Purbrook Junior School

Progression in Calculation
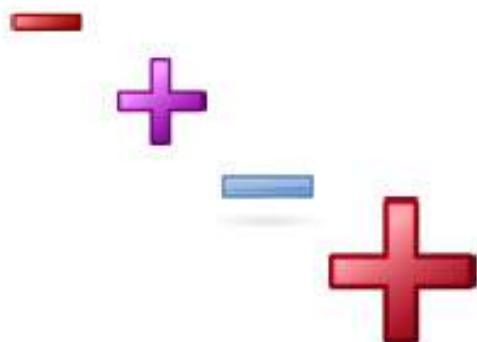
Progression in Calculation

This document has been designed alongside the Progression in Calculation document produced by the Hampshire Mathematics Advisory Centre for addition, subtraction, multiplication and division. It has been designed to allow the children of Purbook Junior School to receive an effective teaching of the calculation methods in mathematics as prescribed by the National Curriculum.

Each of the four operations requires a knowledge that can be built on mental calculations, visual images and jottings before moving onto learning a formal written method. These skills need to be taught, practised and reviewed consistently in order for learning to be secure. A sound understanding of the number system is essential for children to carry out calculations efficiently and accurately. It is imperative that children's knowledge of place value is secure and that the teaching of these methods is driven by the children's needs whilst keeping the end of year expectations in mind.

Strategies for calculation, both mental and written, need to be supported by familiar models and images, as well as a range of resources and visual representations to allow children to develop their conceptual understanding and fluency. When starting to learn a new method, it is important to use numbers that children can count with and manipulate in order to understand the concept behind it. As a result they can then apply this to harder examples by making links in their learning.

It is important that when teaching the four operations, with mental and written methods, that this is applied across all domains of the curriculum in order for children not to perceive them in isolation and to gain experiences of mathematics in everyday scenarios. In addition to this, regular opportunities for reasoning and problem solving also need to be planned for to promote depth, fluency and conceptual understanding.

MATHEMATICS ADVISORY CENTRE

Hampshire Services
Services
HIAS SCHOOL IMPROVEMENT

Progression in Calculation

Addition and Subtraction

How to use this document

This document is designed to give ideas about how to use concrete apparatus and images to support children's conceptual understanding.

So often children are able to follow calculation processes and get the answer right in many cases without fully understanding how and why the method works. This document is designed to support teachers to do that so that children are able to reason effectively and apply maths that they have learnt to other methods and new concepts as they have that deep understanding required at Mastery. Not all National Curriculum objectives are listed but just some to give a flavour of how the images and apparatus can be used to develop children's conceptual understanding of different mathematical ideas. Teachers should read previous year groups to ensure children have consolidated these ideas before moving on. For some year groups the same images and concrete resources will be used but maybe with larger numbers and with a greater level of reasoning so they have therefore not been repeated.

For more guidance use the Resource Tool https://www.ncetm.org.uk/resources/41211 on the NCETM website where exemplification material and activity ideas can be found using the following tabs of EXEMPLIFICATION and ACTIVITIES. The SUBJECT KNOWLEDGE Audit tool will also help to give an insight to the expectations under each NC objective. There is also a tab for VIDEOS under each domain where you can see teacher using concrete resources to develop childrens' conceptual understanding and reasoning.

Key Stage 1

The principal focus of mathematics teaching in key stage 1 is to ensure that pupils develop confidence and mental fluency with whole numbers, counting and place value. This should involve working with numerals, words and the four operations, including with practical resources [for example, concrete objects and measuring tools].

At this stage, pupils should develop their ability to recognise, describe, draw, compare and sort different shapes and use the related vocabulary. Teaching should also involve using a range of measures to describe and compare different quantities such as length, mass, capacity/volume, time and money.

By the end of year 2, pupils should know the number bonds to 20 and be precise in using and understanding place value. An emphasis on practice at this early stage will aid fluency.

Pupils should read and spell mathematical vocabulary, at a level consistent with their increasing word reading and spelling knowledge at key stage 1.

National Curriculum 2014

Key stage 1

Counting

Concentrate on the tricky areas e.g. bridging through 100.

97, 98, 99, 100, 101, 102

Remember to count backwards as frequently as you count on!

Year 1
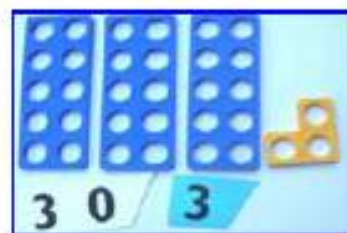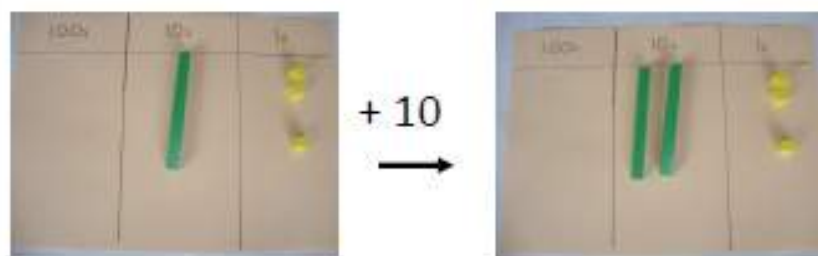Count to and across 100, forwards and backwards, beginning with 0 or 1 or from any given number. Count, read and write numbers to 100 in numerals. Given a number, identify one more, one less.

Year 2
Count in tens from any number (forwards and backwards)

What has changed? Stayed the same?

13, 23, 33

+ 10

Place Value and Number System

Ordering numbers

Which numbers are covered?

Give me a number between… and… .

How do you know?

Order consecutive to 100. Use number line to support.

Year 1
- Read and write numerals from 1 to 20 in numerals and words.
- Identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least

Number formation

Stencils, dot to dot, tracing, writing in sand, making numbers from modelling dough, using different pens.
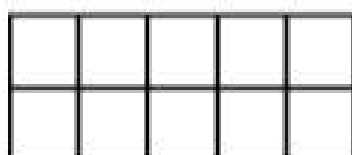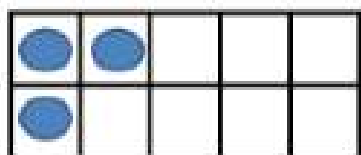
Year 1
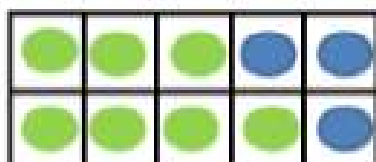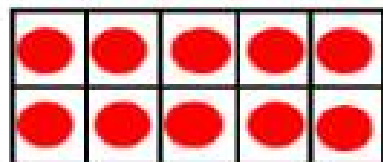Count read and write numbers to 100 in numerals.

