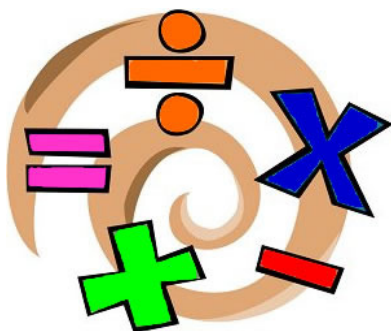




Totley All Saints

Growing & learning together!

Y4-6 WRITTEN METHODS OF CALCULATION



ADDITION

STAGE 4: COLUMN METHOD

$\begin{array}{r} 47 \\ + 76 \\ \hline 123 \\ \hline \end{array}$	$\begin{array}{r} 258 \\ + 87 \\ \hline 345 \\ \hline \end{array}$	$\begin{array}{r} 366 \\ + 458 \\ \hline 824 \\ \hline \end{array}$
---	--	---

$$47 + 76 = 123$$

$$258 + 87 = 345$$

$$366 + 458 = 824$$

- **Write the numbers underneath each other (line up HTU).**
- **Add the units & carry the ten.**
- **Add the tens & carry the hundred.**
- **Add the hundreds.**



SUBTRACTION

STAGE 3: COLUMN METHOD

$$\begin{array}{r} 563 \\ - 241 \\ \hline 322 \end{array}$$

$$\begin{array}{r} 4 \text{ } 16 \\ 563 \\ - 271 \\ \hline 292 \end{array}$$

No decomposition or adjustment:

$$563 - 241 = 322$$

Adjustment from the hundreds to the tens:

$$563 - 271 = 292$$

$$\begin{array}{r} 4 \text{ } 15 \text{ } 13 \\ 563 \\ - 278 \\ \hline 285 \end{array}$$

$$\begin{array}{r} 4 \text{ } 9 \text{ } 13 \\ 503 \\ - 278 \\ \hline 225 \end{array}$$

Adjusting

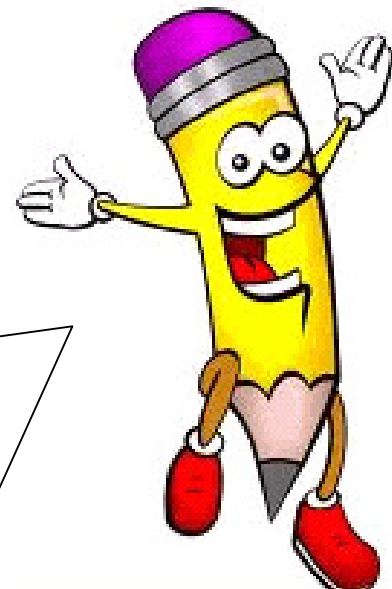
hundreds to the tens & tens to the ones:

$$563 - 278 = 285$$

Dealing with zeros when adjusting:

$$503 - 278 = 225$$

- **Write the numbers underneath each other (line up HTU).**
- **Adjust hundreds, tens & units if needed.**
- **Subtract the units, then tens & hundreds.**



MULTIPLICATION

STAGE 4: SHORT MULTIPLICATION

$$\begin{array}{r}
 38 \\
 \times 7 \\
 \hline
 266 \\
 \hline
 5
 \end{array}$$

$$38 \times 7 = 266$$

- **Line up the units & multiply them carrying tens below the tens column.**
- **Multiply 30 by 7 (remember the tens carried).**
- **38 multiplied by 7 is 266.**



MULTIPLICATION

STAGE 4: LONG MULTIPLICATION

FOR 2-DIGIT & 3-DIGIT PRODUCTS

a.	TU x TU TU	56 x 27 392
b.	TU x TU TU	1120 1512 392

$$56 \times 27 = 392$$

56 x 27 is approximately
60 x 30 = 1800

- **Multiply 6 by 7 to make 42 (carry the 4 tens below).**
- **Multiply the 5 tens by 7 to make 35 tens (remember the 4 tens you carried below). 56x7 is 392.**
- **On the next line, write a 0 to remember you are multiplying by 20, not 2.**
- **Multiply 6 by 2 tens (carry hundreds below).**
- **Multiply the 5 tens by 2 tens (remember the hundred you carried below).**
- **Combine the totals.**

$$286 \times 29 = 8294$$

a.	HTU x TU TU	286 x 29 2574
b.	HTU x TU TU	5720 8294 8294

- **Multiply 286 by 9 to make 2574 (carry tens & hundreds below the line).**
- **Multiply 286 by 20 to make 5720 (record a 0 to remember you are multiplying by 20, not 2 & again, carry below the line).**
- **Combine the totals.**



