"Nurturing Ambition through a living Faith"
Let us not love with words or speech alone but with action and truth John 3:18

St James' Mathematical Fluency Policy

What is fluency?

Fluency is the ability to work out calculations of all sorts in your head (not just addition sums). It means being able to give an answer to a question without having to write down every step of the calculation.

It is our responsibility to teach the children strategies that will enable the children to get the answer in an efficient way.

Mental strategies are the foundations for most areas of mathematics and by training rapid recall it will free up their working memory. If we don't do this, children will still calculate these basic facts again and again. This is why we often see children fall short on 2 step and 3 step word problems as they calculate the basic facts and feel like they have completed the question.

If we take this constraint away, it will lead to more success across the more challenging aspects of the maths curriculum.

Year 6 end of year assessments

In the Arithmetic paper over 80% of the questions are designed to be solved mentally. However, many children complete this paper using formal written methods leading to them running out of time. To challenge this at St Barnabas, we intend on teaching the related number facts needed for rapid recall in every year group.

What is the intention behind this document?

The intention behind this document is to give teachers a clear indication of the number facts and mental calculations the children should be covering. This will ensure there is a clear pathway for students, and in turn, result in better outcomes in the year 6 assessments. The goal is to achieve fluency not just accuracy!

EYFS/KS1

To expect a whole class to grasp rapid recall by the end of year 1 is a big ask due to the wide range of abilities lower down school. However, by the end of year 2, children are expected to:

- Rapidly recall basic addition facts. This includes all number bonds to 20, and doubles to 20.
- Rapidly recall the related subtraction facts.
- Rapidly recall 2, 5 and 10 times tables.
- Begin to look at the link between the 2 and 4 times table.

Below is a table showing the number facts that the children should be able to rapidly recall by the time they join year 3.

+	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

Adding 1 and 2 Bonds to 10 Adding 10 Doubles Adding 0 Near Double Compensating and Adjusting

Year 3

Children will continue to learn the number facts from KS1 and the following facts:

- Addition and subtraction of multiples of 10 where the answer is between 0 and 100 (e.g. 70 + 30 = 100, 20 + 40 = 60)
- Double and halves of multiples of 10 to 100 (e.g. double 60 = 120)
- Multiplying two-digit numbers by 10. (e.g. 24 x 10 = 240)

