



Mathematics Calculation Policy

At St Faith and St Martin Church of England Junior School, we believe that children should be introduced to the process of calculation through practical, oral and mental activities. As children begin to understand the underlying ideas, they develop ways of recording to support their thinking and calculation methods, use particular methods that apply to special cases, and learn to interpret and use the signs and symbols involved.

Choosing the appropriate strategy, recoding in mathematics and in calculation in particular is an important tool both for furthering the understanding of ideas and for communication those ideas to others. A useful written method is one that helps children carry out a calculation and can be understood by others.

Written methods are complementary to mental methods and should not be seen as separate from them. The aim is that children use mental methods when appropriate, but for calculations they cannot do in their heads, they use an efficient written methods of calculation for addition, subtraction, multiplication and division which they know they can rely on when mental methods are not appropriate.

By the end of Year 6, children should be able to choose an efficient method: mental, written, calculator, which is appropriate to a given task. This policy contains the key pencil and paper procedures that will be taught within our school alongside practical resources. It has been written to ensure consistency and progression throughout the school and reflects a whole school agreement.



Addition

**ST FAITH AND ST MARTIN CE JUNIOR SCHOOL
CALCULATION POLICY**

ADDITION

YEAR 3:

VOCABULARY: add, increase, total, plus, sum, more, altogether, column addition, estimate, inverse, double, near double, one more, ten more... one hundred more, how many more to make ...? how many more is... than ...? how much more is...?, tens boundary, hundreds boundary, exchange

addend + addend = total

Method:

Children set out HTO + O (that lie within the tens boundary) in columns and record as column addition.

Example/Representation:

Children set out HTO + TO (that lie within the tens boundary) in columns and record as column addition.

Hundreds	Tens	Ones

$$345 + 23 =$$

$$\begin{array}{r} 345 \\ + 23 \\ \hline 368 \end{array}$$

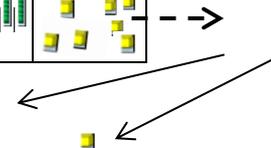
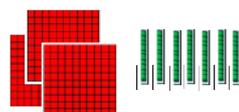
Children set out HTO + TO (that cross the tens boundary) in columns and record as column addition.

Hundreds	Tens	Ones

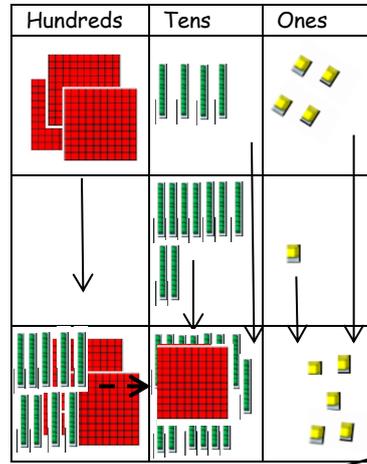
$$346 + 25 =$$

$$\begin{array}{r} 346 \\ + 25 \\ \hline 371 \end{array}$$

Exchange 11 ones for one stick of 10 and 1 unit.



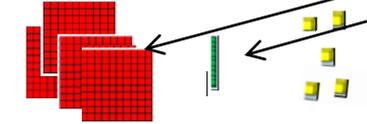
Children set out HTO + TO (that cross the hundreds boundary) in columns and record as column addition.



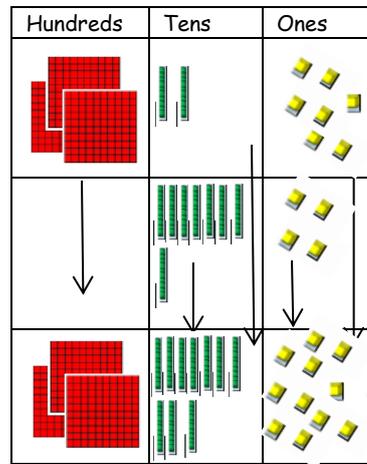
$$324 + 91 =$$

$$\begin{array}{r} 324 \\ + 91 \\ \hline 415 \end{array}$$

Exchange 11 sticks of 10 for one 100 square and 1 stick of 10.



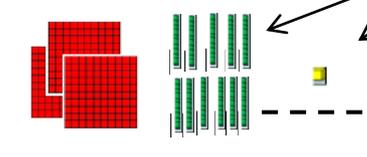
Children set out HTO + TO (that cross the hundred and tens boundaries) in columns and record as column addition.



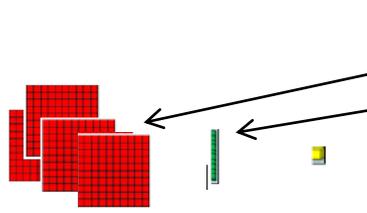
$$327 + 84 =$$

$$\begin{array}{r} 327 \\ + 84 \\ \hline 411 \end{array}$$

Exchange 11 ones for one stick of 10 and 1 unit



Exchange 11 sticks of 10 for one 100 square and 1 stick of 10



Children set out HTO + HTO (that cross the tens boundary) in columns and record as column addition.

$$423 + 139 =$$

$$\begin{array}{r} 423 \\ + 139 \\ \hline 562 \end{array}$$

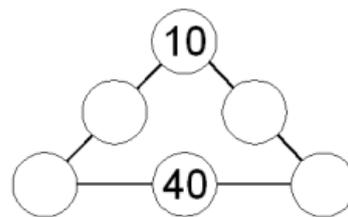
Children set out HTO + HTO (that cross the tens and hundreds boundaries) in columns and record as column addition.

$$362 + 179 =$$

$$\begin{array}{r} 362 \\ + 179 \\ \hline 541 \end{array}$$

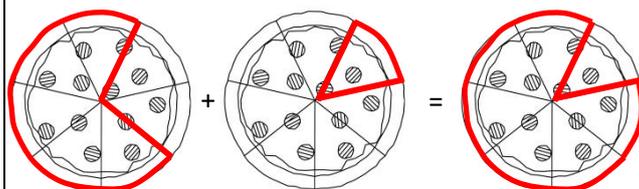
Children will solve one and two-step addition problems (including missing number problems) using concrete objects and pictorial representations.

This number triangle has missing numbers. The numbers along each edge must add up to 90. Put all the numbers: 20, 30, 50 and 60 in the circles to make the totals correct.



Pupils practise adding fractions with the same denominator through a variety of increasingly complex problems to improve fluency.

$$\frac{5}{7} + \frac{1}{7} = \frac{5+1}{7} = \frac{6}{7}$$



MENTAL STRATEGIES:

- Add numbers mentally, including:
 - a three-digit number and a single digit number
 - a 3-digit number and multiples of 10
 - a 3-digit number and multiples of 100
- Estimate the answer to a calculation and use inverse operations to check answers
- Know number pairs that total 1000 (multiples of 100)
- Calculate 10 or 100 more than any given number

YEAR 4

VOCABULARY: add, addition, more, plus, increase, sum, total, altogether, score, double, near double, tens boundary, hundreds boundary, thousands boundary, inverse, exchange

addend + addend = total

Method:

Children will add numbers with up to 4-digits using the formal written method of column addition.

