Year 6

Calculation policy

Updated September 2024



Guidance for teachers

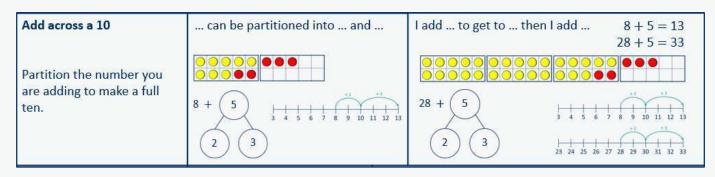


The calculation policy is divided into four sections: addition, subtraction, multiplication and division. At the start of each section, you will find an overview of the progression of skills. Calculations involving decimal numbers and fractions are included.

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 5	Year 6
Add using mental strategies	Add integers up to 10 million
Add whole numbers with more than 4 digits	Add decimals with up to 3 decimal places
Add decimals with up to 2 decimal places	Order of operations
Complements to 1	Negative numbers
Add fractions with denominators that are a multiple of one another	Add fractions

Addition



Year 6	• (Use their knowledge of the order of operations to carry out calculations involving the 4 operations. Calculate intervals across zero. 																								
Progression of skills	Key	repi	rese	nta	atio	ns																				
Add integers up to 10 million																										
million			3	4	6	2	2	1											L							
Encourage children to estimate and use inverse operations to check answers to calculations.		+	1	8	4	3	2	1											L		8	1		8	5	
			5	3	0	5	4	2						3				1	H	+	_	9	5	-	8	
				1							2	2,354		? 750)	1,50	00				9	9	5		8	
Add decimals with up to 3 decimal places Progress to numbers with	I do/		not Tth		th	Thti	1	e an	exc	har	nge	beca	aus	e												
value columns.	00)		9		•		+	3 · 1	5	- 00				+		9 .	5 8							
Encourage children to check that they have lined up the columns correctly.	5	+	2	6		2				5 - 2	1	2					1	4 ·	6 (7						

Addition



Progression of skills	Key representations										
Order of operations	has greater priority than, so the first part of the calculation I need to do is										
Calculations in brackets should be done first. Multiplication and division should be performed before addition and subtraction. *When no brackets are shown and the operations have the same priority, work left to right.	powers $(3 + 4) \times 2$ $\times \text{ and } +$ $+ \text{ and } -$	$2 = 14$ $3 + 4 \times 2 = 11$ $3 \times 4 + 2 = 14$									
Negative numbers Children add to negative numbers and carry out calculations which cross 0	plus is equal to $-3 + 5 = 2$ $-5 -4 -3 -2 -1 0 1 2 3 4 5$	-5 -4 -3 -2 -1 0 1 2 3 4 5 The difference between -5 and -1 is 4									
	+11 $+5$ $-11+16=5$ -11	+5 $+5$ -5 0 5 The difference between -5 and 5 is 10									

Addition



Progression of skills	Key representations		
Add fractions	The denominator has been multiplied by, so the	The lowest common multiple of and is	is made up of wholes and
Convert fractions to the same denominator before	numerator needs to be multiplied by		
adding. Progress from fractions where one			
denominator is a multiple of the other, to any fractions	$\left(\frac{1}{3}\right)\left(\frac{5}{12}\right)$	$\left(\frac{1}{3}\right)\left(\frac{1}{4}\right)$	$\left(2\frac{2}{3}\right)\left(1\frac{1}{6}\right)$
and then to mixed numbers.	3 12		
		$\frac{1}{3} + \frac{1}{4} = \frac{4}{12} + \frac{3}{12} = \frac{7}{12}$	

Progression of skills - Subtraction



Year 5	Year 6							
Subtract whole numbers with more than 4 digits	Subtract integers up to 10 million							
Subtract using mental strategies	Subtract decimals with up to 3 decimal places							
Subtract decimals with up to 2 decimal places	Order of operations							
Complements to 1	Negative numbers							
Subtract fractions with denominators that are a multiple of one another	Subtract fractions							