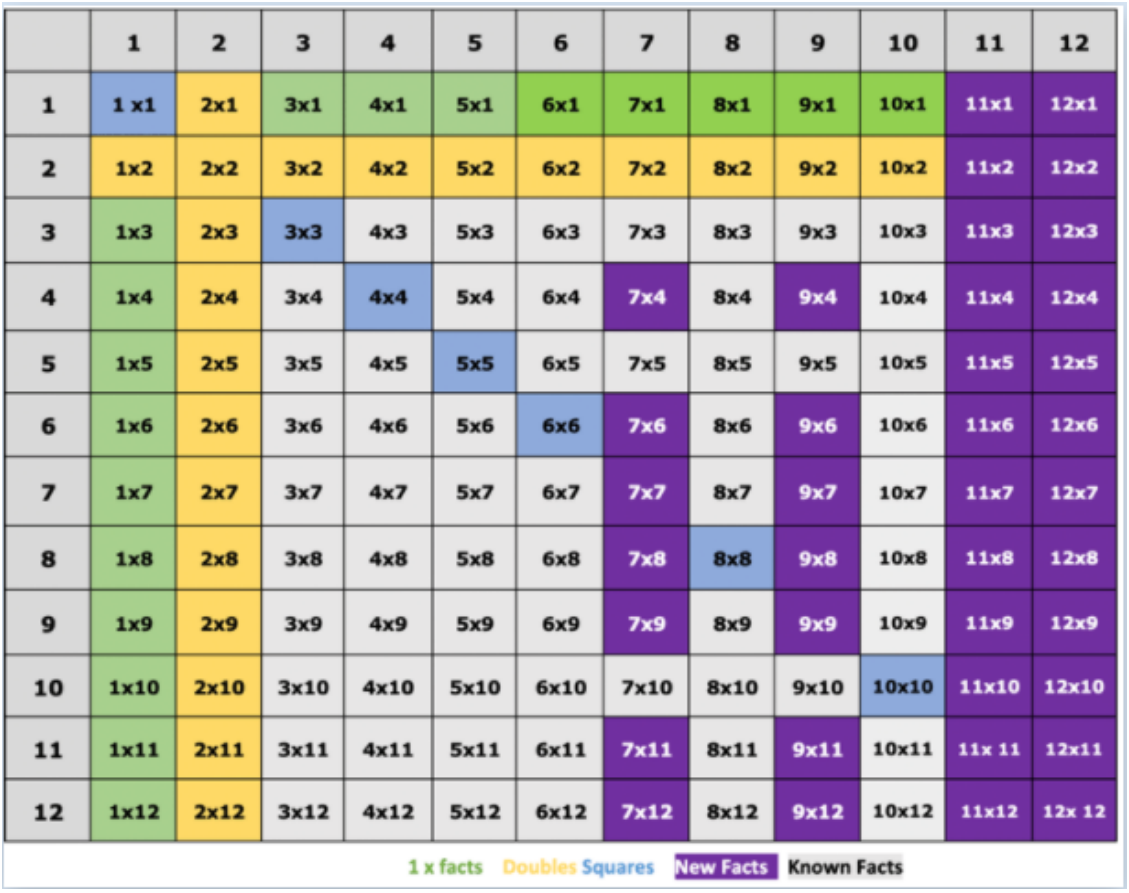
	1	2	3	4	5	6	7	8	9	10	11	12
1	1 x1	2x1	3x1	4x1	5x1	6x1	7x1	8x1	9x1	10x1		
2	1x2	2x2	3x2	4x2	5x2	6x2	7x2	8x2	9x2	10x2		
3	1x3	2x3	3x3	4x3	5x3	6x3	7x3	8x3	9x3	10x3		
4	1x4	2x4	3x4	4x4	5x4	6x4		8x4		10x4		
5	1x5	2x5	3x5	4x5	5x5	6x5	7x5	8x5	9x5	10x5		
6	1x6	2x6	3x6	4x6	5x6	6x6		8x6		10x6		
7	1x7	2x7	3x7	4x7	5x7	6x7		8x7		10x7		
8	1x8	2x8	3x8	4x8	5x8	6x8		8x8		10x8		
9	1x9	2x9	3x9	4x9	5x9	6x9		8x9		10x9		
10	1x10	2x10	3x10	4x10	5x10	6x10	7x10	8x10	9x10	10x10		
11	1x11	2x11	3x11	4x11	5x11	6x11		8x11		10x11		
12	1x12	2x12	3x12	4x12	5x12	6x12		8x12		10x12		

1 x facts Doubles | Squares New Facts Known Facts

Year 4

Children will continue to develop the number facts from KS1 and year 3. They will also learn the following facts:

- Addition and subtraction of multiples of 10 (e.g. 70 + 30 = 100, 50 + 60 = 110, 20 + 40 = 60);
- Addition and subtraction of multiples of 100 where the answer is 1,000 or less (e.g. 300 + 400 = 700, 400 + 600 = 1,000);
- Double and halves of multiples of 10 to 100 (e.g. double 60 = 120, half 50 = 25);
- Multiplying two-digit numbers by 10 (e.g. 24 x 10 = 240);
- Halves of any even number to 100 (e.g. half of 22 = 11);
- And multiplying any two and three-digit number by 10 and 100 (e.g. 24 x 100 = 2,400)