Example/Representation:

$$\begin{array}{r} 2345 \\ + 1792 \\ \hline 4137 \end{array}$$

Solve two-step problems using formal jottings and explaining reasoning behind their calculations (Singapore Bar method)

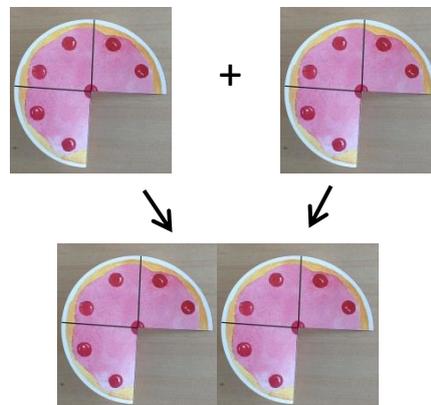
Seb has 77 cubes. He builds two towers. One tower uses 18 cubes and one tower uses 35 cubes. How many cubes does he have left over?

77		
18	35	?

$$\begin{array}{r} 18 \\ + 35 \\ \hline 53 \end{array} \quad \begin{array}{r} 77 \\ - 53 \\ \hline 24 \end{array}$$

Pupils continue practise in adding fractions with the same denominator to become fluent through a variety of increasingly complex problems beyond one whole.

$$\frac{3}{4} + \frac{3}{4} = \frac{3+3}{4} = \frac{6}{4}$$

**MENTAL STRATEGIES:**

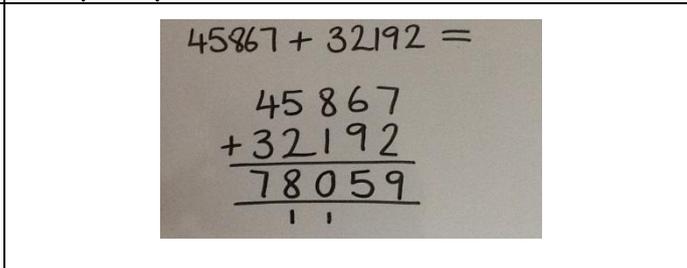
- Add numbers mentally, including:
 - a four digit number and multiples of one thousand
- Use knowledge of doubles to derive related facts (e.g $15 + 16 = 31$ because $15 + 15 = 30$ and $30 + 1 = 31$)
- Know number pairs that total 1000 (multiples of 10)
- Estimate the answer to a calculation and use inverse operations to check answers

YEAR 5

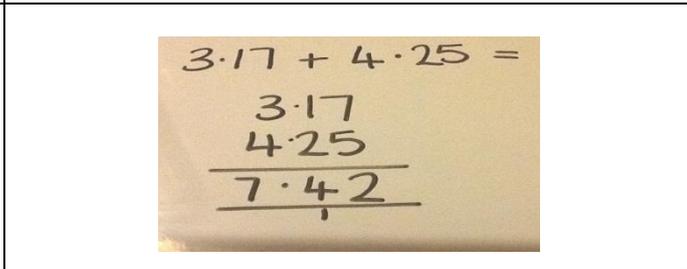
VOCABULARY: Efficient written method, add, addition, more, plus, increase, sum, total, altogether, score, tens boundary, hundreds boundary, thousands boundary, ones boundary, tenths boundary, inverse, exchange
 addend + addend = total

Method: **Example/Representation:**

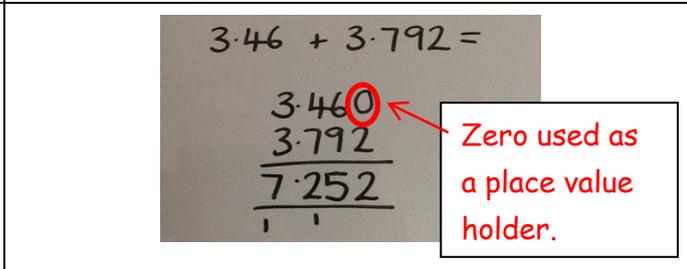
Children will add numbers with more than 4-digits using the formal written method of column addition.



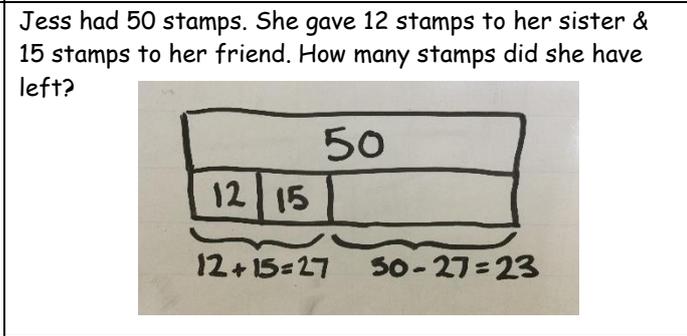
Children will add decimal numbers with the same number of decimal places using the formal written method column addition.



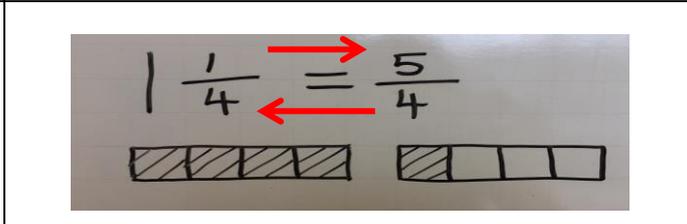
Children will add decimal numbers with a different number of decimal places using the formal written method column addition using 0 as a place value holder.



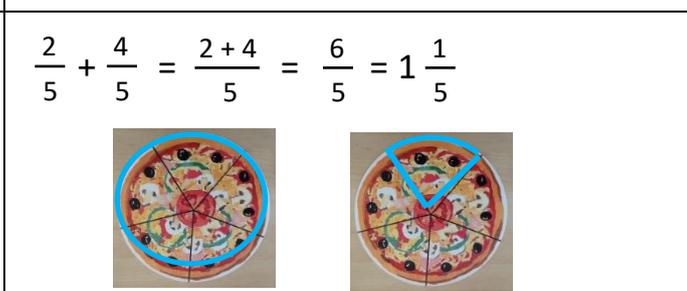
Solve multi-step problems (that may include subtraction) using formal jottings and explaining reasoning behind their choice of operation and calculation (Singapore Bar Method).



Recognise mixed numbers and improper fractions and convert from one to the other.



