Question

$$\begin{array}{r} 729 \\ \times \quad 54 \\ \hline \end{array}$$

Dividing

Sharing objects into groups



I have 10 cubes, can you share them equally in 2 groups?

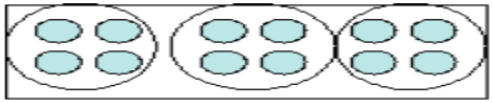
Children use pictures or shapes to share quantities.

8 ÷ 2 = 4

Share 9 buns between three people.

9 ÷ 3 = 3

Students can continue to use drawn diagrams with dots or circles to help them divide numbers into equal groups.



Encourage them to move towards counting in multiples to divide more efficiently.

Begin with divisions that divide equally with no remainder.

$$\begin{array}{r} 218 \\ 4\overline{)872} \\ \scriptstyle 3 \end{array}$$

Move onto divisions with a remainder.

$$\begin{array}{r} 86\ r\ 2 \\ 5\overline{)432} \\ \scriptstyle 3 \end{array}$$

Finally move into decimal places to divide the total accurately.

$$\begin{array}{r} 14.6 \\ 35\overline{)511.0} \\ \scriptstyle 16\quad 21 \end{array}$$

Pure Arithmetic

- KS1 Question

$60 \div 5 =$

- KS2 Question

$221 \div 17 =$

How can you help?

- Learn Tables – Test them regularly – cd songs – apps
- Talk about – What time is it? How long will it take? Calendars, days of the week etc.
- Talk about money and time at home when they are used. How much change? What time should we leave?
- Number bonds
- Confidence.
- Ask – can we help you further?