**Year 5**

# Calculation policy

Updated September 2024
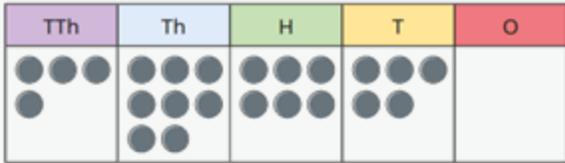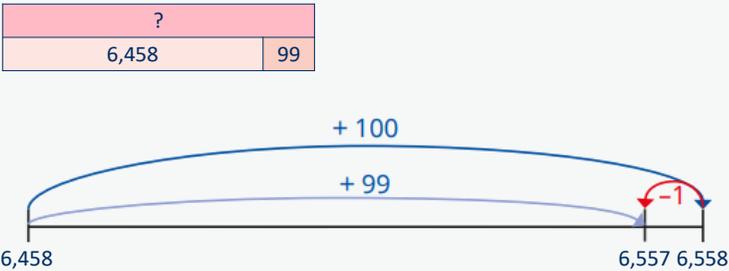
**White Rose MATHS**

# Progression of skills – Addition

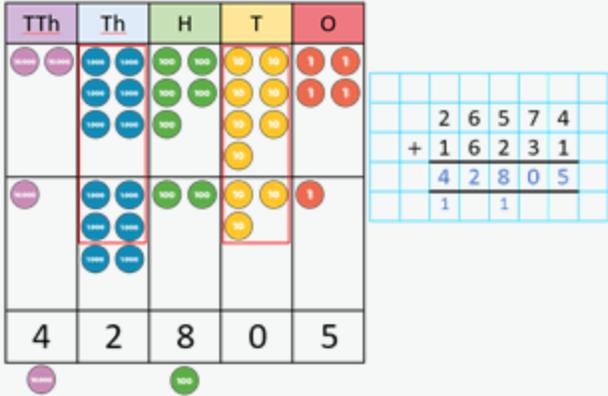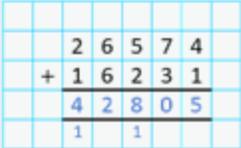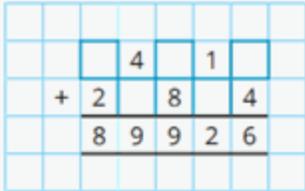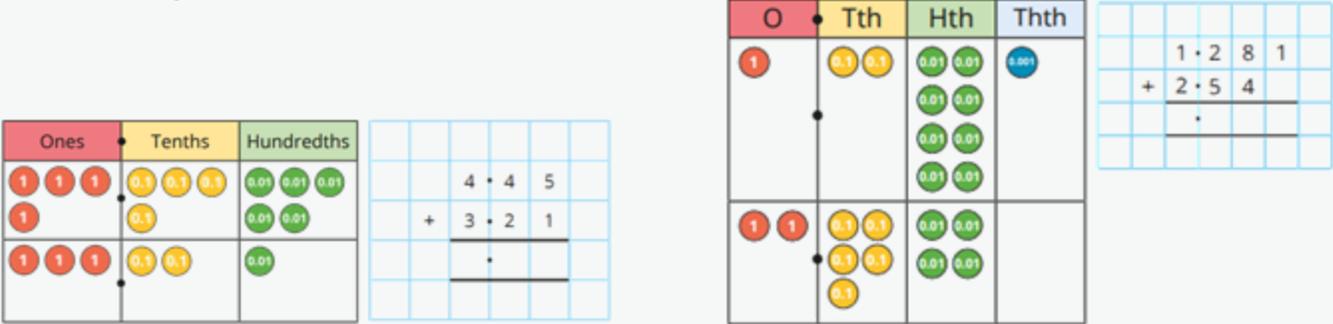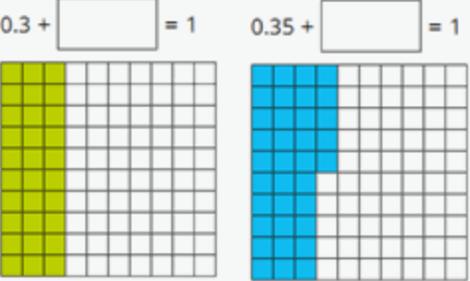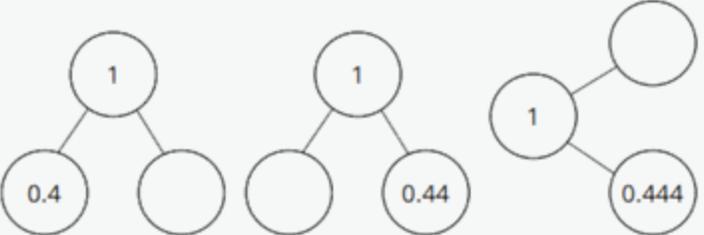| Year 4 | Year 5 | Year 6 |
|---|---|---|
| • Add 1s, 10s and 100s to a 4-digit number<br><br>• Add up to two 4-digit numbers<br><br>• Add decimal numbers in the context of money<br><br>• Add fractions and mixed numbers with the same denominator beyond 1 whole | • Add using mental strategies<br><br>• Add whole numbers with more than 4 digits<br><br>• Add decimals with up to 2 decimal places<br><br>• Complements to 1<br><br>• Add fractions with denominators that are a multiple of one another | • Add integers up to 10 million<br><br>• Add decimals with up to 3 decimal places<br><br>• Order of operations<br><br>• Negative numbers<br><br>• Add fractions |