	1	2	3	4	5	6	7	8	9	10	11	12
1	1 x1	2x1	3x1	4x1	5x1	6x1	7x1	8x1	9x1	10x1	11x1	12x1
2	1x2	2x2	3x2	4x2	5x2	6x2	7x2	8x2	9x2	10x2	11x2	12x2
3	1x3	2x3	3x3	4x3	5x3	6x3	7x3	8x3	9x3	10x3	11x3	12x3
4	1x4	2x4	3x4	4x4	5x4	6x4	7x4	8x4	9x4	10x4	11x4	12x4
5	1x5	2x5	3x5	4x5	5x5	6x5	7x5	8x5	9x5	10x5	11x5	12x5
6	1x6	2x6	3x6	4x6	5x6	6x6	7x6	8x6	9x6	10x6	11x6	12x6
7	1x7	2x7	3x7	4x7	5x7	6x7	7x7	8x7	9x7	10x7	11x7	12x7
8	1x8	2x8	3x8	4x8	5x8	6x8	7x8	8x8	9x8	10x8	11x8	12x8
9	1x9	2x9	3x9	4x9	5x9	6x9	7x9	8x9	9x9	10x9	11x9	12x9
10	1x10	2x10	3x10	4x10	5x10	6x10	7x10	8x10	9x10	10x10	11x10	12x10
11	1x11	2x11	3x11	4x11	5x11	6x11	7x11	8x11	9x11	10x11	11x 11	12x11
12	1x12	2x12	3x12	4x12	5x12	6x12	7x12	8x12	9x12	10x12	11x12	12x 12

1 x facts Doubles Squares New Facts Known Facts

Year 5

Children will continue to develop the number facts from lower down school. They will also learn the following facts.

- Addition and subtraction of multiples of 10 (e.g. 70 + 30 = 100, 50 + 60 = 110, 20 + 40 = 60);

- Addition and subtraction of multiples of 100 (e.g. 300 + 400 = 700, 400 + 600 = 1,000, 800 + 500 = 1,300);
- Addition and subtraction of multiples of 1000 (e.g. 3000 + 4000 = 7000);
- Double and halves of multiples of 10 to 100 (e.g. double 60 = 120, half 50 = 25);
- Quadruples (x4) of all numbers to 10 (e.g. 6 x 4 = 24);
- Multiplying two-digit numbers by 10. (e.g. 24 x 10 = 240);
- Halves of any number to 100 (e.g. half of 22 = 11, half of 51 = 25.5);
- Multiplying and dividing any number by 10 and 100 (e.g. 24 x 100 = 2,400, 45 ÷ 100 = 0.45, 3.4 x 10 = 34);
- Squares of all number up to 12;
- And cubes of 2,3,4 and 5.

Year 6

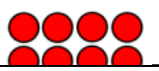
Together with the 1-12 x multiplication and division facts, and their basic addition facts, children should be able to answer the following Year 6 mental maths questions:

- Addition and subtraction of multiples of 10 (e.g. 70 + 30= 100, 50 + 60 = 110, 20 + 40 = 60);
- Addition and subtraction of multiples of 100 (e.g. 300 + 400 = 700, 400 + 600 = 1,000, 800 + 500 = 1,300);
- Addition and subtraction of multiples of 1000 (e.g. 3000 + 4000 = 7000);
- Double and halves of multiples of 10 to 100 (e.g. double 60 = 120, half 50 = 25);
- Quadruples (x4) of all numbers to 10 (e.g. 6 x 4 = 24);
- Multiplying two-digit number by 10 (e.g. 24 x 10 = 240);
- Halves of any number up to 100 (e.g. half of 22 = 11, half of 51 = 25.5);
- Multiplying and dividing any number by 10 and 100 (e.g. 24 x 100 = 2,400, 45 ÷ 100 = 0.45, 3.4 x 10 = 34);
-
- Multiplication of multiples of 10 and 100 based on known facts (e.g. 40 x 40 = 1,600);
- Squares of all number up to 12;
- And cubes of 2,3,4 and 5.

