

Aim of Booklet:

1. Explain four rules (+ - \times \div)
2. See development of mental maths (understanding number)
3. Introduce pencil and paper methods taught to children
4. See progression through to formal written methods

Year 5 and 6 column method

Children use column method to add thousands, hundreds, tens and units. First (a) bridging tens, then (b) bridging hundreds, then (c) bridging thousands then (d) applying place value knowledge to decimals. With decimals remember the numbers move, not the decimal point.

(a)

$$\begin{array}{r} \text{HTU} \\ 528 \\ + 137 \\ \hline 665 \\ | \end{array}$$

(b)

$$\begin{array}{r} \text{HTU} \\ 475 \\ + 147 \\ \hline 622 \\ || \end{array}$$

(c)

$$\begin{array}{r} \text{Th H T U} \\ 1528 \\ + 737 \\ \hline 2265 \\ | | \end{array}$$

(d)

$$\begin{array}{r} \text{TU} . \text{ t h} \\ 15 . 28 \\ \underline{7 . 37} \\ 22 . 65 \\ | \quad | \end{array}$$

Year 5 and 6 column method - Decomposition

Decomposition - this means adjusting numbers so that subtraction is possible.

Children use column method to subtract numbers in thousands, hundreds, tens and units. First (a) no decomposition needed (b) decomposing tens, then (c) decomposing hundreds, then (d) decomposing thousands then applying place value knowledge to decomposing decimals.

$$\begin{array}{r} \text{(a)} \\ \text{HTU} \\ 548 \\ - 137 \\ \hline 411 \end{array}$$

$$\begin{array}{r} \text{(b)} \\ \text{HTU} \\ \quad 6 \ 15 \\ 475 \\ - 147 \\ \hline 325 \end{array}$$

$$\begin{array}{r} \text{(c)} \\ \text{Th H T U} \\ \quad 4 \ 12 \\ 1528 \\ - 237 \\ \hline 1291 \end{array}$$

$$\begin{array}{r} \text{(d)} \\ \quad 2 \ 15 \\ 3548 \\ - 737 \\ \hline 2811 \end{array}$$

Year 5 and 6 column method - Decomposition

Decomposition - this means adjusting numbers so that subtraction is possible.

Children use column method to subtract numbers in thousands, hundreds, tens and units.

Decomposing hundreds into tens and units.

By using this method
the children can see that
the value is still 400

$$300 + 90 + 10 = 400$$

(a)
HTU

$\begin{array}{r} 400 \\ - 147 \\ \hline \end{array}$	$- \begin{array}{r} \overset{3 \ 10}{\cancel{400}} \\ \underline{147} \\ \hline \end{array}$	$- \begin{array}{r} \overset{3 \ 9 \ 10}{\cancel{400}} \\ \underline{147} \\ \hline \end{array}$	$- \begin{array}{r} \overset{3 \ 9 \ 10}{\cancel{400}} \\ \underline{147} \\ \underline{253} \end{array}$
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Year 5 Grid method (cabbage patch method)

$$\begin{array}{r} 549 \\ \times 6 \\ \hline 3294 \end{array}$$

Partition into hundreds tens and units.
Then multiply separately.
Finally add the totals together.

X	500	40	9
6	3000	240	54

Add either horizontally
 $3000 + 240 + 54 = 3294$

or vertically

$$\begin{array}{r} 3000 \\ 240 \\ + 54 \\ \hline 3294 \end{array}$$

Year 5 Grid method (cabbage patch method)

$$\begin{array}{r} 549 \\ \times 26 \\ \hline 14274 \end{array}$$

Multiply by 2 digits.

Partition into hundreds tens and units.

Then multiply separately.

Finally add the totals together.

X	500	40	9
6	3000	240	54
20	10000	800	180

Add either horizontally

$$3000 + 240 + 54 = 3294$$

$$10000 + 800 + 180 = \underline{10980} +$$

$$\underline{14274}$$

or vertically

$$\begin{array}{r} 3000 \\ 240 \\ + 54 \\ \hline 3294 \end{array}$$

$$\begin{array}{r} 10000 \\ 800 \\ + 180 \\ \hline 10980 \end{array}$$

$$\underline{3294}$$

$$\underline{10980}$$

$$+ \underline{10980}$$

$$\underline{14274}$$

Year 5 and Year 6 standard vertical multiplication by partitioning.

$$\begin{array}{r} 36 \\ \times 18 \\ \hline 648 \end{array}$$
$$\begin{array}{r} 36 \\ \times 10 \\ \hline 360 \end{array}$$
$$\begin{array}{r} 36 \\ \times 8 \\ \hline 288 \end{array}$$
$$\begin{array}{r} 360 \\ +288 \\ \hline 648 \end{array}$$

Multiply by 2 digits.

Partition into tens and units.

Then multiply separately.

Finally add the totals together.

Year 5 and Year 6 standard vertical multiplication.

$$\begin{array}{r} 36 \\ \times 18 \\ \hline 360 \\ 288 \\ 4 \\ \hline 648 \end{array}$$

(Multiply by 10)

(Multiply by 8) Remember to add numbers into their appropriate place value columns.

This method can be applied to hundreds, thousands and decimals.

Years 4, 5 and 6

Dividing larger 2 digit numbers

Short division

$$81 \div 3 = 27$$

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

Divide the 8 digit (representing 80)
by 3 ($8 \div 3 = 2r.2$)

Write the 2 (representing 20)
next to the 1 to make 21.

Divide 21 by 3 = 7

Answers can be checked by doing the inverse

$$3 \times 27 = 81$$

Years 5 and 6

Dividing larger 3 digit numbers

Short division.

$$292 \div 3 = 97 \text{ r. } 1$$

$$\begin{array}{r} 097 \text{ r. } 1 \\ 3 \overline{) 292} \end{array}$$

Divide the 2 digit

(representing 200)

by 3 ($2 \div 3 = 0 \text{ r. } 2$)

Write the 2 (representing 200)
next to the 9 to make 29 tens.

Divide 29 tens by 3 = 7 r.2

Write the 2 (representing 2 tens)
next to the 2 to make 22.

Divide 22 by 3 = 7 r. 1

Answers can be checked by doing the inverse

$$3 \times 97 = 291 + 1(\text{ the remainder}) = 292$$

Years 5 and 6

Dividing 3 digit numbers by 2 digit numbers.

Long division

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

$$\begin{array}{r} 0 \ 2 \ 3 \ \text{r}.8 \\ 24 \overline{) 5 \ 6 \ 0} \\ \underline{- 4 \ 8 \ 0} \\ 8 \ 0 \\ \underline{- 7 \ 2} \\ 8 \end{array}$$

Divide the 5 digit

(representing 500)

by 24 ($5 \div 24 = 0$)

Write the 5 (representing 500)

next to the 6 to make 56 tens.

Divide 56 tens by 24 = 2 r.8

Write the 8 (representing 8 tens

next to the 0 to make 80.

Divide 80 by 24 = 3 r.8

Answers can be checked by doing the inverse

$$24 \times 23 = 552 + 8(\text{ the remainder}) = 560$$