Mathematics at St Mark's

Memory is the residue of thought.

Daniel Willingham

...recall important number and concept facts

...be fluent in number, choosing the most efficient ways to solve problems

...take risks, be resilient and be enthused by challenge

...enjoy their Maths lessons

...feel like they can succeed and make progress

...have a deep and broad understanding of the curriculum

Our aims are for children to...

...be able to apply their knowledge in both Maths and other areas of the curriculum

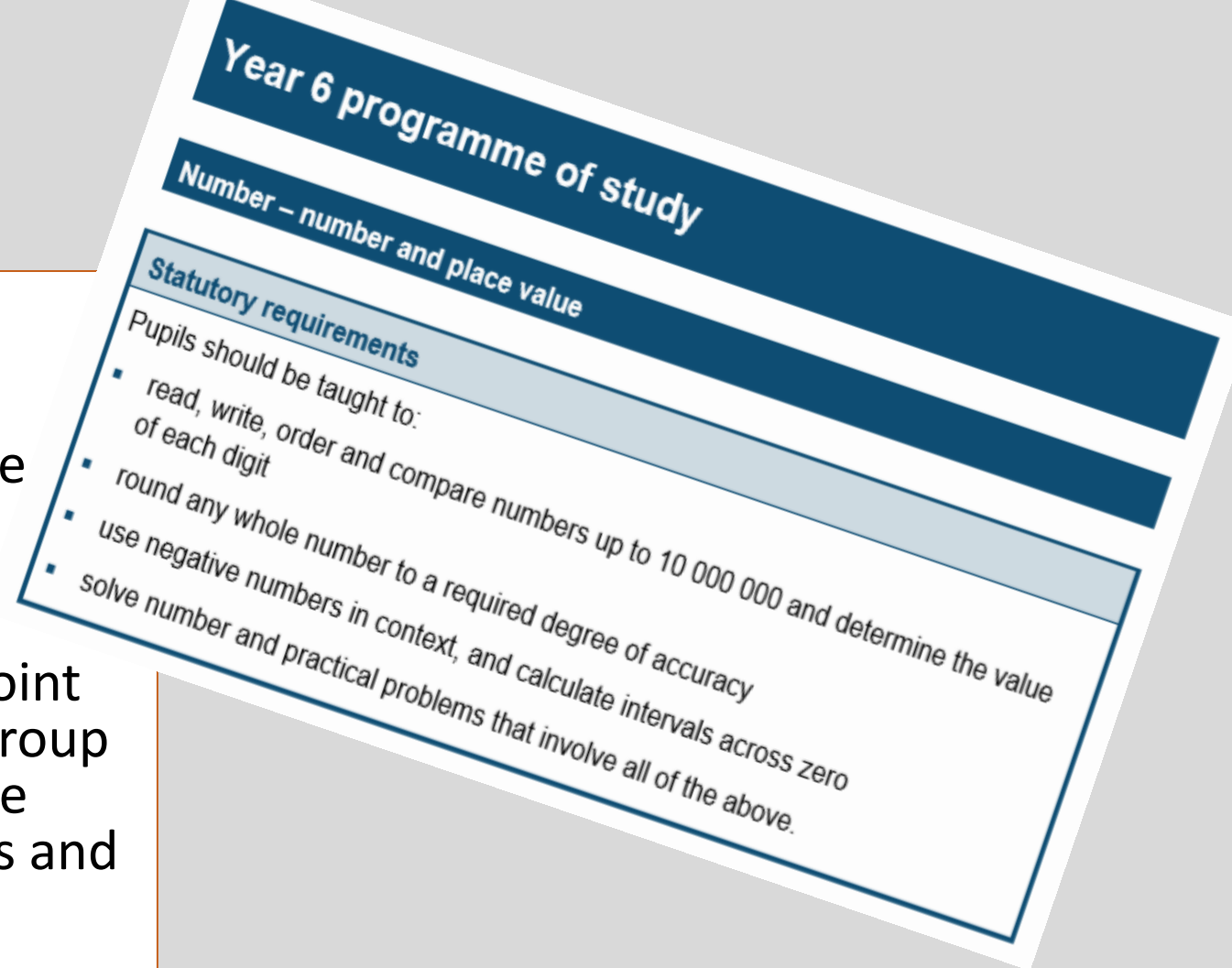...be able to reason Mathematically by explaining and proving

...be able to make connections and links between different areas of Maths

...have a secure conceptual understanding of ideas

Our Curriculum

- The National Curriculum is a statutory document which states the objectives for Mathematics however a school can choose how these objectives are taught

- We use 'White Rose' planning as a start point for our planning which was devised by a group of leading Maths teachers from around the world. This planning fulfils our school aims and teaches a 'Mastery' approach

- In a Mastery approach, the idea is that children study a Mathematical concept in depth and 'master' it before moving on

Year 6 programme of study

Number – number and place value

Statutory requirements

Pupils should be taught to:

- read, write, order and compare numbers up to 10 000 000 and determine the value of each digit
- round any whole number to a required degree of accuracy
- use negative numbers in context, and calculate intervals across zero
- solve number and practical problems that involve all of the above.