# Addition

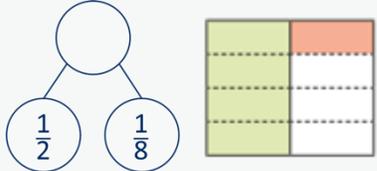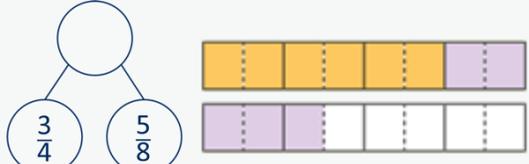| Year 5 | • Add whole numbers with more than 4 digits, including using formal written methods.<br>• Add numbers mentally with increasingly large numbers.<br>• Add decimals, including a mix of whole numbers and decimals, decimals with different numbers of decimal places, and complements of 1<br>• Add fractions with the same denominator, and denominators that are multiples of the same number. |
|---|---|
| **Progression of skills** | **Key representations** |
| **Add using mental strategies**<br><br>Add 1s, 10s, 100s, etc. to any number.<br>Use number bonds and related facts. | <br>$48{,}650 + 300 =$<br>$48{,}650 + 30{,}000 =$<br>$48{,}650 + 30 \;=$<br><br>To add ..., I can add ... then subtract ...<br> |
| **Add whole numbers with more than 4 digits**<br><br>Encourage children to estimate and use inverse operations to check answers to calculations. | I can exchange 10 ... for 1 ...<br> |

