Year 5

Calculation policy

Updated September 2024

© White Rose Education 2024



Guidance for teachers



The calculation policy is divided into four sections: addition, subtraction, multiplication and division. At the start of each section, you will find an overview of the progression of skills. Calculations involving decimal numbers and fractions are included.

The calculation policy follows the same concrete, pictorial, abstract approach as our main schemes of learning. Where appropriate, sentence stems and key questions are included alongside the key representations.

Where skills are divided into more than one section across the page, there is a progression in the level of difficulty from left to right.

For example, when adding across a 10, children need to be able to add across 10 itself, before making links with related facts.



Progression of skills – Addition



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

Addition

Year 5	 Add whole numbers with more than 4 digits, including using formal written methods. Add numbers mentally with increasingly large numbers. Add decimals, including a mix of whole numbers and decimals, decimals with different numbers of decimal places, and complements of 1 Add fractions with the same denominator, and denominators that are multiples of the same number. 	
Progression of skills	Key representations	
Add using mental strategies	тть ть н т о To add, I can add then subtract	
Add 1s, 10s, 100s, etc. to any number. Use number bonds and related facts.	$ \begin{array}{c} $	
Add whole numbers with more than 4 digits Encourage children to estimate and use inverse operations to check answers to calculations.	I can exchange 10 for 1 Th Th H T O C C C C C C C C C C C C C C C C C C C	

Addition

Progression of skills	Key representations
Add decimals with up to 2 decimal places 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 I can exchange 10 for 1 $\boxed{Ores + Tenths + Hundredths} = 4 + 4 + 5 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 2 + 1 + 3 + 3 + 2 + 1 + 3 + 3 + 2 + 1 + 3 + 3 + 3 + 3 + 3 + 3 + 3 + 3 + 3$
Complements to 1 Pairs of numbers with up to 3 decimal places which total 1 Encourage children to make links with bonds to 10 and complements to 100 and 1,000	$\begin{array}{c} 0.3 + \boxed{} = 1 \\ \hline 0.35 + \boxed{} = 1 \\ \hline 0.4 \\ \hline 0.$

Addition



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

Progression of skills - Subtraction



Year 4	Year 5	Year 6
• Subtract 1s, 10s, 100s and 1,000s from a 4-digit number	 Subtract whole numbers with more than 4 digits 	 Subtract integers up to 10 million
 Subtract up to two 4-digit numbers 	 Subtract using mental strategies 	 Subtract decimals with up to 3 decimal places
• Subtract decimal numbers in the context of money	 Subtract decimals with up to 2 decimal places 	Order of operationsNegative numbers
 Subtract fractions and mixed numbers with the same denominator 	 Complements to 1 Subtract fractions with denominators that are a multiple of one another 	Subtract fractions

Subtraction



Year 5	 Subtract whole numbers with more than 4 digits. Subtract numbers mentally with increasingly large numbers. Subtract decimals, including a mix of whole numbers and decimals, decimals with different numbers of decimal places, and complements of 1 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 Encourage children to estimate and use inverse operations to check answers to calculations.	I can exchange 1 for 10 $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	
Subtract using mental strategies Subtract 1s, 10s, 100s etc from any number. Use number bonds and related facts.	TTh Th H T O $48,650 - 300 =$ $48,650 - 30,000 =$ -100 $48,650 - 30 =$ -99 $48,650 - 30 =$ -99 $48,650 - 30 =$ -99 $48,650 - 30 =$ -99 $48,650 - 30 =$ -99 $48,650 - 30 =$ -99	

Subtraction

White Rese



Subtraction



Progression of skills Key representations The denominator has been multiplied by ..., so the numerator needs to be multiplied by... Subtract fractions with denominators that are a for the fractions to be equivalent. multiple of one another 9 9 1 <u>8</u> 9 <u>2</u> 9 39 <u>4</u> 9 59 <u>7</u> 9 <u>6</u> 9 <u>1</u> 9 Convert fractions to the 0 $\frac{2}{3} - \frac{2}{9} = \frac{6}{9} - \frac{2}{9} = \frac{4}{9}$ same denominator before 0 3/3 13 23 subtracting. Progress from $\frac{1}{3} - \frac{1}{15} = \frac{5}{15} - \frac{1}{15} = \frac{4}{15}$ subtracting fractions within 1 whole to subtracting from $2\frac{3}{4}$ a mixed number. 78

Progression of skills – Multiplication



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



Year 5	 Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers Recognise and use square numbers and cube numbers, and the notation for squared (²) and cubed (³) 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. Multiply numbers mentally drawing upon known facts. Multiply whole numbers and those involving decimals by 10, 100 and 1000 Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams. 		
Progression of skills	Key representations		
Multiples and factors Encourage children to notice patterns and make links with known facts.	$ \begin{array}{c} \dots \times \dots = \dots \\ 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \end{array} \end{array} \begin{array}{c} \dots \times \dots = \dots \\ \dots \times \dots = \dots \\ 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \end{array} \end{array} \begin{array}{c} \dots \times \dots = \dots \\ \dots \times \dots = \dots \\ \dots \times \dots = \dots \\ 1 & 2 & 2 & 4 \end{array} \begin{array}{c} \text{and } \dots \text{ are } \dots \\ \text{Factors of } 20 & \text{Factors of } 20 \\ 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \end{array}$		Factors of 20 Factors of 12 5 1 2 3 6
Square and cube numbers	squared means \times 1 \times 1 2 \times 2 3 \times 3 1 ² = 1 2 ² = 4 3 ² = 9	cubed means 4×4 $4^2 = 16$ cubed means $1 \times 1 \times 1$ $1^3 = 1$ $2^3 = 1$	2×2 $3 \times 3 \times 3$