DIVISION

STAGE 3: SHORT DIVISION

TWO-DIGIT NUMBERS

$$\begin{array}{r} 20 + 7 \\ 3 \overline{)60 + 21} \end{array}$$

$$81 \div 3 = 27$$

Then shortened to:

$$\begin{array}{r} 27 \\ 3 \overline{)81} \end{array}$$

- **Mentally partition 81 into tens & units.**
- **Ask yourself 'How many threes divide into 80 so that the answer is a multiple of 10?'**
- **Partition 81 into 60 & 21, and divide each part by 3.**
- **Combine your totals.**
- **Move onto the shorter method when you are ready.**



DIVISION

STAGE 3: SHORT DIVISION

THREE-DIGIT NUMBERS

$$291 \div 3 = 97$$

$$3 \overline{)290+1} = 3 \overline{)270+21} \quad \begin{array}{r} 90+7 \\ \hline \end{array}$$

Then shortened to:

$$\begin{array}{r} 97 \\ \hline 3 \overline{)291} \end{array}$$

- **Ask yourself 'How many threes in 290?' (The answer must be a multiple of 10.)**
- **Count in multiples of 10; 30, 60, 90 (there are 90 threes in 270).**
- **Divide the remaining 21 by 3.**
- **Combine your totals.**
- **Move onto the shorter method when you are ready.**



DIVISION

STAGE 4: LONG DIVISION

CHUNKING

$$560 \div 24 = 23 \text{ r } 8$$

$ \begin{array}{r} 23 \text{ r } \frac{8}{24} \\ 24 \overline{) 560} \\ \underline{240} \quad (\times 10) \\ 320 \\ \underline{240} \quad (\times 10) \\ 80 \\ \underline{48} \quad (\times 2) \\ 32 \\ \underline{24} \quad (\times 1) \\ 8 \end{array} $	$ \begin{array}{l} 10 \times 24 = 240 \\ 5 \times 24 = 120 \\ 2 \times 24 = 48 \end{array} $
---	--

The key to chunking lies in making an estimate beforehand.



- ♦ **Multiply the divisor by multiples of 10 to find the two multiples that 'trap' the HTU dividend. For $560 \div 24$, start by multiplying 24 by 10, 20, 30, ... to find that $24 \times 20 = 480$ and $24 \times 30 = 720$. The multiples of 480 and 720 trap the number 560. This tells us that the answer to $560 \div 24$ is between 20 and 30.**
- ♦ **Start the division by first collecting some multiples of 24 in a magic box ($\times 10$, $\times 5$, $\times 2$). these will be taken off the number in chunks, starting with the largest possible multiple.**
- ♦ **Keep taking off chunks until all multiples of 24 have been subtracted.**
- ♦ **Combine all the multiples subtracted.**
- ♦ **Show your remainder as a fraction.**

DIVISION

STAGE 4: LONG DIVISION

$$432 \div 15 = 28 \text{ r } 12$$

$$\begin{array}{r}
 28 \text{ r } 12 \\
 15 \overline{) 432} \\
 \underline{300} \quad 15 \times 20 \\
 132 \\
 \underline{120} \quad 15 \times 8 \\
 12
 \end{array}$$

$$\begin{array}{r}
 28 \text{ r } \frac{12}{15} \frac{4}{5} \\
 15 \overline{) 432} \\
 \underline{300} \\
 132 \\
 \underline{120} \\
 12
 \end{array}$$

- **Start by multiplying 15 by multiples of 10 to get an estimate; $15 \times 20 = 300$ & $15 \times 30 = 450$, so the answer lies between 20 and 30 packs.**
- **Start by subtracting 300 from 432.**
- **Calculate how many multiples of 15 remain in 132.**
- **Combine your multiples.**
- **The quotient 28, with a remainder of 12, lies between 20 & 30, as predicted.**

• **How many packs of 15 can we make from 432 biscuits?**

- **When you are ready, lose the jottings by the side.**
- **Show your answer as a fraction.**



Written Methods of Calculation for each year group:

ADDITION			
Y1	Y2	Y3	Y4 Y5 Y6
Stage 1 Number Line	Stage 2 Partitioning	Stage 3 Expanded Columns	Stage 4 Column Method

SUBTRACTION			
Y1	Y2	Y3	Y4 Y5 Y6
Stage 1 Number Line Counting back & Partitioning	Stage 1 Number Line Bridging	Stage 2 Expanded Columns	Stage 3 Column Method

MULTIPLICATION			
Y1	Y2	Y3	Y4 Y5 Y6
Stage 1 Number Line	Stage 2 Mental Partitioning	Stage 3 Expanded Columns	Stage 4 Short & Long Multiplication

DIVISION			
Y1 Y2	Y3	Y4	Y5 Y6
Stage 1 Number Line	Stage 2 Mental Partitioning	Stage 3 Short Division	Stage 4 Long Division