

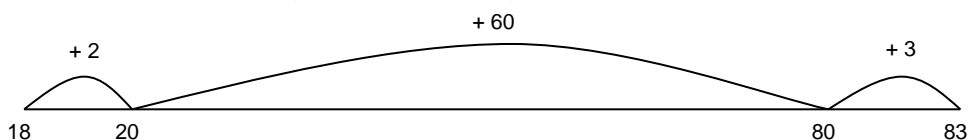


## Christ Church C of E Primary School - Whole School Approach

We have developed a consistent approach to the teaching of written calculation methods. This will establish continuity and progression throughout the school.

**Mental methods will be established. These will be based on a solid understanding of place value in number and will include the following:**

- i. Remembering number facts and recalling them without hesitation  
*e.g. pairs of numbers which make 10*  
*Doubles & halves to 20*
- ii. Using known facts to calculate unknown facts  
*e.g.  $6 + 6 = 12$  therefore  $6 + 7 = 13$*   
 *$24 + 10 = 34$  therefore  $24 + 9 = 33$*
- iii. Understanding and using relationships between addition & subtraction to find answers and check results  
*e.g.  $14 + 6 = 20$  therefore  $20 - 6 = 14$*
- iv. Having a repertoire of mental strategies to solve calculations  
*e.g. doubles / near doubles*  
*bridging 10 / bridging 20*  
*adding 9 by +10 & -1*
- v. Making use of informal jottings such as blank number lines to assist in calculations with larger numbers *e.g.  $83 - 18 = 65$*



- vi. Solving one-step word problems (either mentally or with jottings) by identifying which operation to use, drawing upon their knowledge of number bonds and explaining their reasoning
- vii. Beginning to present calculations in a horizontal format and explain mental steps using numbers, symbols or words
- viii. Learn to estimate/approximate first e.g.  $29 + 30$  (round up to nearest 10, the answer will be near to 60).

Place value will be taught mentally first from Reception class where number tracks are used, progressing to number lines (to 10 or 20 as appropriate) in Years 1 and 2. The empty number line will then be introduced to aid calculations.

Subtraction will be taught by counting on and counting back depending on the numbers.

## **WHEN ARE CHILDREN READY FOR WRITTEN CALCULATIONS?**

### **Addition and subtraction**

- Do they know addition and subtraction facts to 20?
- Do they understand place value and can they partition numbers?
- Can they add three single digit numbers mentally?
- Can they add and subtract any pair of two digit numbers mentally?
- Can they explain their mental strategies orally and record them using informal jottings?

### **Multiplication and division**

- Do they know the 2, 3, 4, 5 and 10 time table
- Do they know the result of multiplying by 0 and 1?
- Do they understand 0 as a placeholder?
- Can they multiply two and three digit numbers by 10 and 100?
- Can they double and halve two digit numbers mentally?
- Can they use multiplication facts they know to derive mentally other multiplication facts that they do not know?
- Can they explain their mental strategies orally and record them using informal jottings?

**The above lists are not exhaustive but are a guide for the teacher to judge when a child is ready to move from informal to formal methods of calculation.**

## Stages in Addition

1. Mental method, using partitioning:

$$47 + 76 = (40 + 70) + (7 + 6)$$

or

$$47 + 76 = (47 + 70) + 6$$

2. Introduction to vertical layout, using partitioning

$$\begin{array}{r} 300 + 70 + 8 \\ 400 + 80 + 7 \\ \hline 700 + 150 + 15 = 865 \\ \hline \end{array}$$

3. Vertical layout, expanded working, moving to adding the least significant digit first:

$$\begin{array}{r} 47 \\ + 76 \\ \hline 110 \\ 13 \\ \hline 123 \end{array} \quad \begin{array}{r} 47 \\ + 76 \\ \hline 13 \\ 110 \\ \hline 123 \end{array} \quad \begin{array}{r} 368 \\ + 493 \\ \hline 700 \\ 150 \\ 11 \\ \hline 861 \end{array} \quad \begin{array}{r} 368 \\ + 493 \\ \hline 11 \\ 150 \\ 700 \\ \hline 861 \end{array}$$