Subtraction



Year 6	•	 Use their knowledge of the order of operations to carry out calculations involving the 4 operations. Calculate intervals across zero. 																							
Progression of skills	Key	rep	res	ent	atio	ns																			
Subtract integers up to 10 million																									
-			23	¹ 4	56	¹ 2	2	1																	
Encourage children to estimate and use inverse operations to check answers		-	1	8	4	3	2	1											8		4	8	5		
			1	6	1	9	0	0		Ī				1,604				-	3	5	5	5	5	5	
to calculations.											5	2,354		750	?					5	J	5	5	3	
Subtract decimals with up to 3 decimal places Progress from the same number of decimal and whole number places to a different number of decimal and whole number places.	Ido	- :	not		ed t	o m	nake	Ø	exc	Tttl (C) (C) (C) (C		e bed Hth	TI	hth		8 ¹ 1 6 2 9 ;	_								

Subtraction



Progression of skills	Key representations											
Order of operations	has greater priority than, so the first part of the calculation I need to do is											
Children learn the order of priority for operations in a calculation. Calculations in brackets should be done first. Multiplication and division should be performed before addition and subtraction.	powers $\begin{array}{c} \times \text{ and } + \\ + \text{ and } - \\ \end{array}$ $(8-2) \times 3 = 18$											
Negative numbers Children subtract from positive and negative numbers and calculate	minus is equal to $-1-4=-5$ $-5-4-3-2-1 \ 0 \ 1 \ 2 \ 3 \ 4 \ 5$ The difference between -5 and -1 is 4											
intervals across 0	1 - 4 = -3 $-5 - 4 - 3 - 2 - 1 0 1 2 3 4 5$ $-5 - 4 - 3 - 2 - 1 0 1 2 3 4 5$ The difference between 5 and -5 is 10											

Subtraction



Progression of skills	Key representations		
Subtract fractions Convert fractions to the same denominator before subtracting. Progress from fractions where one denominator is a multiple of the other, to any fractions and then subtracting from a mixed number.	The denominator has been multiplied by, so the numerator needs to be multiplied by $\frac{2}{3} - \frac{1}{9} = \frac{6}{9} - \frac{1}{9} = \frac{5}{9}$	The lowest common multiple of and is $\frac{7}{9} - \frac{1}{2} = \frac{14}{18} - \frac{9}{18} = \frac{5}{18}$	is made up of wholes and $2\frac{3}{4}$ $2\frac{3}{4} - 1\frac{1}{8} = 1\frac{5}{8}$

Progression of skills – Multiplication



Year 5	Year 6
Multiples and factors	Multiply numbers up to 4 digits by a 2-digit
Square and cube numbers	number
Multiply numbers up to 4 digits by a 1-digit	Multiply by 10, 100 and 1,000
number	Order of operations
 Multiply numbers up to 4 digits by a 2-digit number 	Multiply decimals by integers
	Multiply fractions by fractions
Widitiply by 10, 100 and 1,000	Find the whole
Mental strategies	Calculations involving ratio
Multiply fractions by a whole number	
Multiply mixed numbers by a whole number	
Find the whole	



Year 6	 Identify common factors and common multiples. Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication. Multiply numbers by 10, 100 and 1,000 Multiply one-digit numbers with up to two decimal places by whole numbers. Use their knowledge of the order of operations to carry out calculations involving the 4 operations. Multiply simple pairs of proper fractions, writing the answer in its simplest form. Solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts. Solve problems involving the calculation of percentages. 									
Progression of skills	Key representations									
Multiply numbers up to 4 digits by a 2-digit number	To multiply by a 2-digit number, first multiply by the ones, then multiply by the tens and then find the total. To multiply by a 2-digit number, first multiply by the ones, $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$									
Multiply by 10, 100 and 1,000 Some children may overgeneralise that multiplying by a power of 10 always results in adding zeros.	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 M HTh TTh Th H T O Tth Hth Thth 234 × 10 = 2,340 234 × 100 = 23,400 0.234 × 100 = 23.4 234 × 1,000 = 234,000 0.234 × 1,000 = 234									



Progression of skills	Key representations	
Order of operations Calculations in brackets should be done first. Multiplication and division should be performed before addition and subtraction.	has greater priority than, so the formula $(3 + 4) \times 2$	First part of the calculation I need to do is $= 14$ $3 + 4 \times 2 = 11$ $3 + 4^2 = 19$
Multiply decimals by integers This is the first time children multiply decimals by numbers other than 10, 100 or 1,000 Encourage them to make links with known facts and whole number multiplication.	I know that \times $=$, so I also know that \times $=$ $=$ $6 \times 2 = 12$ $6 \times 0.2 = 1.2$	I need to exchange 10 for 1 Th