Mental Calculation Progression

Although this document outlines the rapid recall facts each year group must be achieving, below is a wider set of mental calculations and strategies that go hand in

hand with the number facts above. Due to a wide range of abilities in KS1, teachers should prioritise the progression document below which should help the children develop rapid recall. In KS2, it is advised that teachers prioritise the rapid recall facts as this will aid the children when carrying out calculations displayed in the progression table below.

Year group	Addition and Subtraction Mental Calculation Skills (Working mentally with jottings)	Methods or Strategies	Multiplication and Division Mental Calculation Skills (Working mentally with jottings)	Methods or Strategies
Year 1	- Number bonds to 10. - Add and subtract a pair of single digit numbers (not crossing 10) e.g. 4 + 5, 8 - 3 - Add or subtract a single digit number from a teen number (not crossing 10 or 20) e.g. 13 + 5, 17 - 4 - Add or subtract a single digit number to or from 20. - Add near doubles within 10. e.g. 5 + 6 - Add a multiple of 10 to a single digit number. e.g. 7 + 10, 7 + 20	- Reorder numbers when adding e.g. put the largest number first. - Count back in ones, twos or tens. - Partition and combine tens and ones  30 + 7 = 37 - Double and adjust 5 + 6 = 5 + 5 + 1	- Count on from or back to zero in ones, twos, fives or tens.	- Use the patterns of the last digit. e..g. Twos - digits end in 2, 4, 6, 8, 0 Fives - digits end in 0 or 5 Tens - digits end in a zero This will help them make the link that a number can be in different times tables.
Year 2	- Add and subtract a pair of single digit numbers (crossing 10) e.g. 5 + 8, 11 - 7 - Add any single digit number to or from a multiple of 10 e.g. 60 + 5 - Subtract any single digit number from a multiple of 10. e.g. 80 - 7 - Add or subtract any single - digit number to or from a two-digit number.	- Reorder numbers when adding e.g. put the largest number first. - Partition small numbers in order to bridge through 10 and multiples of 10. When adding and subtracting. - Partition and combine multiples of tens and ones.	- Double any multiple of 5 up to 50 e.g. double 35 - Halve any multiple of 10 up to 100. e.g. halve 70 - Find half of even numbers to 40. e.g. half of 44 - Find the total number of objects when they are organised into groups of 2, 5 and 10. 	- Partition: double the tens and ones separately and then recombine - Use the knowledge that halving is the inverse of doubling and doubling is the same as multiplying by 2. - Use knowledge of multiplication facts from the

	Including crossing the tens boundary. e.g. 23 + 5, 27 - 3 28 + 6, 33 - 5 - Add or subtract any multiple of 10 to or from any two - digit number e.g. 27 + 60, 83 - 40 - Add numbers such as 9, 19, 29 and 11, 21, 31 - Add near doubles of numbers in the teens. e.g. 15 + 14, 12 + 13	- Use knowledge of pairs making 10. - Count on in tens and ones to find the total. - Count on or back in tens and ones to find the difference. - Add a multiple of 10 and adjust by 1. - Double and adjust.		2, 5 and 10 times table. e.g. There are 20 objects because there are 10 groups of 2.
Year 3	- Add and subtract a group of small numbers e.g. 4 - 3 + 2 - Add or subtract a two - digit number to or from a multiple of 10 e.g. 60 + 28, 72 - 40 - Add and subtract two - digit numbers that don't bridge over a multiple of 10. e.g. 53 + 42, 78 - 54 - Add near doubles of numbers within 50. e.g. 18 + 17, 44 + 45 - Count on and back in minutes and hours through 60 (analogue).	- Identify pairs totalling ten - Count on or back in tens from any number. - Partition: Add and subtract tens and ones separately and recombine. - Partition: Count on in tens and ones to find the total. - Partition: Count on or back in tens and ones to find the difference. - Double and adjust E.g. 18 + 17 = 18 + 18 - 1	Double any multiple of 5 up to 100 e.g. double 35 - Halve any multiple of 10 up to 200. e.g. halve 170 - Multiply one-digit and two-digit numbers by 10 and 100. e.g. 7 x 10, 7 x 100, 46 x 10, 46 x 100 - Find unit fractions of quantities. This should include: Halves, thirds, quarters, fifths and tenths	- Partition: double the tens and ones separately and then recombine - Halve the hundreds, tens and ones separately and recombine. - Recognise that finding a unit fraction is the equivalent of dividing by the denominator. - Recognise that halving and doubling are inverse operations. - Use knowledge of division facts. - Recognise that when a number is multiplied by 10 or 100 the digits move one or two places to the left and 0 is used as a placeholder.
Year 4	- Add any pair of 2 digit numbers that cross the 10 and 100 boundary. e.g. 38 + 76, 83 - 26	- Count on or back in hundreds, tens or ones.	- Double any two-digit number. e.g. double 37 - Double and halve any multiple of 10	- Partition: double the tens and ones separately and then recombine

