



Written Calculation Policy for Mathematics

October 2017

Progression towards a standard written method of calculation

Introduction:

The national curriculum framework document for mathematics in England aims to ensure all pupils: become fluent in the fundamentals of mathematics; can reason mathematically and can apply their mathematics to solve problems. There is a considerable emphasis on number, starting with practical resources and informal jottings before moving on to developing efficient written and mental methods, which they can use accurately and fluently with increasingly large whole numbers.

At Long Sutton Primary School, we have developed a consistent whole school approach to the teaching of written calculations, in order to establish continuity and progression throughout the school.

The following policy is organised according to the age stage expectations as set out in the National Curriculum 2014, however we consider it is **vital** that the **pupils are taught according to the stage they are currently working at, being moved onto the next level as soon as they are ready, or working at a lower stage until they are secure enough to move on.**

When is a child ready to move on to efficient written methods?

There is no exhaustive list for knowing when a child is ready to move onto formal written methods but indicators are:

- ✓ Do they know addition and subtraction facts to 20?
- ✓ Can they confidently count forwards and backwards, including crossing key boundaries?
- ✓ Do they know their times tables, and corresponding division facts?
- ✓ Can they multiply 2 and 3 digit numbers by 10 and 100?
- ✓ Can they double and halve numbers mentally?
- ✓ Do they understand place value and can they partition and recombine numbers?
- ✓ Can they add and subtract numbers as listed in the key skills?
- ✓ Can they use known facts to help work out related ones?
- ✓ Can they keep track of calculations using jottings?
- ✓ Can they explain their mental and informal methods to others?
- ✓ Can they solve missing number problems?

As a child begins to use efficient written methods, it is essential that concrete/ pictorial images are used alongside in order to ensure conceptual understanding.

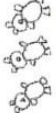
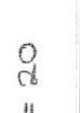
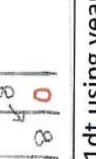
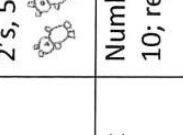
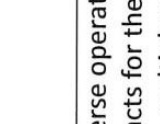
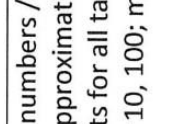
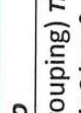

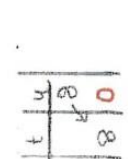
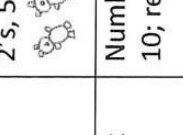
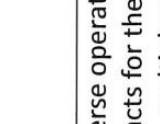
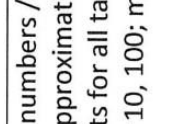
It is important that any type of calculation is given a real life context or problem solving approach to help build children's understanding of the purpose of calculation, and to help them recognise which operations and methods to use when faced with problems. This approach must be given a priority within calculation lessons.

Whichever calculation a child may be faced with they should always be encouraged to consider:

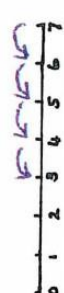




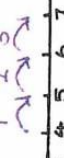
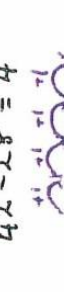

- ✓ Can I do it in my head using a mental strategy?
- ✓ The size of an approximate answer
- ✓ Could I use some jottings to help?
- ✓ Should I use a written method to work it out?

Approximate \Rightarrow *Calculate* \Rightarrow *Check it out!*

Multiplication

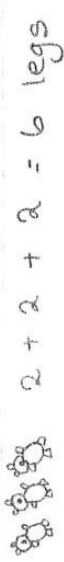
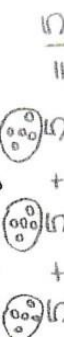
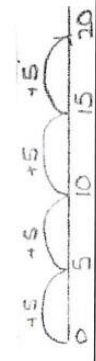
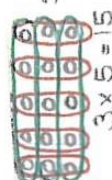
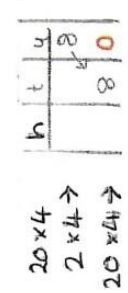
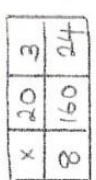
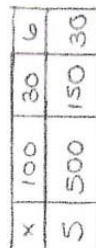

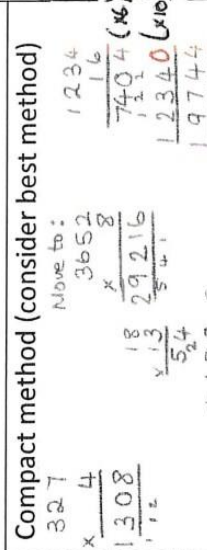
Written methods	
Ongoing	Beginning with
Year 1 Sorting apparatus, counters, numicon	Concrete objects, pictorial representations (count in 2's, 5's, 10's) <i>How many legs will the teddies have?</i>  $2 + 2 + 2 = 6$ legs
Year 2 As above plus number lines	Number lines (repeated addition using at least 2, 5, 10; recall 2, 5, 10 x tables)  $4 \times 5 = 20$
Year 3 Pre drawn grids, place value mats	Secure conceptual understanding of multiplication. Arrays as a more abstract form.  $20 \times 4 \rightarrow$ $2 \times 4 \rightarrow$ $20 \times 4 \rightarrow$
Year 4 As above	Grid method 2dt x 1dt using year appropriate table facts.  $136 \times 5 = 680$
Year 5 Place value mats	Grid method (up to 4dt x 1 or 2dt) <i>optional stage</i>  327×4 (short multiplication) \rightarrow 327×4 (long multiplication)  18×13 (long multiplication)
Year 6 As needed	Compact method for short and long multiplication – see examples from year 5 (move to 4dt x 3 dt)
	Moving to Arrays (grouping) <i>There are 5 sweets in one bag. How many in 3 bags?</i>  $5 + 5 + 5 = 15$ Arrays  $5 \times 3 = 15$ $3 \times 5 = 15$ (use practical apparatus) $5 \times 3 = 3 + 3 + 3 + 3 + 3 = 15$ Array alongside grid method 2dt x 1dt using year appropriate table facts.  $23 \times 8 = 184$ Use array initially Use apparatus such as diennes Grid method 3dt x 1dt $136 \times 5 = 680$  Compact method (consider best method)  Move to:  Multiplying decimals up to 2dp x 1dt. Multiplying a fraction by an integer and another fraction. $3 \cdot 19$ $3 \cdot 8$ ← discuss placement of '8' as unit $\frac{25 \cdot 52}{217}$