Addition
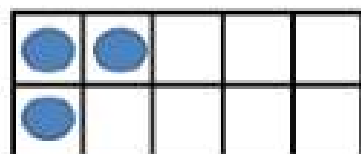
$\boxed{3}$ + $\boxed{}$ = 10

How many to make 10? What about 20?

Partitioning numbers in different ways

$20 = \boxed{10}$ + $\boxed{7}$ + $\boxed{}$

Lucy has 20 marbles in her bag. 10 were red, 7 were green and the rest were blue. How many

Commutativity

$4 + 3 = 3 + 4$

Subtraction

$36 + \boxed{}$ = 100

Jo poured 4 cups of juice from the jug. How many cups were left in the jug?

Children need to use number lines in different orientations e.g. a vertical number line supports work with capacity and Statistics

Number lines in varying orientations should always be displayed clearly on working walls. They should include the types of numbers that children are experiencing working with.

Addition

Using known facts

Secure bonds to ten

Bonds to 20

Bonds for any number to ten

Then use these for bonds within 20

Year 1
- Represent and use number bonds and related subtraction facts within 20
- Add and subtract one-digit and two-digit numbers to 20, including zero
- Read and write mathematical statements involving addition and subtraction and equals signs.

If I know 2 + 3 = 5,

How could this help you with 2 + 4?

What is the same? What is different?

Show me

Variation

Vary the way in which you present the practice. Use images and practical apparatus combined with symbols.

$$\square + \square = 5$$

$$\square + 4 = 5$$

How many ways can you make

Continue the pattern. What is the same? What is different?

$$\square + 3 = 5$$

What other ways can you arrange your counters to make your calculation equal 5?
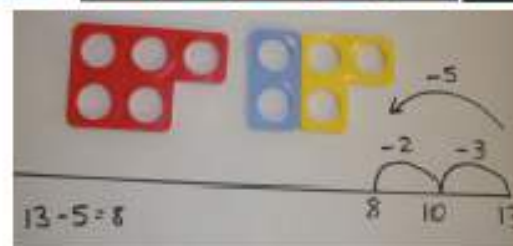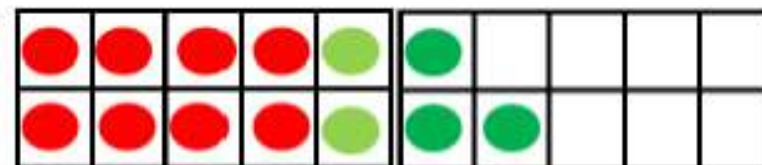
$$5 = \square + \square$$

Year 2
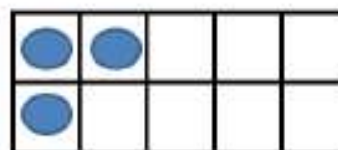- Recall and use addition and subtraction facts to 20 fluently and derive and use related facts up to 100.

Subtraction

Using known facts

$$13 - 5 = 13 - 3 - 2$$

It is important that children experience addition and subtraction in different contexts.

$$13 - 5 = 8$$

$$10 - \square = 3$$

$$20 = \square - \square$$

What subtraction facts to 20 can you show using a range of apparatus ?

Record as a number sentence.

dogs	ЖЖ ||	7
Cats	ЖЖ ЖЖ ЖЖ ||||	19
Rabbits	ЖЖ ЖЖ ||	12
Snake	|	1
Hamster	|||	3
birds	||	2

Addition

Jottings to support mental methods e.g. using place value - partitioning

Once children can count on/back in tens it is easier if they just partition one number as quickly as possible. This prevent issues with subtraction where partitioning both numbers does not work with bridging.

Progression

36 + 40 (adding only tens to any number)

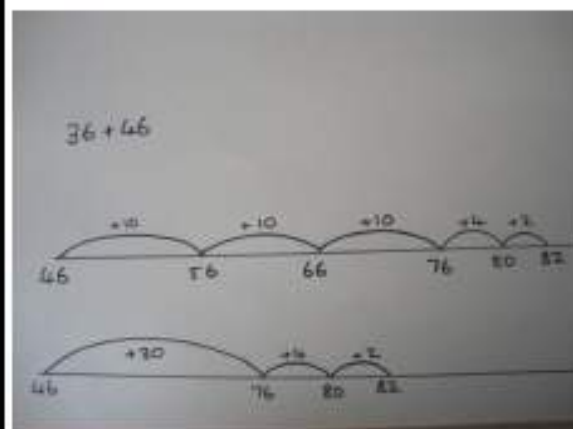36 + 43 (adding tens and ones with no bridging)

36 + 46 (adding tens and ones with bridging)

36 + 46

36 + 40 (36, 46, 56, 66, 76) add tens

76 + 6 or 76 + 4 + 2 (using number bond knowledge)

Subtraction

Jottings to support mental methods e.g. using place value - partitioning

56 - 20 (subtracting only tens to any number)

56 - 23 (subtracting tens and ones with no bridging)

56 + 28 (subtracting tens and ones with bridging)

56 - 28

56, 46, 36 (-20)

36—8 or 36—6 –2

When using number lines for addition and subtraction, ensure children understand the difference between finding the difference and counting on. Promoting conceptual understanding and fluency of number facts will help children to know which numbers contribute to their final answer e.g. the amount of jumps or the number they finish on.
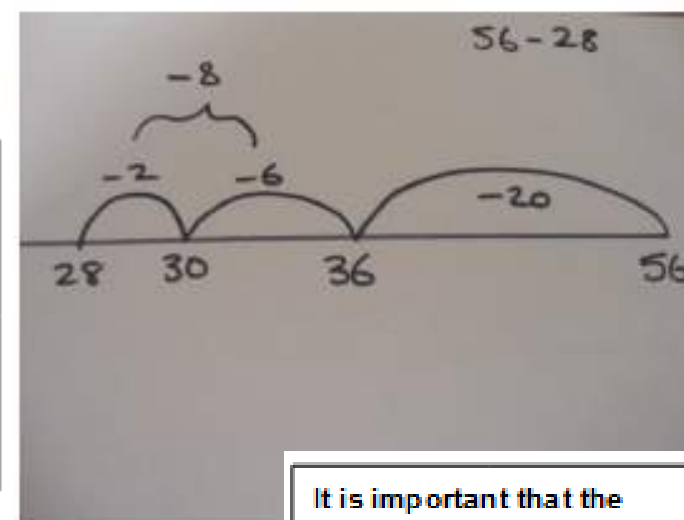
It is important that the expectation of the size of the numbers that the children should be working with are kept in mind to ensure children's number knowledge can be built on suffiently throughout the Key Stage.

