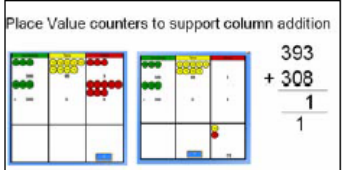


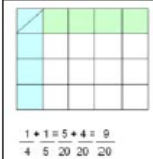




Rhodes Avenue Primary School Calculation Policy for addition Year 5

Informal methods to support mental Calculations	<ul style="list-style-type: none"> Add numbers mentally with increasingly large numbers, e.g. $12\ 462 + 2300 = 14\ 762$ Mentally add tenths, and one-digit numbers and tenths Add decimals, including a mix of whole numbers and decimals, decimals with different numbers of places, and complements of 1 (e.g. $0.83 + 0.17 = 1$) <p>Children use representation of choice Refer back to pictorial and physical representations when needed.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Common mental calculation strategies: Partitioning and recombining Doubles and near doubles Use number pairs to 10 and 100 Adding near multiples of ten and adjusting Using patterns of similar calculations Using known number facts Bridging though ten, hundred, tenth Complementary addition</p> </div>
Written Calculations	<p>Add whole numbers with more than four digits, using the formal written (columnar) method</p> <p>Add three digit numbers using columnar method and then move onto 4 digits. Include decimal addition for money</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="border: 1px solid black; padding: 5px;"> $\begin{array}{r} 24172m \\ + 5929m \\ \hline 30101m \\ \hline 1\ 1\ 1\ 1 \end{array}$ </div> <div style="border: 1px solid black; padding: 5px;"> $\begin{array}{r} £563.14 \\ + £207.88 \\ \hline £771.02 \\ \hline 1\ 1\ 1 \end{array}$ </div> </div> <div style="background-color: #f4a460; padding: 5px; text-align: center; margin-top: 10px;"> Revert to expanded methods if children find formal calculation method difficult (see Y3) </div>
Representations to support mental and written calculations.	<p>Use physical/pictorial representations alongside columnar methods where needed.</p> <div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="border: 1px solid black; padding: 5px; width: 30%;"> $\begin{aligned} 12\ 462 + 2300 \\ = 12\ 462 + 2000 + 300 \\ = 14\ 462 + 300 \\ = 14\ 762 \end{aligned}$ <p style="text-align: center; font-size: small;">Partitioning and recombining</p> </div> <div style="width: 30%; text-align: center;"> <p style="border: 1px solid black; border-radius: 50%; padding: 10px; display: inline-block;">Ask what is the same and what is different about all these methods?</p> </div> <div style="width: 30%; text-align: center;">  <p style="font-size: x-small;">Place Value counters to support column addition</p> </div> </div> <div style="text-align: center; margin-top: 10px;">  <p style="font-size: x-small;">Jottings to support mental calculation</p> </div>
Fractions	<ul style="list-style-type: none"> Add fractions with the same denominator and denominators that are multiples of the same number (to become fluent through a variety of increasingly complex problems and add fractions that exceed 1 as a mixed number) <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 10px;"> <div style="border: 1px solid black; padding: 5px;"> $\frac{1}{2} + \frac{3}{4} = \frac{2}{4} + \frac{3}{4} = \frac{5}{4}$ </div> <div style="border: 1px solid black; padding: 5px;">  </div> <div style="border: 1px solid black; padding: 5px;">  <p style="font-size: x-small; text-align: center;">$\frac{1}{4} + \frac{1}{5} = \frac{5}{20} + \frac{4}{20} = \frac{9}{20}$</p> </div> </div>
Links from other strands	<ul style="list-style-type: none"> Solve problems involving up to three decimal numbers. Solve addition and subtraction multi step problems in context, deciding which operations and methods to use and why Use all four operations to solve problems involving measure [e.g. length, mass, volume, money] using decimal notation, Calculate the perimeter of composite rectilinear squares in centimetres and metres Use angle sum facts and other properties to make deductions about missing angles Solve comparison, sum and difference problems using information presented in a line graph