Subtraction


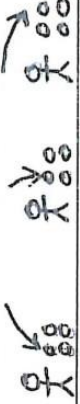

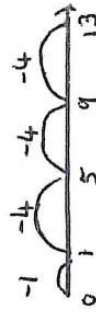
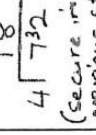
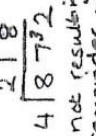
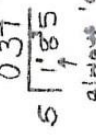
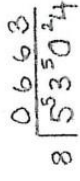
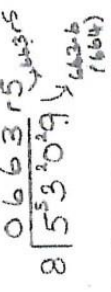
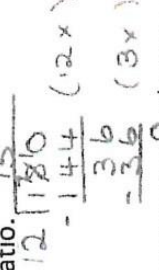
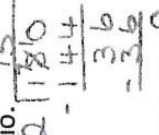
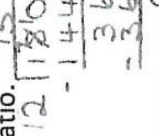

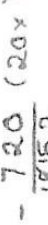
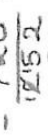
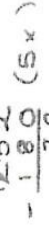
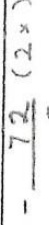
Written methods	
Ongoing	Beginning with
Year 1 N.O. lines, hundred squares, unifix, (initially), Numicon - find the difference	Structured number line. Counting back ('taking away') from numbers up to 20  $7 - 4 = 3$
Year 2 As above plus bead strings	Number line. Counting back ('taking away') 2, 2dt numbers $47 - 23$ 
Year 3 Hundred squares, bead strings, base 10, place value counters	Expanded column method (3dt - 2dt, 3dt - 3dt no decomposition; decomposition) $89 - 50 = 39$ $12 - 47 = 25$ $80 + 9 = 89$ $30 + 5 = 35$ $50 + 4 = 54$ 
Year 4 Base 10, Place value counters	Expanded column method (4dt - 3dt; 4dt - 4dt; money & measures) $2754 - 128 = 2626$ $2000 + 700 + 50 + 14 = 2754$ $100 + 20 + 8 = 128$ $2000 + 600 + 20 + 6 = 2626$
Year 5 As previous year when required	Compact column method (to at least 4dts) 
Year 6 As previous year when required	Compact method (more complex numbers; dealing with zero) 
	Moving to Counting on ('Find the difference', 'How many more?')  Counting on (difference, numbers close together) $42 - 28 = 4$ 
	Counting on (close together numbers, near multiples to 10, 100, 1000 or calculating change) I have £5. How much change will I get from £2.65? 
	Compact method (consider best method) $2852 - 261 = 2091$ $2852 - 261 = 2091$
	Compact method (decimals to 2dp moving onto 3dp, mixture of integers and decimals) $327.4 - 106.9 = 220.5$ $327.4 - 106.9 = 220.5$
	Compact method (decimals with different number of dp to 3dp, money & measures) $0.1815 - 0.3419 \text{ kg} = -0.1604 \text{ kg}$ $0.1815 - 0.3419 \text{ kg} = -0.1604 \text{ kg}$

Multiplication

Written methods

	Ongoing	Beginning with	Moving to
Year 1 Sorting apparatus, counters, numicon		Concrete objects, pictorial representations (count in 2's, 5's, 10's) <i>How many legs will the teddies have?</i> 	Arrays (grouping) <i>There are 5 sweets in one bag. How many in 3 bags?</i> 
Year 2 As above plus number lines	x = signs. Recall and use facts from 2, 5, 10 x tables. Commutative rule.	Number lines (repeated addition using at least 2, 5, 10; recall 2, 5, 10 x tables) 	Arrays  $5 \times 3 = 3 + 3 + 3 + 3 + 3 = 15$ $3 \times 5 = 5 + 5 + 5 = 15$ (use practical apparatus)
Year 3 Pre drawn grids, place value mats	x = Missing numbers / inverse operation for checking. Recall and use facts for the 2, 3, 4, 5, 8 and 10 x tables. Multiply multiples of ten by a single digit	Secure conceptual understanding of multiplication. Arrays as a more abstract form. 	Array alongside grid method 2dt x 1dt using year appropriate table facts.  $23 \times 8 = 184$ Use array initially Use apparatus such as diennes
Year 4 As above	x = Missing numbers / inverse operation for checking/ approximating by rounding. Recall and use facts for all tables up to 12 x 12. Multiply by 10, 100; multiply 3 numbers.	Grid method 2dt x 1dt using year appropriate table facts.	Grid method 3dt x 1dt $136 \times 5 = 680$ 
Year 5 Place value mats	Alongside identifying multiples and factors 12x12; multiply integers and decimals by 10, 100, 1000)	Grid method (up to 4dt x 1 or 2dt) <i>optional stage</i> 	Compact method (consider best method) 
Year 6 As needed	As above for year 5, plus multiplying by multiples of 10	Compact method for short and long multiplication – see examples from year 5 (move to 4dt x 3 dt)	Multiplying decimals up to 2dp x 1dt. Multiplying a fraction by an integer and another fraction. $3 \cdot 19$ $\times 8$ <hr/> 25.52 ← discuss placement of 8 as unit