	- Add or subtract a near multiple of 10 e.g. 34 + 39, 87 - 49 - Add near doubles of any 2 digit numbers e.g. 66 + 67, 72 + 73 - Add or subtract two - digit and three - digit multiples of ten e.g. 120 - 40, 230 + 320 - Count on and back in minutes and hours through 60 (analogue and digital)	- Partition: Add tens and ones separately and then recombine. - Partition: Subtract tens and then ones E.g. If you subtract 34, subtract 30 and then 4. - Subtracting by counting up from the smaller number to the larger number. - Add or subtract a near multiple of 10 and then adjust. e.g. 34 + 39 = 34 + 40 - 1 87 - 49 = 87 - 50 + 1 - Double and adjust. - Use knowledge of place value e.g. 120 - 40 use 12 - 4 = 8 230 + 320 use 23 + 32	and 100 e.g. double or half of 800, double or half of 420. - Halve any even number to 200. - Find unit fractions and simple non-unit fractions of quantities. e.g. 1/8 of 32, 4/8 of 32, - Multiply and divide numbers to 1000 by 10 and 100 (answers with whole numbers only) e.g. 456 x 10, 800 divided by 10, 42 x 100 - Multiply a multiple of 10 to a hundred by a one-digit number. e.g. 60 x 3, 40 x 4 - Multiply numbers to 20 by a one-digit number. e.g. 19 x 4 - Identify the remainder when dividing by 2, 5 and 10 - Give the factor pair of a number e.g. 6 has a factor pair of 2 and 3.	- Recognise that when a number is multiplied or divided by 10 or 100 the digits move one or two places to the left or right and 0 is used as a placeholder. - Use knowledge of multiplication facts and place value. - Use partitioning and distributive law to multiply. e.g. 14 x 3 = (10 + 4) x 3 10 x 3 = 30 4 x 3 = 12 30 + 12 = 42
Year 5	- Add or subtract a pair of two-digit numbers or three-digit multiples of 10. e.g. 30 + 90, 360 - 240, 220 + 460 - Add or subtract a near multiple of 10 or 100 to any two-digit or three-digit number. e.g. 34 + 39, 87 - 49, 432 + 190, - Find the difference between two near multiples of 100 and 1000 (count up the difference by using a number line, bridge through multiples of 100). e.g. 6800 - 3040, 608 - 375	- Count on or back in hundreds, tens, ones and tenths. - Partition: Add hundreds, tens and ones separately and then recombine. - Subtract by counting up from a smaller to a larger number (only when it is the most efficient method). - Add or subtract a multiple of 10 or 100 and	- Multiply any two-digit number by 4 and 8. e.g. 32 x 4, 88 divided by 8 - Multiply two-digit numbers by 5 or 20 using doubling or halving. e.g. 42 x 20, 36 x 5 - Multiply by 25 and 50. e.g. 42 x 25, 36 x 50 - Double of 3 digit multiples of 10 to 500 and corresponding halves. e.g. 240 x 2, 480 divided by 2 - Find remainders when dividing a 2 digit number by a single digit number. e.g. 34 divided by 8 = 4 R2	- Multiply or divide by 4 or 8 by repeated doubling and halving. - Form an equivalent calculation e.g. Multiply by 5 by multiplying by 10 and halving. Multiply by 20 by doubling and times by ten. - Use knowledge of doubles and halves and place value. E.g. When you multiply by 50, multiply by 100 and halve the answer. - Use knowledge of division facts

