

# CALCULATION POLICY

June 2018

Laid out below are the calculations which students are expected to be able to accomplish in each year group. Students will move from manipulating materials, on to pictorial representations and informal written methods and eventually on to efficient formal written methods.

YR GRP	MILESTONES			END OF YEAR EXPECTATIONS
	END NOVEMBER	END TERM 3	START TERM 5	
YEAR 3	HTU + U e.g. 345 + 8 mentally or using a resource	HTU + HTU e.g. 245 + 438 using partitioning and recombining or resources 200+400 40+30 5+8 600 + 70 + 10 + 3 = 683	TU x 2, 3, 4, 5, 8, 10 using known facts and partitioning and recombining e.g. 24 x 3 20 x 3 = 10 x 2 x 3 10 x 6 = 60 4 x 3 = 12 60 + 12 = 72	HTU + HTU using column method including carrying  $\begin{array}{r} 245 \\ +438 \\ \hline 683 \end{array}$
	HTU + H e.g. 279 + 300 mentally or using a resource	HTU + T e.g. 245 + 80 using partitioning and recombining, counting on in tens or resources 200 + 120 + 5 = 325	Divide TU by 4 and 8 for known facts. Fast recall. e.g. 72 ÷ 8 = 9	HTU - HTU using column method including exchange  $\begin{array}{r} 279 \\ -154 \\ \hline 125 \end{array}$
	HTU – U e.g. 413 – 9 mentally or using a resource	Multiply and divide by 2,3,4,5 and 10 mentally and using resources	Add & subtract fractions with the same denominator within 1 whole e.g. $\frac{1}{5} + \frac{3}{5} = \frac{4}{5}$	Multiply by 3, 4 and 8 mentally, using doubling strategies for x 4 and x 8. e.g. 31 x 8 double 31 = 62 double 62 = 124 double 124 = 248  Working towards TU x U formal short multiplication  $\begin{array}{r} 34 \\ \times 3 \\ \hline 102 \end{array}$
	HTU – h e.g. 904 – 200 mentally or using a resource			Divide TU by 3, 4 or 8 for known facts, or halving to divide by 4 or 8.

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	END NOVEMBER	END TERM 3	START TERM 5	
YEAR 4	Multiply and divide by 6 using mental recall, partitioning and formal short multiplication	Add and subtract ThHTU using informal methods, including partitioning and using resources e.g. 6523 + 1846  or 4873 - 1937	ThTU + ThHTU using column method, including carrying e.g.  $\begin{array}{r} 7\ 4\ 5 \\ + 4\ 3\ 8 \\ \hline 1\ 1\ 8\ 3 \end{array}$	ThTU + ThHTU using column method, including carrying e.g.  $\begin{array}{r} 7\ 4\ 5 \\ + 4\ 3\ 8 \\ \hline 1\ 1\ 8\ 3 \end{array}$
	Add & subtract fractions with the same denominator	Multiply and divide by 9 and 11 using mental recall, partitioning and formal short multiplication	ThHTU - ThHTU using column method, including exchange e.g.  $\begin{array}{r} 2\ 3\ 1\ 8\ 6 \\ - 1\ 5\ 4\ 3 \\ \hline 1\ 6\ 4\ 3 \end{array}$	ThHTU - ThHTU using column method, including exchange e.g.  $\begin{array}{r} 2\ 3\ 1\ 8\ 6 \\ - 1\ 5\ 4\ 3 \\ \hline 1\ 6\ 4\ 3 \end{array}$
		HTU x U using partitioning or other informal methods e.g. 643 x 9 600 x 9 = 5400 40 x 9 = 360 3 x 9 = 27  5400 + 360 + 27 5700 + 80 + 7 = 5787	All multiplication & division facts to 12 x 12	HTU x U formal short  HTU x U formal short e.g. $\begin{array}{r} 4\ 6\ 2 \\ \times \quad 6 \\ \hline 2\ 7\ 7\ 2 \end{array}$
		Divide by 10 and 100 to 1 decimal place. e.g. 670 ÷ 10 = 67 673 ÷ 10 = 67.3 67 ÷ 10 = 6.7	U x U x U e.g. 4 x 6 x 3 rearrange 4 x 3 x 6 12 x 6 = 72	HTU ÷ U formal short  $6 \overline{) 22} \frac{1}{6}$
			HTU x U formal short e.g. $\begin{array}{r} 4\ 6\ 2 \\ \times \quad 6 \\ \hline 2\ 7\ 7\ 2 \end{array}$	
			TU ÷ U by partitioning, e.g. 96 ÷ 3 90 ÷ 3 = 30 6 ÷ 3 = 2 30 + 2 = 32	