Rhodes Avenue Primary School Calculation Policy for subtraction Year 5

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Mental Calculations</p>	<ul style="list-style-type: none"> Subtract numbers mentally with increasingly large numbers. E.g. $12\ 462 - 2300 = 10\ 162$ Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy . Pupils practise adding and subtracting decimals, including a mix of whole numbers and decimals, decimals with different numbers of decimal places, and complements of 1 (for example, $1 - 0.17 = 0.83$). Pupils mentally add and subtract tenths, and one-digit whole numbers and tenths. 	<p>Basic Mental Strategies for Subtraction</p> <ul style="list-style-type: none"> Find differences by counting up Partitioning Applying known facts Bridging through 10 and multiples of 10 Subtracting 9, 11 etc. by compensating Counting on to, or back from the largest number <p><i>National Curriculum 1999</i></p> <p><i>Which method works best? Why? How else could we do it?</i></p> <p>Children use, or visualise, representation of choice. Refer back to physical representations as required.</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Written Calculations</p>	<p>Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction). <i>(Pupils) practise adding and subtracting decimals.</i></p> <p>Begin with three-digit numbers using formal, columnar method; then move into four-digit numbers.</p> <p>As in Year 4, compare physical and / or pictorial representations and expanded algorithms alongside columnar methods. Ask: <i>What is the same? What's different?</i> Compare and discuss the suitability of different methods, (mental or written), in context. Revert to expanded methods whenever difficulties arise</p>	<p>$£17.34 - £12.16$</p> <p>$1000+700+20+14p$ $- 1000+200+10+ 6p$ $\underline{500+10+ 8p}$</p> <p>$1734p$ $- 1216p$ $\underline{518p}$</p> <p>$£ 2$ 17.34 $- 12.16$ $\underline{5.18}$</p> <p><i>What is the same about these models? What's different?</i></p> <p>Relate place value of decimals with that of whole numbers using representations. See below.</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Representations to support mental and written calculations.</p>	<p>Integers Money Decimals</p>	<p>Column Subtraction with Place Value Counters</p> <p>Use physical and pictorial representations to stress the place value relationships between money, decimals and whole numbers. A place value mat such as the this one could be used, moving away from the traditional: <i>Hundreds, tens and ones</i> model used in Lower KS2 and KS1.</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Fractions</p>	<p>Subtract fractions with the same denominator and denominators that are multiples of the same number. <i>(Include fractions exceeding 1 as a mixed number.)</i> Solve problems involving number up to three decimal places . They mentally add and subtract tenths, and one-digit whole numbers and tenths.</p>	
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Links from other strands</p>	<p>Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign. Use all four operations to solve problems involving time, money and measure using decimal notation.; (up to 3d.p.)</p>	



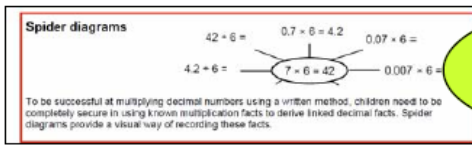
Rhodes Avenue Primary School Calculation Policy for multiplication Year 5

Informal methods to support mental Calculations

- multiply and divide numbers mentally drawing upon known facts
- multiply and divide whole numbers and those involving decimals by 10, 100 & 1000
- Recognise and use square & cube numbers (& notation)

$24 \times 15 = ?$

Pupils should be taught throughout that percentages, decimals and fractions are different ways of expressing proportions.



I did: $24 \times 5 = 120$ (half of 24×10), then multiplied 120 by 3 to get 360

I did: $(24 \times 10) + (24 \times 5)$.

Example of constructing equivalence statements:
 $4 \times 35 = 2 \times 2 \times 35$;
 $3 \times 270 = 3 \times 3 \times 9 \times 10 = 92 \times 10$

Written Calculations

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

$\begin{array}{r} 24 \\ \times 16 \\ \hline 144 \\ 240 \\ \hline 384 \end{array}$	$\begin{array}{r} 124 \\ \times 26 \\ \hline 744 \\ 2480 \\ \hline 3224 \end{array}$	$\begin{array}{r} 124 \\ \times 26 \\ \hline 744 \\ 2480 \\ \hline 3224 \end{array}$	$\begin{array}{r} 2741 \\ \times 6 \\ \hline 16446 \\ 42 \\ \hline 16446 \end{array}$
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Compact methods for multiplication are efficient but often do not make the value of each digit explicit. When introducing multiplication of decimals, it is sensible to take children back to an expanded form such as the grid method where the value of each digit is clear, to ensure that children understand the process.

Does your answer seem reasonable?

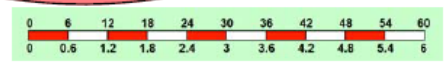
Revert to expanded methods if children find formal calculation method difficult (see Y3/Y4)

Representations to support mental and written calculations.

	3000	500	60	7	
20	50000	10000	1200	140	71340
4	12000	2000	240	28	14268
					85608
					Total 85608

To start multiplying using the least significant digit for the grid method will support children with implementation of the written procedure

What is the same and what is different about these two methods?



Build on children's understanding: demonstrate multiplication of a decimal number alongside its whole number equivalent.

$\begin{array}{r} 326 \\ \times 8 \\ \hline 2400 \\ 160 \\ 48 \\ \hline 2608 \end{array}$	$\begin{array}{r} 3.26 \\ \times 8 \\ \hline 24.00 \\ 1.60 \\ 0.48 \\ \hline 26.08 \end{array}$
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Fractions

- multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams
- identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths

Pupils connect multiplication by a fraction to using fractions as operators (fractions of), and to division, building on work from previous years. This relates to scaling by simple fractions, including fractions > 1.

$\frac{1}{2} \times \frac{1}{2}$
 Scaling by $\frac{1}{2}$
 "finding a half of a quarter"

$\frac{1}{2} \times \frac{1}{4}$
 "1/2 of a 1/4": find a 1/2, then divide it by 4.

