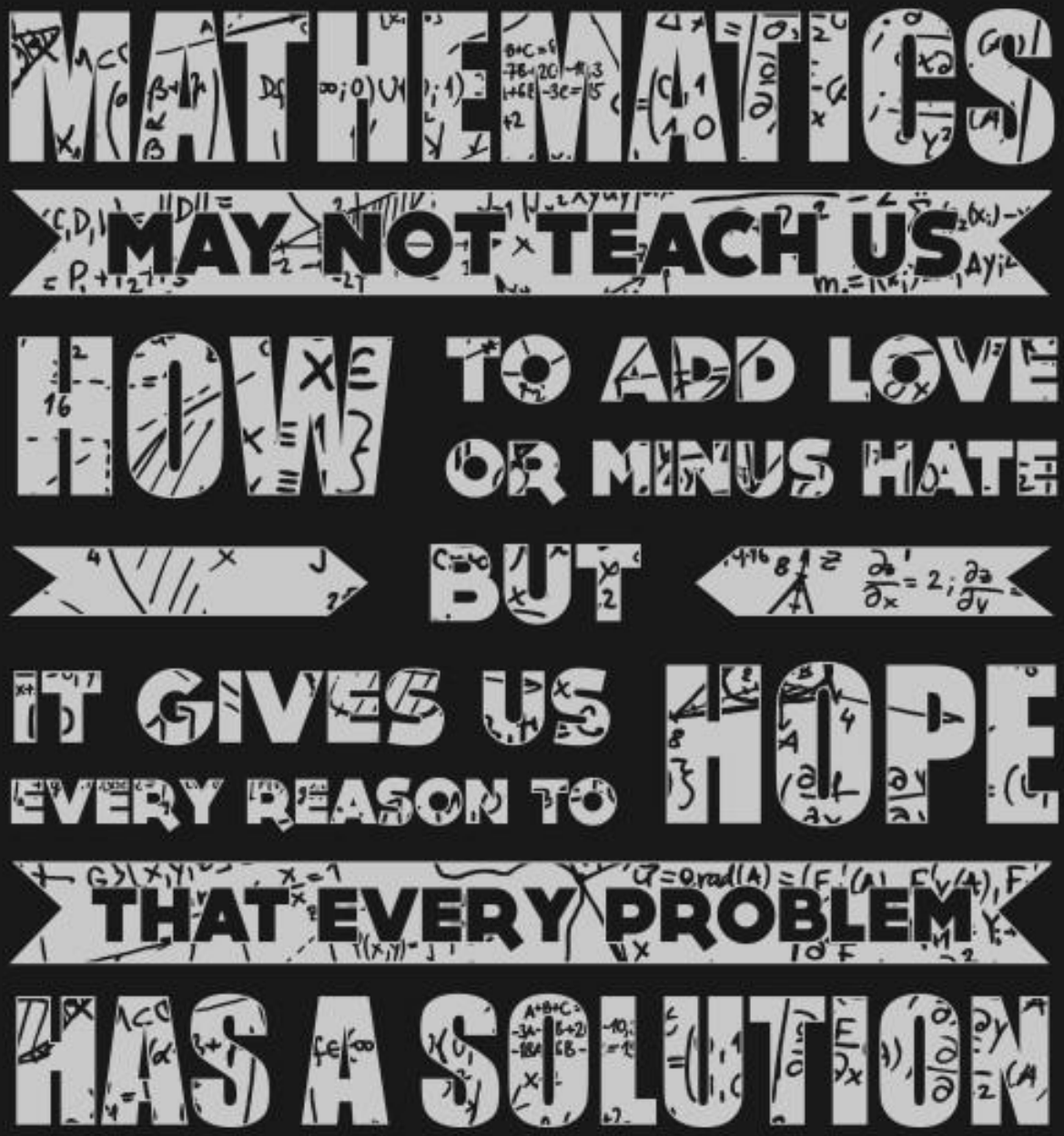

MATHEMATICS
MAY NOT TEACH US
HOW TO ADD LOVE
OR MINUS HATE
BUT
IT GIVES US
EVERY REASON TO HOPE
THAT EVERY PROBLEM
HAS A SOLUTION

Welcome to the KS2 maths workshop

16th October 2019

Objectives

- Explain and demonstrate how maths is taught in KS2
- Understand what is meant by ‘Mastery’
- Identify how fluency impacts upon mastery
- Increase confidence and understanding at home.