Practise adding fractions where calculations exceed one as a mixed number



- MENTAL STRATEGIES:**
- Add numbers mentally with increasingly large numbers (e.g $10,162 + 2,300 = 12,462$)
 - Mentally add tenths (e.g $0.2 + 0.6 = 0.8$) and 1-digit whole numbers and tenths ($8 + 0.3 = 8.3$)
 - Use number bonds to 100 knowledge to calculate complements to one using hundredths (e.g $0.83 + 0.17 = 1$)
 - Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy.

YEAR 6

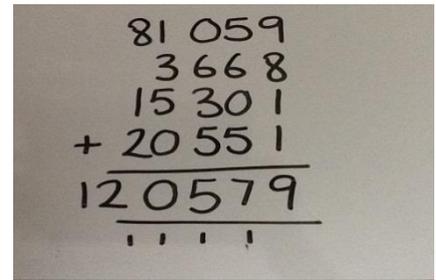
VOCABULARY: order of operations, column addition, add, in total, answer, tens boundary, hundreds boundary, thousands boundary, millions boundary, ones boundary, tenths boundary, hundredths boundary, decimal place, inverse, exchange

addend + addend = total

Method:**Example/Representation:**

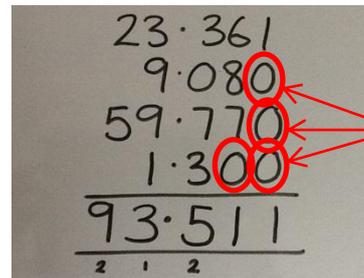
Children will add several numbers of increasing complexity.

$$81,059 + 3,668 + 15,301 + 20,551 = 120,579$$



Children will add several decimal numbers with a different number of decimal places.

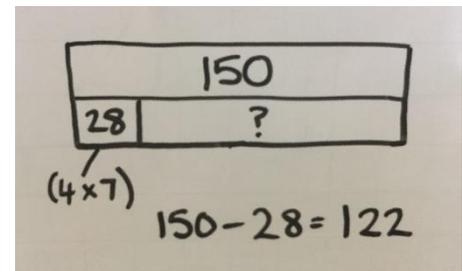
$$23.361 + 9.08 + 59.77 + 1.3 = 93.511$$



Zero used as a place value holder.

Solve multi-step problems (that may include subtraction) using formal jottings and explaining reasoning behind their calculations (Singapore Bar Method)

A pack of paper has 150 sheets. 4 children take 7 sheets each. How many sheets of paper are left in the packet?



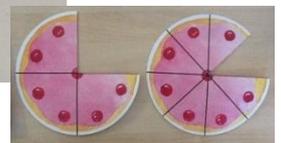
Add fractions and mixed numbers with different denominators using the concept of equivalent fractions.

$$\frac{3}{4} + \frac{7}{8} = 1\frac{5}{8}$$

$$\frac{3}{4} \times \frac{2}{2} = \frac{6}{8}$$

$$\frac{6}{8} + \frac{7}{8} = \frac{13}{8} = 1\frac{5}{8}$$

Check & adjust



$$2\frac{2}{3} + 1\frac{2}{3} =$$

$$\begin{array}{r} 2\frac{2}{3} \\ + 1\frac{2}{3} \\ \hline 3\frac{4}{3} \end{array} \rightarrow 3\frac{4}{3} = 3 + \frac{3}{3} + \frac{1}{3}$$

$$= 3 + 1 + \frac{1}{3}$$

$$= 4\frac{1}{3}$$

MENTAL STRATEGIES:

- Add numbers mentally with increasingly large numbers (e.g $10,162 + 2,300 = 12,462$)
- Add decimal numbers mentally (up to 2 decimal places)
- Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.



Subtraction

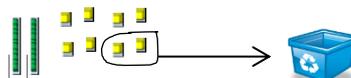
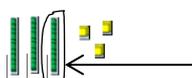
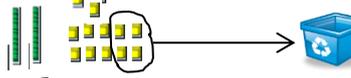
**ST FAITH AND ST MARTIN CE JUNIOR SCHOOL
CALCULATION POLICY**

SUBTRACTION

YEAR 3:

VOCABULARY: leave, subtract, less, minus, column subtraction, inverse, decomposition, exchange, how many are left/left over?, difference between, how many more/fewer is... than...?, how much more/less is...?, Is the same as, equals, sign, multiples of tens and hundreds

minuend - subtrahend = difference

Method:	Example/Representation:
<p>Children begin to set out TO - TO (that lie within the tens boundary) in columns and record as column subtraction.</p>	<div style="display: flex; flex-direction: column; align-items: center;">  <div style="border: 1px solid black; padding: 2px; margin: 2px;">Subtract ones first</div>  <div style="border: 1px solid black; padding: 2px; margin: 2px;">Then subtract tens</div> <div style="border: 1px solid black; padding: 5px; margin: 2px; background-color: #f0e68c;"> $28 - 12 = 16$ $\begin{array}{r} 28 \\ - 12 \\ \hline 16 \end{array}$ </div> </div>
<p>Children begin to set out TO - TO (that cross the tens boundary) in columns and record as column subtraction with decomposition.</p>	<div style="display: flex; flex-direction: column; align-items: center;">  <div style="border: 1px solid black; padding: 2px; margin: 2px;">Exchange 1 stick of 10 for 10 ones</div>  <div style="border: 1px solid black; padding: 2px; margin: 2px;">Subtract the ones</div>  <div style="border: 1px solid black; padding: 2px; margin: 2px;">Subtract the tens</div> <div style="border: 1px solid black; padding: 5px; margin: 2px; background-color: #f0e68c;"> $33 - 14 = 19$ $\begin{array}{r} \overset{\cancel{3}}{3}3 \\ - 14 \\ \hline 19 \end{array}$ </div> </div>
<p>Children begin to set out HTO - TO (that lie within the tens boundary) in columns and record as column subtraction.</p>	<div style="border: 1px solid black; padding: 10px; background-color: #f0e68c; text-align: center;"> $324 - 12 =$ $\begin{array}{r} 324 \\ - 12 \\ \hline 312 \end{array}$ </div>
<p>Children begin to set out HTO - TO (that cross the tens boundary) in columns and record as column subtraction with decomposition.</p>	<div style="border: 1px solid black; padding: 10px; background-color: #f0e68c; text-align: center;"> $136 - 18 = 118$ $\begin{array}{r} \overset{\cancel{1}}{1}36 \\ - 18 \\ \hline 118 \end{array}$ </div>

Children begin to set out HTO - TO (that cross the hundreds boundary) in columns and record as column subtraction with decomposition.

Subtract the ones

Exchange 1 square of 100 for 10 sticks of 10.