Encourage children to draw diagrams to represent situations or problems involving fractions. Model how to do this, for example:
 $\frac{2}{5}$ of a number is 20. What is the number? $\frac{10 \ 10 \ 10 \ 10 \ 10}{20}$ Whole=50

Links from other strands

- identify multiples & factors, including finding all factor pairs of a number, & common factors of two numbers
 - know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers
 - establish whether a number up to 100 is prime and recall prime numbers up to 19
 - solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes, and including understanding the meaning of the equals sign
 - solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates
 - use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling.
 - convert between different units of metric measure; problems including money.
- Other links: ratio,
 Pupils use their knowledge of place value and multiplication and division to convert between standard units.
 Pupils calculate the perimeter of rectangles and related composite shapes, including using the relations of perimeter or area to find unknown lengths. Missing measures questions such as these can be expressed algebraically, for example $4 + 2b = 20$ for a rectangle of sides 2 cm and b cm and perimeter of 20cm.
 Pupils calculate the area from scale drawings using given measurements.



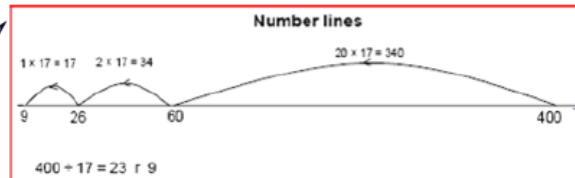
Rhodes Avenue Primary School Calculation Policy for division Year 5

Informal methods to support mental Calculations

Pupils should be taught to:

- multiply and divide whole numbers and those involving decimals by 10, 100 and 1000
 - multiply and divide numbers mentally drawing upon known facts
- identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers .

If $42 \div 6 = 7$
 $+ 10$ $+ 10$
 Then $4.2 \div 6 = 0.7$



Factorising
 $480 \div 15$
 $= 480 \div 5 \div 3$

"I know that the answer to $138 \div 6$ will be close to 20, because $2 \times 6 = 12$, so $20 \times 6 = 120$."

Pupils apply all the multiplication tables and related division facts frequently and use them confidently .

Written Calculations

Pupils practise and extend their use of the formal written methods of short multiplication and short division.

- Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context.

$98 \div 7$ becomes

$$\begin{array}{r} 14 \\ 7 \overline{) 98} \\ \underline{7} \\ 28 \\ \underline{28} \\ 0 \end{array}$$

Answer: 14

$432 \div 5$ becomes

$$\begin{array}{r} 86 \text{ r } 2 \\ 5 \overline{) 432} \\ \underline{40} \\ 32 \\ \underline{30} \\ 2 \end{array}$$

Answer: 86 remainder 2

$496 \div 11$ becomes

$$\begin{array}{r} 45 \text{ r } 1 \\ 11 \overline{) 496} \\ \underline{44} \\ 56 \\ \underline{55} \\ 1 \end{array}$$

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

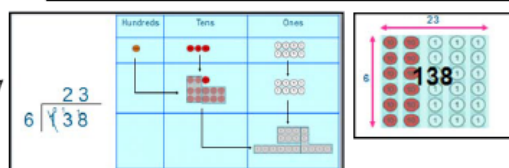
- Pupils interpret non-integer answers to division by expressing results in different ways according to the context, including with remainders, as fractions, as decimals or by rounding. (See Representations below.)

Revert to expanded methods if children find formal calculation method difficult

Representations to support mental and written calculations.

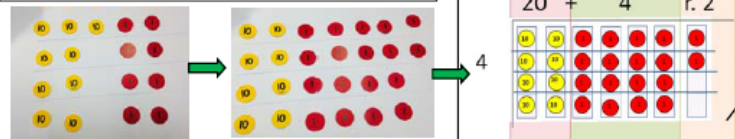
Can we divide this taken into 6 equal groups?, then we must exchange it for ten tokens. Can we divide into 6 groups now?

Short division with exchange.



Practical experience with manipulatives is vital for children to talk through the language of division e.g. *exchange, remainder*; and to embed conceptual understanding.

Understanding remainders.



2 out of a whole group of $4 = \frac{2}{4} = \frac{1}{2} = 0.5$

$$98 \div 4 = \frac{98}{4} = 24 \text{ r } 2 = 24 \frac{1}{2} = 24.5$$

What is the same? What's different about the ways that these remainders are expressed?

Fractions

- Recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number .
- Pupils connect equivalent fractions > 1 that simplify to integers with division and other fractions > 1 to division with remainders.
- Pupils connect multiplication by a fraction to using fractions as operators (fractions of), and to division.
- Pupils should make connections between percentages, fractions and decimals

Links from other strands

- Pupils use all four operations in problems involving time and money, including conversions.using decimal notation, including scaling.
- calculate and compare the area of rectangles (including squares). (MEASURES)

- establish whether a number up to 100 is prime and recall prime numbers up to 19
- recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3)
- solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes and including scaling by simple fractions and problems involving simple rates.
- solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign. (NUMBER—MULTIPLICATION AND DIVISION)