Division

Written methods	
Ongoing	Moving to
<p>Year 1 Variety of sorting objects, number lines, numicon</p>	<p>Sharing (practical apparatus) Sharing 12 buns between 3 friends</p>  
<p>Year 2 Number lines, counters and grids, numicon</p>	<p>Recognise when to group and when to share</p>
<p>Year 3 Table squares, $\div =$ Missing numbers / inverse operation for checking using year group appropriate tables</p>	<p>Grouping (arrays, number line) – scaling down</p>  <p>$12 \div 3 = 4$</p> <p>Number line (grouping and chunking) with and without remainders – scaling down $13 \div 4 = 3 \text{ r } 1$</p> 
<p>Year 4 Table squares</p>	<p>Short division (carrying remainder; 3dt by 1dt; answer in first column, is zero)</p>    <p>Short division (up to 4dt by 1dt; include remainder answers; measures and money; real life context; interpret remainders appropriately)</p>  
<p>Year 5 Table squares</p>	<p>Introduce long division with chunking using simple numbers. Scaling by fractions and problems with ratio.</p>   
<p>Year 6 Table squares</p>	<p>Long division by efficient chunking (up to 4dt by 2dt)</p>     

Number Facts: Year 1

Number and place value

- Pupils should be taught to:
- count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number
 - count, read and write numbers to 100 in numerals; count in multiples of twos, fives and tens
 - given a number, identify one more and one less

- Pupils should be taught to:
- read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs
 - represent and use number bonds and related subtraction facts within 20
 - add and subtract one-digit and two-digit numbers to 20, including zero
 - solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as $7 = \square - \square$.

Addition and subtraction

- Pupils should be taught to:
- recognise, find and name a half as one of two equal parts of an object, shape or quantity
 - recognise, find and name a quarter as one of four equal parts of an object, shape or quantity.

- Pupils should be taught to:
- recognise and know the value of different denominations of coins and notes
 - sequence events in chronological order using language such as: before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening
 - recognise and use language relating to dates, including days of the week, weeks, months and years

Fractions

Number Facts: Number and place value

- Know the sequence of counting in multiples of 2.
- Know the sequence of counting in multiples of 10.
- Know the sequence of counting in multiples of 5.
- Understand that
 - + 1 = 'next number' on a number line
 - 1 = 'number before' on a number line

Number Facts: Addition and subtraction

- Know the number bonds for all numbers to 5

For example:

$4 + 0 = 4$	$4 - 0 = 4$
$3 + 1 = 4$	$4 - 1 = 3$
$2 + 2 = 4$	$4 - 2 = 2$
$1 + 3 = 4$	$4 - 3 = 1$
$0 + 4 = 4$	$4 - 4 = 0$

- Know the number bonds for all numbers to 10 and the related subtraction facts.
- Know the number bonds for all numbers to 20 and the related subtraction facts.

For example

$10 + 2 = 12$	$12 - 2 = 10$
$9 + 3 = 12$	$12 - 3 = 9$
$8 + 4 = 12$	$12 - 4 = 8$

- To recognise that $10 + x = \text{teen number}$

Number facts: Measure

- Say the days of the week in the correct order.
- Recognise coins such as 1p, 2p, 10p, 20p.
- Apply number bond knowledge to coins (1ps, 10ps) eg
 - $10p + 1p = 11p$
 - $10p + 2p = 12p$
 - $10p + 3p = 13p$

Number Facts: Fractions

Understand that.....

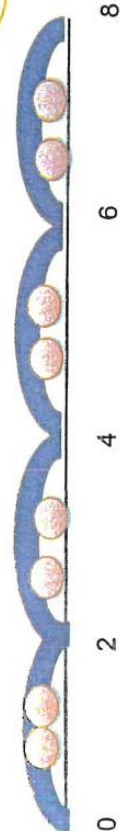
$\frac{1}{2} + \frac{1}{2} = 1$ whole (use 'half' rather than 'two halves').