Progression of skills	Key representations									
Multiply fractions by fractions	When multiplying a pair of fractions, I ne denominator.	eed to multiply the numerator and multiply the								
Encourage children to give answers in their simplest form.	$\frac{1}{3} \times \frac{1}{5} = \frac{1}{15}$ $\frac{2}{3} \times \frac{4}{5} = \frac{8}{15}$	$\frac{2}{3} - \frac{6}{2} - \frac{2}{3}$								
	$\overline{3} \stackrel{\wedge}{\overline{5}} = \overline{15}$ $\overline{3} \stackrel{\wedge}{\overline{5}} = \overline{15}$	$\frac{3}{5} - \frac{15}{15} - \frac{5}{5}$								
Find the whole	If $\frac{1}{\Box}$ is, then the whole is \times	If $\frac{\square}{\square}$ is, then $\frac{1}{\square}$ is and the whole is \times								
Children multiply to find the whole from a given part.	$\frac{1}{3}$ of = 18 ? $18 \times 3 = 54$ $\frac{1}{3}$ of 54 = 18	$\frac{4}{9}$ of = 48 $\frac{1}{9} = 48 \div 4 = 12$ $9 \times 12 = 108$ $\frac{4}{9}$ of $108 = 48$								



Progression of skills	Key representations	
Calculate percentages Children first learn how to find 1%, 10%, 20%, 25% and 50% before using multiples of these amounts to find any percentage.	There are lots of % in 100% To find %, I need to divide by	% is made up of %, and % 100% 10% 10% 10% 10% 10% 10% 10% 10% 10% 10%
Encourage children to see the multiplicative relationship between ratios. They will need to multiply or divide each value by the same number to keep the ratio equivalent. Double number lines and	For every , there are For every 1 adult on a school trip, the adults children	ere are 6 children. Adults Children 1 6 2 12 3 18
ratio tables help children to see both horizontal and vertical multiplicative relationships.	The ratio of adults to children is 1	0 1 2 3 4 5 6 Adults Children 0 6 12 18

Progression of skills – Division



Year 5	Year 6
Mental strategies	Short division
Divide numbers up to 4 digits by a 1-digit number	Mental strategies
	Long division
Divide by 10, 100 and 1,000Fraction of an amount	Order of operations
Fraction of an amount	• Divide by 10, 100 and 1,000
	Divide decimals by integers
	Decimal and fraction equivalents
	Divide a fraction by an integer
	Fraction of an amount
	Calculate percentages
	Calculations involving ratio



Year 6	 Perform mental calculations, including with mixed operations and large numbers. Divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context. Divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context. Divide numbers by 10, 100 and 1,000 giving answers up to three decimal places. Use written division methods in cases where the answer has up to two decimal places. Associate a fraction with division and calculate decimal fraction equivalents. Divide proper fractions by whole numbers [for example, \(\frac{1}{3} \div 2 = \frac{1}{6}\)] Solve problems involving the calculation of percentages. 	
Progression of skills	Key representations	
Short division Encourage children to interpret remainders in context, for example knowing that "4 remainder 1" could mean 4 complete boxes with 1 left over so 5 boxes will be needed.	There are groups of hundreds/tens/ones/ in I can exchange 1 for 10 There are groups of hundreds/tens/ones/ in The are groups of hundreds/tens/ones/ in The are groups of hundreds/tens/ones/ in The are groups of groups of hundreds/tens/ones/ in hundreds/tens/o	



Progression of skills	Key representations		
Mental strategies	To divide by, I can first divide by and then divide the answer by		
Include partitioning and number line strategies outlined in Y5 as well as division using factors.	$240 \div 60 = 240 \div 10 \div 6$ $240 \longrightarrow \div 10 \longrightarrow \div 6 \longrightarrow \bullet$ $480 \div 24 = 480 \div 4 \div 6$ $480 \longrightarrow \div 4 \longrightarrow \bullet$ $480 \longrightarrow \div 4 \longrightarrow \bullet$	$9,120 \div 15 = 9,120 \div 5 \div 3$	
Long division The long division method is introduced for the first time. Two alternative methods are shown.	Method 1 0 3 6 0 2 4 r 12 15 3 7 2	Method 2 0 3 6 12 4 3 2 3 6 7 2 7 2 0 1 1 7 0 9 0 1 1 7	
Order of operations Calculations in brackets should be done first, then powers. Multiplication and division should be performed before addition and subtraction.	has greater priority than, so the first part of the powers \times and \div $(6+4) \div 2 =$		



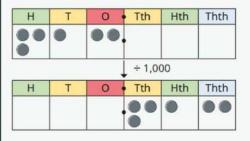
Progression of skills Key r

Divide by 10, 100 and 1,000

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.