©White Rose Education 2024

Progression of skills	Key representations	
Multiply numbers up to 4 digits by a 1-digit number This builds on the short multiplication method introduced in Y4	To multiply a 4-digit number by , I multiply a multiply a 4-digit number by , I multiply a	tiply the ones by , the tens by , the hundreds $\begin{array}{c c} \hline Th & H & T & O \\ \hline \hline & 0 & 0 & 0 & 0 \\ \hline \hline & 1 & 1 & 5 & 2 \\ \hline & \times & 1 & 3 \\ \hline & 1 & 1 & 5 & 2 \\ \hline & \times & 1 & 3 \\ \hline & 1 & 1 & 5 & 2 \\ \hline & \times & 1 & 3 \\ \hline & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 1 & 1 & 1 & 5 & 2 \\ \hline & & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ \hline & & 1 & 1 & 1 & 1 & 1 & 1 & 1 $
Multiply numbers up to 4 digits by a 2-digit number Numbers are first partitioned using an area model then long multiplication is introduced for the first time.	I can partition into and $ \begin{array}{r} \times & \bigcirc &$	x 10 3 30 300 90 2 20 6 $300 + 90 + 20 + 6 = 416$ 1

Progression of skills	Key representations	
Multiply by 10, 100 and 1,000	To multiply by 10/100/1,000, I move all the digits places to the left. is 10/100/1,000 times the size of	
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.	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Th H T O Tth Hth $2.34 \times 10 = 23.4$ $2.34 \times 100 = 234$ $2.34 \times 1,000 = 2,340$
Mental strategies 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 \times is To calculate \times 12, I can do \times \times For example: 121 \times 12 I could calculate 100 \times 12 plus 20 \times 12 plus 1 \times 12 I could calculate 121 \times 10 plus 121 \times 2 I could calculate 121 \times 6 \times 2 I could calculate 121 \times 4 \times 3	

Progression of skills	Key representations	
Multiply fractions by a whole number	To multiply a fraction by an integer, I multiply the numerator by the integer and the denominator remains the same.	
Make links with repeated addition. E.g. $\frac{1}{5} \times 4 = \frac{1}{5} + \frac{1}{5} + \frac{1}{5} + \frac{1}{5}$	$\frac{1}{7} \frac{1}{7} \frac{1}$	
	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	
	$\frac{1}{5} \times 6 = \frac{6}{5} = 1\frac{1}{5} \qquad \qquad \frac{2}{5} \times 3 = \frac{6}{5} = 1\frac{1}{5}$	
Multiply mixed numbers by a whole number	I can partition into and	
	$2\frac{2}{3} \times 3$ $2 \times 3 = 6$ $2 \times 3 = 6$ $2 \times 3 = 6$ $\frac{2}{3} \times 3 = \frac{6}{3} = 2$	
	$2\frac{2}{3} \times 3 = 6 + 2 = 8$	



Progression of skills	Key representations	
Find the whole	If $\frac{1}{\Box}$ is , then the whole is \times	If $\frac{\Box}{\Box}$ is, then $\frac{1}{\Box}$ is and the whole is \times
Children multiply to find the whole from a given part.	$\frac{1}{5}$ of = 6	$\frac{4}{7}$ of = 24 $\frac{1}{7} = 24 \div 4 = 6$
	$\begin{array}{c} ? \\ \hline 6 & 6 & 6 & 6 \\ \hline 6 & 6 & 6 & 6 \\ \hline \hline 5 \times 6 = 30 \\ \hline \hline 1 \\ 5 & of 30 = 6 \\ \end{array}$	$7 \times 6 = 42$ $\frac{4}{7} \text{ of } 42 = 24$

Progression of skills – Division



Year 4	Year 5	Year 6
• Division facts to 12 × 12	Mental strategies	Short division
• Divide a number by 1 and	• Divide numbers up to 4 digits	Mental strategies
itself	by a 1-digit number	Long division
Related facts	 Divide by 10, 100 and 1,000 	Order of operations
 Divide a 2 or 3-digit number by a 1-digit number 	 Fraction of an amount 	• Divide by 10, 100 and 1,000
• Divide by 10 and 100		 Divide decimals by integers
		 Decimal and fraction equivalents
		• Divide a fraction by an integer
		Fraction of an amount
		Calculate percentages
		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. $100 \times 4 \qquad 9 \times 4$ $400 \qquad 436$	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 hund I can exchange 1 for 10	H T O O O O O O O O O O O O O O O O O O	1 2 2 3 r2 4 4 8 9 14 1 2 2 3 r2 4 4 8 9 14 1 7 0 0 0 1 1 1 1 14 1 1 1 0 0 0 1 1 0 0 0 0 1 1 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 </th

Division



Progression of skills	Key representations			
Divide by 10, 100 and 1,000	To divide by 10/100/1,000, I move all the digits places to the right. is one-tenth/one-hundredth/one-thousandth the size of			
Encourage children to notice that dividing by 100 is the same as dividing by	Th H T O Tth Hth Image: Comparison of the second seco			
10 twice, and that dividing by 1,000 is the same as dividing by 10 three times.	ThHTOTthHthImage: Image of the state of th			
	ThHTOTthHthIIIIIIIIIIII			
	ThHTOTthHthImage: Image of the state of th			
Fraction of an amount Bar models support children	To find \Box of , I need to divide byIf $\frac{1}{\Box}$ is , then the whole is \times and multiply by?			
to understand that to find a fraction of an amount, we divide by the denominator and multiply by the numerator.	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			
	$\frac{1}{5}$ of 20 = $\frac{1}{4}$ of 84 = $\frac{?}{1}$ $\frac{4}{7}$ of $= 24$			
	$\frac{3}{5}$ of 20 = $\frac{3}{4}$ of 84 = 24			