$\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = 1$ whole

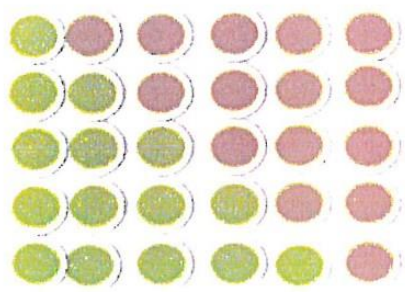
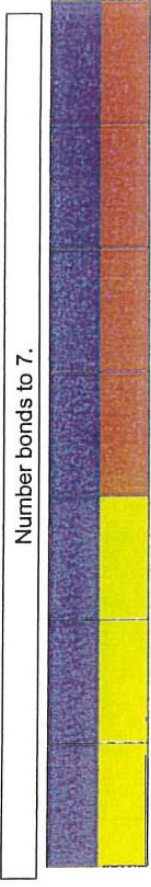
Images and mathematical models to support year 1 conceptual understanding underpinning the facts

Numberlines to 20 and 100

Counting in sequences of 2, 5 and 10

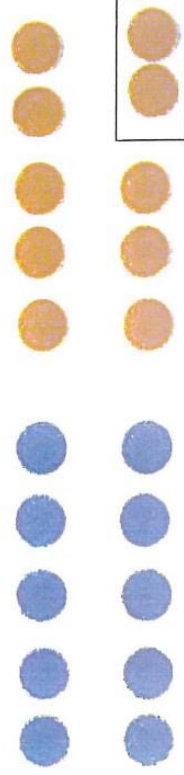
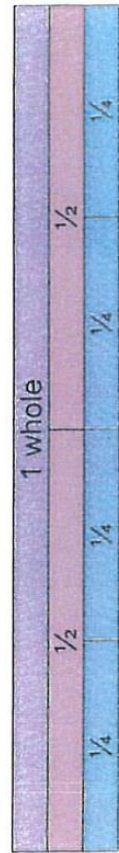


Finding one more and one less



Finding number bonds

Finding number bonds to 20



Number Facts: Year 2

Number and place value

Pupils should be taught to:

- count in steps of 2, 3, and 5 from 0, and in tens from any number, forward or backward

Pupils should be taught to:

- recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100
- recognise and use the inverse relationship between addition and subtraction and use this to check calculations and missing number problems.

Number Facts: Number and place value

- Know the sequence of counting in multiples of 3.

Multiplication and division

Pupils should be taught to:

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

Pupils should be taught to:

- recognise, find, name and write fractions $\frac{1}{3}$, $\frac{1}{2}$, $\frac{1}{4}$ and $\frac{1}{4}$ of a length, shape, set of objects or quantity
- write simple fractions e.g. $\frac{1}{2}$ of 6 = 3 and recognise the equivalence of $\frac{1}{4}$ and $\frac{1}{2}$.

Number Facts: Addition and subtraction

- Secure all number facts in the year 1 curriculum.
- Focus on inverse operations.
For example –
I know that $13 + 4 = 17$ therefore
 $17 - 4 = 13$ and $17 - 13 = 4$.
- Know number bonds to 100 using multiples of 10 using related number bond to 10 facts.
For example –

If I know that $1 + 9 = 10$, then I also know that $10 + 90 = 100$.

Number Facts: Measure

- 100p = £1 $\frac{1}{2}$ of £1 = 50p
- 100 cm = 1m
- Whole hour = 60 minutes
- $\frac{1}{2}$ an hour = 30 minutes
- $\frac{1}{4}$ of an hour = 15 minutes
- $\frac{3}{4}$ of an hour = 45 minutes
- There are 24 hours in a day
- Able to recite all the months in a year in the correct order..

Fractions

Pupils should be taught to:

- compare and sequence intervals of time.
- Know the number of minutes in an hour and the number of hours in a day

Number facts: Multiplication and division

- Know the 2, 5 and 10 times table and the related division facts.
- Be able to recognise odd and even numbers.

Number Facts: Fractions

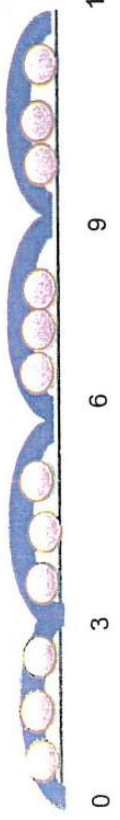
- $\frac{1}{3} + \frac{1}{3} + \frac{1}{3} = 1$ whole
 - $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{3}{4}$
 - 1 whole – $\frac{1}{4} = \frac{3}{4}$
 - $\frac{2}{4} = \frac{1}{2}$
 - Able to say $\frac{1}{2}$ of all even numbers to 20
- For example –
A half of 14 is 7

Images and mathematical models to support year 2 conceptual understanding underpinning the facts

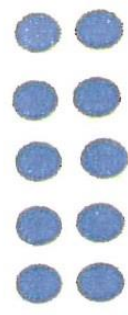
Numberline to 100



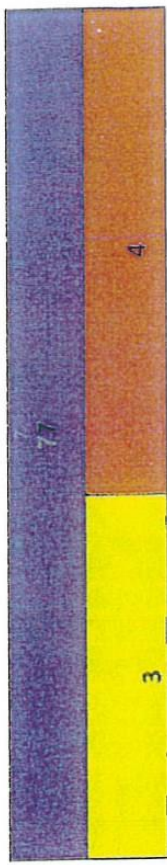
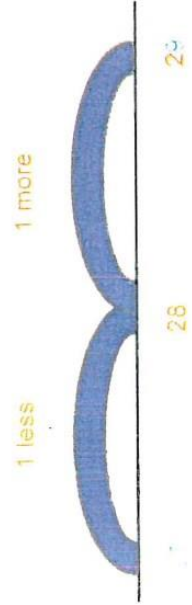
Counting in sequences of 3