# Addition

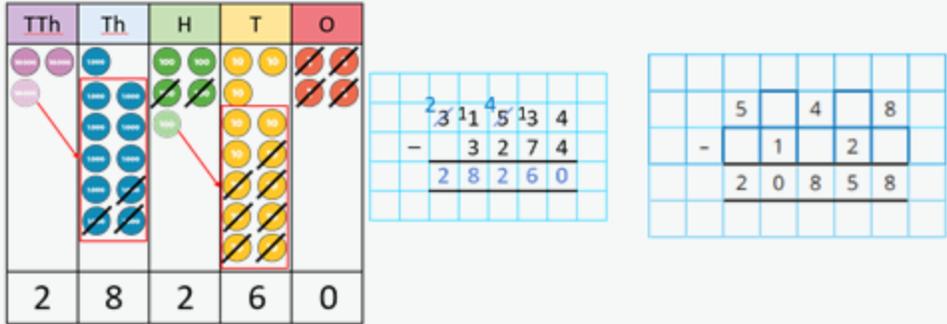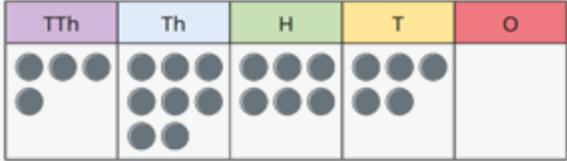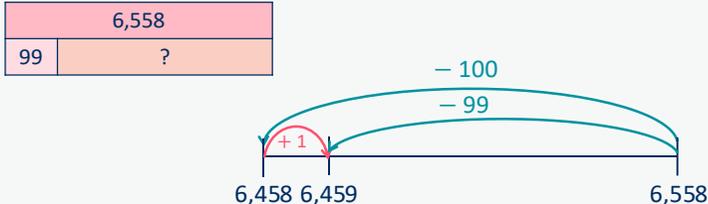| Progression of skills | Key representations |
|---|---|
| **Add decimals with up to 2 decimal places**<br><br>Progress from the same number of decimal places to a different number of decimal places, and from no exchange to exchange. | I do/do not need to make an exchange because …<br>I can exchange 10 … for 1 …<br><br> |
| **Complements to 1**<br><br>Pairs of numbers with up to 3 decimal places which total 1<br><br>Encourage children to make links with bonds to 10 and complements to 100 and 1,000 | $0.3 + \boxed{\phantom{x}} = 1$  $0.35 + \boxed{\phantom{x}} = 1$<br><br><br><br>$4 + 6 = 10$   $0.4 + 0.6 = 1$<br>$44 + 56 = 100$   $0.44 + 0.56 = 1$<br>$444 + 556 = 1,000$   $0.444 + 0.556 = 1$ |

# Addition

| Progression of skills | Key representations |
|---|---|
| **Add fractions with denominators that are a multiple of one another**<br><br>Encourage children to convert fractions to the same denominator before adding.<br><br>Progress from adding fractions within 1 whole to adding fractions beyond 1 whole. | The denominator has been multiplied by …, so the numerator needs to be multiplied by… for the fractions to be equivalent.<br><br>$\frac{1}{2} + \frac{1}{8} = \frac{4}{8} + \frac{1}{8} = \frac{5}{8}$<br><br>$\frac{1}{4} + \frac{3}{8} = \frac{2}{8} + \frac{3}{8} = \frac{5}{8}$<br><br>$\frac{3}{4} + \frac{5}{8} = \frac{6}{8} + \frac{5}{8} = \frac{11}{8} = 1\frac{3}{8}$ |

# Progression of skills - Subtraction

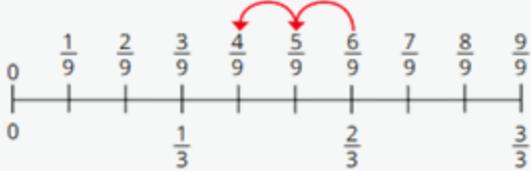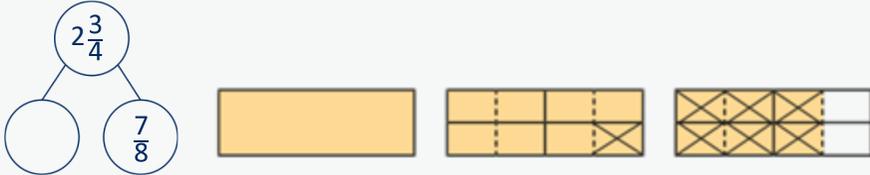| Year 4 | Year 5 | Year 6 |
|---|---|---|
| • Subtract 1s, 10s, 100s and 1,000s from a 4-digit number | • Division facts to 12 × 12 | • Subtract integers up to 10 million |
| • Subtract up to two 4-digit numbers | • Divide a number by 1 and itself | • Subtract decimals with up to 3 decimal places |
| • Subtract decimal numbers in the context of money | • Related facts | • Order of operations |
| • Subtract fractions and mixed numbers with the same denominator | • Divide a 2 or 3-digit number by a 1-digit number | • Negative numbers |
| | • Divide by 10 and 100 | • Subtract fractions |

