

Chester Diocesan Academies Trust

Year 6

Maths Calculation Policy



### Addition



Year 6	•	<ul> <li>Use their knowledge of the order of operations to carry out calculations involving the 4 operations.</li> <li>Calculate intervals across zero.</li> </ul>																							
Progression of skills	Ке	y rep	ores	ent	atio	ns																			
Add integers up to 10 million																		_							
Encourage children to			3	4	6	2	2	1											-	8	1		8	5	-
estimate and use inverse		+	1	8	4	3	2	1											+			0	6	-	
operations to check answers			5	3	0	5	4	2						?						9	9	5		8	
to calculations.			1	1							2	2,354	ŀ	750	1,	500									
Add decimals with up to 3 decimal places		o/do	Tth		ed t			e an	ех	cha	nge	bec	aus	е											
Progress to numbers with digits in different place value columns.	Ō						0																		
varue columns.	0	•	•	0	0	90	9			_	. 0 . 5					+ 1		0 5	2 7 3		_				
Encourage children to check				ŏ						_	2 6					2	4	6	) 7						
that they have lined up the columns correctly.		5 •	2	6	•	2					1					1		1							

## 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 x and + + and -	$a = 14$ $3 + 4 \times 2 = 11$ $3 \times 4 + 2 = 14$							
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	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$							
	+11 $+5$ $-11+16=5-11$ $-11$	+5 +5 -5 0 5 The difference between - 5 and 5 is 10							

# Addition



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

#### **Subtraction**



Year 6 Progression of skills	<ul> <li>Use</li> <li>4 o</li> <li>Cal</li> <li>Sub</li> </ul>	<ul> <li>Use their knowledge of the order of operations to carry out calculations involving the 4 operations.</li> <li>Calculate intervals across zero.</li> <li>Subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions.</li> </ul>																					
	Keyler	ЛЕЗ		auo																			
Subtract integers up to 10									1														
million		<sup>2</sup> 3⁄	<sup>1</sup> 4	<sup>5</sup> 6	<sup>1</sup> 2	2	1									-	_	_					_
Encourage children to		1	8	4	2	2	1									+	8	$\neg$	4	8	5		
estimate and use inverse									┤_						_	-	-	6	-	Ţ	-	4	
operations to check answers		1	6	1	9	0	0					4,60	)4					5	5	5	5	5	
to calculations.										2,35	54	75	0	?									
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.	- :	5 67 1 3 5 3		ed t	o m	nake	e an		Tth OC OC OC OC OC OC OC OC OC OC OC OC OC	-	h (	Thth		<sup>0</sup> X <sup>1</sup> 0	6 4								

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#### **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 $\times$ and + + and - $8 - 2 \times 3 = 2$ $(8 - 2) \times 3 = 18$ $8 - 2 \times 3 = 18$							
Negative numbers Children subtract from positive and negative numbers and calculate intervals across 0	minus is equal to -1 - 4 = -5 $-5 - 4 - 3 - 2 - 1 \ 0 \ 1 \ 2 \ 3 \ 4 \ 5$ 1 - 4 = -3 1 - 4 = -3							
	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$							

#### **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 $\frac{2}{3}$ $\frac{1}{9}$ $\frac{1}{9}$ $\frac{2}{3} - \frac{1}{9} = \frac{6}{9} - \frac{1}{9} = \frac{5}{9}$	The lowest common multiple of and is $\frac{7}{9}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{7}{9} - \frac{1}{2} = \frac{14}{18} - \frac{9}{18} = \frac{5}{18}$	is made up of wholes and $2\frac{3}{4}$ $1\frac{1}{8}$ $2\frac{3}{4} - 1\frac{1}{8} = 1\frac{5}{8}$



Year 6	<ul> <li>Identify common factors and common multiples.</li> <li>Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication.</li> <li>Multiply numbers by 10, 100 and 1,000</li> <li>Multiply one-digit numbers with up to two decimal places by whole numbers.</li> <li>Use their knowledge of the order of operations to carry out calculations involving the 4 operations.</li> <li>Multiply simple pairs of proper fractions, writing the answer in its simplest form.</li> <li>Solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts.</li> <li>Solve problems involving the calculation of percentages.</li> </ul>					
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. $\begin{array}{c ccccccccccccccccccccccccccccccccccc$					
Multiply by 10, 100 and	To multiply by 10/100/1,000, I move all the digits places to the left.					
1,000	is 10/100/1,000 times the size of					
Some children may over- generalise that multiplying by a power of 10 always	M     HTh     Th     H     T     O     Th     H     T     O • Tth     Hth     Thth       Image:					
results in adding zeros.	$234 \times 10 = 2,340$ $0.234 \times 10 = 2.34$					
C C	$234 \times 100 = 23,400 \qquad 0.234 \times 100 = 23.4 \\ 0.234 \times 1,000 = 23.4 \\ 0$					
	$234 \times 1,000 = 234,000 \qquad \qquad 0.234 \times 1,000 = 234$					



Progression of skills	Key representations	
Order of operations	has greater priority than, so the firs	at 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.	() powers $\times$ and $+$ + and $-(3 + 4) \times 2 =$	
Multiply decimals by integers This is the first time children multiply decimals by	I know that $\dots \times \dots = \dots$ , so I also know that $\dots \times \dots = \dots$	0       Tth       Hth         0       0       0
numbers other than 10, 100 or 1,000 Encourage them to make links with known facts and whole number multiplication.	$6 \times 2 = 12$ $6 \times 0.2 = 1.2$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $



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.	$\frac{1}{3} \times \frac{1}{5} = \frac{1}{15}$ $\frac{1}{3} \times \frac{4}{5} = \frac{8}{15}$	$\frac{2}{3} \times \frac{3}{5} = \frac{6}{15} = \frac{2}{5}$
Find the whole	If $\frac{1}{\Box}$ is , then the whole is $\times$	If $\frac{1}{\Box}$ is, then $\frac{1}{\Box}$ is and the whole is $\times$
Children multiply to find the whole from a given part.	$\frac{\frac{1}{3} \text{ of } = 18}{}$ $\frac{1}{18}$ $18 \times 3 = 54$ $\frac{1}{3} \text{ of } 54 = 18$	$\frac{4}{9} \text{ of } = 48$ $\frac{1}{9} = 48 \div 4 = 12$ $9 \times 12 = 108$ $\frac{4}{9} \text{ of } 108 = 48$



Progression of skills	Key representations	
<b>Calculate percentages</b> 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         100%         50%         25%       25%         50% of =÷ 2         25% of =÷ 4	% is made up of %, and %         100%         10%       10%       10%       10%       10%       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%
Calculations involving ratio 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, th adults children	ere are 6 children. Adults Children 1 6 2 12 3 18 $\times 6$
ratio tables help children to see both horizontal and vertical multiplicative relationships.	The ratio of adults to children is 1 :	6 0 1 2 3 4 5 6 Adults 4 4 5 6 Children 6 12 18

Year 6	<ul> <li>Perform mental calculations, including with mixed operations and large numbers.</li> <li>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.</li> <li>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.</li> <li>Divide numbers by 10, 100 and 1,000 giving answers up to three decimal places.</li> <li>Use written division methods in cases where the answer has up to two decimal places.</li> <li>Associate a fraction with division and calculate decimal fraction equivalents.</li> <li>Divide proper fractions by whole numbers [for example, <sup>1</sup>/<sub>3</sub> ÷ 2 = <sup>1</sup>/<sub>6</sub> ]</li> <li>Solve problems involving the calculation of percentages.</li> </ul>
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 in for 10 There are in for 10 There are in for 10 There are in for 10 in the formation of the formati



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.	$240 \div 60 = 240 \div 10 \div 6$ $240 \rightarrow \div 10 \rightarrow \bigcirc \div 6 \rightarrow \bigcirc$ $480 \div 24 = 480 \div 4 \div 6$ $480 \rightarrow \div 4 \rightarrow \bigcirc \div 6 \rightarrow \bigcirc$	9,120 ÷ 15 = 9,120 ÷ 5 ÷ 3					
Long division	Method 1	Method 2					
The long division method is introduced for the first time. Two alternative methods are shown.	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	0       3       6         12       4       3         3       6         7       2         0       7         0       0         1       1         1       1         1       1         1       7         1       0         1       1         1       7         1       0         1       1         1       7         1       0         1       0         1       1<					
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 powers $\times$ and $\div$ + and $-(6 + 4) \div 2 =$						

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Progression of skills	Key representations		
<b>Divide by 10, 100 and 1,000</b> 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, I move the digits places to the right. $\begin{array}{r rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	$906 \div 10 = 90.6$ $906 \div 100 = 9.06$ $906 \div 1,000 = 0.906$	
<b>Divide decimals by integers</b> 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 $\dots \div \dots = \dots$ $\bigcirc$ 1 1 1       1 $\bigcirc$	I need to exchange 1 for 10	
Decimal and fraction equivalents	The fraction is equivalent to the decimal $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	is equal to $\frac{1}{100}$ $\begin{array}{r} \times 25 \\ 3 \\ \hline 4 \\ \times 25 \end{array} = 0.75 \\ \hline \times 25 \end{array}$	



Progression of skills	Key representations		
Divide a fraction by an integer	ones divided by 2 is ones so sevenths divided by 2 is	I am dividing by , so I can split each part into equal	is equivalent to so $\dots \div \dots = \dots \div \dots$
This is the first time children divide fractions by an integer.	sevenths. $\frac{4}{7} \div 4 = \frac{1}{7}$ $\frac{4}{7} \div 2 = \frac{2}{7}$	parts. $\frac{1}{3} \div 2 = \frac{1}{6}$	$\frac{2}{3} = \frac{4}{6}$ so $\frac{2}{3} \div 4 = \frac{4}{6} \div 4 = \frac{1}{6}$
<b>Fraction of an amount</b> Children divide and multiply	To find $\frac{1}{\Box}$ I divide by	If $\frac{1}{\Box}$ is equal to, then $\frac{\Box}{\Box}$ 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.	$\frac{1}{2}$ of 36 = 36 ÷ 2 $\frac{1}{12}$ of 36 = 36 ÷ 12	$\frac{2,700 \text{ m}}{1}$ $\frac{1}{7} \text{ of } 2,700 = \frac{1}{9} \text{ of } 2,700 \times 7$	$\frac{48}{\frac{4}{9}} \text{ of } = 48$

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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 $100\%$ $50\%$ $25\%$ $25\%$ $25\%$ $25\%$ $25\%$ $25\%$ $25\%$ $25\%$ $25\%$ $50\%$ of = $\div$ 2 $25\%$ of = $\div$ 4	% is made up of %, and %         100%         10%       10%       10%       10%       10%       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%
Calculations involving ratio 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 ratio tables help children to see both horizontal and vertical multiplicative relationships.	For every 6 children on a school tri odults children The ratio of children to adults is 6 :	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$