Long Units with Number at the Heart

Year 6 – Yearly Overview

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Number- Place Value		Number- Addition, Subtraction, Multiplication and Division				Fractions				Geometry- Position and Direction	Consolidation
Spring	Number- Decimals		Number- Percentages		Number- Algebra		Measurement Converting units	Measurement Perimeter, Area and Volume		Number- Ratio		Consolidation
Summer	Geometry- Properties of Shapes		Problem solving			Statistics		Investigations				Consolidation

Lessons

- Whole class teaching

- When teaching something new, the children start at the same point in learning – no assumptions are made

- Learning is not capped

- Lesson tasks start in a more simple way, covering earlier foundations then move on to more complex problems, this limits gaps in learning

- The children have the same opportunities but will move through 'steps' at a different speed, with varying amounts of support

- Children who grasp concepts at a faster speed can move onto more complex problems quicker so are still stretched
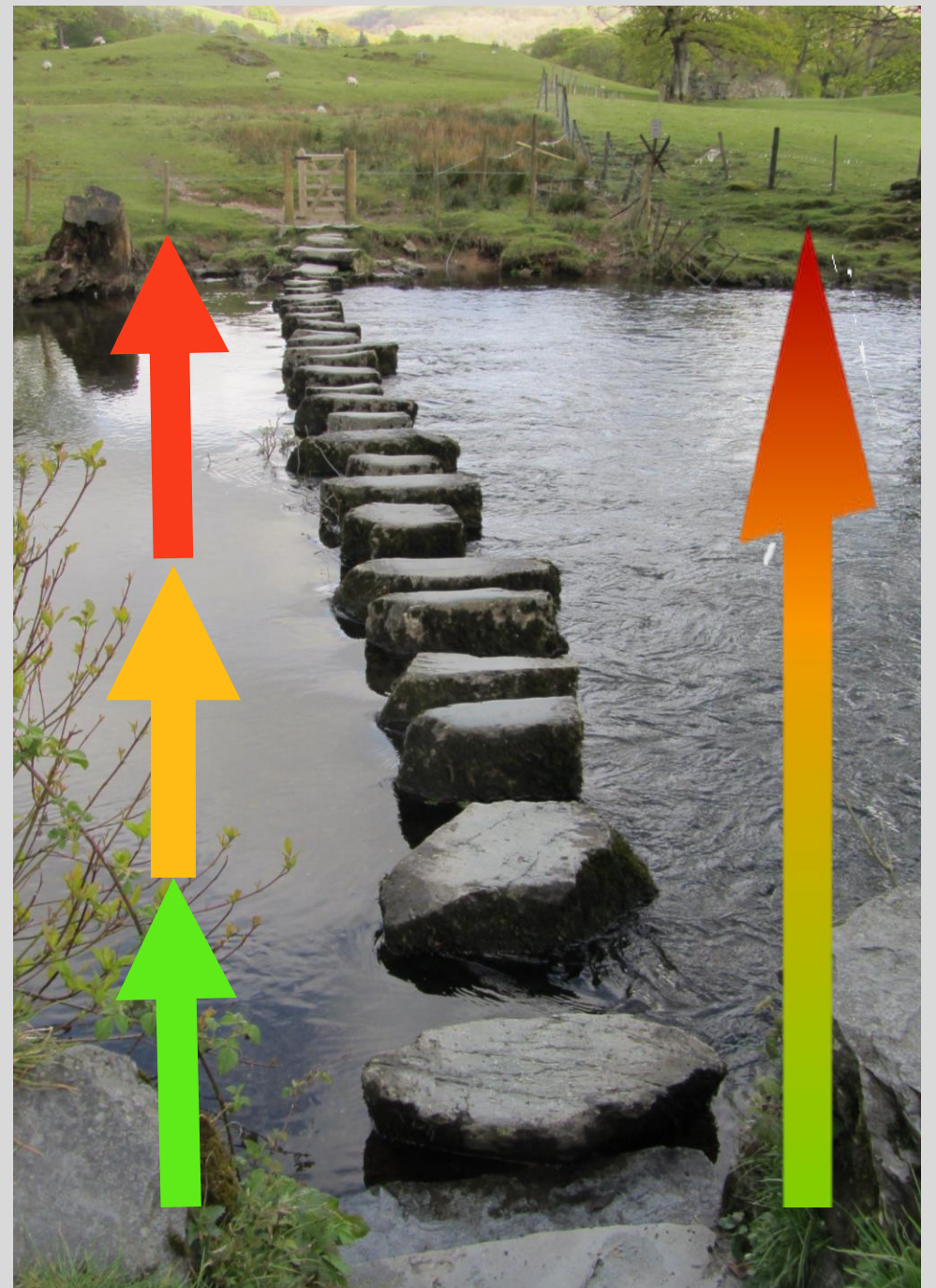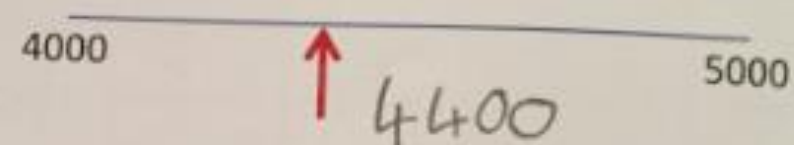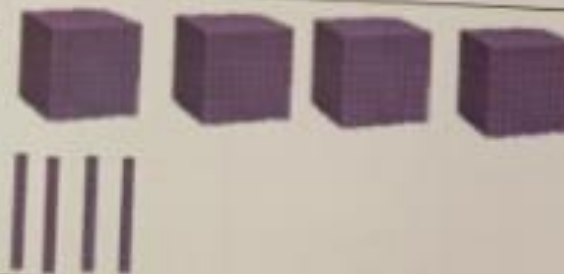
Using pictorials and visuals