$2 \times 5 = 10$
 $5 \times 2 = 10$
 $10 \div 2 = 5$
 $10 \div 5 = 2$

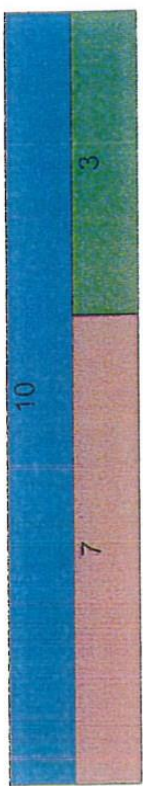


Finding one more and one less

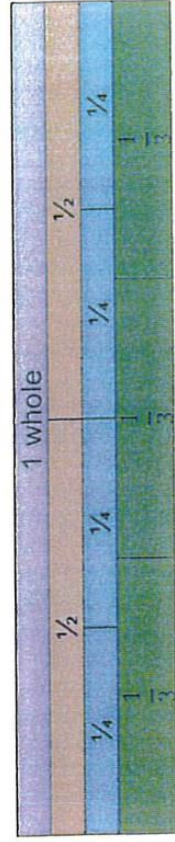
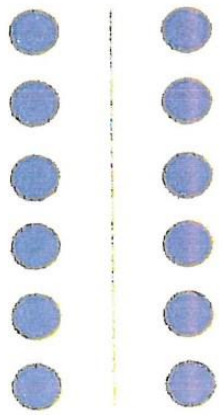


$3 + 4 = 7$
 $4 + 3 = 7$
 $7 - 3 = 4$
 $7 - 4 = 3$

Using knowledge of numberbonds to 10 to find number bonds to 100



A half of 12 is 6



Number Facts: Year 3

Number and place value

- Pupils should be taught to:
- count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number
- Pupils should be taught to:
- add and subtract numbers mentally, including:
 - a three-digit number and ones
 - a three-digit number and tens
 - a three-digit number and hundreds

Number Facts: Number and place value

- Know the sequence of counting in 50's.
- Know the sequence if counting in 100's

Multiplication and division

- Pupils should be taught to:
- recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
 - 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

Number Facts: Fractions

- $\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8} = \frac{5}{10}$
- $\frac{1}{5} + \frac{1}{5} + \frac{1}{5} + \frac{1}{5} + \frac{1}{5} = 1$ whole
- $\frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} = 1$ whole
- $\frac{1}{7} + \frac{1}{7} + \frac{1}{7} + \frac{1}{7} + \frac{1}{7} + \frac{1}{7} + \frac{1}{7} = 1$ whole
- $\frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} = 1$ whole
- $\frac{1}{9} + \frac{1}{9} + \frac{1}{9} + \frac{1}{9} + \frac{1}{9} + \frac{1}{9} + \frac{1}{9} + \frac{1}{9} + \frac{1}{9} = 1$ whole
- $\frac{1}{10} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10} = 1$ whole
- Understand fraction facts related to whole number facts
 - $1 + 5 = 6$ (Year 1)
 - $\frac{1}{6} + \frac{5}{6} = 1$ (Year 3)



Number Facts: Measure

- 60 seconds = 1 minute
- How many days in each month / year / leap year.
- Find and recognise complements to 60.
 - 50p x 2 = £1.00 £50 x 2 = £100
 - 25p x 4 = £1.00 £25 x 4 = £100
 - 20p x 5 = £1.00 £20 x 5 = £100
 - 1000g = 1kg 1000ml = 1l
 - 1000cm = 1km
 - 1000 ÷ 2 = 500 1000 ÷ 4 = 250
 - 1/2 l/kg/km = 500
 - 1/4 l/kg/km = 250
 - 3/4 l/kg/km = 750



Fractions

- Pupils should be taught to:
- count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10
 - recognise and show, using diagrams, equivalent fractions with small denominators
 - add and subtract fractions with the same denominator within one whole (e.g. $\frac{5}{7} + \frac{1}{7} = \frac{6}{7}$)

Number facts: Addition and subtraction

- Know all the complements to 100
 -  +  = 100
- Know pairs of multiples of 100 that total 1000
 - 1 + 9 = 10 (Year 1)
 - 10 + 90 = 100 (Year 2)
 - 100 + 900 = 1000 (Year 3)

Number Facts: Multiplication and division

- Know the 3, 4 and 8 times table and the related division facts
- Understand that  x 2 = doubling
- Understand that  ÷ 2 = halving
- Know that...
 - 50 x 2 = 100
 - 25 x 4 = 100
 - 20 x 5 = 100

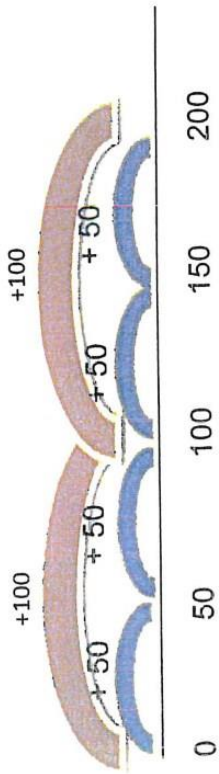
Measurement

- Pupils should be taught to:
- measure, compare, add and subtract lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml)
 - know the number of seconds in a minute and the number of days in each month, year and leap year

