Mental Maths on a page

What are mental maths strategies?
Mental maths strategies are accepted ways of working maths out in your head that help us take shortcuts and get to the correct answer in an efficient way.

Why are mental maths strategies important?
Mental maths strategies are the foundations for most of the areas of mathematics that use numbers. Without efficient mental strategies, children can often struggle to quickly and fluently calculate.

Mental strategies are also the foundation of any written or formal method in mathematics. Referring to it as mental maths does not mean you cannot write anything down at all, but any written work would be quick jottings to help remember through multi-step problems.

As children begin to use more formal methods, from around Year 4 onwards and as the numbers they are working with increase in value, mental maths skills are vital for ensuring fluency and accuracy in maths. (Third Space Learning, 2022)

By the time children start Year 3 at RJS, they should know the facts in the table below fluently. In addition, they will need to be able to add on in steps of 2, 3 and 5 from 0 as well as in steps of 10 from any number.

Adding 1 | Bonds to 10 | Adding 10 | Bridging/ compensating
Adding 2 | Adding 0 | Doubles | Near doubles

Y1 facts
Y2 facts

+	0	1	2	3	4	5	6	7	8	9	10
0	0 + 0	0 + 1	0 + 2	0 + 3	0 + 4	0 + 5	0 + 6	0 + 7	0 + 8	0 + 9	0 + 10
1	1 + 0	1 + 1	1 + 2	1 + 3	1 + 4	1 + 5	1 + 6	1 + 7	1 + 8	1 + 9	1 + 10
2	2 + 0	2 + 1	2 + 2	2 + 3	2 + 4	2 + 5	2 + 6	2 + 7	2 + 8	2 + 9	2 + 10
3	3 + 0	3 + 1	3 + 2	3 + 3	3 + 4	3 + 5	3 + 6	3 + 7	3 + 8	3 + 9	3 + 10
4	4 + 0	4 + 1	4 + 2	4 + 3	4 + 4	4 + 5	4 + 6	4 + 7	4 + 8	4 + 9	4 + 10
5	5 + 0	5 + 1	5 + 2	5 + 3	5 + 4	5 + 5	5 + 6	5 + 7	5 + 8	5 + 9	5 + 10
6	6 + 0	6 + 1	6 + 2	6 + 3	6 + 4	6 + 5	6 + 6	6 + 7	6 + 8	6 + 9	6 + 10
7	7 + 0	7 + 1	7 + 2	7 + 3	7 + 4	7 + 5	7 + 6	7 + 7	7 + 8	7 + 9	7 + 10
8	8 + 0	8 + 1	8 + 2	8 + 3	8 + 4	8 + 5	8 + 6	8 + 7	8 + 8	8 + 9	8 + 10
9	9 + 0	9 + 1	9 + 2	9 + 3	9 + 4	9 + 5	9 + 6	9 + 7	9 + 8	9 + 9	9 + 10
10	10 + 0	10 + 1	10 + 2	10 + 3	10 + 4	10 + 5	10 + 6	10 + 7	10 + 8	10 + 9	10 + 10

Mental Maths and Progression in KS2

	Year 3	Year 4	Year 5	Year 6
Addition and Subtraction	**+/- ones to a three-digit number including crossing a boundary** e.g. 426 + 7 = 435, 204 - 5 = 199 **+/- multiples of 10 to a three-digit number** e.g. 246 + 30 = 276, 380 - 40 = 340 **+/- multiples of 100 to a three-digit number** e.g. 189 + 100 = 289, 532 – 200 = 332	**+/- multiples of 10 where answer is 100 or more** e.g. 90 + 60 = 160 **+/- multiples of 100 where answer is 1,000 or less** e.g. 300 + 400 = 700, 400 + 600 = 1,000	**+/- multiples of 100 where answer is 1,000 or more** e.g. 800 + 600 = 1,400 **+/- multiples of 1000** e.g. 4000 + 5000 **+/- multiples of 9 by compensating** e.g. 56 + 29 → 56 + 30 – 1 = 85	**Consolidate from all previous years.** **+/- mentally with increasingly large numbers** e.g. 12 462 – 2300 = 10162
Doubles and Halves	**Double multiples of 10 up to 100** e.g. double 60 = 120	**Double and halve multiples of 10 up to 100** e.g. double 60 = 120, half 50 = 25	**Halves of any even number to 100** e.g. half 22 = 11	**Halves of any number up to 100** e.g. half 40 = 20, half 25 = 12.5
Multiplication and Division	**Multiplying two digits by 10** e.g. 24 x 10 = 240 **Recall and use x/÷ facts for 3, 4, 8 tables**	**Multiply any two and three-digit number by 10 and 100** e.g. 24 x 100 = 2400 **Recall and use x/÷ facts for 1 to 12 times tables**	**Multiply any two and three-digit number by 10, 100 and 1000**	**x/÷ any two and three-digit number by 10, 100 and 1000 up to 3 decimal places**
Fractions, Decimals and Percentages			**Finding 50% of numbers by halving** e.g. 50% of 86 = 43	**Finding 25% of numbers by halving and halving again** e.g. 25% of 64 = 16
Other			**Squares of all numbers up to 12**	**Cubes of 2, 3, 4 and 5**

