

## Appendix 4

### Mental strategies journey through school

Grid shows KS1 number bonds to secure – practised throughout school.

		Adding 1 and 2		Bonds to 10		Adding 10		Bridging/compensating		Y1 facts		
		Doubles		Adding 0		Near doubles				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

Year 1
<b>Rapid recall</b>
Y1 facts on grid tested and recorded termly – including associated subtraction facts
<b>Mental strategies</b>
+ 0 + 1 and + 2 (and –) to any number up to 20 (Just 0, 1, or 2 more/less)
+/- 10 to any 1 digit number including zero: $10 + 7 = 17$
Notice <b>Number bonds</b> to 10
<b>Doubling and halving:</b> double facts and halves to $5 + 5$ (and $10 + 10$ )
<b>Near number bonds</b> to add two one digit numbers: " $7 + 2 = 9$ because $7 + 3 = 10$ so it's just one less" or " $8 + 3$ must be 11 because $8 + 2 = 10$ "
<b>Near double facts</b> e.g. " $3 + 4 = 7$ because double 3 is 6 so it's just one more".
<b>Partitioning:</b> Use number facts to add $10 + 0$ : " $24 + 3...$ I know that $3 + 4 = 7$ so $20 + 7 = 27$ "
<b>Adjusting:</b> 'make ten' supported by models and images e.g. $8 + 6 = 8 + 2 + 4$

Year 2
<b>Rapid recall</b>
Y1 and 2 facts on grid tested and recorded termly – including associated subtraction facts
2, 5 and 10 times table multiplication and division facts
<b>Mental strategies</b>
<b>Number bonds</b> to 10 and <b>near number bonds</b> to add two or three single digit numbers
Spot <b>doubles</b> and <b>near doubles</b> to add two or three single digit numbers
Use <b>number bonds</b> to 20 and near number bonds to 20 to add 2 numbers
+ 10 to any 2 digit number (support with models, images and hundred square)
<b>Partitioning:</b> Calculations with whole numbers which do not involve crossing place value boundaries- e.g. $23 + 45 = ?$ by $40 + 5 + 20 + 3$ or $40 + 23 + 5$
<b>Counting on or back</b> in tens and ones to add or subtract – flexibility with number line
<b>Adjusting</b> +/- 9 and 11 by adding 10 then subtracting or adding 1
<b>Adjusting: 'make ten'</b> supported by models and images e.g. $8 + 6 = 8 + 2 + 4$
+/- multiples of 10 where the answer is between 0 and 100 (e.g. $70 + 30 = 100$ , $20 + 40 = 60$ )
<b>Doubling and halving:</b> Derives doubles and halves of multiples of 10 up to 100
<b>Doubling and halving:</b> Find the doubles to 100 using partitioning and halves of any even number to 100

Year 3
<b>Rapid recall</b>
3, 4 and 8 times table and associated division facts
Multiply 2 digit number by 10
+/- multiples of 10 where the answer is between 0 and 100 (e.g. $70 + 30 = 100$ , $20 + 40 = 60$ )
Doubles and halves of multiples of 10 up to 100
<b>Mental strategies</b>
<b>Counting on or back</b> in fives from any multiple of 5– e.g. $35 + 15 = ?$ by counting on in steps of 5 from 35
<b>Counting on or back</b> in hundreds from any number e.g. $570 + 300 = ?$ by counting on in hundreds from 570
<b>Partitioning:</b> Calculations with whole numbers which involves crossing place value boundaries e.g. $42 - 28 = ?$ by $42 - 2 - 20 - 6$
<b>Adjusting</b> multiples of 10 e.g. $38 + 68 = ?$ by $38 + 70 - 2$ or $45 - 29 = 45 - 30 + 1$
<b>Adjusting: 'make ten'</b> progressing to multiples of ten e.g. $28 + 13 = 30 + 11$
<b>Near doubles</b> to numbers under 20 e.g. $18 + 16$ is double 18 and subtract 2 or double 16 and add 2
<b>Near doubles</b> to multiples of 10 e.g. $60 + 70$ is double 60 and add 10 or double 70 and subtract 10
<b>Doubling and halving:</b> Find the doubles and halves of any two-digit number and any multiple of 10 or 100– e.g. half 680 or double 73
<b>Doubling and halving:</b> Multiply and divide by 4 by doubling/halving twice and 8 by doubling/halving again. – e.g. $34 \times 4 = 34 \times 2 \times 2$ .