As a child…

- Discuss 2 positive and negative experiences of maths that you had when you were a child

Supporting your child

- If children hear, ‘I can’t do maths’ from parents, teachers, relatives and friends, they begin to believe it isn’t important.

The curriculum – Lower KS2

- The principal focus of mathematics teaching in lower key stage 2 is to ensure that pupils become increasingly fluent with whole numbers and the four operations, including number facts and the concept of place value. This should ensure that pupils develop efficient written and mental methods and perform calculations accurately with increasingly large whole numbers.

- At this stage, pupils should develop their ability to solve a range of problems, including with simple fractions and decimal place value. Teaching should also ensure that pupils draw with increasing accuracy and develop mathematical reasoning so they can analyse shapes and their properties, and confidently describe the relationships between them. It should ensure that they can use measuring instruments with accuracy and make connections between measure and number.

The Curriculum cont…

- By the end of year 4, pupils should have memorised their multiplication tables up to and including the 12 multiplication table and show precision and fluency in their work.

- Pupils should read and spell mathematical vocabulary correctly and confidently, using their growing word reading knowledge and their knowledge of spelling.

The Curriculum – Upper KS2

- The principal focus of mathematics teaching in upper key stage 2 is to ensure that pupils extend their understanding of the number system and place value to include larger integers. This should develop the connections that pupils make between multiplication and division with fractions, decimals, percentages and ratio.

- At this stage, pupils should develop their ability to solve a wider range of problems, including increasingly complex properties of numbers and arithmetic, and problems demanding efficient written and mental methods of calculation. With this foundation in arithmetic, pupils are introduced to the language of algebra as a means for solving a variety of problems. Teaching in geometry and measures should consolidate and extend knowledge developed in number. Teaching should also ensure that pupils classify shapes with increasingly complex geometric properties and that they learn the vocabulary they need to describe them.

The curriculum cont…

- By the end of year 6, pupils should be fluent in written methods for all four operations, including long multiplication and division, and in working with fractions, decimals and percentages.

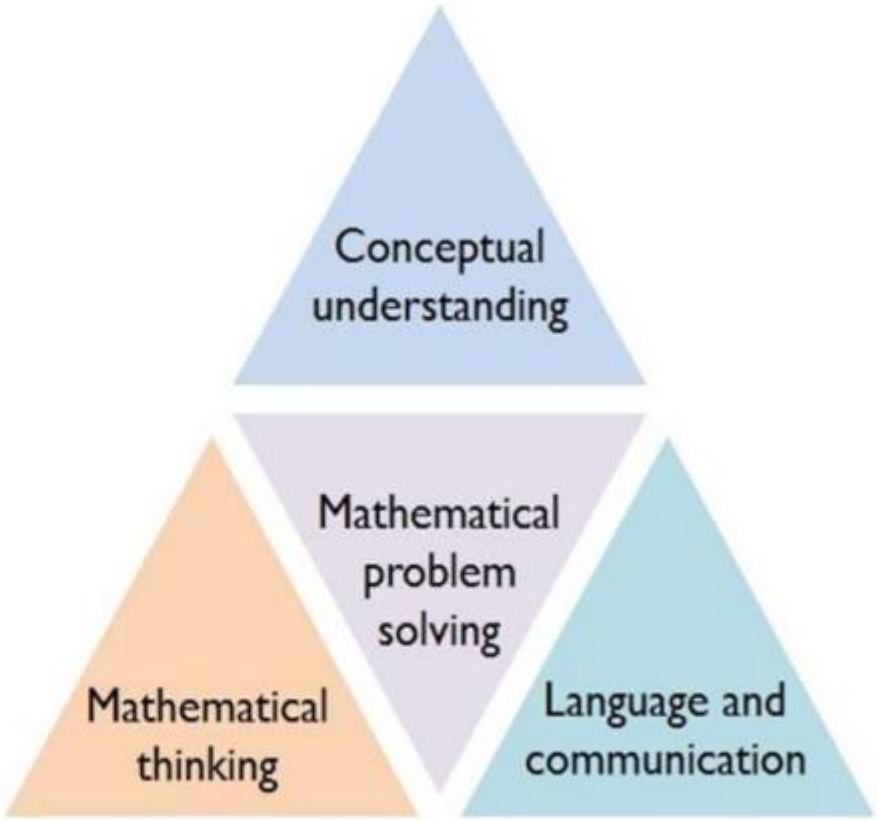
- Pupils should read, spell and pronounce mathematical vocabulary correctly.

