CHRIST CHURCH
CHURCH OF ENGLAND
PRIMARY SCHOOL

Mathematics Mental Calculation Policy – February 2021

At Christ Church C of E Primary School, we understand that mental strategies are important for children to be able to confidently use and apply their knowledge of number relationships, number facts and our number system in order to calculate efficiently and solve problems. Mental methods help children understand concepts more effectively. We aim to ensure all children leave primary school with a secure grasp and understanding of mathematics, and believe that effective understanding of mental methods contribute to this particularly well.

The following mental calculation policy has been devised to firstly show progression of learning of mental methods across our school. Early learning in number in reception follows the 'Development Matters' EYFS document, and this policy builds on the content and methods established in the Early Years Foundation Stage. This policy works alongside our Written Calculation Policy which outlines in details the different strategies implemented in

Teachers work hard to ensure any prior learning is revisited as research shows frequent practice and revisiting of objectives helps children retain and recall numbers facts better. These concepts are not just taught during lesson times, but also daily basic skills session, interventions and a focus during home learning and homework.

Progression of mental objectives in each year group

	Counting	Addition/subtraction	Doubling/halving	Multiplication and division
Year 1	Count forward and back in steps of 2, 5 and 10	Number bonds to 10 One more/one less than any number to 100 10 more/10 less of multiples of 10 Addition and subtraction facts to at least 5	Doubles of numbers up to 10 Halves of even numbers up to 10	
Year 2	Count in steps of 2, 3 and 5 from 0 and 10s from any number, forward and back	Number Bonds to 20 Addition and subtraction facts to at least 10 Find 10 more/less than a given number	Doubles of numbers up to 20 Halves of even numbers to 20	2, 5 and 10x tables – learning is not just restricted to these tables and children work through other times tables when secure.

		Add and subtract mentally: - A two-digit number and 1s - A two-digit number and 10s Add 3 one-digit numbers		
Year 3	Count forward and back in 10s from any given number Count from 0 in multiples of 4, 8, 50 and 100	Addition and subtraction of multiples of 10 (e.g. 70 + 30 = 100, 80 – 60 = 20) Number bonds to 100 using multiples of 5 (e.g. 75 + __ = 100, 35 + ___ = 100) Find 10 or 100 more or less than a given number Add and subtract numbers including - a three-digit number and 1s - a three-digit number and 10s - a three-digit number and 100s	Double and halving multiples of 10 to 100 (e.g. double 60 = 120, half of 90 = 45)	Know all times tables Multiplying any two-digit number by 10 (e.g. 24 x 10 = 240)
Year 4	Count in multiples of 6, 7, 9, 25 and 1000 Count backwards through 0 to include negative numbers	Addition and subtraction facts of multiples of 100/1000 (e.g. 300 + 400 = 700, 400 + 600 = 1,000) Number bonds to 100 (e.g 38 + ___ = 100) Find 1,000 more or less than a given number	Halves of even numbers to 100 (e.g. half of 22 = 11) Double and halves of multiples of 10 to 100 (e.g double 60 = 120, half 50 = 25)	Know all times tables and related division facts Multiplying any two and three-digit number by 10 and 100 where the quotient is whole
Year 5	Count forwards and back in steps of powers of 10 for any given number up to 1,000,000	Addition and subtractions facts of multiples of 1000 Number bonds to 1000 (multiples of 50 e.g. 350	Doubles of any number to 100 Halves of any number to 100 including odd numbers	Know all times tables up to 12 x 12 and related division facts

	Count forwards and backwards through 0	+ ___ = 1000, 850 + ___ = 1000) Decimal number bonds to 1 and 10		Multiplying and dividing any number by 10 and 100 Squares of all numbers up to 12
Year 6	Consolidate all strategies from previous years	Sums and differences of decimal numbers e.g. 6.5 + 2.7 Decimal number bonds to 1, 10 and 100 Number bonds to 1000	Doubles of any number to 100 Halves of any number to 100 including odd numbers	Multiplication of multiples of 10 and 100 based on known number facts (e.g. 40 x 40 = 1600) Partition to carry out multiplication (e.g. 21 x 5 = 20 x 5, 1 x 5) Use times tables facts to multiply and divide decimals e.g 0.8 x 7 and 4.8 ÷ 6 Cubes of 2, 3, 4 and 5

Strategies for the teaching of mental methods

Here are some of the ways our children are taught to use and apply mental methods. They may practise this methods using concrete, pictorial and abstract/written methods until they are secure in their understanding and can rapidly recall or mentally calculate.

1. Addition and subtraction

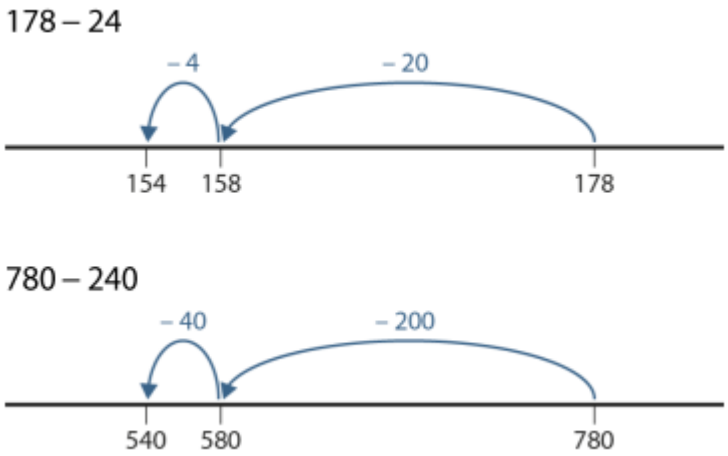
- **Putting the bigger number first when adding**
  When adding 2 + 8, it is more efficient to count on from the 8 (8+2). As children move further up school, this still applies when children are presented with 2 and 3-digit calculations such as 23 + 152.