We use concrete resources and visual aids where possible to help children build a conceptual understanding, particularly in place value

Using pictorials and visuals

The CPA approach (concrete, pictorial/visual, abstract) is used from Year R throughout the school to give meaning to numbers and number sentences
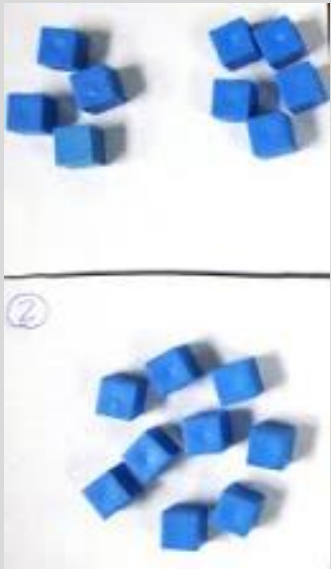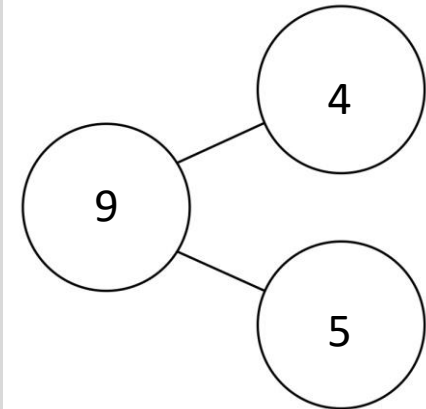
There are 7 apples so the whole is 7.
4 apples are red so the red apples represent 4/7.
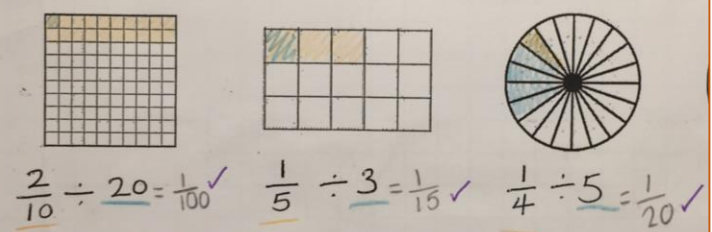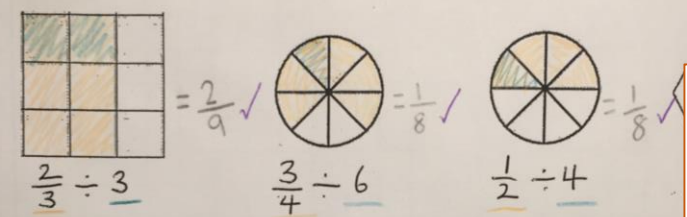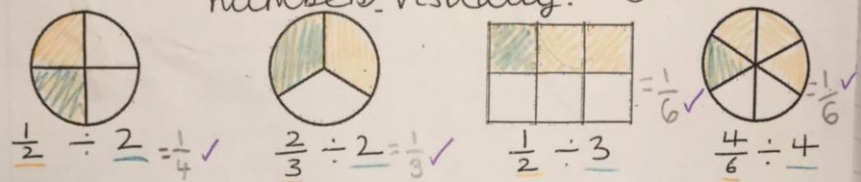3 apples are green so the red apples represent 3/7.

Visuals can help children to understand the 'why' behind a procedure

Having a secure conceptual understanding is more likely to result in sustained learning