Programmes of study

- Number – number and place value
- Number – addition and subtraction
- Number – multiplication and division
- Number – fractions (including decimals and percentages)
- Measurement Geometry – properties of shape
- Geometry – position and direction
- Statistics

Maths mastery

- Using spoken and written language with confidence and clarity to explain and justify mathematical reasoning.
- Having a deep conceptual understanding of mathematical concepts and skills.
- Developing mathematical thinking, including generalising, classifying and comparing, and modifying.



What does it mean to master something?

- I know how to do it
- It becomes automatic and I don't need to think about it – for example driving a car
- I'm really good at doing it – painting a room or a picture
- I can show someone else how to do it

What is mastery in maths?

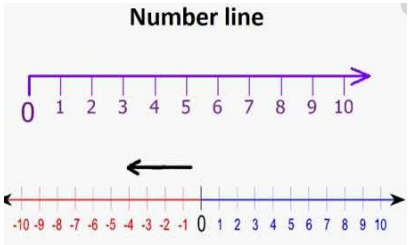
"In mathematics, you know you've mastered something when you can apply it to a totally new problem in an unfamiliar situation."

Dr. Helen Drury, Director of Mathematics Mastery

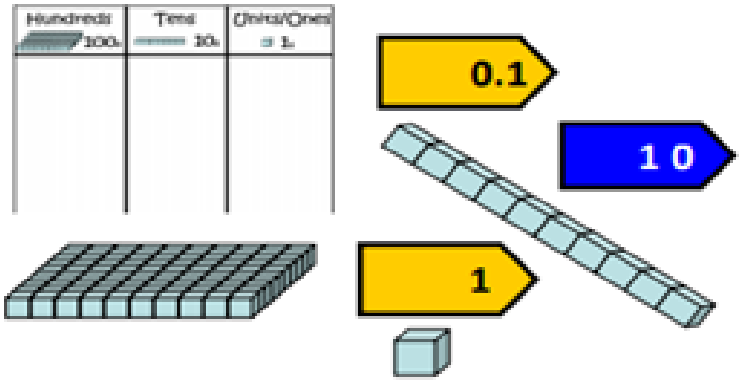
Resources

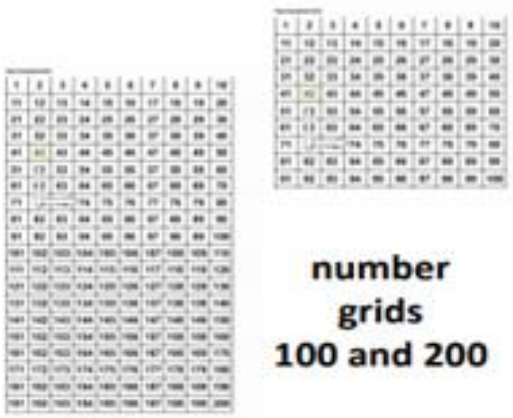
bead string

place value counters



place value apparatus





number grids 100 and 200

Mental maths

- We encourage children to develop a range of mental maths skills throughout their time in KS1 and KS2. We encourage them to use these skills before making jottings or doing written calculations. This increases fluency and allows children to use the best method to calculate simpler answers.

Examples of mental maths

- Number bonds
- Doubling and halving
- Near doubles
- Know 10/100/1000 more/less than a number
- Know times tables and their associated division facts
- Counting in multiples
- Partitioning

The four operations

Addition

- **Year 3** – add numbers with up to three digits, using formal written methods of columnar addition and subtraction
- **Year 4** – add numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate
- **Year 5** – add whole numbers with more than 4 digits, including using formal written methods
- **Year 6** – solve addition multi-step problems in contexts, deciding which operations and methods to use and why

- Y3 - Add numbers with up to 3-digits Introduce the expanded column addition method.

Y4 - Add numbers with up to 4 digits Move from expanded addition to the compact column method, adding units first, and carrying 'numbers' underneath the calculation.

226 + 73

```
  226
+  73
-----
    9
   90
  200
-----
  299
-----
```

226 + 73

```
  226
+  73
-----
  299
-----
```

3517+396

```
 3517
+ 396
------
 3913
------
 1 1
```

- Y5 - Add numbers **with more than 4 digits** including money, measures and decimals with different numbers of decimal places.