Year 2
Add and subtract numbers using concrete objects, pictorial representations and mentally, including:
- A 2 digit number and ones
- A 2 digit numbers and tens
- Two 2 digit numbers.
- Adding 3 one digit numbers.

Lower Key Stage 2

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.

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.

National Curriculum 2014

Recognising place value

ANY BANK PLC

Account Payee

Pay_____

_____

20-10-25

Date _____

A N OTHER

Cheque No. Branch Sort Code Account No.
001234   20-10-25   4411223331

Lottery win! Write the winning cheques.

Correct the mistake– 1 person has been paid £100 too much/£1000 too little etc!

Use the pattern to complete the missing values.

I	1	XXI	21
II	2	XXII	22
III	3	...	23
IV	4	XXIV	24
V	5	XXV	25
VI	6	XXVI	26
VII	7	XXVII	27
VIII	8	XXVIII	28
...	9	XXIX	29
X	10	XXX	30
...	11	XXXI	31
XII	12	XXXII	32
XIII	13	XXXIII	33
XIV	14	...	34
XV	15	XXXV	35
XVI	16	XXXVI	36
XVII	17	XXXVII	37
XVIII	18	XXXVIII	38
XIX	19	XXXIX	39
XX	20	XL	40

> 1136

Prove it. How do you know? Show me.

Recognising place value

What is the same/different about the numbers?

$$340 - 20 = 360 - \square$$

$$\square\square\square + \square\square = 500$$

$$\square\square\square - \square\square\square = 320$$

It is important that children are taught to partition flexibly and see numbers represented in a variety of ways to promote conceptual understanding and fluency.

Same and different

Which calculations are the same? How do you know?

230 + 30   210 + 50   290 − 30

245 + 15   247 + 13

Year 3
- Solve problems using missing number problems using number facts, place value and more complex addition and subtraction
- order and compare numbers to 1000
- identify, represent and estimate numbers using different representations
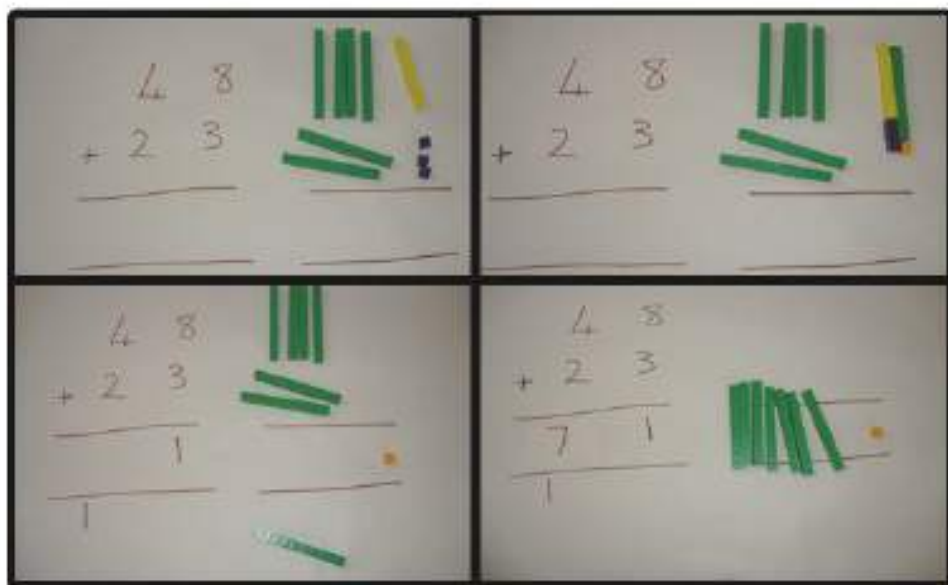
Addition

Moving to formal methods

Year 3
- Add and subtract numbers with up to 3 digits, using formal written methods of columnar addition and subtraction.

Year 4
- Add and subtract numbers with up to 4 digits, using formal written methods of columnar addition and subtraction where appropriate
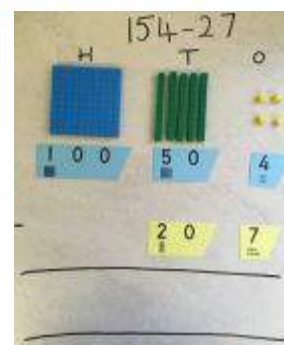
8 + 3 = 11 (exchange for 1 ten and 1 one)

Key skills progression

Carrying 10s

Carrying 100s/1000s

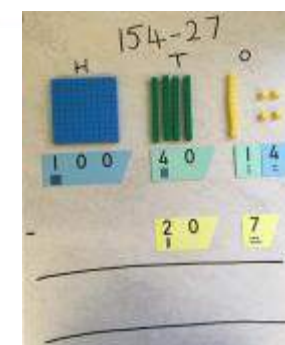Carrying in more than 1 column (e.g. 10's and 100's)
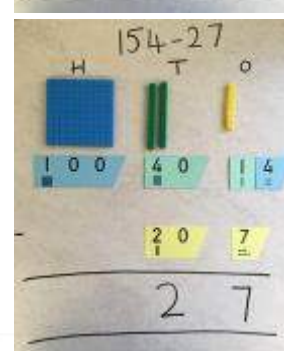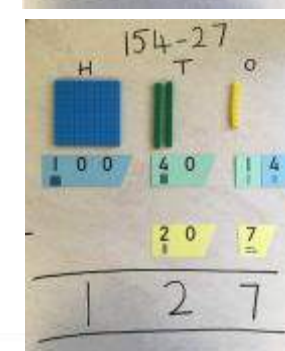
Subtraction

Moving to formal methods

1

2

3

4

Model using practical apparatus alongside written methods so children UNDERSTAND what is happening.

It is important that as a school we are consistent with the vocabulary of exchanging.