4. Vertical layout, contracting the working to a compact efficient form:

$$\begin{array}{r} 47 \\ + 76 \\ \hline 13 \\ 110 \\ \hline 123 \end{array} \quad \begin{array}{r} 47 \\ + 76 \\ \hline 123 \\ \hline 11 \end{array} \quad \begin{array}{r} 368 \\ + 493 \\ \hline 11 \\ 150 \\ 700 \\ \hline 861 \end{array} \quad \begin{array}{r} 368 \\ + 493 \\ \hline 861 \\ \hline 11 \end{array}$$

5. Bigger numbers and decimals

## Stages in Subtraction by Decomposition

1.  $563 - 241$

$$\begin{array}{r} 500 \quad 60 \quad 3 \\ - 200 \quad 40 \quad 1 \\ \hline 300 \quad 20 \quad 2 = 322 \\ \hline \end{array}$$

leading to

$$\begin{array}{r} 5 \quad 6 \quad 3 \\ - 2 \quad 4 \quad 1 \\ \hline 3 \quad 2 \quad 2 \\ \hline \end{array}$$

2.  $563 - 278$

$$\begin{array}{r} 500 \quad 60 \quad 3 \rightarrow 400 \quad 150 \quad 13 \\ - 200 \quad 70 \quad 8 \rightarrow -200 \quad 70 \quad 8 \\ \hline 200 \quad 80 \quad 5 = 285 \\ \hline \end{array}$$

leading to

$$\begin{array}{r} {}^4 5 \quad {}^{15} 6 \quad {}^1 3 \\ - 2 \quad 7 \quad 8 \\ \hline 2 \quad 8 \quad 5 \\ \hline \end{array}$$

## Stages in Multiplication

1. Mental method using partitioning multiplying tens first:  $38 \times 7$

$$38 \times 7 = (30 \times 7) + (8 \times 7) = 210 + 56 = 266$$

2. Grid layout  $38 \times 7$

x	30	8	
7	210	56	266

3. Grid layout - extend to bigger numbers i.e.  $238 \times 7$

x	200	30	8	
7	1400	210	56	1666

Extend to ThHTU

4. Extend to bigger numbers:  $56 \times 27$

$$56 \times 27 = (50 + 6) \times (20 + 7)$$

x	50	6	
20	1000	120	1120
7	350	42	392
			1512

5. Vertical format, expanded working

$$\begin{array}{r} 38 \\ x \quad 7 \\ \hline 210 \quad (30 \times 7) \\ \quad 56 \quad (8 \times 7) \\ \hline 266 \end{array}$$

Extend to HTU x U  
Long multiplication

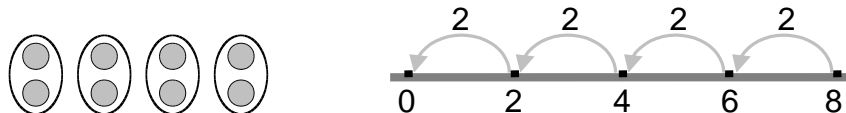
$$\begin{array}{r} 56 \\ \times 27 \\ \hline 1000 \quad (50 \times 20) \\ 120 \quad (6 \times 20) \\ 350 \quad (50 \times 7) \\ 42 \quad (6 \times 7) \\ \hline 1512 \end{array}$$

6. Vertical format, compact working

$$\begin{array}{r} 56 \\ \times 27 \\ \hline 1120 \quad (56 \times 20) \\ 392 \quad (56 \times 7) \\ \hline 1512 \\ \hline 1 \end{array}$$

## Stages in Division

1. Number lines & grouping



2. Informal methods using multiples of the divisor or 'chunking'  $TU \div U$

$72 \div 5$		72	
	$5 \times 10 = 50$	<u>- 50</u>	
		22	
	$5 \times 4 = 20$	<u>- 20</u>	
Answer: 14 r 2	14	2	

3. 'Chunking'  $HTU \div U$

$256 \div 7$		256	
	$7 \times 10 = 70$	<u>- 70</u>	
Approximate answer		186	
$280 \div 7 = 40$	$7 \times 20 = 140$	<u>- 140</u>	
		46	
	$7 \times 6 = 42$	<u>- 42</u>	
Answer: 36 r 4	36	4	