Subtract the tens

$$236 - 73 = 163$$

$$\begin{array}{r} 236 \\ - 73 \\ \hline 163 \end{array}$$

Children begin to set out HTO - TO (that cross the hundreds and tens boundary) in columns and record as column subtraction with decomposition.

$$242 - 94 = 148$$

$$\begin{array}{r} 242 \\ - 94 \\ \hline 148 \end{array}$$

Children begin to set out HTO - HTO (that cross the hundreds and tens boundary) in columns and record as column subtraction with decomposition.

$$341 - 183$$

$$\begin{array}{r} 341 \\ - 183 \\ \hline 158 \end{array}$$

Children will solve one and two-step subtraction problems (including missing number problems).

Fill in the missing number:



Children practise subtracting fractions with the same denominator through a variety of increasingly complex problems to improve fluency.

$$\frac{5}{7} - \frac{1}{7} = \frac{5-1}{7} = \frac{4}{7}$$

MENTAL STRATEGIES:

- Subtract numbers mentally, including:
 - Subtracting a single digit number from a 3-digit number
 - Subtracting a multiple of 10 from a 3-digit number
 - Subtracting a multiple of 10 from a 3-digit number
- Estimate the answer to a calculation and use inverse operations to check answer

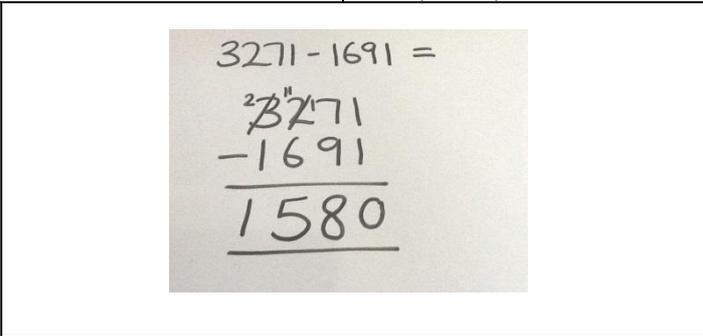
YEAR 4

VOCABULARY: subtract, subtraction, minus, decrease, leave, how many are left/left over?, difference between, how many more/fewer is... than...?, how much more/less is...?, Is the same as, equals, sign. Column subtraction, decomposition, exchange, multiples of thousand, inverse, exchange

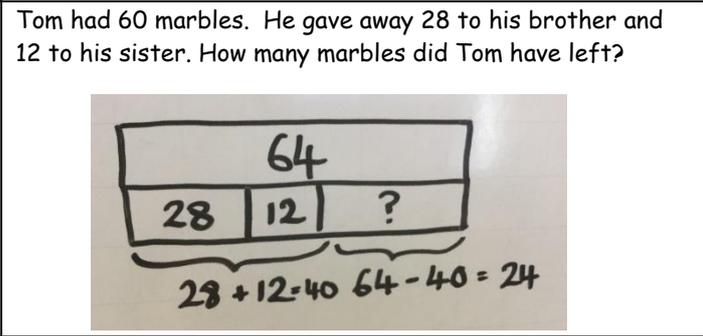
minuend - subtrahend = difference

Method: **Example/Representation:**

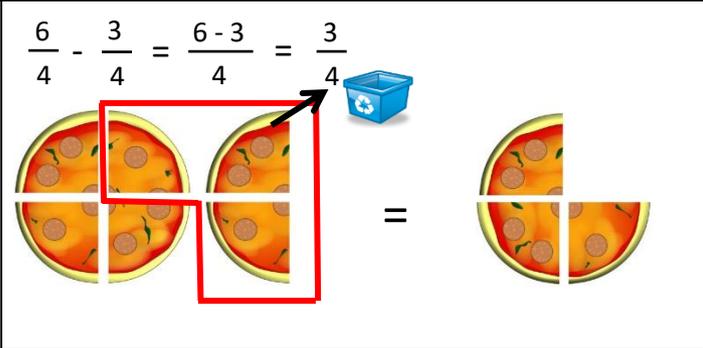
Children will subtract numbers with up to 4-digits using the formal written method of column subtraction with decomposition.



Solve two-step problems using formal jottings and explaining reasoning behind their choice of operation and calculations (Singapore Bar Method).



Pupils continue practise in subtracting fractions with the same denominator to become fluent through a variety of increasingly complex problems beyond one whole.



MENTAL STRATEGIES:

- Subtract numbers mentally, including:
- Subtracting multiples of one thousand from a 4-digit number
- Use of number pairs that total 1000 (multiples of 10) to calculate subtraction (e.g 1000 - 300 = 700)
- Estimate the answer to a calculation and use inverse operations to check answers

YEAR 5

VOCABULARY: efficient written method, subtract, subtraction, minus, decrease, difference between, inverse, decimals, ones and tenths boundary, column subtraction, decomposition, exchange.

minuend - subtrahend = difference

Method:**Example/Representation:**

Children will subtract numbers with more than 4-digits using the formal written method of column subtraction with decomposition.

$$\begin{array}{r} 63719 - 32831 = \\ \cancel{6} \overset{5}{} 3719 \\ - 32831 \\ \hline 30888 \end{array}$$

Children will subtract decimal numbers with the same number of decimal places with decomposition.

$$\begin{array}{r} 4.63 - 2.91 = \\ \cancel{4} \overset{3}{}.63 \\ - 2.91 \\ \hline 1.72 \end{array}$$

Solve multi-step problems using formal jottings and explaining reasoning behind their calculations (Singapore method?)

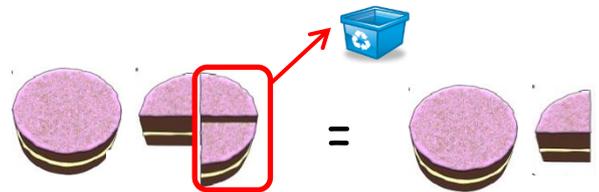
Ali had £10. He bought a DVD for £6.70 and a CD for £2.90. How much money did he have left?

$$\begin{array}{|c|c|c|} \hline 10 & & \\ \hline 6.70 & 2.90 & ? \\ \hline \end{array}$$

$\text{£}6.70 + \text{£}2.90 = \text{£}9.60$
 $\text{£}10.00 - \text{£}9.60 = \text{£}0.40$

Practise subtracting fractions where calculations exceed one as a mixed number.

$$\begin{array}{r} 2 \frac{3}{4} - 1 \frac{2}{4} = 1 \frac{1}{4} \\ \cancel{2} \overset{1}{} \frac{3}{4} \\ - 1 \frac{2}{4} \\ \hline 1 \frac{1}{4} \end{array}$$

**MENTAL STRATEGIES:**

- Subtract increasingly large numbers mentally (e.g. $12, 654 - 1,341 = 11, 213$)
- Mentally subtract tenths (e.g. $0.7 - 0.5 = 0.2$) and 1-digit whole numbers and tenths ($8 - 0.3 = 7.7$)
- Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy

YEAR 6

VOCABULARY: order of operations, subtract, decrease, difference, inverse, decimals, ones , tenths and hundredths boundary, column subtraction, decomposition, exchange.

minuend - subtrahend = difference

Method:

Example/Representation:

Children will subtract several numbers of increasing complexity and be taught to combine some of the numbers so that the subtraction can be completed.

$$63719 - 2352 - 175 =$$

$$\begin{array}{r} 63719 \\ - 2352 \\ \hline 61367 \\ - 175 \\ \hline 61192 \end{array}$$

Children will subtract decimal numbers with a different number of decimal places with decomposition.

$$3.21 - 1.8 =$$

$$\begin{array}{r} 3.21 \\ - 1.80 \\ \hline 1.41 \end{array}$$

Zero used as place holder

Children will subtract several decimals numbers with a different number of decimal places be taught to combine some of the numbers so that the subtraction can be completed.

$$7.35 - 2.1 - 1.675 =$$

$$\begin{array}{r} 7.35 \\ - 2.10 \\ \hline 5.25 \\ - 1.675 \\ \hline 3.575 \end{array}$$

Zero used as place holder

Solve multi-step problems using formal jottings and explaining reasoning behind their calculations (Singapore method?)

Chen & Megan each buy a sandwich. Chen gets 5p change from £2 and Megan gets £2.25 change from £5. How much more does Megan pay than Chen?

①

C	£2.00	£2 - 0.05 =
	?	£1.95

M

£5	£5 - £2.25 =
£2.25 ?	£2.75

②

£2.75	£2.75 - £1.95 =
£1.95 ?	£0.80

Subtract fractions and mixed numbers with different denominators using the concept of equivalent fractions.

$$3\frac{1}{5} - 1\frac{4}{10} = 2\frac{2}{10} = 2\frac{1}{5}$$

MENTAL STRATEGIES:

- Subtract increasingly large numbers mentally (e.g 12, 654 - 1,341 = 11, 213)
- Subtract decimal numbers mentally (up to 2 decimal places)
- Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.



Multiplication

**ST FAITH AND ST MARTIN CE JUNIOR SCHOOL
CALCULATION POLICY**

MULTIPLICATION

YEAR 3:

VOCABULARY: multiply, times, groups of, equal groups of, multiple of, multiplied by, estimate, inverse, grid multiplication, expanded column multiplication, partition, commutative, associative, product.

factor x factor = product

Method:

Example/Representation:

Children will learn to calculate doubles of 2-digit numbers through partitioning.

Double 24 = 24 + 24 = 48

Children will be taught to multiply numbers (TO x O) through partitioning and the formal written method of grid multiplication.

$$23 \times 4 = 92$$

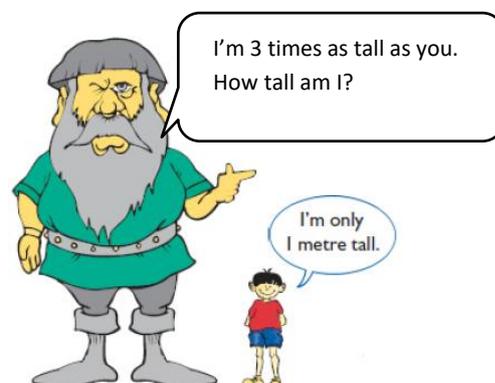
	20	3	80
4	80	12	+ 12
			92

Children will be taught to multiply numbers (TO x O) using the formal written method of expanded column multiplication and make the link to grid method.

$$23 \times 4 = 92$$

23	
x 4	
12	(4 x 3)
+ 80	(4 x 20)
92	

Children will solve problems involving multiplication, including scaling.



MENTAL STRATEGIES:

- Count forwards and backwards in multiples of 4, 8, 50 & 100
- Know the 3, 4 and 8 times tables (in and out of order)
- Connect the 2, 4 and 8 times tables through doubling
- Use knowledge of place value to calculate multiplication (e.g. $2 \times 2 = 4$, $2 \times 20 = 40$, $2 \times 200 = 400$)

YEAR 4

VOCABULARY: multiply, multiplied by, product, short multiplication, partition, distributive law, commutative, groups of, multiply, times, multiples, inverse, exchange

factor \times factor = product

Method:**Example/Representation:**

Children will be taught to multiply numbers (TO \times O) by partitioning the 2-digit number and using two short multiplications along with addition to solve the problem (Distributive Law).

$$24 \times 7 = 168$$

$$\begin{array}{r} 20 \\ \times 7 \\ \hline 140 \end{array} \quad \begin{array}{r} 4 \\ \times 7 \\ \hline 28 \end{array} \quad \begin{array}{r} 140 \\ + 28 \\ \hline 168 \end{array}$$

Children will be taught to multiply numbers (TO \times O) using the formal written method of short multiplication and will link with the Distributive Law method.

$$24 \times 7 = 168$$

$$\begin{array}{r} 20 \\ \times 7 \\ \hline 140 \end{array} \quad \begin{array}{r} 4 \\ \times 7 \\ \hline 28 \end{array} \quad \begin{array}{r} 140 \\ + 28 \\ \hline 168 \end{array} \rightarrow \begin{array}{r} 24 \\ \times 7 \\ \hline 168 \\ \text{\scriptsize 2} \end{array}$$

Distributive Law *Short multiplication*

Children will be taught to multiply numbers (HTO & O) by partitioning the 3-digit number and using two short multiplications along with addition to solve the problem

$$235 \times 6 = 1410$$

$$\begin{array}{r} 200 \\ \times 6 \\ \hline 1200 \end{array} \quad \begin{array}{r} 30 \\ \times 6 \\ \hline 210 \end{array} \quad \begin{array}{r} 5 \\ \times 6 \\ \hline 30 \end{array} \quad \begin{array}{r} 1200 \\ + 210 \\ + 30 \\ \hline 1410 \end{array}$$

Children will be taught to multiply numbers (HTO \times O) using the formal written method of short multiplication and will link with the Distributive Law method.

$$235 \times 6 = 1410$$

$$\begin{array}{r} 235 \\ \times 6 \\ \hline 1410 \\ \text{\scriptsize 2 3} \end{array}$$

Solve problems involving multiplying and adding to multiply two or three-digit numbers by one digit.