Key skills progression—exchanging or regrouping

No regrouping/exchanging required

Regrouping tens (exchanging from 1s for 10s only)

Regrouping from hundreds only (exchanging from 10s)

Regrouping in more than 1 column (e.g. exchanging both 1s and 10s for 100s)

Upper Key Stage 2

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.

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.

National Curriculum 2014

Place value, addition and subtraction in context

Year 3
- Add and subtract amounts of money to give change, using both £ and p in practical contexts. (non statutory; including mixed units)

Year 4
Estimate, compare and calculate different measures, including money in pence and pounds
NON STATUTORY- *pupils build on knowledge of place value and decimal notation to record metric measures including money.*

Use < > or = to compare

112p and £1.12

Prove it.

Year 4 Measures
- Measure and calculate the perimeter of a rectilinear figure (including squares) in cm and m

NON STATUTORY- *perimeter can be expressed algebraically as 2(a+b)*

Year 5 Statistics

Solve comparison, sum and difference problems using information presented in a line graph.

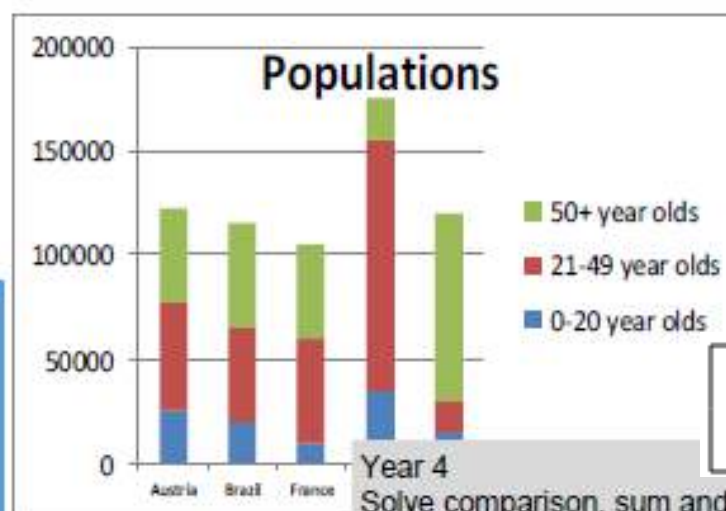What formula will I need to calculate the perimeter of a rectangle?

$2(a + b)$

How many rectangles can you draw with a perimeter of...?
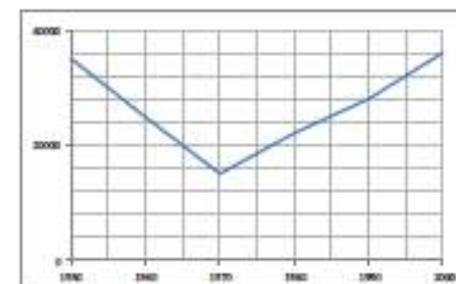
How many 21-49 year olds live in Austria?

Key

■ Blue = 0-20 year olds

■ Red = 21-49 year olds

■ Green = 50+ year olds

Populations

■ 50+ year olds
■ 21-49 year olds
■ 0-20 year olds

Austria   Brazil   France

How did the population grow between 1970 and 1980?

It is important and necessary to make links between domains so children do not perceive addition and subtraction to be in isolation.
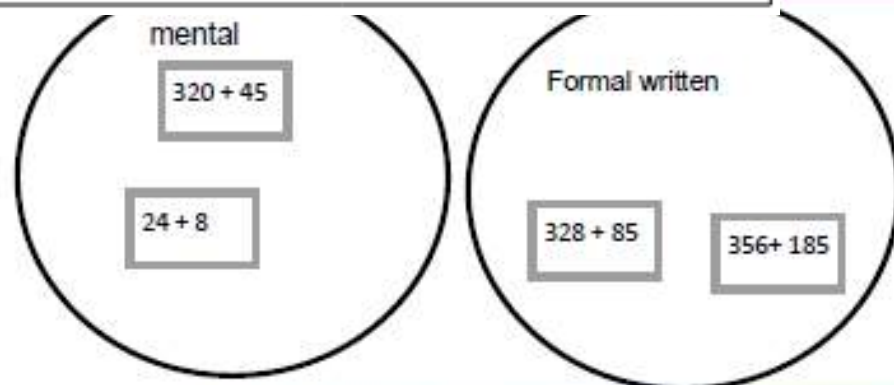
Year 4
Solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs.

Addition

Subtraction

Making choices about when formal methods are appropriate

Sort these calculations. Explain which methods you would use and why.

Encourage children to draw visual images when working mentally to help explain their thinking. How does it look in your head?

Year 3
Add and subtract numbers mentally, including:
- A three digit number and ones
- A three digit number and tens
- A three digit number and hundreds

mental

320 + 45

24 + 8

Formal written

328 + 85

356 + 185

Year 4
- Add and subtract numbers with up to 4 digits, using formal written methods of columnar addition and subtraction where appropriate

Which of these will give the following approximate answer?   50

78 – 40
175 – 122
139 – 90
89 - 50

Encourage children to make links in their learning - use what you know to work out what you do not know. What do you know about this already?

Year 5 and Year 6

solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why

If there are 2544 people in the stadium on Thursday and 3456 on Friday. How many went to the matches that week?

2500 + 3400 =
2540 + 3450 =   Which will give the largest total?
2540 + 3460 =
2500 + 3450 =
2500 + 3460 =

Year 3
- Estimate and check the answer to a calculation and use inverse operations to check answers.

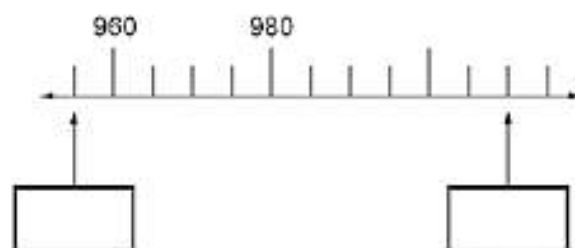# Place Value and Counting

How many of these would make a million?

Think about how you would record it?

- read, write, order and compare numbers to at least 1 00 000 and determine the value of each digit

960   980

Read the numbers on the scale.

Which number is between… and …?

Where would 4250 be approximately?