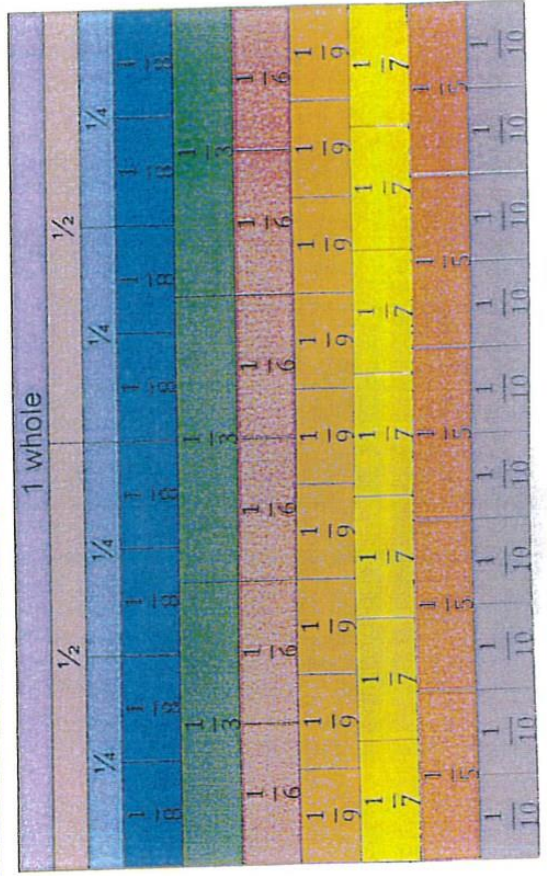
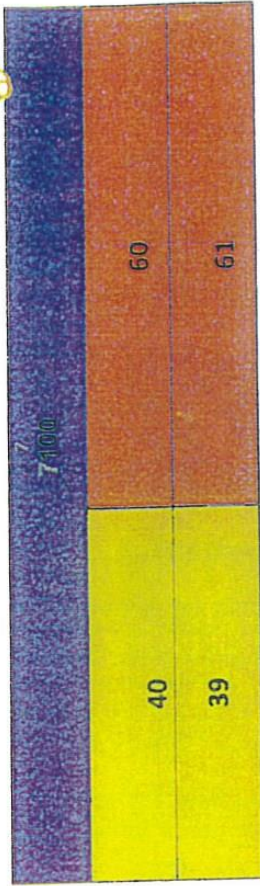
Images and mathematical models to support year 3 conceptual understanding underpinning the facts

Numberline to 1000

Counting in sequences of 50 and 100



Using knowledge of numberbonds to 100 to find number bonds to 1000



Number Facts: Year 4

Number and place value

- Pupils should be taught to
- count in multiples of 6, 7, 9, 25 and 1000

Addition and subtraction

- Pupils should be taught to
- order and compare numbers beyond 1000
- add and subtract numbers with up to 4 digits

Multiplication and division

- Pupils should be taught to:
- recall multiplication and division facts for multiplication tables up to 12×12
- multiply two-digit and three-digit numbers by a one-digit number

Fractions

- Pupils should be taught to:
- count up and down in hundredths: recognise that hundredths arise when dividing an object by a hundred and dividing tenths by ten.
- recognise and write decimal equivalents to $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$

- Convert between different units of measure (e.g. kilometre to metre; hour to minute)

Number Facts: Number and place value

- Know sequences of counting in multiples of 25.

Number Facts: Measure

- $\text{£}5.00 \times 2 = \text{£}10.00$
 $\text{£}500 \times 2 = \text{£}1000$
 $\text{£}2.50 \times 4 = \text{£}10.00$
 $\text{£}250 \times 4 = \text{£}1000$
 $\text{£}2.00 \times 5 = \text{£}10.00$
 $\text{£}200 \times 5 = \text{£}1000$
- $10\text{cm} = \frac{1}{10}\text{m}$
 $1\text{cm} = \frac{1}{100}\text{m}$
- $100\text{g} = \frac{1}{10}\text{kg}$
 $1.1\text{kg} = 1\text{kg} + 100\text{g} = 1\text{kg} + \frac{1}{10}\text{kg}$
- $48\text{hours} = 2\text{days}$
 $120\text{minutes} = 2\text{hours}$
 $90\text{minutes} = 1\frac{1}{2}\text{hours}$

Number Facts: Fractions

- $100 \div 10 = 10$
 $1000 \div 10 = 100$
 $10 \div 10 = 1$
 $1 \div 10 = \frac{1}{10}$
- $1 \div 10 = \frac{1}{10} = 0.1$
 $2 \div 10 = \frac{2}{10} = 0.2$
- $3 \div 10 = \frac{3}{10} = 0.3$
 $4 \div 10 = \frac{4}{10} = 0.4$
- $5 \div 10 = \frac{5}{10} = 0.5$
 $6 \div 10 = \frac{6}{10} = 0.6$
- $7 \div 10 = \frac{7}{10} = 0.7$
 $8 \div 10 = \frac{8}{10} = 0.8$
- $9 \div 10 = \frac{9}{10} = 0.9$
 $10 \div 10 = \frac{10}{10} = 1.0$
- $\frac{1}{4} = 0.25$
 $\frac{1}{2} = 0.5$
- $\frac{3}{4} = 0.75$

Number facts: Addition and subtraction

- Know all the complements to 10,000 using multiples of 1000
 $1 + 9 = 10$ (Year 1)
 $10 + 90 = 100$ (Year 2)
 $100 + 900 = 1000$ (Year 3)
 $1000 + 9000 = 10,000$ (Year 4)

Pupils should also understand the related subtraction facts.

- Reliably calculate 2 digit numbers mentally.