Harriet has 7 friends who each have 24 apples. Joseph has 3 friends who each have 27 apples. How many apples do Harriet and Joseph's friends have altogether?

$$24 \times 7 = 168 \quad 27 \times 3 = 81$$

$$\begin{array}{r} 24 \\ \times 7 \\ \hline 168 \\ \text{\scriptsize 2} \end{array} \quad \begin{array}{r} 27 \\ \times 3 \\ \hline 81 \\ \text{\scriptsize 2} \end{array} \quad \begin{array}{r} 168 \\ + 81 \\ \hline 249 \\ \text{\scriptsize 1} \end{array}$$

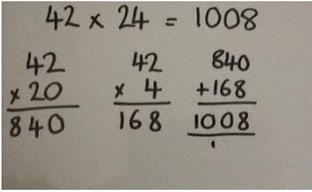
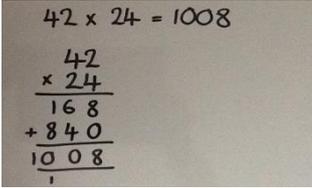
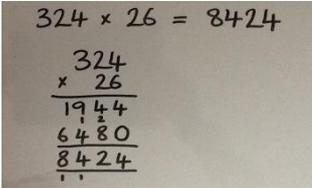
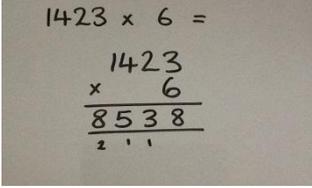
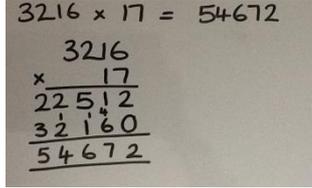
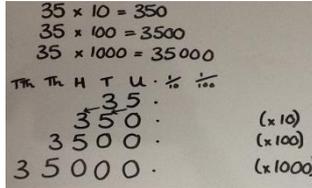
MENTAL STRATEGIES:

- Know all times tables up to and including 12×12 (by the end of Year 4)
- Recognise and use factor pairs (e.g factor pairs for numbers up to and including 10)
- Know that TO \times 5 is TO \times 10 then divide by 2 (e.g $18 \times 5 = (18 \times 10) \div 2 = 90$)
- Know that TO \times 9 is TO \times 10 then subtract TO (e.g $18 \times 9 = (18 \times 10) - 18 = 162$)

YEAR 5

VOCABULARY: composite numbers, prime number, prime factor, cube number, square number, derive, factor pairs, formal written method, times, multiply, multiplied by, multiple of, product, short multiplication, partition, long multiplication, scaling, decimal place, ones, tenths and hundreds, exchange

factor x factor = product

Method:	Example/Representation:
Children will be taught to multiply numbers (TO x TO) by partitioning the second 2-digit number and using two short multiplications along with addition to solve the problem.	
Children will be taught to multiply numbers (TO x TO) using the formal written method of long multiplication.	
Children will be taught to multiply numbers (HTO x TO) using the formal written method of long multiplication.	
Children will be taught to multiply numbers (ThHTO x O) using the formal written method of short multiplication.	
Children will be taught to multiply numbers (ThHTO x TO) using the formal written method of long multiplication.	
Children will learn to multiply whole numbers and those involving decimals by 10, 100 and 1000 by moving the digits around the fixed decimal on a place value grid.	
Children will solve problems involving multiplication, including scaling.	Alfie runs 3400m on Sports Day. His friend, Harry, runs three times as far. How far does Harry run?
With the use of materials and diagrams, pupils will multiply proper fractions and mixed numbers by whole numbers	$\frac{1}{4} \times 2 = \frac{1 \times 2}{4} = \frac{2}{4}$  $1 \frac{1}{4} \times 2 = (1 \times 2) + \left(\frac{1 \times 2}{4}\right) = 2 \frac{2}{4}$ 

MENTAL STRATEGIES:

- Recognise and calculate factor pairs for any number
- Use times table knowledge to derive multiples of any number
- Establish whether a number is a prime number (up to 100) or a composite number (not prime) and recall prime numbers up to 19
- To know what a square number is and recall all square numbers (up to and including 144)
- To know what a cube number is and recall the first 5 cube numbers

YEAR 6

VOCABULARY: common factors, multiples, prime, formal written method, multiply, multiplied by, multiple of, product, short and long multiplication, partition, scaling, decimal place, ones, tenths and hundredths, exchange

factor x factor = product

Method:

Example/Representation:

Multiply numbers by 10, 100 and 1000 where the answers are up to three decimal places.

$2.345 \times 10 = 23.45$
 $2.345 \times 100 = 234.5$
 $2.345 \times 1000 = 2345$

Tens Tens Hundreds Tens Units Tenths Hundredths Thousandths
 2 3 4 5
 2 3 4 5 (x10)
 2 3 4 5 (x100)
 2 3 4 5 (x1000)

Multiply one-digit numbers with up to two decimal places by whole numbers using:

- Short multiplication when multiplying by a single digit
- Long multiplication when multiplying by a 2-digit number

$1.27 \times 3 = 3.81$
 $1.27 \times 15 = 19.05$

Multiply multi-digit numbers up to 4 digits by a 2-digit whole number using the formal written method of long multiplication.

$2439 \times 17 = 41463$
 $23.12 \times 12 = 277.44$

Multiply simple pairs of fractions, writing the answer in its simplest form.

$\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$
 Think: "1/4 of 1/2"

$\frac{1}{4} \times \frac{1}{2} = \frac{1 \times 1}{4 \times 2} = \frac{1}{8}$

Pupils use their understanding of the relationship between unit fractions and division to work backwards by multiplying a quantity that represents a unit fraction.

$\frac{1}{4} \text{ of } \boxed{?} = 36$
 $36 \times 4 = 144$
 $? = 144 \text{ cm}$

MENTAL STRATEGIES:

- Identify common factors, common multiples and prime numbers
- Use common factors to simplify fractions mentally
- Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy



Division

**ST FAITH AND ST MARTIN CE JUNIOR SCHOOL
CALCULATION POLICY**

DIVISION

YEAR 3:

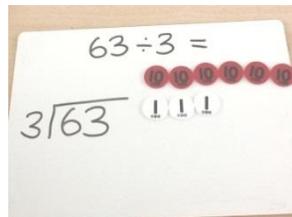
VOCABULARY: divided by, divide, divided into, grouping, divisor, short division, remainder, inverse.

$$\frac{\text{quotient}}{\text{divisor}} \overline{) \text{dividend}}$$

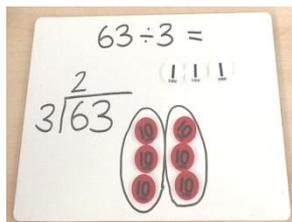
Method:

Children will use practical resources to support the short division method and will be encouraged to use multiples of the divisor to assist ($TO \div O$)

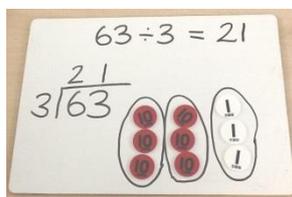
Example/Representation:



Create the dividend using Place Value counters.