Diagrams can help children to understand the structures of number sentences

Whole

Part   Part

_____+_____=_____   _____+_____=_____

5 whole — 3 part — 2 part

Whole

Part   Part
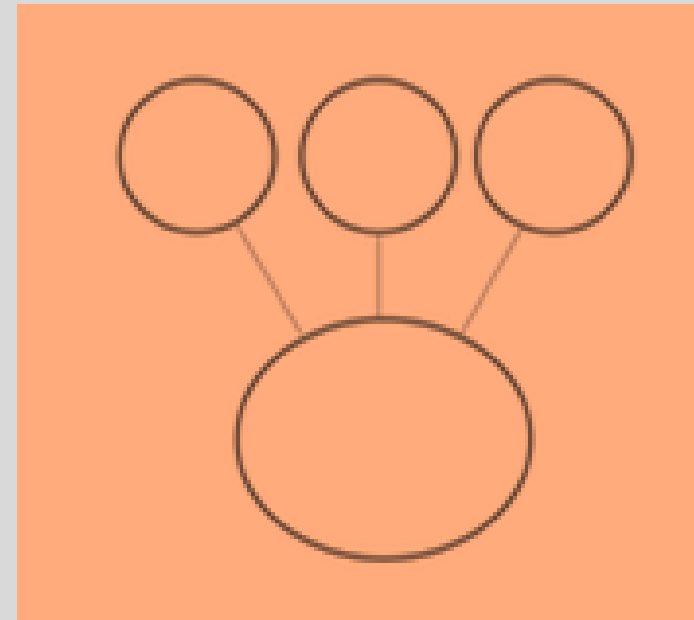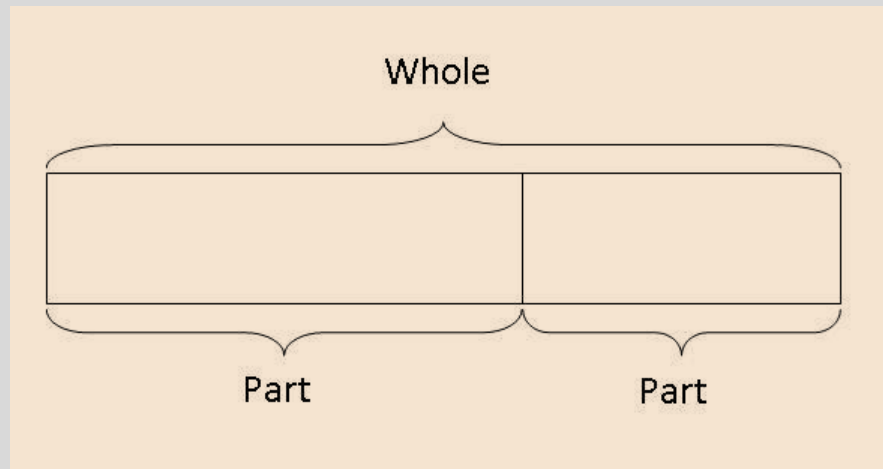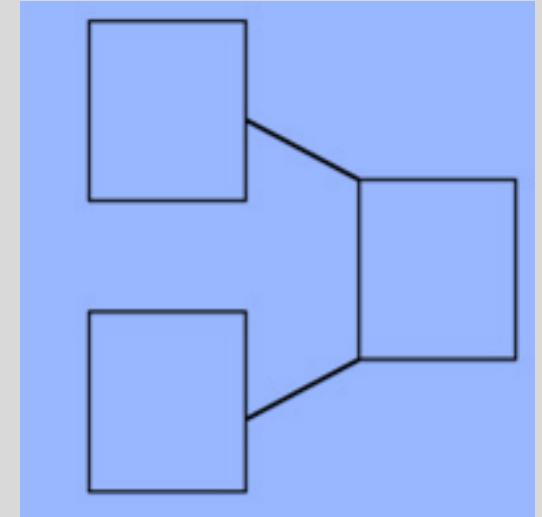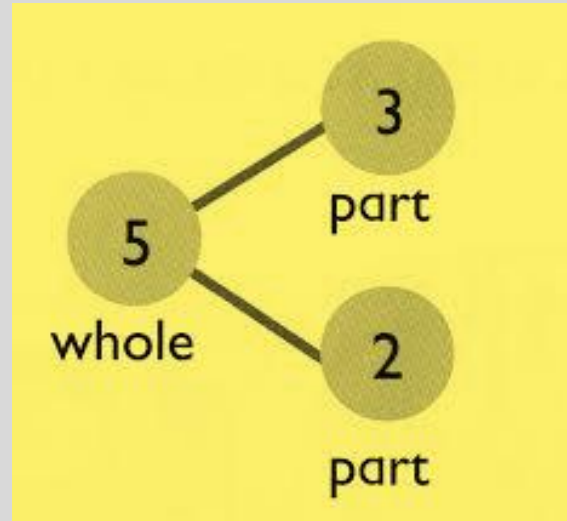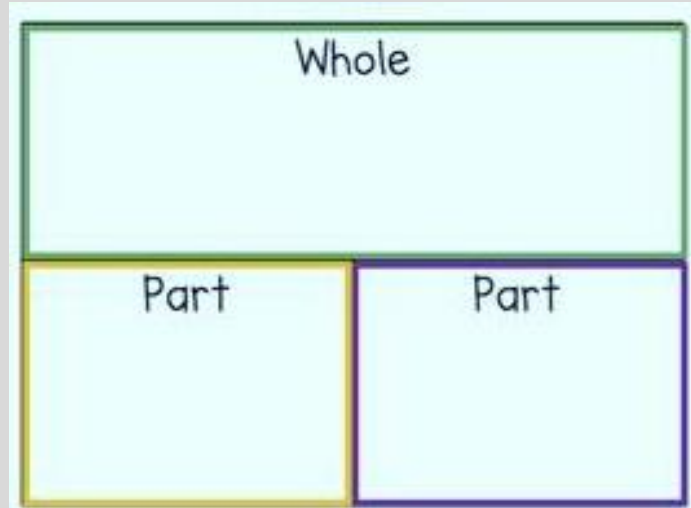
These diagrams and structures help children to understand what they need to do to solve a problem

Challenge 7:
Mr Applegate spent £129.57 on new furniture for his office. He bought 2 chairs, 1 desk and a sofa.
The chairs cost £25.20 each and the desk cost £31.50.
How much was the sofa?