Year 6

read, write, order and compare numbers up to 10 000 000 and determine the value of each digit

Planet	Diameter km
Mercury	4878
Venus	12104
Earth	12756
Mars	6787
Jupiter	142796
Saturn	120660
Uranus	51118
Neptune	48600
Pluto	2274

Order the planet sizes from smallest to largest

Make a scale model

Year 5

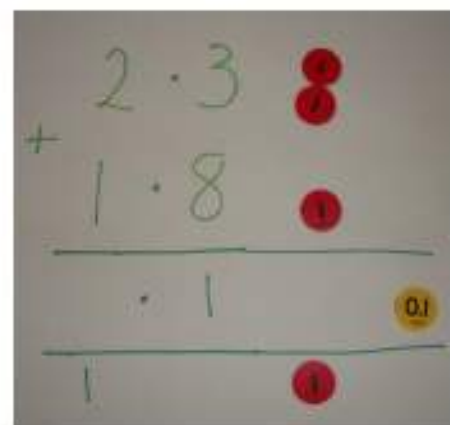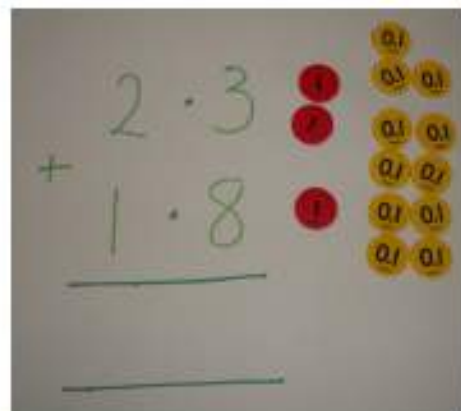- count forward or backwards in steps of powers of 10 for any given number up to 1 000 000

2500, 2600, 2700 etc

Will 3850 be in your sequence. Why? Why not?

Create a sequence with 2450 in it. Describe it.
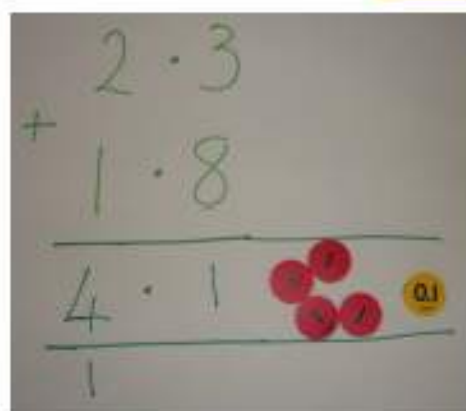
Addition

Working with decimals

Year 5

- add and subtract whole numbers with more than 4 digits,
- including using formal written methods (columnar addition and subtraction)
- add and subtract numbers mentally with increasingly large numbers

Non Statutory (Fractions)

- They mentally add and subtract tenths, and one digit whole numbers and tenths
- use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy

Subtraction

Children should continue to use concrete apparatus as required. They need to understand the structure of the maths.

This includes for decimals

Add up tenths first then whole numbers.

10 x 0.1-1 whole so exchange for 1 counter. 0.1 left in tenths column.

$2 - 0.3 = 1.7$

$1.7 + \boxed{} = 2$

Year 6

solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why

True or false?

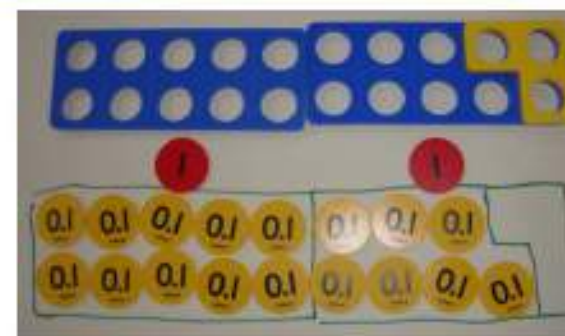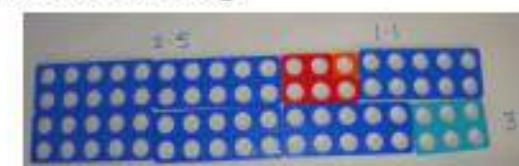Explain how you know *without* calculating.

$3.6 - 2.5 = 4.6 - 3.5$

The use of resources and visual images in Upper Key Stage 2 is still vitally important.

Statutory Guidance– Written Methods

Addition and subtraction

789 + 642 becomes

```
    7  8  9
 +  6  4  2
 _____
 1  4  3  1
    1  1
```

Answer: 1431

874 – 523 becomes

```
    8  7  4
 -  5  2  3
 _____
    3  5  1
```

Answer: 351

932 – 457 becomes
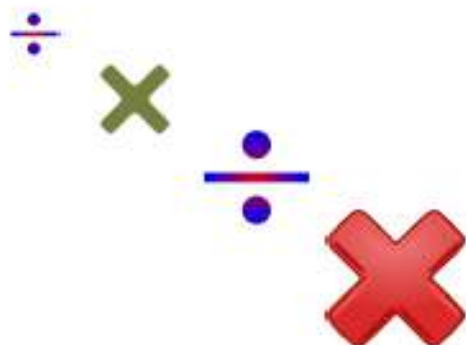
```
   8  12  1
   9   3  2
 - 4   5  7
 _____
   4   7  5
```

Answer: 475

National Curriculum 2014– Appendices

See NCETM for useful Videos modelling how to use Concrete Resources to support written methods.