Year 4
<b>Rapid recall</b>
All multiplication and division facts up to $12 \times 12$
+/- multiples of 10 beyond 100 e.g. $50 + 60 = 110$
+ or – multiples of 100 up to 1000
Half of any even number to 100
Multiply and 2 or 3 digit number by ten
<b>Mental strategies</b>
<b>Counting on or back</b> 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 – flexibility with a number line
<b>Adjusting</b> multiples of 10 or 100 e.g. $138 + 69 = ?$ by $138 + 70 - 1$ or $299 - 48 = 300 - 48 - 1$
<b>Adjusting 'make ten'</b> progressing to 3 digit numbers e.g. $128 + 32 = 130 + 30$
<b>Partitioning:</b> Calculations with decimal numbers not crossing place value boundaries then crossing boundaries. E.g. $3.2 + 2.1$ progressing to $3.7 + 6.8$
<b>Near doubles</b> to 100 e.g. $75 + 76$ is double 76 and subtract 1 or double 75 and add 1.
<b>Doubling and halving:</b> Find the doubles and halves of any number up to 1,000 by partitioning

Year 5
<b>Rapid recall</b>
+/- multiples of 1000
Multiply and divide any number by 10 and 100
Halves of any number to 100 (e.g. half of 22 = 11, half of 51 = 25.5)
Squares of all numbers up to 12
Cubes of 2, 3, 4 and 5
<b>Mental strategies</b>
<b>Adjusting</b> multiples with decimals e.g. $2\frac{1}{2} + 1\frac{3}{4}$ by $2\frac{1}{2} + 2 - \frac{1}{4}$ or $5.7 + 3.9$ by $5.7 + 4.0 - 0.1$
Decimal <b>near doubles</b> to whole numbers e.g. $2.5 + 2.6$ is double 2.5 add 0.1 or double 2.6 subtract 0.1.
<b>Doubling and halving:</b> Find the doubles and halves of any number up to 10,000 by partitioning – e.g. half of 32,202 by halving 3,000, 2000, 200 and 2
<b>Doubling and halving:</b> Multiply by 50 by multiplying by 100 and halving e.g. $8 \times 50 = 8 \times 100$ divided by 2
<b>Doubling and halving:</b> Double and half decimal number with up to one decimal place by partitioning – e.g. half of 8.4 by halving 8 and halving 0.4

Year 6
<b>Rapid recall</b>
Multiplication of multiples of 10 and 100 based on known facts (e.g. $40 \times 40 = 1,600$ );
<b>Mental strategies</b>
<b>Adjusting</b> multiples with decimals e.g. $2\frac{1}{2} + 1\frac{3}{4}$ by $2\frac{1}{2} + 2 - \frac{1}{4}$ or $5.7 + 3.9$ by $5.7 + 4.0 - 0.1$
Decimal <b>near doubles</b> to whole numbers e.g. $2.5 + 2.6$ is double 2.5 add 0.1 or double 2.6 subtract 0.1.
<b>Doubling and halving:</b> Find the doubles and halves of any number up to 10,000 by partitioning – e.g. half of 32,202 by halving 3,000, 2000, 200 and 2
<b>Doubling and halving:</b> Multiply by 50 by multiplying by 100 and halving e.g. $8 \times 50 = 8 \times 100$ divided by 2
<b>Doubling and halving:</b> Double and half decimal number with up to one decimal place by partitioning – e.g. half of 8.4 by halving 8 and halving 0.4