# Subtraction

| Year 5 | • Subtract whole numbers with more than 4 digits.<br>• Subtract numbers mentally with increasingly large numbers.<br>• Subtract decimals, including a mix of whole numbers and decimals, decimals with different numbers of decimal places, and complements of 1<br>• Subtract fractions with the same denominator, and denominators that are multiples of the same number. |
|---|---|
| **Progression of skills** | **Key representations** |
| **Subtract whole numbers with more than 4 digits**<br><br>Encourage children to estimate and use inverse operations to check answers to calculations. | I can exchange 1 … for 10 …<br><br> |
| **Subtract using mental strategies**<br><br>Subtract 1s, 10s, 100s etc from any number.<br>Use number bonds and related facts. | <br><br>$48,650 - 300 =$<br>$48,650 - 30,000 =$<br>$48,650 - 30 =$ | To subtract …, I can subtract … then add …<br><br> |

# Subtraction

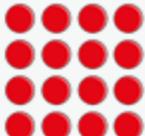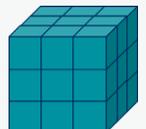| Progression of skills | Key representations |
|---|---|
| **Subtract decimals with up to 2 decimal places**<br><br>Progress from the same number of decimal places to a different number of decimal places and from no exchange to exchange. |  |
| **Complements to 1**<br><br>Encourage children to make links with bonds to 10 and complements to 100 and 1,000 when finding a missing part or subtracting from 1 | $0.3 + \square = 1$   $0.35 + \square = 1$<br><br><br><br>$10 - 4 = 6$     $1 - 0.4 = 0.6$<br>$100 - 44 = 56$     $1 - 0.44 = 0.56$<br>$1,000 - 444 = 556$   $1 - 0.444 = 0.556$ |

# Subtraction

| Progression of skills | Key representations |
|---|---|
| **Subtract fractions with denominators that are a multiple of one another**<br><br>Convert fractions to the same denominator before subtracting. Progress from subtracting fractions within 1 whole to subtracting from a mixed number. | The denominator has been multiplied by …, so the numerator needs to be multiplied by… for the fractions to be equivalent.<br><br>$\frac{1}{3} - \frac{1}{15} = \frac{5}{15} - \frac{1}{15} = \frac{4}{15}$<br><br>$\frac{2}{3} - \frac{2}{9} = \frac{6}{9} - \frac{2}{9} = \frac{4}{9}$ |

# Progression of skills – Multiplication

| Year 4 | Year 5 | Year 6 |
| --- | --- | --- |
| • Times-table facts to $12 \times 12$ <br><br> • Multiply by 1 and 0 <br><br> • Multiply 3 numbers <br><br> • Factor pairs <br><br> • Multiply by 10 and 100 <br><br> • Related facts <br><br> • Mental strategies <br><br> • Multiply a 2 or 3-digit number by a 1-digit number <br><br> • Scaling <br><br> • Correspondence problems | • Multiples and factors <br><br> • Square and cube numbers <br><br> • Multiply numbers up to 4 digits by a 1-digit number <br><br> • Multiply numbers up to 4 digits by a 2-digit number <br><br> • Multiply by 10, 100 and 1,000 <br><br> • Mental strategies <br><br> • Multiply fractions by a whole number <br><br> • Multiply mixed numbers by a whole number <br><br> • Find the whole | • Multiply numbers up to 4 digits by a 2-digit number <br><br> • Multiply by 10, 100 and 1,000 <br><br> • Order of operations <br><br> • Multiply decimals by integers <br><br> • Multiply fractions by fractions <br><br> • Find the whole <br><br> • Calculations involving ratio |