https://www.ncetm.org.uk/resources/40532 Developing Column Subtraction

Progression in Calculation

Multiplication and Division

Key Stage 1

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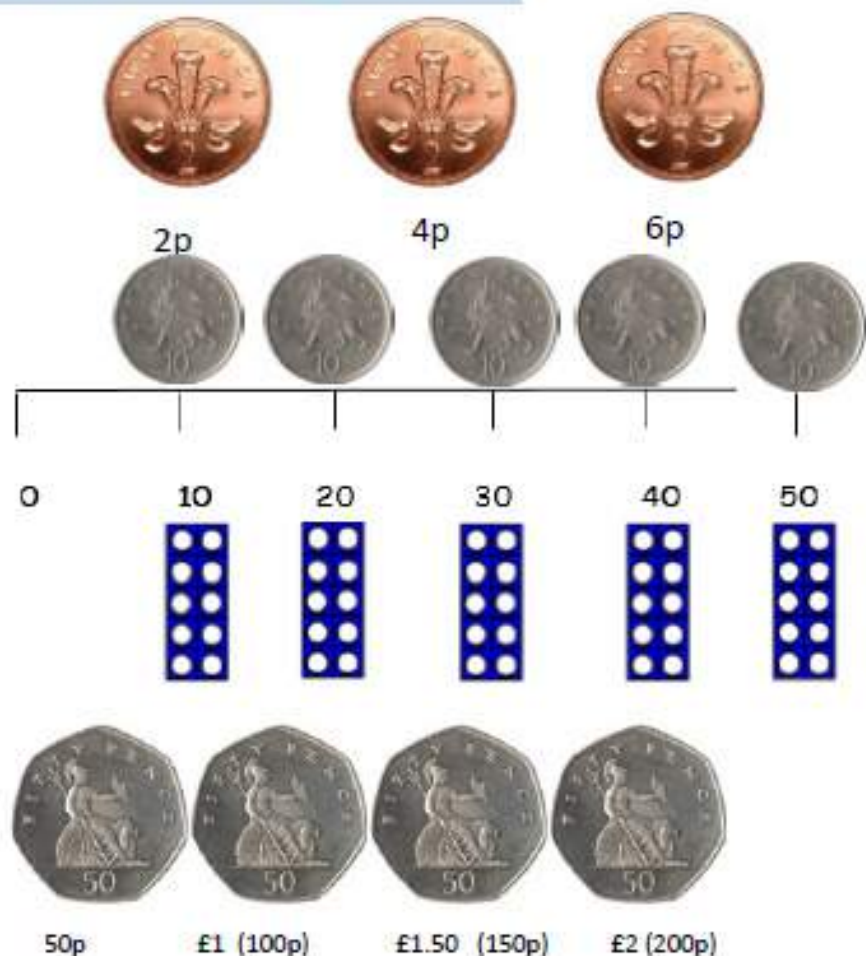
Pupils should read and spell mathematical vocabulary, at a level consistent with their increasing word reading and spelling knowledge at key stage 1.

National Curriculum 2014

Counting and Place Value

Year 1

Count in multiples of two, five and ten.

2p   4p   6p

0   10   20   30   40   50

50p   £1 (100p)   £1.50 (150p)   £2 (200p)

Year 2

Count in steps of 2, 3, 5 from 0 and in tens from any number forwards and backwards

Year 2

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

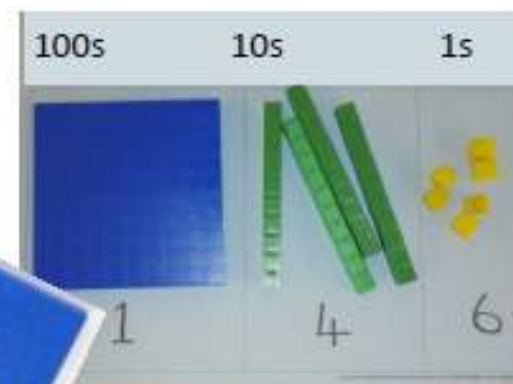$3 \times 5 = 15$

How many 3s in 15?

How many groups of 3 in 15?

$3 \times \square = 15$

Encourage explanations to gauge children's understanding of the concept of multiplication and division to aid fluency.

Year 3

Count in zero from multiples of 4, 8, 50, 100 and find 100 more or less than a given num-

What will change/stay the same if I add/subtract another 100?

100s	10s	1s
1	4	6

Using objects and pictorial representations alongside concrete resources
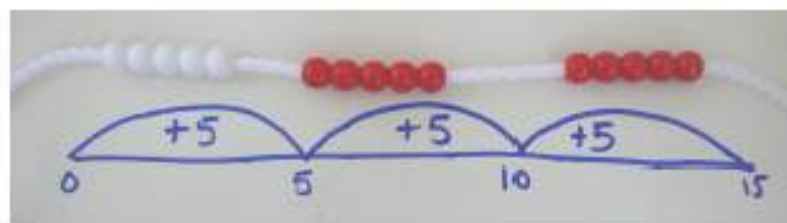
If I have 6 socks. How many pairs will that make?

3 pairs

15 frogs ÷ 3 lilly pads = ☐ Frogs on each

5 frogs on each lily pad

5 x 3 = 15

☐ frogs X 3 lilly pads = 15

Repeated Addition

There are 15 frogs. There are the same amount on each Lilly pad. If there are 3 Lilly pads, how many are sat on each one?

Division as grouping and sharing

3 people will fit in a carriage. How many carriages will I need to carry 6 people?

3 people can fit in a carriage. How many carriages?

2 carriages will be needed.

$6 \div 3 = 2$

ITPs National Numeracy Strategy
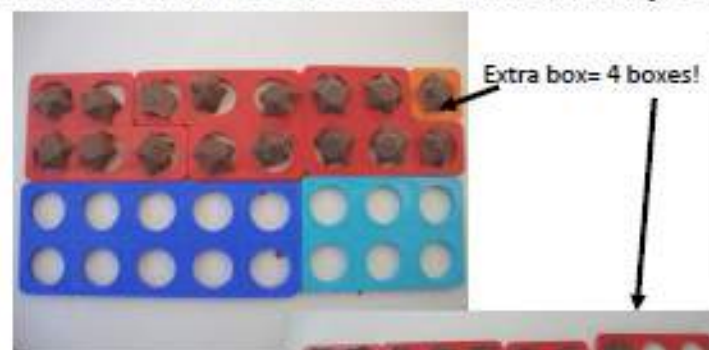
5 chocolates will fit in a box. How many boxes will I need for 15 chocolates?

What if I had 16 chocolates...how many boxes would I need then?

Extra box= 4 boxes!

There are 6 fish. How many bowls will I need if I want 2 fish in each?

There are 3 bowls, each with 2 fish!

I will group in 2s or share my fish across the 3 bowls.

Which is more efficient?

$16 \div 5 = 3 \, r \, 1$

That is 4 boxes

Multiplication- Repeated addition, arrays and multiples

4 x 1

4 x 2

4 x 3

4 x 4

4 x 5
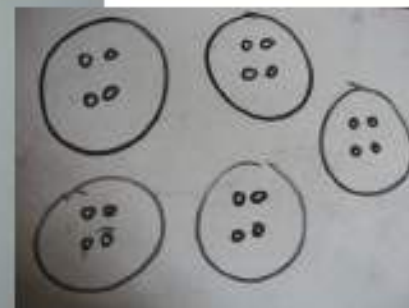
4 Cheerios in one bowl, how many in 5 bowls?