£25.20	£25.20	£31.50	£47.67 ✓
£129.57			

25.20 × 2 = £50.40
+ £31.50
£81.90

$^0_8$
× 12 9.57
− 81.90
47.67 ✓

Superb work solving multi-step word problems. Well done for checking your answers.

h) $\frac{5}{9}$ of a number is 30. What was the original number?
30 ÷ 5 = 6

6	6	6	6	6	6	6	6	6
54								

d) A stack of 5 identical books is 6.05 cm tall.

Jake takes two books off the top.

How tall is the stack now? 3.63 cm

1.21
1.21
1.21
1.21
1.21
1.21

1.21 × 2 = 2.42 cm
6.05 − 2.42 =

⁵6.⁰0 5
− 2.4 2
3.6 3

1.21 6.05 − 5:
     1.21
5⌐6.05

a) In a survey of children's favourite dinner choice, these were the results.

	Red meal	Green meal
Percentage of children	45%	55%

12 more children chose red meal than chose green meal

How many children took part in the survey?
120

55%
45%
10%

10% = 12
(÷10) (×10)
100% = 120

Procedural skills are practised in lessons before applying them to contextual problems

28/03/19

I can solve measure problem using conversion and ~~multiplacation~~ multiplacation.

d) 335 x 45 = 15075 ✓

```
   335
x   45
  1675
+    2
 13400
+    2
 15075
+
```

e) 335 x 55 = 18425 ✓

```
   335
x   55
  1675
+    2
 16750
+    2
 18425
+    +
```

f) 385 x 55 = 21175 ✓

```
   385
x   55
  1925
+    2
 19250
+    2
 21175
+    +
```

g) 684 x 55 = 37620 ✓

```
   684
x   55
  3420
+    2
 34200
+    2
 37620
```

h) 684 x 77 =

```
   684        684
x   77      x   77
  4508
+    2  2
 47880
```
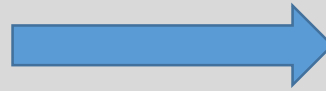
d) It is Princeley's birthday.

Altogether, there are 22 children at his party.

Princeley's dad has 5 litres of coke.

He pours 185ml of coke for every child.

How much coke is left over? 930ml or 0.93L ✓

```
    185        5L = 5000ml
x    22
    370      5000 - 4070 =
+    +               930ml
   3700
+    +
   4070
```

```
    4 9
  5 10 10 0
-  4 0 7 0
   0 9 3 0
```

Deep Thinking – breadth and depth in learning

In order to embed skills and understanding, children will solve more complex problems which will deepen their understanding of a concept

2. Write the missing digits in the boxes.

$$\begin{array}{ccc} 4 & 9 & \square \\ + 3 & \boxed{\square} & 3 \\ \hline 8 & 6 & 4 \end{array}$$

Explain how you found the number in the **bold** box:

$$\begin{array}{ccc} & \square & \\ + & \square & \\ \hline 8 & 6 & 6 \end{array}$$

What are all the possibilities?
List them systematically

Circle the mistake and explain what their misconception is

$$\begin{array}{cccc} & 7 & 6 & 2 \\ + & 6 & 3 & 8 \\ \hline 1 & 3 & 0 & 0 \end{array}$$

$$\begin{array}{ccc} & b & b \\ + & & a \\ \hline a & c & c \end{array}$$

What are the values of b, a and c?

True or false
A 2-digit number add a 1-digit number always totals a 2-digit number

Reasoning and Explaining

Not all Maths is just wrong or right. In order to show a deep understanding about a concept, children need to be able to explain their thinking using Mathematical vocabulary

I can explain and prove whether a number will be in a sequence

a) Here is a sequence of numbers:

2, 4, 6....

Georgie says that 18 is in the sequence.

Is he (true) or false? Explain why:

The sequence is increasing by 2 each; therefore, Georgie is true because the difference between 6 and 18 is 12. 12 is divisible by 2. It is 6 jumps from 6.

b) Here is a sequence of numbers:

2, 4, 6....

Chloe says that 126 is in the sequence.

Is she (true) or false? Explain why:

The sequence is increasing by 2 each time; therefore, Chloe is true because the difference between 126 and 6 is 120. 120 is divisible by 2. 120 ÷ 2 = 60. It is 60 jumps from 6.

c) Here is a sequence of numbers:

3, 5, 7....

Evan says that 78 is in the sequence.

Is he true or (false?) Explain why:

The sequence is increasing by 2 each time; therefore Evan is false because the difference between 78 and 7 is 71. 71 isn't divisible by 2.

Stem Sentences

Stem sentences are a oral or written framework which is repeated. It helps children to identify patterns and remember key facts.

1 thousand is equal to 1000

2 thousands are equal to 2000

3 thousands are equal to 3000

4 thousands are equal to ____

5 thousands are equal to ____

___ thousands are equal to ____

___ thousands are equal to ____

___ thousands are equal to ____

I can solve two step problems involving converting

Part 1 - Copy and complete these sentences

A
1 litre is made up from 1,000 ml.
2 litres is made up from 1000 ✓ ml.
3 litres is made up from 3000 ✓ ml.
7 litres is made up from 7000 ✓ ml.
9 litres is made up from 9000 ✓ ml.
12 litres is made up from 12,000 ✓ ml.