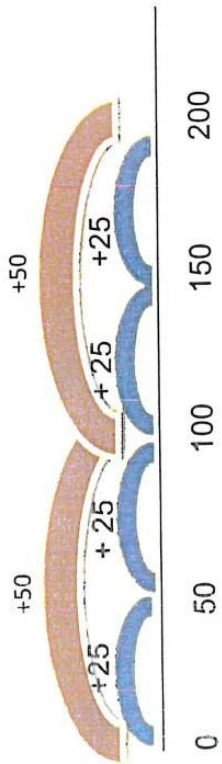
Number Facts: Multiplication and division

- Know the 6, 7 and 9 times table and the related division facts
- Know all the table facts and the related division facts
- $500 \times 2 = 1000$
 $1000 \div 2 = 500$
- $250 \times 4 = 1000$
 $1000 \div 4 = 250$
- $200 \times 5 = 1000$
 $1000 \div 5 = 200$

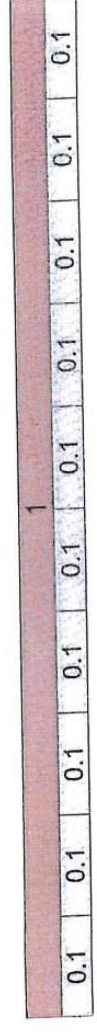
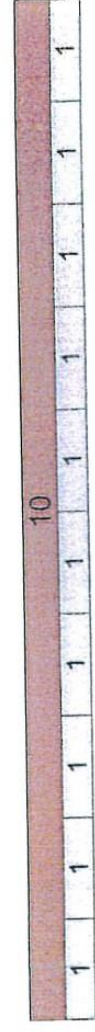
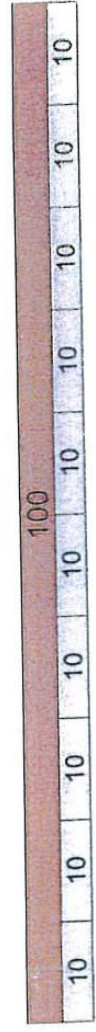
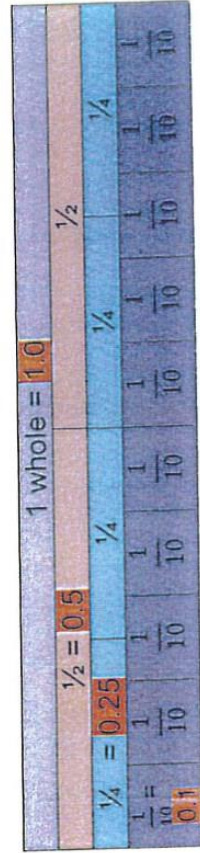
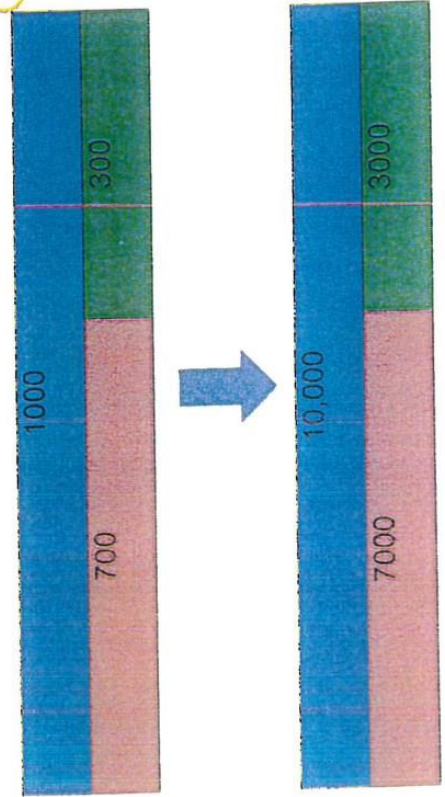
Images and mathematical models to support year 4 conceptual understanding underpinning the facts

Numberline to 10,000

Counting in sequences of 25



Using knowledge of numberbonds to 1000 to find number bonds to 10,000



Number Facts: Year 5

Multiplication and division

- Pupils should be taught to:
- recall prime numbers up to 19
 - multiply and divide numbers mentally drawing upon known facts
 - multiply and divide whole numbers and those involving decimals by 10, 100 and 1000
 - recognise and use square numbers

Number Facts: Multiplication and division

- To be able to find related facts from knowing the 12 x 12 multiplication and division facts.

For example.....

$$12 \times 5 = 60 \quad 60 \div 5 = 12$$

$$1.2 \times 5 = 6.0 \quad 6 \div 5 = 1.2$$

$$5 \times 7 = 35 \quad 5 \times 0.7 = 3.5 \quad 5 \times 0.07 = 0.35$$

- Recognise all square numbers to 12 x 12.
- Recognise all prime numbers to 19
- $10,000 \div 2 = 5000$
- $10,000 \div 4 = 2500$
- $10,000 \div 5 = 2000$
- $10,000 \div 10 = 1000$
- $10,000 \div 100 = 100$

Fractions

- Pupils should be taught to:
- read and write decimal numbers as fractions (e.g. $0.71 = \frac{71}{100}$)
 - recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents
 - recognise the per cent symbol (%) and understand that per cent relates to "number of parts per hundred", and write percentages as a fraction with denominator hundred, and as a decimal fraction