# Multiplication

| Year 5 | • Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers<br>• Recognise and use square numbers and cube numbers, and the notation for squared (²) and cubed (³)<br>• 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.<br>• Multiply numbers mentally drawing upon known facts.<br>• Multiply whole numbers and those involving decimals by 10, 100 and 1000<br>• Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams. |
|---|---|
| **Progression of skills** | **Key representations** |
| **Multiples and factors**<br><br>Encourage children to notice patterns and make links with known facts. | … is a multiple of … because … $\times$ … = … <br><br>… is a factor of … because … $\times$ … = … <br>$1 \times 8$<br>$2 \times 4$<br>1, 2, 4 and 8 are factors of 8<br><br>The common factors of … and … are …<br>Factors of 20     Factors of 12 |
| **Square and cube numbers** | … squared means … $\times$ …<br>$1 \times 1$  $2 \times 2$  $3 \times 3$  $4 \times 4$<br>$1^2 = 1$  $2^2 = 4$  $3^2 = 9$  $4^2 = 16$<br><br>… cubed means … $\times$ … $\times$ …<br>$1 \times 1 \times 1$  $2 \times 2 \times 2$  $3 \times 3 \times 3$<br>$1^3 = 1$  $2^3 = 8$  $3^3 = 27$ |

# Multiplication

| Progression of skills | Key representations |
|---|---|
| **Multiply numbers up to 4 digits by a 1-digit number**<br><br>This builds on the short multiplication method introduced in Y4 | To multiply a 4-digit number by … , I multiply the ones by … , the tens by … , the hundreds by … and the thousands by … |

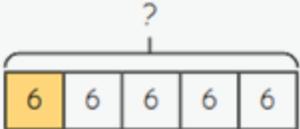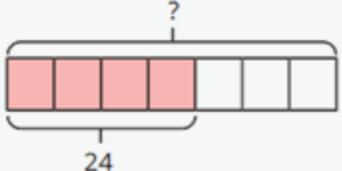| **Multiply numbers up to 4 digits by a 2-digit number**<br><br>Numbers are first partitioned using an area model then long multiplication is introduced for the first time. | I can partition … into … and …<br><br>| × | 40 | 4 |<br>|---|---|---|<br>| 30 | 1,200 | 120 |<br>| 2 | 80 | 8 |<br><br>$32 \times 44 = 1,200 + 80 + 120 + 8$<br>$32 \times 44 = 1,408$ | First, I multiply by the … Then I multiply by the …<br><br>| × | 10 | 3 |<br>|---|---|---|<br>| 30 | 300 | 90 |<br>| 2 | 20 | 6 |<br><br>$300 + 90 + 20 + 6 = 416$ |

# Multiplication

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| Progression of skills | Key representations |
|---|---|
| **Multiply by 10, 100 and 1,000**<br><br>Some children may over-generalise that multiplying by a power of 10 always results in adding zeros. This will cause issues later when multiplying decimals. | To multiply by 10/100/1,000, I move all the digits … places to the left.<br>… is 10/100/1,000 times the size of …<br><br>| M | HTh | TTh | Th | H | T | O |<br>|---|---|---|---|---|---|---|<br><br>| Th | H | T | O • | Tth | Hth |<br><br>$234 \times 10 = 2,340$<br>$234 \times 100 = 23,400$<br>$234 \times 1,000 = 234,000$     $2.34 \times 10 = 23.4$<br>$2.34 \times 100 = 234$<br>$2.34 \times 1,000 = 2,340$ |
| **Mental strategies**<br><br>Children continue to use efficient mental strategies such as partitioning and knowledge of factor pairs and related facts to multiply. | The most efficient strategy to calculate … × … is …<br>To calculate … × 12, I can do … × … × …<br><br><br>For example: $121 \times 12$<br>I could calculate $100 \times 12$ plus $20 \times 12$ plus $1 \times 12$<br>I could calculate $121 \times 10$ plus $121 \times 2$<br>I could calculate $121 \times 6 \times 2$<br>I could calculate $121 \times 4 \times 3$ |