B
1.5 litres is equivalent to 1,500 ml.
2.5 ✓ litres is equivalent to 2,500ml.
3.5 ✓ litres is equivalent to 3,500ml.
5.5 ✓ litres is equivalent to 5,500ml.
7.5 ✓ litres is equivalent to 7,500ml.
10.5 ✓ litres is equivalent to 10,500ml.

C
1.2 litres is equivalent to 1,200 ml.
2.2 litres is equivalent to 2,200 ✓ ml.
2.3 litres is equivalent to 2,300 ✓ ml.
5.3 litres is equivalent to 5,300 ✓ ml.
9.4 litres is equivalent to 9,400 ✓ ml.
10.9 litres is equivalent to 10,900 ✓ ml.

D
1.25 litres is the same as 1,250 ml.
2.35 ✓ litres is the same as 2,350ml.
3.45 ✓ litres is the same as 3,450ml.
5.45 ✓ litres is the same as 5,450ml.
7.65 ✓ litres is the same as 7,650ml.
10.75 ✓ litres is the same as 10,750ml.

E
1.12 litres is equal to 1,120 ml.
2.32 litres is equal to 2,320 ✓ ml.
2.33 litres is equal to 2,330 ✓ ml.
5.53 litres is equal to 5,530 ✓ ml.
9.04 litres is equal to 9,040 ✓ ml.
10.49 litres is equal to 10,490 ✓ ml.

F
1.005 litres is then same as 1,005 ml.
2.005 ✓ litres is equal to as 2,005ml.
3.007 ✓ litres is equal to as 3,007ml.
3.057 ✓ litres is equal to as 3,057ml.
3.087 ✓ litres is equal to as 3,087ml.
10.046 ✓ litres is equal to as 10,046ml.

Variation and Making Small Steps

When a new concept is introduced, we provide questions that begin with just slight variations before moving onto more mixed practice

42 x 5 =

43 x 5 =

47 x 5 =

47 x 6 =

57 x 6 =

67 x 7 =

63 x 8 =

Q2. Emma is thinking of a number.
- My number is odd.
- It is less than 15
- It is a multiple of 3.
- It can be divided by 4.

What number is Emma thinking of?

Q3. Sharon is thinking of a number.
- My number is odd.
- It is less than 10.
- It is a multiple of 3.
- It can be divided by 2.

What number is Sharon thinking of?

Q4. Jaden is thinking of a number.
- My number is odd.
- It is less than 30.
- It is a multiple of 3.
- It can be divided by 5.

What number is Jaden thinking of?

+9	+8
13 + 9 = 13 + 10 - 1 = 23 - 1 = 22	13 + 8
14 + 9	14 + 8
15 + 9	15 + 8
16 + 9	16 + 8
25 + 9	25 + 8
26 + 9	26 + 8
108 + 9	108 + 8
109 + 9	109 + 8
644 + 9	644 + 8
1,044 + 9	1,044 + 8
1,525 + 9	1,525 + 8
2,159 + 9	2,159 + 8

11 Nearest 10 →

12 Nearest 10 →

13 Nearest 10 →

14 Nearest 10 →

15 Nearest 10 →

16 Nearest 10 →

a) 15 is one ten less than _____
b) 45 is one ten less than _____
c) 345 is one hundred less than _____
d) 345 is two hundreds less than _____
e) 345 is three hundreds less than _____
f) 7,345 is one thousand less than _____
g) 7,345 is two thousand less than _____
h) 7,345 is four thousands less than _____

# Re-visiting previous concepts and making connections

We aim to keep learning alive by revisiting concepts during Morning Maths Challenges or in future lessons. When children are able to make connections with other Mathematical concepts, then their learning becomes more purposeful

What you learned last lesson...

What you learned last week...

What you learned last term...