4 + 4 + 4 + 4 + 4 = 20

4 x 5 = 20

If 5 friends wanted to share 20 Cheerios, how many would they each have? 20 Cheerios ÷ 5 people = 4 Cheerios each

3 + 3 + 3 + 3 + 3   5 x 3 = 15
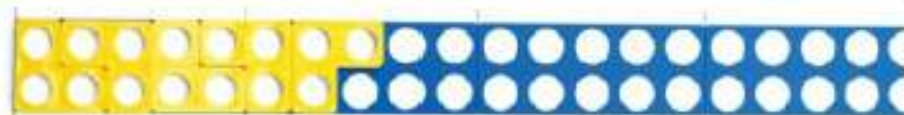
0   10   20   30
zero   ten   twenty   thirty

4 x 3 = 3 x 4

How many pies?

Lower Key Stage 2

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.

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.

National Curriculum 2014

Counting and place value

50p   100p   150p   200p

50p   £1   £1.50   £2

Year 3
* Count in zero in multiples of 4, 8, 50, 100...

50p, £1, £1.50, £2

Or 50p, 100p, 150p, 200p

Count in different contexts using the language associated with the context.

Show number lines in many orientations and count in multiples.

50ml, 100ml, 150ml.

Ordering and comparing numbers

What numbers could lie between these two values?
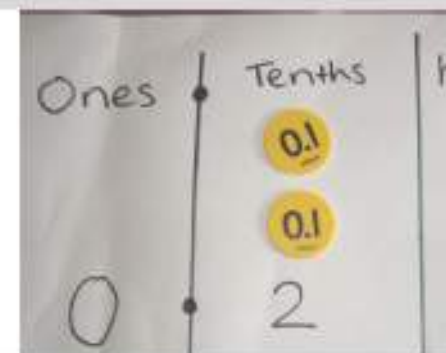
Which number is halfway between... and ...?

Year 3 (Fractions)
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.
*
   .

Year 4 (Fractions)
* Count up or down in hundredths; recognise hundredths arise when dividing an object by one hundred and dividing tenths by ten.

Complete:

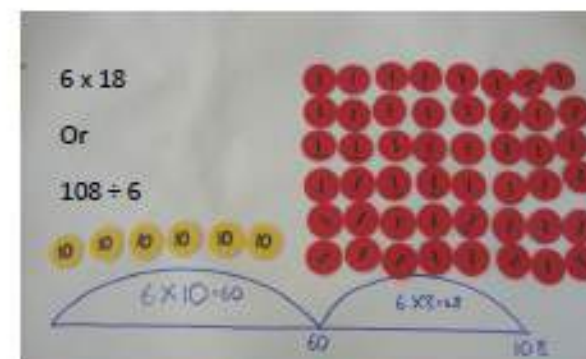## Developing Reasoning and Application to other domains

6 x 2 =

6 x 10 =

6 x 20 =

6 x 22 =

6 x 18

Or

108 ÷ 6

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

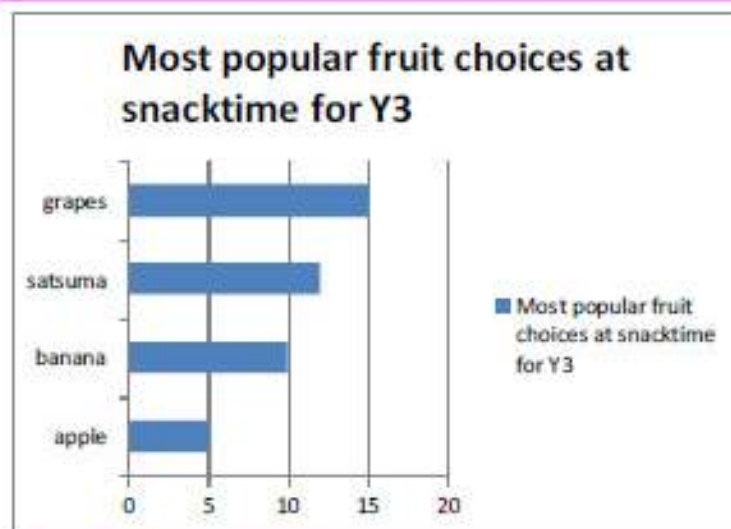What is the same/different? Model these to show the connections

Children need a good grasp of using multiplication and division facts to allow them to use informal jottings to solve simple calculations mentally using recall of known facts.

Year 3 (Statistics)
Solve one and two step problems using information presented in scaled bar charts and pictograms
Non– Statutory
Pupils use simple scales e.g. 2, 5, 10 units per cm.

How many more people prefer cats to dogs?

5—2 = 3

Favourite Pets	
Cat	🐾 🐾 🐾 🐾 🐾
Dog	🐾 🐾
Hamster	🐾 🐾 🐾

Each 🐾 stands for 2 votes

Most popular fruit choices at snacktime for Y3

How many more people preferred banana to apple?

How many people had a snack altogether?

Count in 5's to help you

$4 \times 2 \times 3 = 3 \times 2 \times 4$

Year 3 Non– Statutory
Pupils develop efficient methods, for example, using commutativity and associativity.

4 x 2 x 3 = 3 x 2 x 4

True or false? Prove it!

Moving towards formal written methods of multiplication and division

Multiplication

It is extremely important that visual representation in the form of an array is used when teaching the grid method. This will allow the children to understand the proportion of their answers e.g. How large the number will be when multiplying a ten by a ten. REF: ITP - Multiplication facts.

20   5

4

42 x 4 = 168

40 x 4 = 160
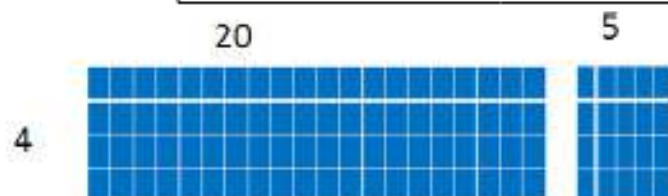
$$2\ 5$$
$$\underline{X\ 4}$$
$$2\ 0\ (5 \times 4)$$
$$\underline{8\ 0}\ (20 \times 4)$$
$$\underline{1\ 0\ 0}$$

Linking arrays and grid method

Using questions such as 'What is the same? What is different?' when moving onto new methods allows children to use the knowledge they already have to promote conceptual understanding. This will prevent an over reliance on procedural understanding.

Division

Ref: NCETM

1   4

7   70   98   28

Exchange or regroup the ten that cannot be grouped into 3s.