Teaching children to know when to calculate mentally and when to use a written method

In an effort to reassure themselves, and 'safely' arrive at an accurate answer, many children find security in using a written method to work out the calculation. However, it is not always the quickest or most efficient method e.g. 1003 – 998 is quicker when counting on from 998. Therefore, it is our responsibility to equip children at Ravensdale with a range of calculation strategies and teach them when it is most appropriate to use each one. Making jottings should also be encouraged depending on the calculations as it allows them to free up their working memory when faced with more complex problems. Below are the key strategies taught within our maths curriculum:

Mental addition and mental subtraction strategies at KS2

Counting forwards and backwards examples	**Partitioning for addition and subtraction examples**	**Compensating and adjusting examples**
• Counting on or back in tens from any number. E.g. working out 27 + 60= ? by counting on in tens from 27 • Counting on or back in fives from any multiple of 5– e.g. 35+15=? by counting on in steps of 5 from 35. • Counting on or back in hundreds from any number e.g. 570 + 300= ? by counting on in hundreds from 570. • Counting on or back in tenths and/or hundredths- e.g. 3.2 + 0.6 = ? by counting on in tenths. 1.7 + 0.55=? by counting on in tenths and hundredths.	• Calculations with whole numbers which do not involve crossing place value boundaries. E.g. 23 + 45= ? by 40 + 5 +20 + 3 or 40 + 23 + 5 • Calculations with whole numbers which involves crossing place value boundaries. E.g. 49 – 32= ? by 49 – 9 – 23 or 57 + 34=? by 57 + 3 + 31 • Calculations with decimal numbers which do not involve crossing place value boundaries 5.6 + 3.7= ? by 5.6 + 3 +0.7 or 540 + 380= ? by 540 + 300 + 80 or 540 + 360 + 20 • Calculations with decimal numbers which involve crossing place value boundaries. E.g. 1.4 + 1.7= ? by 1.4 + 0.6 + 1.1 and 0.8 + 0.35= ? by 0.8 + 0.2 + 0.15	• Compensating and adjusting to 10. E.g. 34 + 9=? by 34 + 10 – 1 or 34 – 11= ? by 34 – 100 – 1 = ? • Compensating and adjusting multiples of 10. E.g. 38 + 68= ? by 38 + 70 – 2 or 45 – 29 = 45 – 30 + 1 • Compensating and adjusting multiples of 10 or 100. E.g. 138 + 69= ? by 138 + 70 – 1 or 299 – 48 = 300 – 48 – 1 • Compensating and adjusting multiples with decimals. E.g 2 ½ + 1 ¾ by 2½ + 2 – ¼ or 5.7 + 3.9 by 5.7 + 4.0 – 0.1

(Third Space Learning, 2022)

Mental strategies involving multiplication and division

Place Value multiplication strategies	**Doubling and halving strategies**	**Fractions, Decimal and Percentage strategies**
• Multiply a 2-digit number by a single-digit number by partitioning. E.g. 26 x 3 = 20 x 3 + 6 x 3 • Multiply a decimal number with up to 2 decimal places by a single digit by partitioning. E.g. 3.42 x 4 = 3 x 4 + 0.4 x 4 + 0.02 x 4	• Multiply and divide by 4 by doubling/halving twice and 8 by doubling/halving again.E.g.34 x 4 =34 x 2 x 2. • Multiply by 50 by multiplying by 100 and halving. E.g. 8 x 50= 8 x 100 divided by 2 • Divide a multiple of 25 by 25 dividing by 100 then multiplying by 4 (by doubling and doubling again). E.g. 350 ÷ 25 = 350 ÷ 100 x 2 x2 • Divide a multiple of 50 by 50 by dividing by 100 then doubling. E.g. 450 ÷ 50= 450 ÷ 10 x 2 • Double and half decimal number with up to one decimal place by portioning. E.g. half of 8.4 by halving 8 and halving 0.4	• Mentally find fractions of numbers in the 2,3,4,5 and 10 times table using known multiplication and division facts. E.g. 3/5 of 45 by 45 ÷ 5 x 3. • Recall percentage equivalents to ½, 1/3, ⅕, ⅙, 1/10 and 1/100. E.g. ¼ = 25% • Find 10% or multiples of 10% of whole numbers and quantities. E.g. 30% of 50 by 50 ÷ 10 x 3 • Mentally find 50% by halving and 25% by dividing by 4 or 2 of numbers and quantities. E.g. 25% of 150 by 150 ÷ 4

(Third Space Learning, 2022)