What you learned year...
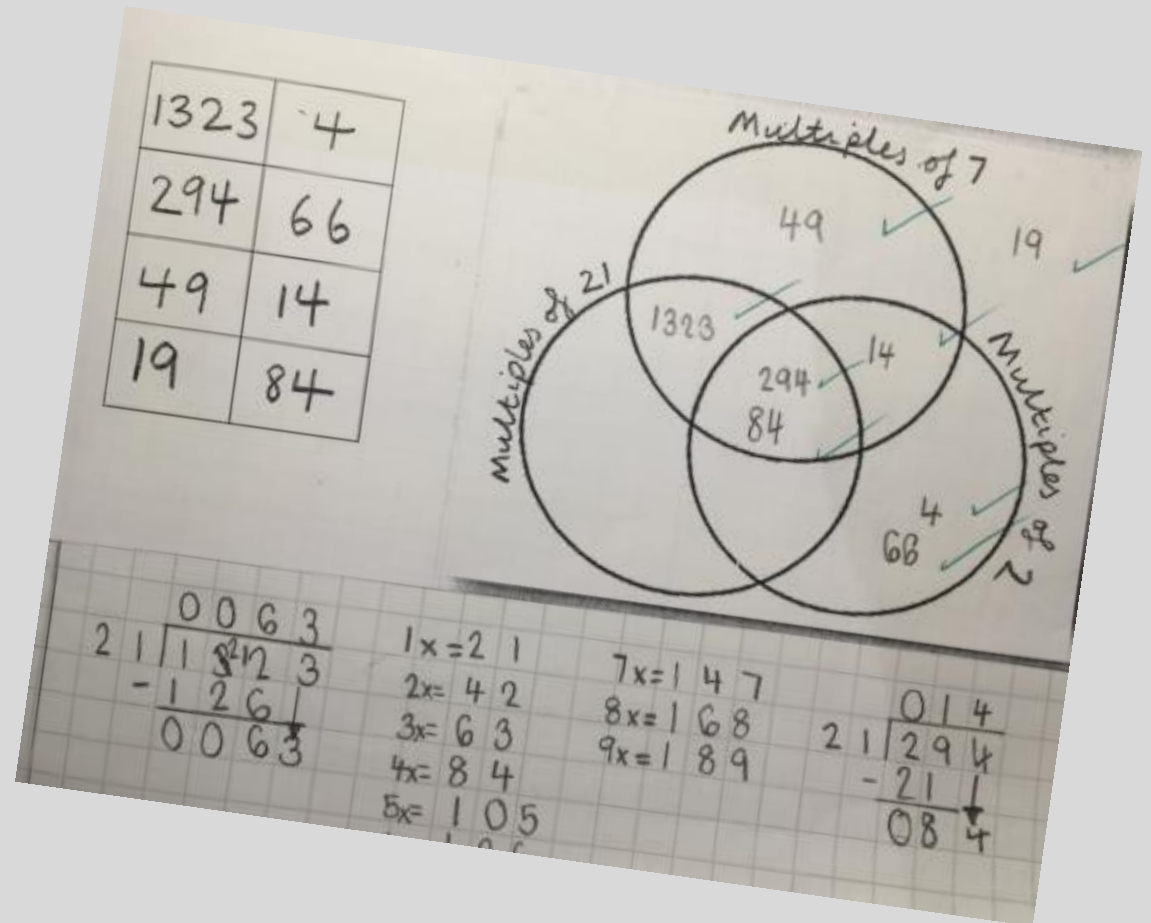
Number Fluency – Written Methods

Our calculation policy ensures steady progression from Year R – Year 6.

These posters are displayed in classrooms to aid children in their working.

Multiplication

Pictorial Grouping

Repeated Addition using Pictorials

4×2

$2 + 2 + 2 + 2$
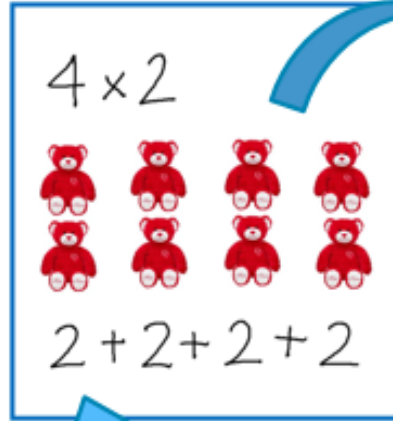
Grouping with Arrays

5×2

 $= 10$

3×6

 $= 18$
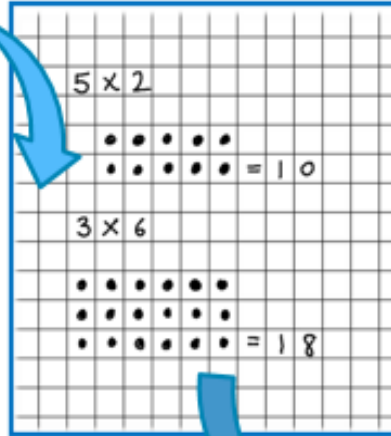
Repeated Addition on a Number Line