Key representations

To divide by ..., I move the digits ... places to the right.



$$312 \div 10 = 31.2$$

 $312 \div 100 = 3.12$

$$312 \div 1,000 = 0.312$$

$$906 \div 10 = 90.6$$

$$906 \div 100 = 9.06$$

$$906 \div 1,000 = 0.906$$

Divide decimals by integers

This is the first time children divide decimals by numbers other than 10, 100 or 1,000

I know that $\dots \div \dots = \dots$,

so I also know that $... \div ... = ...$



$$39 \div 3 = 13$$

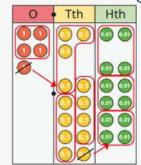


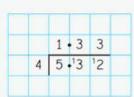
$$3.9 \div 3 = 1.3$$



$$0.39 \div 3 = 0.13$$

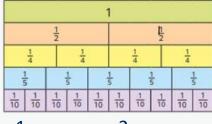
I need to exchange 1 ... for 10 ...



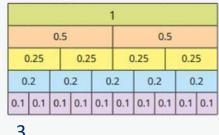


Decimal and fraction equivalents

The fraction ... is equivalent to the decimal ...

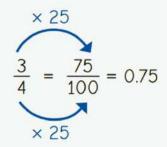


$$\frac{1}{5} = 0.2$$
 $\frac{2}{5} = 0.4$



$$\frac{3}{5} = 0.6$$

 $\frac{\Box}{\Box}$ is equal to $\frac{\Box}{100}$





Progression of skills	Key representations		
Divide a fraction by an integer	ones divided by 2 is ones so sevenths divided by 2 is sevenths.	I am dividing by, so I can split each part into equal parts.	\dots is equivalent to \dots so $\dots \div \dots = \dots \div \dots$
This is the first time children divide fractions by an integer.	$\frac{4}{7} \div 4 = \frac{1}{7}$ $\frac{4}{7} \div 2 = \frac{2}{7}$	$\frac{1}{3} \div 2 = \frac{1}{6}$	$\frac{2}{3} = \frac{4}{6}$ so $\frac{2}{3} \div 4 = \frac{4}{6} \div 4 = \frac{1}{6}$
Fraction of an amount Children divide and multiply	To find $\frac{1}{\Box}$ I divide by	If $\frac{1}{\Box}$ is equal to, then \Box are equal to	If is equal to, then the whole is equal to
to find fractions of an amount. Bar models can still be used to support understanding where needed.	$\frac{1}{2} \text{ of } 36 = 36 \div 2$ $\frac{1}{12} \text{ of } 36 = 36 \div 12$	$\frac{2,700 \text{ m}}{7}$ $\frac{7}{9} \text{ of } 2,700 = \frac{1}{9} \text{ of } 2,700 \times 7$	$\frac{4}{9} \text{ of } \underline{\qquad} = 48$



Progression of skills	Key representations	
Calculate percentages Children first learn how to find 1%, 10%, 20%, 25% and 50% before using multiples of these amounts to find any percentage.	There are lots of % in 100% To find %, I need to divide by	% is made up of %, and % 100% 10% 10% 10% 10% 10% 10% 10% 10% 10% 10% To find 30%, I can find 10% and then multiply it by 3 To find 23%, I can use 10% × 2 and 1% × 3 To find 99%, I can find 1%, then subtract from 100%
Encourage children to see the multiplicative relationship between ratios. They will need to multiply or divide each value by the same number to keep the ratio equivalent. Double number lines and	For every , there are For every 6 children on a school tri adults children	p, there is 1 adult. Adults Children $\begin{array}{c ccccccccccccccccccccccccccccccccccc$
ratio tables help children to see both horizontal and vertical multiplicative relationships.	The ratio of children to adults is 6 :	0 1 2 3 4 5 6 Adults