	- Add or subtract any pairs of decimal fractions with ones and tenths. e.g. 5.6 + 2.6, 6.5 - 3.8 - Count on or back in minutes and hours bridging through 60 (analogue and digital times) e.g. mental jottings (time number line)	adjust. e.g. 264 + 88 (add 90 and subtract 2), 826 - 198 (subtract 200 and add 2). - Double and adjust.. - Use knowledge of place value and related calculations. e.g. 7.2 - 4.3 using 72 - 43.	- Multiply and divide whole numbers and decimals by 10, 100 or 1000. e.g. 7.2 x 1000, 68 divided by 100, 4.2 x 10 - Multiply a pair of multiples of 10 and a multiply a multiple of 100 by a single digit. e.g. 40 x 60, 400 x 8 - Divide a multiple of 10 by a single digit number (whole number answers only) e.g. 320 divided by 4. - Find fractions of whole numbers or quantities. e.g. ⅜ of 64, ⅔ of 30 - Find 10, 25 and 50% of whole numbers and quantities. e.g. 10% of 80, 25% of 80 - Factor pairs of numbers to 100 e.g. 42 has factor pairs of: 42 and 1 21 and 2 14 and 3 7 and 6	when finding a remainder. - Use understanding that when you multiply or divide a number by 10 and 100, its digits move 1 or 2 places to the left or right. - Use knowledge of multiplication and division facts and understanding of place value when calculating with multiples of 10. - Use knowledge of equivalence between fractions and percentages. 50% = ½ 25% = ¼ 10% = 1/10 - Use knowledge of multiplication and division facts to find factor pairs.  This can be done by creating factor rainbows.
Year 6	- Add or subtract a pair of decimals with ones, tenths or hundredths. e.g. 0.7 + 3.36 - Find doubles of decimals each with ones and tenths e.g. 1.2 + 1.2 - Add near doubles of decimals. e.g. 1.6 + 1.7	- Count on or back in hundreds, tens, ones, tenths and hundredths. . - Use knowledge of place value and related calculations	- Multiply pairs of two-digit and single-digit numbers. e.g. 28 x 3 - Divide a two-digit number by a single-digit number e.g. 68 divided by 4. - Divide by 25 or 50. e.g. 480 divided by 25, 2700 divided by 50 - Double decimals	- Use partitioning and distributive law to divide tens and ones separately. e.g. 92 divided by 4 = (80 + 12) divided by 4 = 20 + 3 = 23 - Form equivalent calculations. e.g. To divide by 25,