- **Partitioning**
  To encourage mental calculating of 2 2-digit number calculations, children are encouraged to partition the numbers into tens and units.
  One method when adding is to add the tens and then the ones, then adding the tens to the ones:

Children also explore adding the tens and the ones onto the first number:

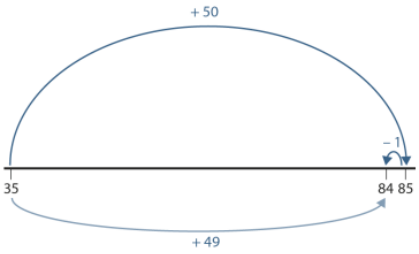
52 + 29 =
52 + 20 = 72
72 + 9 = 81

This helps when they come to subtract:



- **Adjusting**

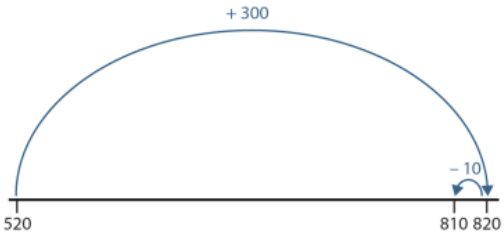
  Sometimes partitioning is not the most efficient method to be used. 99 + 99 can be done an easier way instead of 90 + 90 + 9 + 9.



$35 + 49 = 35 + 50 - 1$
$= 85 - 1$
$= 84$

Here, children are taught when a number ends in 9, to round up to 10 and then adjust the answer by subtracting one. This applies when adding 9/19/29/39 and so on, and can also be applied to adding 11/21/31 etc. This time children round down to the nearest 10 and add 1 back on. Once children are secure in this, they can use the same method when subtracting 9/11/21/29 etc, and may also extend their understanding to adding numbers ending in 8 and 2.

This method can then be applied to adding 3-digit numbers:



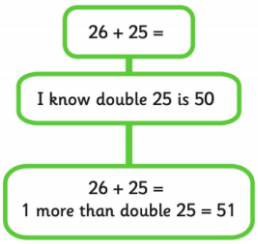
- Linked equations

520 + 290 = 810

520 + 300 = 820

– 10

- **Near doubles**
  This method is applied when adding similar numbers. Double one of the numbers and adjust by adding or subtracting the difference:

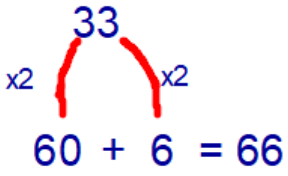


- **Using known number facts**

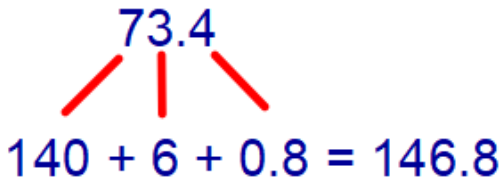
Number bonds to £1, £10 and £100 e.g.
£7·00 – £4·37
e.g. *£100 – £66·20 using 20p + 80p = £1 and £67 + £33 = £100*

2. <u>Doubling and halving</u>

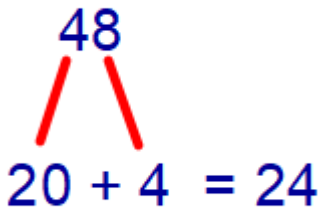
- **Partitioning**
  When doubling a 2-digit number, children are shown how to partition in order to double:



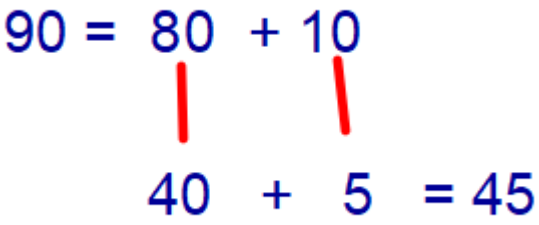
Children must have a secure understanding of place value and doubling the tens column in order to use this method. It can be used further up school when mentally doubling larger numbers and decimal numbers:



The same method is also applied when halving numbers:

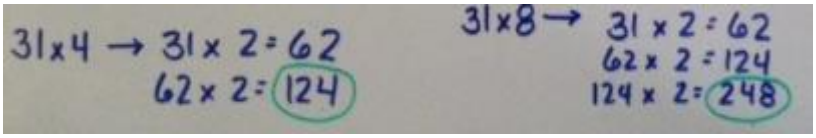


A common misconception is halving of odd numbers or numbers where the first digit is odd. Children are shown to partition this into two even numbers which they find easier to halve:

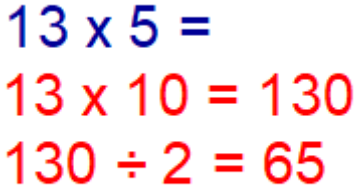


3. Multiplying and dividing

- **Using related facts – multiplying by 4/5/8**
  When children are asked to multiply a number 4, a tip is to double the number, and double again. This can also apply to multiplying by 8, and then subsequently division.



Multiplying by follows the same rule:



- **Partitioning**

As with addition and subtraction, numbers can be multiplied mentally through partitioning:

36 x 9 =
30 x 9 = 270
6 x 9 = 54
270 + 54 = 324

Children need to be secure in using known number facts to multiply the tens, and also in mental addition strategies to total the two sums.