4. Efficient 'chunking'  $HTU \div U$

$196 \div 6$		196	
	$6 \times 30 = 180$	<u>- 180</u>	
Approximate answer		16	
$180 \div 6 = 30$	$6 \times 2 = 12$	<u>- 12</u>	
Answer: 32 r 4	32	4	

5. Extend to decimals with up to 1 place

$87.5 \div 7$		87.5
	$7 \times 10 = 70.0$	<u>- 70.0</u>
Approximate answer		17.5
$84 \div 7 = 12$	$7 \times 2 = 14.0$	<u>- 14.0</u>
		3.5
	$7 \times 0.5 = 3.5$	<u>- 3.5</u>
Answer: 12.5	12.5	0

6. 'Chunking' HTU  $\div$  TU

$560 \div 24$		560
	$24 \times 10 = 240$	<u>- 240</u>
Approximate answer		320
$550 \div 25 = 22$	$24 \times 10 = 240$	<u>- 240</u>
		80
	$24 \times 2 = 48$	<u>- 48</u>
		32
	$24 \times 1 = 24$	<u>- 24</u>
Answer: 23 r 8	23	8

7. Efficient chunking HTU  $\div$  TU

$560 \div 24$		560
	$24 \times 20$	<u>- 480</u>
Approximate answer		80
$550 \div 25 = 22$	$24 \times 3$	<u>- 72</u>
Answer: 23 r 8	23	8



8. Extending to an efficient standard method

$$560 \div 24$$

	24)	560
Approximate answer:	20	<u>-480</u>
		80
$550 \div 25 = 22$	3	<u>-72</u>
	23	8
Answer 23 r 8		

**Extend to decimals with up to 2 decimal places**

## **Maths Links**

Bar chart maker

<http://www.amblesideprimary.com/ambleweb/mentalmaths/grapher.html>

Coordinates:

[http://www.topicbox.org.uk/R.E./direction\\_including\\_coordinates/](http://www.topicbox.org.uk/R.E./direction_including_coordinates/)

<http://www.transum.org/Software/SW/>

[http://www.transum.org/Software/SW/Starter\\_of\\_the\\_day/](http://www.transum.org/Software/SW/Starter_of_the_day/)

[http://www.kenttrustweb.org.uk/kentict/kentict\\_sub\\_math\\_res.cfm](http://www.kenttrustweb.org.uk/kentict/kentict_sub_math_res.cfm)

<http://nrich.maths.org/frontpage>

Hit the button:

<http://www.wmnet.org.uk/resources/gordon/Hit%20the%20button%20v9.swf>

Broken calculator: <http://www.woodlands-junior.kent.sch.uk/maths/broken-calculator/index.htm>

< and > signs <http://www.crickweb.co.uk/assets/resources/flash.php?&file=ncmenu>

Doubling and halving <http://www.crickweb.co.uk/assets/resources/flash.php?&file=crazy>

[http://www.kenttrustweb.org.uk/kentict/kentict\\_sub\\_math\\_res.cfm](http://www.kenttrustweb.org.uk/kentict/kentict_sub_math_res.cfm)

WC times table teaching:

<http://www.teachingtables.co.uk/>

<http://www.maths-packs.co.uk/>

<http://www.mad4maths.com/>

Money – change

<http://www.bbc.co.uk/skillswise/numbers/wholenumbers/addsubtract/mental/game.shtml>

<http://www.woodlands-junior.kent.sch.uk/maths/timestable/interactive.htm>

<http://www.interactiveclock.com/clock-worksheet-maker.php>

BBC KS1 Bite size numeracy

## **Literacy Links**

[www.phonicsplay.co.uk](http://www.phonicsplay.co.uk)

[www.bbc.co.uk/bitesize/KS1/literacy/phonics](http://www.bbc.co.uk/bitesize/KS1/literacy/phonics)

[www.oxfordowl.co.uk](http://www.oxfordowl.co.uk)

[www.booktrust.org.uk](http://www.booktrust.org.uk)