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	END NOVEMBER	END TERM 3	START TERM 5	
YEAR 5	Recall all multiplication and division facts to 12 x 12 and derive extended facts e.g. $30 \times 7 = 210$ $720 \div 9 = 80$	Add & subtract any whole numbers using column methods	ThHTU x U using short formal multiplication e.g. $\begin{array}{r} 2894 \\ \times \quad 9 \\ \hline 26808436 \end{array}$	Add & subtract any number including decimals using the column method
	Multiply and divide by 10 and 100 mentally to 2 decimal places e.g. $673 \div 100 = 6.73$	ThHTU - HTU mentally, using jottings to assist e.g. $4713 - 638$	HTU x TU using formal long multiplication $\begin{array}{r} 452 \\ \times \quad 67 \\ \hline 33164 \\ 237120 \\ \hline 30284 \end{array}$	ThHTU x TU using formal long multiplication $\begin{array}{r} 2894 \\ \times \quad 29 \\ \hline 26808436 \\ 517880 \\ \hline 8139126 \end{array}$
	Add & subtract fractions with same denominator, including mixed numbers. e.g. $1\frac{3}{5} + 2\frac{4}{5} = 5\frac{2}{5}$ $7\frac{1}{3} - \frac{2}{3} = 6\frac{2}{3}$	ThHTU x TU using partitioning and recombining	Divide by 10, 100 and 1000 to 2 decimal places. e.g. $3.8 \div 10 = 0.38$	ThHTU $\div$ TU using formal long division e.g. $\begin{array}{r} 315 \\ 12 \overline{) 3780} \\ \underline{- 3600} \\ 180 \\ \underline{- 120} \\ 60 \\ \underline{- 60} \\ 0 \end{array}$ $3784 \div 12 = 315$
		Add & subtract fractions with denominators which are multiples of same number e.g. $\frac{1}{3} + \frac{5}{6} = 1\frac{1}{6}$		Divide to 3 decimal places. $45632 \div 1000 = 45.632$

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	END NOVEMBER	END TERM 3
YEAR 6	Multiply or divide any 4 digit number by a 2-digit number using formal long methods.	Add and subtract number with different decimal places using column methods.
	Use order of operations correctly: BoDMAS Brackets; Divide, Multiply; Add; Subtract	ThHTU ÷ TU using formal long division including remainders e.g. $  \begin{array}{r}  315 \text{ r}3/12 \\  12 \overline{) 3783} \\  \underline{- 3600} \\  183 \\  \underline{- 120} \\  63 \\  \underline{- 60} \\  3  \end{array}  $ 3784 ÷ 12 = 315 r. 3/12
	Add & subtract fractions with different denominators by finding equivalent fractions. $\frac{7}{8} - \frac{3}{5} =$	Multiply a unit number with 2 decimal places by a whole number e.g. 4.26 x 5
	Multiply proper fractions and simplify the answers. $\frac{1}{6} \times \frac{3}{8}$	Divide proper fractions and mixed numbers by whole numbers $\frac{4}{5} \div 2$ $4 \frac{2}{3} \div 3$
		Formal long division giving answers up to 2 decimal places e.g. 3783 ÷ 12 $  \begin{array}{r}  315.25 \\  12 \overline{) 3783} \\  \underline{- 3600} \\  183 \\  \underline{- 120} \\  63 \\  \underline{- 60} \\  30 \\  \underline{- 24} \\  60 \\  \underline{- 60} \\  0  \end{array}  $

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# PROGRESSION THROUGH CALCULATION POLICY

## HARDER, HIGHER, FASTER...

### Why?

- ❖ *Fluent mental and written calculation skills are an important element in mathematical problem-solving. Students who develop strategies to manipulate numbers flexibly in order to add, subtract, multiply and divide achieve at higher levels in Mathematics.*
- ❖ *Our policy ensures a consistent approach to teaching mathematical methods throughout the school as students move towards the most efficient methods.*
- ❖ *Our policy ensures we meet the requirements of the 2014 curriculum.*

### How?

- By choosing the right method.
  - 60% of the maths done by adults is calculated in their head. We believe that pupils should first develop their conceptual understanding and mental fluency before moving on to jotting, informal and, eventually, formal written methods.
- By respecting individual learning approaches.
  - Students often develop efficient strategies of their own and will be encouraged to use these alongside the preferred methods taught in school.
  - Manipulating materials and drawing diagrams are essential mathematical skills and represent stages of learning which must be acquired before moving towards abstract written notation.
- By expecting all students to achieve highly.
  - Mathematics is a subject in which everyone can succeed. Students will be provided with the necessary means to fully access year-appropriate learning as independently as possible.
- By keeping it real.
  - Mathematics is the study of problem-solving. Children will be asked to perform calculations to solve real problems which are of practical use.
- By developing key mathematical skills alongside calculation.
  - Estimation is described by top mathematicians as the most important mathematical skill. Number flexibility and mental calculation strategies are essential for effective estimation.
  - Other key skills are looking for patterns, making models, drawing pictures or diagrams, working with others, guessing, checking and improving, acting out the problem, producing lists and tables, working systematically, reasoning logically, trying simpler cases, working backwards...
- By playing games.
  - Card, dice and board games are excellent ways of developing calculation skills. Shopping and cooking at home are other brilliant opportunities for using calculation strategies.