For video model see: https://www.ncetm.org.uk/resources/43589
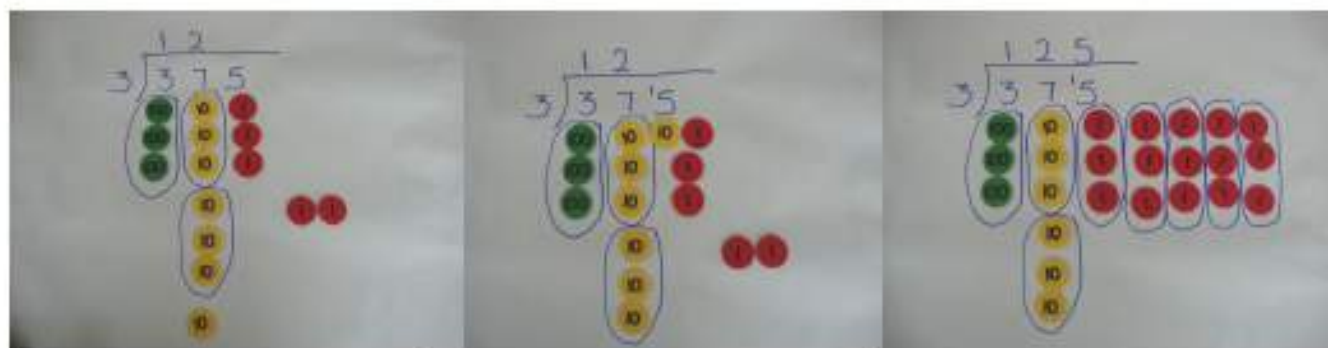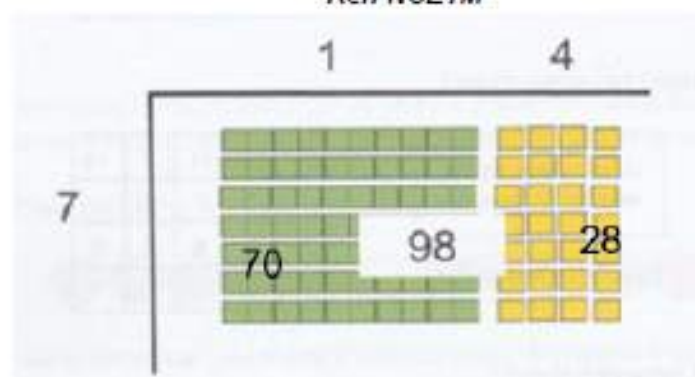
Year 4
Multiply 2 digit and 3 digit numbers by a one digit number using formal written layout. (see appendices of National Curriculum)

Upper Key Stage 2

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.

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.

National Curriculum 2014

Developing written methods of multiplication and division

Division using decimals

regroup 2 into tenths

Group into 8

0.4 to regroup into hundredths

Group into 8s (as the divisor)

2 x 0.8 = 1.6   with 0.4 to regroup into hundredths

Year 6 (Fractions)

Use written division methods in cases where the answer has up to two decimal places.

True or false? Prove it.

How do you know?

Show using a model.

0.2 x 5 = 0.5 x 2

0.2 x 4 + 0.2 = 0.2 x 5

Ref: Primary Magazine

Statutory Guidance– Formal Written Methods

Short multiplication

24 × 6 becomes

```
      2   4
  ×       6
  ─────────
  1   4   4
      2
```

Answer: 144

342 × 7 becomes

```
      3   4   2
  ×           7
  ─────────────
  2   3   9   4
      2   1
```

Answer: 2394

2741 × 6 becomes

```
      2   7   4   1
  ×               6
  ─────────────────
  1   6   4   4   6
      4   2
```

Answer: 16 446

Long multiplication

24 × 16 becomes

```
          2
      2   4
  ×   1   6
  ─────────
  2   4   0
  1   4   4
  ─────────
  3   8   4
```

Answer: 384

124 × 26 becomes

```
      1   2
  1   2   4
  ×       2   6
  ─────────────
  2   4   8   0
      7   4   4
  ─────────────
  3   2   2   4
      1   1
```

Answer: 3224

124 × 26 becomes

```
      1   2
  1   2   4
  ×       2   6
  ─────────────
      7   4   4
  2   4   8   0
  ─────────────
  3   2   2   4
      1   1
```

Answer: 3224

National Curriculum 2014– Appendices

Statutory Guidance– Formal Written Methods

Short division

$98 \div 7$ becomes

$$
\begin{array}{r}
1 \ 4 \\
\hline
7 \ | \ 9 \ {}^{2}8 \\
\end{array}
$$

Answer: 14

$432 \div 5$ becomes

$$
\begin{array}{r}
8 \ 6 \ r\,2 \\
\hline
5 \ | \ 4 \ 3 \ {}^{3}2 \\
\end{array}
$$

Answer: 86 remainder 2

$496 \div 11$ becomes

$$
\begin{array}{r}
4 \ 5 \ r\,1 \\
\hline
1 \ 1 \ | \ 4 \ 9 \ {}^{5}6 \\
\end{array}
$$

Answer: $45\frac{1}{11}$

Long division

$432 \div 15$ becomes

$$
\begin{array}{r}
2 \ 8 \ r\,12 \\
\hline
1 \ 5 \ | \ 4 \ 3 \ 2 \\
3 \ 0 \ 0 \\
\hline
1 \ 3 \ 2 \\
1 \ 2 \ 0 \\
\hline
1 \ 2 \\
\end{array}
$$

Answer: 28 remainder 12

$432 \div 15$ becomes

$$
\begin{array}{r}
2 \ 8 \\
\hline
1 \ 5 \ | \ 4 \ 3 \ 2 \\
3 \ 0 \ 0 \quad 15\times20 \\
\hline
1 \ 3 \ 2 \\
1 \ 2 \ 0 \quad 15\times8 \\
\hline
1 \ 2 \\
\end{array}
$$

$$\frac{12}{15} = \frac{4}{5}$$

Answer: $28\frac{4}{5}$

$432 \div 15$ becomes

$$
\begin{array}{r}
2 \ 8 \cdot 8 \\
\hline
1 \ 5 \ | \ 4 \ 3 \ 2 \cdot 0 \\
3 \ 0 \\
\hline
1 \ 3 \ 2 \\
1 \ 2 \ 0 \\
\hline
1 \ 2 \ 0 \\
1 \ 2 \ 0 \\
\hline
0 \\
\end{array}
$$

Answer: 28·8

National Curriculum 2014– Appendices