# Multiplication

| Progression of skills | Key representations |
|---|---|
| **Multiply fractions by a whole number**<br><br>Make links with repeated addition.<br><br>E.g. $\frac{1}{5} \times 4 = \frac{1}{5} + \frac{1}{5} + \frac{1}{5} + \frac{1}{5}$ | To multiply a fraction by an integer, I multiply the numerator by the integer and the denominator remains the same.<br><br>$\frac{1}{7} \times 5 = \frac{1}{7} + \frac{1}{7} + \frac{1}{7} + \frac{1}{7} + \frac{1}{7} = \frac{5}{7}$     $\frac{2}{7} \times 3 = \frac{2}{7} + \frac{2}{7} + \frac{2}{7} = \frac{6}{7}$<br><br>$\frac{1}{5} \times 6 = \frac{6}{5} = 1\frac{1}{5}$     $\frac{2}{5} \times 3 = \frac{6}{5} = 1\frac{1}{5}$ |
| **Multiply mixed numbers by a whole number** | I can partition $\square\frac{\square}{\square}$ into $\square$ and $\frac{\square}{\square}$<br><br>$2\frac{2}{3} \times 3$<br><br>$2 \times 3 = 6$     $\frac{2}{3} \times 3 = \frac{6}{3} = 2$<br><br>$2\frac{2}{3} \times 3 = 6 + 2 = 8$ |
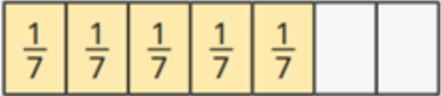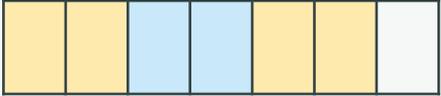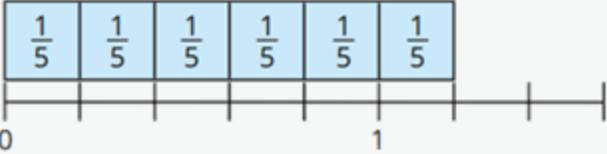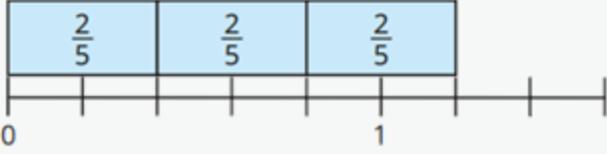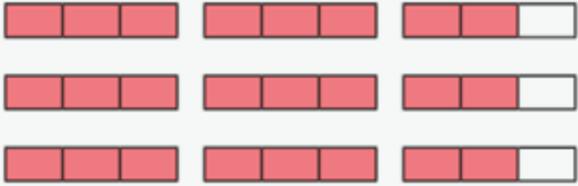
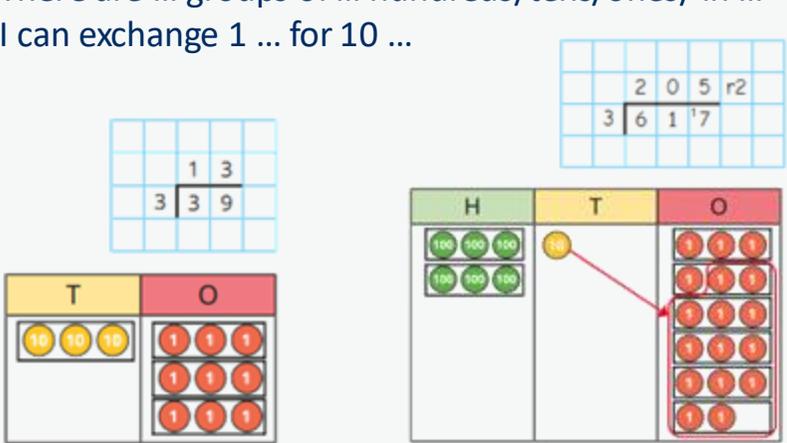# Multiplication

| Progression of skills | Key representations | |
|---|---|---|
| **Find the whole**<br><br>Children multiply to find the whole from a given part. | If $\frac{1}{\Box}$ is … , then the whole is … × …<br><br>$\frac{1}{5}$ of __ = 6<br><br>? <br>$\boxed{6}\ \boxed{6}\ \boxed{6}\ \boxed{6}\ \boxed{6}$<br><br>$5 \times 6 = 30$<br><br>$\frac{1}{5}$ of **30** = 6 | If $\frac{\Box}{\Box}$ is … , then $\frac{1}{\Box}$ is … and the whole is … × …<br><br>$\frac{4}{7}$ of __ = 24<br><br>?<br>24<br><br>$\frac{1}{7} = 24 \div 4 = 6$<br><br>$7 \times 6 = 42$<br><br>$\frac{4}{7}$ of **42** = 24 |