	- Add or subtract a decimal with ones and tenths, that is nearly a whole number. e.g. 5.2 + 3.6 - Count on and back in minutes and hours bridging through 60 (analogue and digital times, 12 hour, 24 hour clock) e.g. mental jottings (time number line)	e.g. 4.7 + 5.6, 470 + 560, 0.56 + 0.47 can be worked out using 47 + 56 - Use knowledge of place value and doubles of two-digit whole numbers. - Double and adjust. - Add or subtract a whole number and adjust. e.g. 5.2 + 3.6 = 3.6 + 5 + 0.2	with ones and tenths and the corresponding halves. e.g. double 7.6, half of 15.2 - Multiply pairs of multiples of 10 and 100 e.g. 50 x 30, 700 x 20 - Divide multiples of 100 by a multiple of 10 or 100. e.g. 800 divided by 400, 600 divided by 20 - Multiply and divide two-digit decimals using place value knowledge. e.g. 4.8 divided by 6 (48 divided by 6 is 8, then divide by 10 is 0.8) - Find 10% or multiples of 10% of whole numbers and quantities. e.g. 40% of £30, 70% of 200g - Simplify fractions by cancelling. - Scale up and down using known facts. - Identify numbers with odd and even numbers of factors, and no factor pairs other than one and themselves.	divide by 100 and multiply by 4. To divide by 50, divide by 100 and then double. - Use knowledge of equivalence between fractions and percentages and relationship between fractions and division. - Recognise how to scale up or down using multiplication and division. e.g. If three oranges cost 24p, one orange costs 24 divided by 3 = 8. 4 oranges would cost 8 x 4 = 32p - Use multiplication and division facts to identify factor pairs and numbers with only two factors.

The Teaching of Fluency at Darwen St James'

It is important that fluency is taught and we don't just rely on the children picking it up. Fluency is only achieved when the children are able to select the most appropriate method for the task in hand. In order to achieve this, they need to be exposed to multiple contexts and have the opportunity to apply their skills. At St Barnabas, we will tackle this by providing mental maths sessions little and often following the format below:

Discuss - Expose the children to questions and allow them to discuss their mental strategies with each other. Because children all approach mental calculations differently, it gives them the opportunity to share different ways of thinking and seeing a calculation.

Teach - Support children to make connections between their known facts from previous year groups and the new mental calculations they have been exposed to (through modelling and manipulatives).

Make it meaningful - Play games with the children. If the activities are meaningful, the children will be motivated. See below for ideas of games that can be adapted to a wide range of mental calculations.

Mental maths practice - Make sure the children have the opportunity to practise the mental strategies that they have learnt. This could be timed testing, but this is only recommended when the children have taken part in the previous 3 stages. Do not set the children up to fail! If they are likely to succeed, the more they will enjoy maths and the more motivated they will be in future lessons.

Making it meaningful

Meaningful Activities All of the activities below can be adapted to suit the focus of your mental maths session.	Resources
Maths, paper, scissors 2 children face each other and just as they would in 'Rock, Paper, Scissors' they call out Maths, Paper, Scissors. When they call scissors, they hold up as many fingers as they wish and whoever adds them up the quickest wins.	No resources
Addition War 2 players have a pack of cards with the picture cards removed. Ace counts as 1. The 2 players pick up a card at the same time and place them in the middle of the table. The first child to add them up wins and keeps both cards.	Pack of cards with picture cards removed
Number Bond Bingo The children write down 5 numbers from 0-10 or 0-20. The teacher calls out a number and if the children have a number that will make it a bond to 10 or 20 they cross it out. The winner is the first person to cross all of their numbers out.	Whiteboard and pen
Bang Bang Two children stand back to back, cowboy shootout style. The teacher will shout out a number and the children have to work out how many groups of 2, 5 or 10 go into it. The first child to turn and face their partner, shout 'bang, bang' and give the answer wins the round. Winner stays on!	No resources
Times Table Champion	

2 children stand up in their places. The teacher calls out a multiplication and the children compete to answer it first. The winner stays standing and the loser sits down. Who can defeat the most people in the class to become the 'Times Table Champion'? On Guard Two children stand next to a whiteboard with the numbers 1-10 displayed. They stand holding a ruler like two knights 'On Guard'. The teacher will then shout out a number and the children have to splat the correct bond to 10. The game can be adapted for a different focus.	No resources Two rulers Large white board
Other Resources TT Rockstars https://ttrockstars.com/ Topmarks https://www.topmarks.co.uk/maths-games/7-11-years/mental-maths Mathsframe https://mathsframe.co.uk/en/resources/category/22/most-popular	