- Y6 - **Add several numbers of increasing complexity**

£23.59 + £7.55

$$\begin{array}{r} 23.59 \\ +\ 7.55 \\ \hline £31.14 \\ \hline 1\ 1\ \ 1 \end{array}$$

$$\begin{array}{r} 23.361 \\ 9.080 \\ 59.770 \\ +\ \ 1.300 \\ \hline 93.511 \\ \hline 2\ \ 1\ 2 \end{array}$$

Have a go

- **2945 + 943**

- **15.33 + 118.54**

Subtraction

- **Year 3** – subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction
- **Year 4** - subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate
- **Year 5** – subtract whole numbers with more than 4 digits, including using formal written methods
- **Year 6** - solve subtraction multi-step problems in contexts, deciding which operations and methods to use and why

- Y3 - Subtracting with 2 and 3-digit numbers. Introduce partitioned column subtraction method.

Y4 - Subtract with up to 4-digit numbers Partitioned column subtraction with 'exchanging' (decomposition).

376 – 214

300+70+6
- 200+10+4
100+60+2

376 – 214

376
- 214
162

2754-1562

$$\begin{array}{r} {}^{6}\not{7}^{1}54 \\ -\ 1562 \\ \hline 1192 \end{array}$$

- Y5 - Subtract with at least 4-digit numbers including money, measures, decimals.

Y6 - Subtracting with increasingly large and more complex numbers and decimal values.

31056 - 2128

```
  2 10 1  4  1
  3 1  0  5  6
-   2  1  2  8
-------------
  2  8  9  2  8
-------------
```

105.419kg – 36.080kg

```
  0  9  1  3  1
  1  0  5. 4  1  9
-    3  6. 0  8  0
-----------------
     6  9. 3  3  9 kg
-----------------
```

Have a go

- **1549 – 862 =**

Multiplication

- **Year 3** – write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods

- **Year 4** – multiply two-digit and three-digit numbers by a one-digit number using formal written layout

- **Year 5** – multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers

- **Year 6** – multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication

Multiplication – Grid Method

Year 3

123 x 8

x	100	20	3
8	800	160	24

800
+ 160
24
984

Year 4

23 x 14

x	20	3
10	200	30
4	80	12

200
30
80
+ 12
322

1

Year 5

327 x 4

$$\begin{array}{r} 327 \\ \times \quad 4 \\ \hline 1308 \\ \hline 1\ 2 \end{array}$$

Year 6

124 x 26

$$\begin{array}{r} 124 \\ \times \quad 26 \\ \hline 1\ 2 \\ 744 \\ +2480 \\ \hline 3224 \\ \hline 1\ 1 \end{array}$$

Have a go using the grid method

- 236 x 7
- 45 x 26

Division

- **Year 3** – write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods

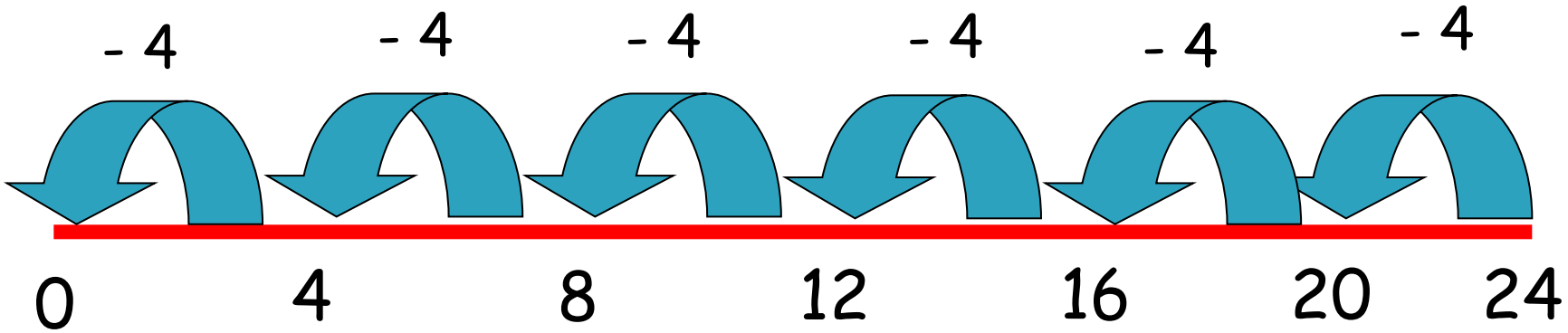
- **Year 4** – divide a two-digit and three-digit numbers by a one digit number using formal written layout