# Progression of skills – Division

| Year 4 | Year 5 | Year 6 |
|---|---|---|
| • Division facts to 12 × 12 <br><br> • Divide a number by 1 and itself <br><br> • Related facts <br><br> • Divide a 2 or 3-digit number by a 1-digit number <br><br> • Divide by 10 and 100 | • Mental strategies <br><br> • Divide numbers up to 4 digits by a 1-digit number <br><br> • Divide by 10, 100 and 1,000 <br><br> • Fraction of an amount | • Short division <br><br> • Mental strategies <br><br> • Long division <br><br> • Order of operations <br><br> • Divide by 10, 100 and 1,000 <br><br> • Divide decimals by integers <br><br> • Decimal and fraction equivalents <br><br> • Divide a fraction by an integer <br><br> • Fraction of an amount <br><br> • Calculate percentages <br><br> • Calculations involving ratio |

# Division

| Year 5 | • Divide numbers mentally drawing upon known facts. |
|---|---|
| | • 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. |
| | • Divide whole numbers and those involving decimals by 10, 100 and 1,000 |

| Progression of skills | Key representations |
|---|---|

| Mental strategies | I can partition ... into ... and ... to help me to divide more easily. $436 \div 4$ / $400 \div 4$ / $36 \div 4$ | I can show groups of ... on a number line. $100 \times 4$  $9 \times 4$  0  400  436 | To divide by ..., I can divide by ... and then divide the result by ... $436 \div 4 = 436 \div 2 \div 2$ $436 \div 2 = 218$ $218 \div 2 = 109$ |
|---|---|---|---|

| Divide numbers up to 4 digits by a 1-digit number  The short division method is introduced for the first time. | There are ... groups of ... hundreds/tens/ones/ in ... I can exchange 1 ... for 10 ...  |
|---|---|
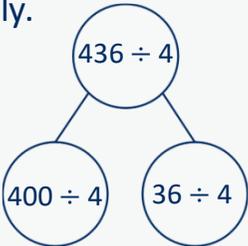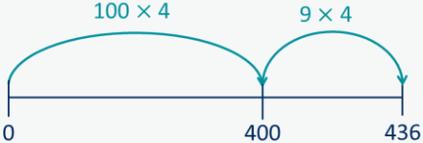
# Division

| Progression of skills | Key representations |
|---|---|
| **Divide by 10, 100 and 1,000**<br><br>Encourage children to notice that dividing by 100 is the same as dividing by 10 twice, and that dividing by 1,000 is the same as dividing by 10 three times. | To divide by 10/100/1,000, I move all the digits … places to the right.<br>… is one-tenth/one-hundredth/one-thousandth the size of …<br><br>$120 \div 10 = 12$<br><br>$120 \div 100 = 1.2$<br><br>$120 \div 1,000 = 0.12$ |
| **Fraction of an amount**<br><br>Bar models support children to understand that to find a fraction of an amount, we divide by the denominator and multiply by the numerator. | To find $\frac{\square}{\square}$ of … , I need to divide by … and multiply by …<br><br>$\frac{1}{5}$ of $20 =$     $\frac{1}{4}$ of $84 =$<br><br>$\frac{3}{5}$ of $20 =$     $\frac{3}{4}$ of $84 =$<br><br>If $\frac{1}{\square}$ is … , then the whole is … × …<br><br>$\frac{1}{5}$ of ___ $= 6$<br><br>$\frac{4}{7}$ of ___ $= 24$ |