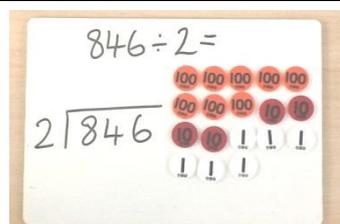
Group the tens counters according to the divisor and write the number of groups above the line in the tens column.



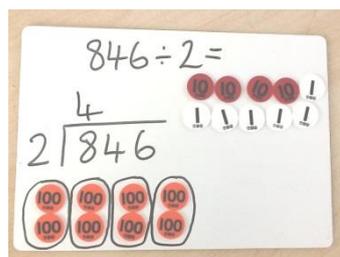
Group the tens counters according to the divisor and write the number of groups above the line in the tens column.

The quotient can be seen across the groups.

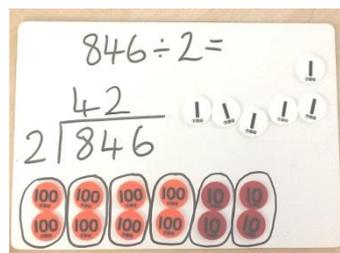
Children will use practical resources to support the short division method and will be encouraged to use multiples of the divisor to assist ($HTO \div O$)



Create the dividend using Place Value counters.



Group the 100s counters according to the divisor. Write the number of groups above the line in the hundreds column.



Next, group the 10s counters according to the divisor. Write the number of groups above the line in the tens column.

$846 \div 2 =$

$$\begin{array}{r} 423 \\ 2 \overline{) 846} \end{array}$$

Next, group the ones counters according to the divisor. Write the number of groups above the line in the ones column.

The quotient can be seen across the groups.

Children will use practical resources to support solving division number sentences with remainders (TO ÷ O)

$64 \div 3 =$

$$\begin{array}{r} 21 \\ 3 \overline{) 64} \end{array}$$

Create the dividend using Place Value counters.

$64 \div 3 =$

$$\begin{array}{r} 2 \\ 3 \overline{) 64} \end{array}$$

Starting with tens counters, group them according to the divisor. Write the number of groups in the tens column above the line.

$64 \div 3 =$

$$\begin{array}{r} 21 \\ 3 \overline{) 64} \end{array}$$

Next, group the ones according to the divisor and arrange next to the groups of ten. Write the number of groups above the line in the

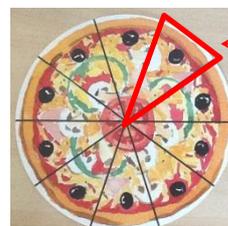
$64 \div 3 =$

$$\begin{array}{r} 21 \text{ r}1 \\ 3 \overline{) 64} \end{array}$$

Any counters that cannot be grouped are the remainder. Write this at the end as 'r1'.

As you look across each group, the quotient can be seen.

Pupils connect tenths to place value, decimal measures and that tenths is to divide by 10.



$\frac{1}{10}$

$\frac{1}{10}$ of 50 = 5
 $50 \div 10 = 5$

MENTAL STRATEGIES:

- Know the division facts from the 3, 4 and 8 times tables
- Use knowledge of place value to calculate division (e.g. $14 \div 2 = 7$, $140 \div 2 = 70$, $1400 \div 2 = 700$)

YEAR 4

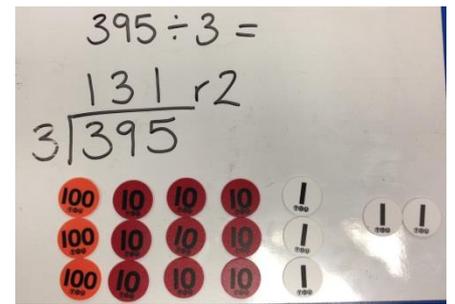
VOCABULARY: factor, divisor, divided by, divided into, remainders, divisible by, equivalent, short division, derive, quotient, inverse, remainder, multiples, exchange.

$$\begin{array}{r} \text{quotient} \\ \text{divisor} \overline{) \text{dividend}} \end{array}$$

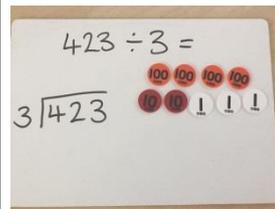
Method:

Children will use practical resources to support solving division number sentences with remainders ($\text{HTO} \div \text{U}$)

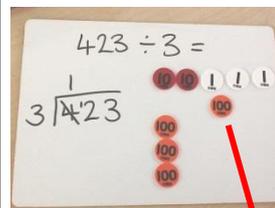
Example/Representation:



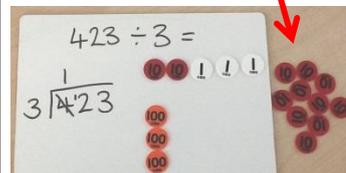
Children will use practical resources to support the short division method where exchange across place value columns occurs. ($\text{HTO} \div \text{O}$)



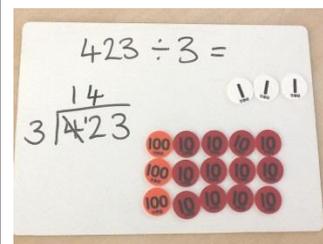
Create the dividend using Place Value counters.



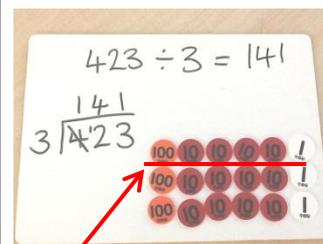
Group the hundreds counters according to the divisor. Write the number of groups above the line in the hundreds column.



Exchange the left over 100s counter for ten 10s counters and represent this beneath the line in the tens column.



Next, group the 10s counters according to the divisor and write the number of groups above the line in the tens column.



Group the ones counters according to the divisor and write the number of groups above the line in the ones column.

The quotient can be seen across each group.

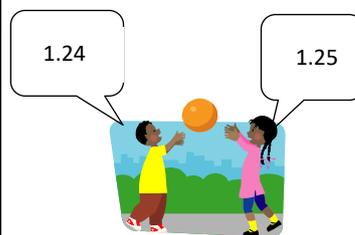
Children will use the short division method where exchange across the place value columns occurs. Pupils will be encouraged to use multiples of the divisor to assist (HTO ÷ TO).

Handwritten short division showing $325 \div 13 = 25$. The division is written as $13 \overline{)325}$. The quotient is 25. To the right, a list of multiples of 13 is shown: 13, 26, 39, 52, 65.

Find the effect of dividing a 1 or 2-digit number by 10 and 100; identifying the value of the digits in the answer as ones, tenths and hundredths.