4×3

$+4 \quad +4 \quad +4$

$1 \times 4 \quad 1 \times 4 \quad 1 \times 4$

$0 \quad 4 \quad 8 \quad 12$

8×5

$+8 \ +8 \ +8 \ +8 \ +8$

$1 \times 8 \ 1 \times 8 \ 1 \times 8 \ 1 \times 8 \ 1 \times 8$

$0 \quad 8 \quad 16 \quad 24 \quad 32 \quad 40$

Long Method

372×43

```
    372
  x  43
   1116
  xz
+14880
 xz
 15996
```

Short Method

241×7

```
    241
  x   7
   1687
   x2
```

8×416

```
    416
  x   8
   3328
   x x
```

Grid Method

23×35

```
        30    5
  20   600  100
   3    90   15
```

$600 + 100 + 90 + 15 = 805$
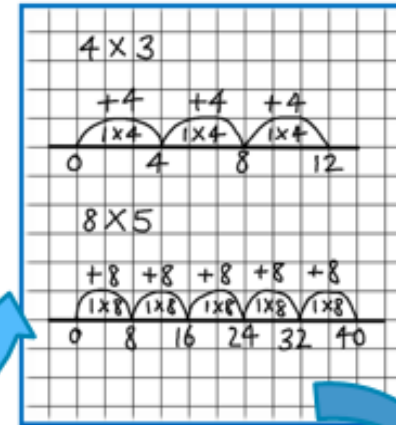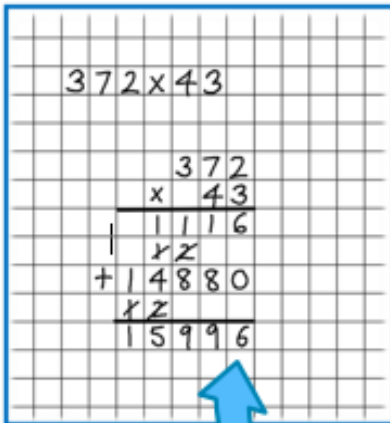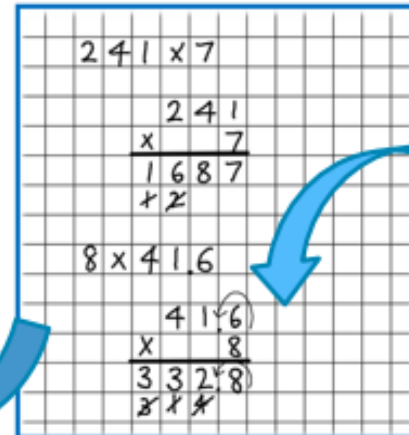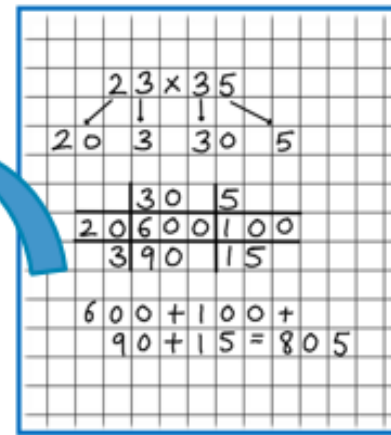
Chunking on a Number Line
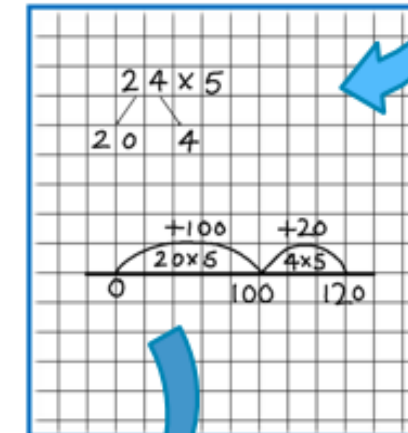
24×5

$20 \quad 4$

$+100 \qquad +20$

$20 \times 5 \qquad 4 \times 5$

$0 \qquad 100 \quad 120$

Smooth Transitions

Number fluency

100 × 100	1320 ÷ 12
404 ÷ 4	8120 ÷ 145

99 x 4	14.05 ÷ 10
7 x 5	800 ÷ 25

When solving number problems, we need to equip our children with the ability to choose efficient methods drawing on their knowledge.

Alongside more formal methods, we teach children a range of mental maths skills and how to use jottings to support their thinking.

Daily Fluency Practice

Week 12 – Day 1	Week 12 – Day 2	Week 12 – Day 3	Week 12 – Day 4	Week 12 – Day 5
180 ÷ 30 = 6	180 ÷ 60 = 3	150 ÷ 30 = 5	120 ÷ 30 = 4	120 ÷ 60 = 2
XXIX = 29	XL = 40	LIV = 54	LIX = 59	XC = 90
2/5 x 2 = 4/5	2/5 x 3 = 1⅕	2/3 x 2 = 1⅓	2/3 x 5 = 3⅓	4/5 x 4 = 3⅕
1.57 x 3 = 4.71	2.36 x 3 = 7.08	4.76 x 5 = 23.8	4.63 x 7 = 8.41	1.02 x 8 = 8.16
1/2 + 1/9 =	3/4 x 3/7 = 9/28	4/5 – ½ = 3/10	1/3 ÷ 5 = 1/15	2/7 + 3/14 = 1/2
943 ÷ 41 = 23	14,104 ÷ 41 = 344	1,435 ÷ 42= 47.07	18,942 ÷ 42 = 451	14,663 ÷ 43 = 341
0.8 + 0.3 = 1.1	0.9 + 0.2 = 1.1	0.9 + 0.5 = 1.4	0.5 + 0.9 = 1.4	0.3 + 1.1 = 1.4
4/7	7/7	6/7	6/7	7/7

Times Tables/ Multiplication Recall

Learning their times tables is fundamental for solving more complex number problems as this knowledge is required for most areas of Mathematics

National Curriculum - Statutory Guidance for multiplication and division tables

Year 2

Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables.

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.

2x÷	3x÷	4x÷	5x÷	6x÷	7x÷	8x÷	9x÷	10x÷	11x÷	12x÷

TIMES TABLES ROCK STARS

Join us back in the classrooms

Lesson about using an alternative method to add more efficiently

I can use 'adjustment' as an efficient addition method

Feel free to question their

understanding – how do you know?

Can you explain that to me?

+9	+8
13 + 9 = 13 + 10 - 1 = 23 - 1 = 22	13 + 8
14 + 9	14 + 8
15 + 9	15 + 8
16 + 9	16 + 8
25 + 9	25 + 8
26 + 9	26 + 8
108 + 9	108 + 8
109 + 9	109 + 8
644 + 9	644 + 8
1,044 + 9	1,044 + 8
1,525 + 9	1,525 + 8
2,159 + 9	2,159 + 8