- **Year 5** – divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context

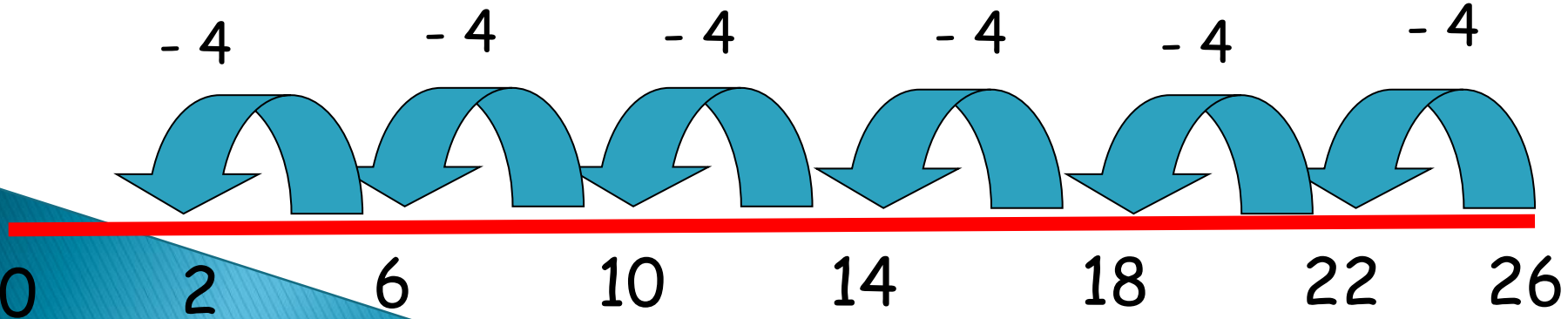
- **Year 6** – divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context
- divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context

Division – chunking

24 ÷ 4 = 6



26 ÷ 4 = 6 r2



Year 4 & 5

145 ÷ 8 = 18 r1

8 | 145

- 80 (8x10)

65

- 40 (8x5)

25

- 24 (8x3)

1

Year 5 & 6

432 ÷ 5 = 86 r2

8 6 r2

5 | 4 3_3 2

Have a go using the chunking method

- 345 ÷ 8

What do all these maths strands have in common?

- Multiplication using grid method
- Division using the ‘chunking’ method
- Finding fractions of numbers
- Percentages
- Algebra
- Area
- Multiplying and dividing multiples of 10/100 by a single digit
- Mental multiplication and division
- Finding factors and multiples
- Square and cube numbers

Times tables

Following on from Year 2:

- **Year 3** – recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
- **Year 4** – recall multiplication and division facts for multiplication tables up to 12 × 12
- **Year 5** – identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers
- **Year 6** - identify common factors, common multiples

How can you help at home?

- Fluency is key!
- Practise, practise, practise!
- **Think and talk like a mathematician.**

Other ideas

- A focus on **mental calculations.**
- The ability to **estimate**.
- To use maths in a **real life context.**
- To ask children to **explain** how they have calculated something using a method that suits them.
- Teach children **written calculations** following the progression in the calculations policy
- Ensure children are confident with their **addition bonds and multiplication tables (up to 12x12)** – and make sure they can use the related inverse facts too!

Questions


WHY?
WHAT?
WHERE?
WHEN?
WHO?
HOW?
WHICH?
WHOSE?
WHAT? HOW? WHY?
WHO? WHERE? WHAT? HOW?
WHY? HOW? WHERE?
WHO? WHOSE?
WHERE? WHAT? HOW?
WHERE? WHICH? WHOSE? WHEN? WHY?
WHEN? WHERE?
WHY? HOW?
HOW? WHO?
WHO? WHERE? WHAT? HOW?
WHAT? HOW? WHY?
HOW?

WHAT IF THE ALGEBRA TEACHERS ARE REALLY PIRATES, AND ARE USING US TO FIND THE "X"

DESPICABLEMEMINIONS.ORG