Handwritten examples showing the effect of dividing by 10 and 100:
 $7 \div 10 = 0.7$
 $7 \div 100 = 0.07$
Below these, the number 7 is written with a decimal point and a blank space for the tenths place, and another with a decimal point and two blank spaces for the hundredths place:
 $7 \cdot \frac{1}{10} \frac{1}{100}$
 $7 \cdot$
 $0.7 \quad (\div 10)$
 $0.07 \quad (\div 100)$

Count up and down in hundredths; recognise that hundredths arise when dividing an object by a hundred and dividing tenths by ten.



What should I cut my pizza into if I have 100 people to serve?



MENTAL STRATEGIES:

- Know all related division facts for all times tables up to 12 times table (by the end of Year 4)

YEAR 5

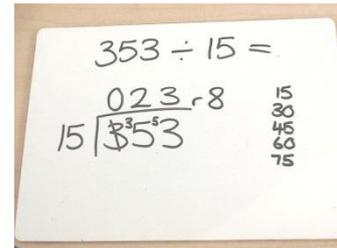
VOCABULARY: divide, divided by, divided into, divisible by, remainder, quotient, inverse, decomposing, factor, decimal place, ones, tenths, scaling, short division, exchange

quotient
divisor) dividend

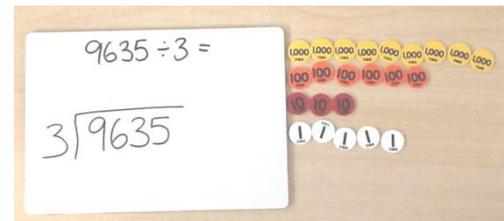
Method:

Children will use short division to solve division number sentences with remainders (HTO ÷ TO)

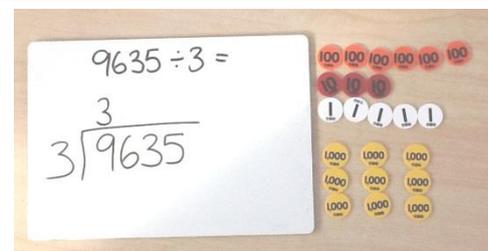
Example/Representation:



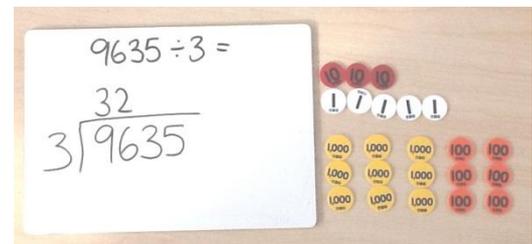
Children will use practical resources to support solving division number sentences with remainders (ThHTO ÷ U)



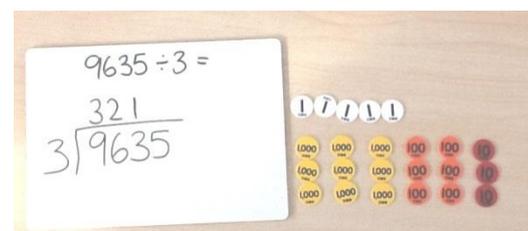
Create the dividend using Place Value counters.



Group the 1000s counters according to the divisor and write the number of groups above the line in the thousands column.

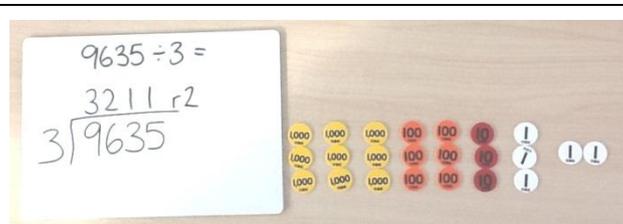


Group the 100s counters according to the divisor and write the number of groups above the line in the hundreds column.



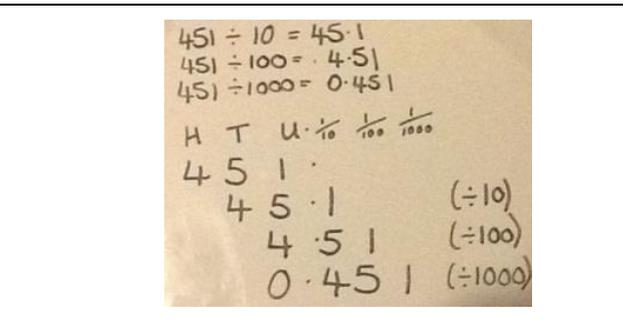
Group the 10s counters according to the divisor and write the number of groups above the line in the tens column.

Children will learn to divide whole numbers and those involving decimals by 10, 100 and 1000 by moving the digits around the fixed decimal.



Group the ones counters according to the divisor and write the number of groups about the line in the ones column. Express remainders as 'r2' as part of the quotient.

Children will solve problems involving division, including scaling.



- MENTAL STRATEGIES:**
- Multiply and divide numbers mentally drawing upon known facts
 - Associate fractions with division

YEAR 6

VOCABULARY: divide, divided by, divided into, divisible by, remainder, factor, quotient, inverse, decimal place, ones, tenths, hundredths, scaling, formal written methods, exchange

$$\frac{\text{quotient}}{\text{divisor} \overline{) \text{dividend}}}$$

Method:

Divide numbers up to 4 digits by a two-digit whole number using the formal written method of division.

Example/Representation:

Alternative written method of long division (taken from National Curriculum):

Long division

432 ÷ 15 becomes

$$\begin{array}{r} 28 \text{ r } 12 \\ 15 \overline{) 432} \\ \underline{300} \\ 132 \\ \underline{120} \\ 12 \end{array}$$

Answer: 28 remainder 12

432 ÷ 15 becomes

$$\begin{array}{r} 28 \\ 15 \overline{) 432} \\ \underline{300} \quad 15 \times 20 \\ \underline{132} \quad 15 \times 8 \\ \underline{120} \\ 12 \end{array}$$

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

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

432 ÷ 15 becomes

$$\begin{array}{r} 28.8 \\ 15 \overline{) 432.0} \\ \underline{300} \downarrow \\ \underline{132} \downarrow \\ \underline{120} \downarrow \\ \underline{120} \\ 0 \end{array}$$

Answer: 28.8

Interpret remainders as whole number remainders, fractions or decimals.

Divide numbers decimal numbers with up to 3 decimal places by 10, 100 and 1000 by moving the digits around a fixed decimal.

Divide proper fractions by whole numbers

$$\frac{1}{3} \div 2 = \frac{1}{6}$$



MENTAL STRATEGIES:

- Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy
- Calculate a fraction of an amount

References:

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<http://www.newbyprimary.co.uk/wp-content/uploads/2013/01/Newby-Calculation-Policy-with-progression.Pdf>

2016 Key Stage 1 Mathematics Test Framework

2016 Key Stage 2 Mathematics Test Framework

Bourne Westfield Primary Academy

Progression through Written Calculation CfBT Education Services