Number Facts: Fractions

- $1 \div 100 = \frac{1}{100} = 0.01$
- $2 \div 100 = \frac{2}{100} = 0.02$
- $3 \div 100 = \frac{3}{100} = 0.03$
- $4 \div 100 = \frac{4}{100} = 0.04$
- $5 \div 100 = \frac{5}{100} = 0.05$
- $6 \div 100 = \frac{6}{100} = 0.06$
- $7 \div 100 = \frac{7}{100} = 0.07$
- $8 \div 100 = \frac{8}{100} = 0.08$
- $9 \div 100 = \frac{9}{100} = 0.09$
- $10 \div 100 = \frac{10}{100} = \frac{1}{10} = 0.1$

- $10\% = 0.1 = \frac{1}{10} = \frac{10}{100} = \frac{100}{1000}$

$$50\% = 0.5 = \frac{1}{2} = \frac{5}{10} = \frac{50}{100}$$

$$25\% = 0.25 = \frac{1}{4} = \frac{4}{10} = \frac{40}{100}$$

$$75\% = 0.75 = \frac{3}{4} = \frac{75}{100}$$

$$20\% = 0.2 = \frac{1}{5} = \frac{2}{10} = \frac{20}{100}$$

$$40\% = 0.4 = \frac{4}{10} = \frac{40}{100}$$

Geometry

- Pupils should be taught to:
- convert between different units of metric measure (e.g. kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre)
 - understand and use equivalences between metric units and common imperial units such as inches, pounds and pints
- Pupils should be taught to identify:
- angles at a point and one whole turn (total 360°)
 - angles at a point on a straight line and $\frac{1}{2}$ a turn (total 180°)
 - other multiples of 90°

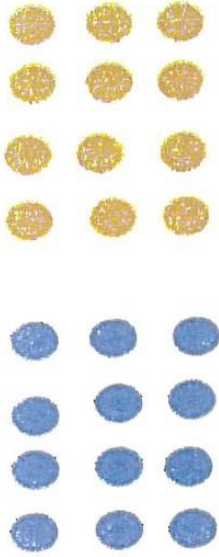
Number Facts: Measurement

- $1 \text{ mm} = \frac{1}{10} \text{ cm}$
- $1 \text{ mm} = \frac{1}{1000} \text{ m}$
- $1 \text{ kg} = 2.20462 \text{ lbs}$
- $1 \text{ l} = 1.75975 \text{ pints}$
- $1 \text{ m} = 39.3701 \text{ inches}$

Number Facts: Geometry

- To know complements to 360.
- Know complements to 180
- Recognise multiples of 90.
- Know that the angles in a triangle total 180 degrees
- Know that the angles in a quadrilateral total 360 degrees
- Know that the angles of a straight line total 180 degrees
- $360 \div 4 = 90$
- $360 \div 2 = 180$
- $\frac{1}{4}$ of $360 = 90$
- $\frac{1}{2}$ of $360 = 180$
- $\frac{3}{4}$ of $360 = 270$

Images and mathematical models to support year 5 conceptual understanding underpinning the facts



Because I know that $8 \times 3 = 24$ I also know.....

$80 \times 3 = 240$ $8 \times 30 = 240$

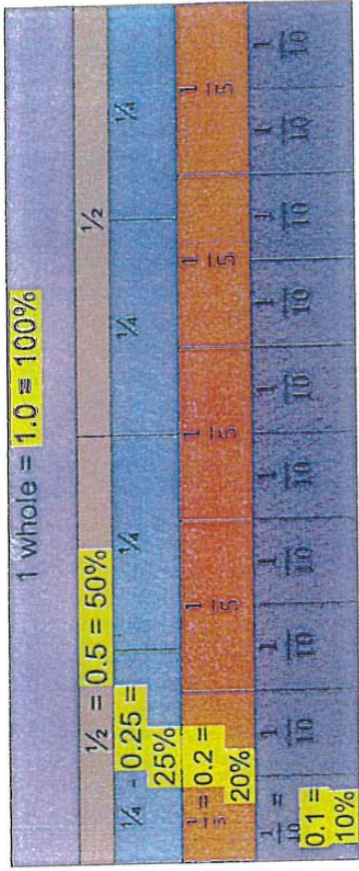
$80 \times 30 = 2400$

Because I know that $8 \times 3 = 24$ I also know.....

$80 \times 3 = 240$ $8 \times 30 = 240$

$80 \times 30 = 2400$

Know complements to 90, 180 and 360



Number Facts: Year 6

Fractions

- Pupils should be taught to:
- = associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. $\frac{3}{8}$)
 - recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.

Measurement

- Pupils should be taught to:
- = convert between miles and kilometres
 - = recognise when it is possible to use formulae for area and volume of shapes

Geometry

- Pupils should be taught to:
- = illustrate and name parts of circles, including radius, diameter and circumference
 - and know that the diameter is twice the radius

Number Facts: Measure

- 1km = 0.621371 miles
- Formula for area of a quadrilateral = length x width
- Formula for area of a triangle = $\frac{1}{2}$ base x height
- Formula for finding the volume of a cube = length x width x height

Number Facts: Fractions

$$\frac{1}{8} = 12.5\% = 0.125$$

$$\frac{1}{3} = 33.3\% = 0.333$$

Number Facts: Ratio and Proportion

- To recognise related percentage facts.
For example:
If I know 1% then I can find 2% by doubling.
If I know 10% then I can find 5% by halving

Number Facts: Geometry

- Diameter = 2 x radius
- Radius = $\frac{1}{2}$ diameter

Images and mathematical models to support year 6 conceptual understanding underpinning the facts

