

Addition and Subtraction	
Mental Fluency Expectations	SATs question examples
By the end of lower KS2 (Year 4) Apply all mental strategies to addition and subtraction using 4-digit whole numbers, including - Using known facts and related facts - Rounding and adjusting - Using doubles / halves / near doubles - Partitioning and recombining - Using approximation to estimate an answer Apply known facts and understanding of unit and non-unit fractions to add and subtract fractions with the same denominator Use understanding of place value in decimals, and simple fraction / decimal equivalents to add and subtract some decimals	$826 = 800 + \boxed{} + 6$ $\boxed{} + 5 = 341$ $\boxed{} = 87 - 65$ $602 - \boxed{} = 594$ $39 + 673 =$ $\boxed{} - 10 = 298$ $\boxed{} = 6,000 + 90$ $\boxed{} = 8,275 + 82$ $7,064 - 502 =$ $\frac{9}{11} - \frac{4}{11} =$ $7 - 2.25 =$ $9 - 1.9 =$ $10 - 5.4 =$
By the end of upper KS2 (Year 6) Pupils now apply all mental strategies to addition and subtraction with increasingly large numbers, decimals and fractions, including - Using known facts and related facts - Rounding and adjusting - Using doubles / halves / near doubles - Partitioning and recombining - Using approximation to estimate an answer Use knowledge of common factors and multiples to support the addition and subtraction of fractions with different denominators. This includes calculations that exceed 1 as a mixed number.	$\frac{1}{5} + \frac{3}{4} =$ $1\frac{1}{5} + 2\frac{1}{10} =$ $\frac{8}{9} - \frac{1}{4} =$ $1\frac{3}{7} - \frac{4}{7} =$ $2\frac{1}{2} - \frac{3}{4} =$ $5.87 + 3.123 =$ $3,050,020 = 3,000,000 + \boxed{} + 20$ $37.8 - 14.671 =$

Addition and Subtraction	
Mental Fluency Expectations	Sample questions (NCETM Y6 assessment for mastery resource)
At the beginning of KS3 (Year 7) Pupils should consolidate their numerical and mathematical capability from KS2 and begin to build on prior knowledge and understanding of the number system and place value They should use the four operations applied to integers, decimals, proper and improper fractions, and mixed numbers. This will include: - Using known facts and related facts - Rounding and adjusting - Using doubles / halves / near doubles - Partitioning and recombining - Using approximation to estimate an answer Pupils should begin to formalise their understanding of the three laws of arithmetic and how they are used to increase mental fluency: - Commutativity $a + b = b + a$ - Associativity $a + (b + c) = (a + b) + c$ - Distributivity $a(b + c) = ab + ac$	Calculate $36.2 + 19.8$ with a mental method, explaining your reasoning. Calculate $8.78 + 5.26$ using a suitable adjustment ($8.75 + 5.75$ then adjust) Two numbers sum to 1000: What could they be? If one is 498, what is the other? If one is 398, what is the other? If one is 328. What is the other? Calculate mentally, using informal jottings: 37×15 ($37 \times 10 + 37 \times 5$) Know that $\times 5$ is half of $\times 10$ I buy eight pens at £1.99 each. How much have I spent? Which is harder and which is easier? Explain why. $2001 - 48$ $130 - 48$ $199 - 48$ Which is harder and which is easier? Explain why. $2996 + 1650$ $3461 + 2537$ $4837 + 2189$

Multiplication and Division (including FDP)	
Mental Fluency Expectations	SATs question examples
By the end of lower KS2 (Year 4) Pupils should be fluent with all multiplication and division facts up to 12×12, and be able to use a range of mental strategies to solve some calculations involving larger numbers. They should also be able to use multiplication facts to solve some problems involving known decimals. -	$2 \times 45 =$ $180 \div 3 =$ $120 \div 12 =$ $213 \times 0 =$ $60 \div 15 =$ $99 \div 11 =$ $270 \div 3 =$ $120 \div 12 =$ $1,210 \div 11 =$ $\frac{3}{4}$ of 1,000 = $5 \times 4 \times 10 =$ $5,400 \div 9 =$ $0.5 \times 28 =$
By the end of upper KS2 (Year 6) Pupils secure understanding of place value, and scaling up or down by a scale factor of ten, should enable pupils to accurately multiply and divide numbers by 10, 100, 1000. Pupils continue to apply their quick recall of all multiplication facts to derive related facts and to solve multiplication and division calculations, including those involving fractions. Pupils can use their recall of multiplication table facts to work out square and cube numbers. Pupils understanding of percentages enables them to use their known facts and mental strategies to work out percentages such as 1%, 10%, 25% of an amount. Pupils are able to apply their mental skills and strategies to increasingly large numbers and also to decimals and fractions.	$1,210 \div 11 =$ $3^3 =$ $101 \times 1,000 =$ $6^2 + 10 =$ $1\frac{3}{4} \times 10 =$ $0.1 \div 100 =$ $20\% \text{ of } 3,000 =$ $35\% \text{ of } 320 =$ $51\% \text{ of } 900 =$ $20\% \text{ of } 1,200 =$ $99\% \text{ of } 200 =$ $\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$ $\frac{1}{3} \div 2 = \frac{1}{6}$ $\frac{4}{5} \div 4 =$

Multiplication and Division (including FDP)	
Mental Fluency Expectations	Sample Questions (NCETM Y6 assessment for mastery resource)
At the beginning of KS3 (Year 7) Pupils should consolidate their numerical and mathematical capability from KS2 and begin to build on prior knowledge and understanding of the number system and place value. They are able to apply their mental skills and strategies to increasingly large numbers and also to decimals and fractions. They should use the four operations applied to integers, decimals, proper and improper fractions, and mixed numbers. Pupils should begin to formalise their understanding of the three laws of arithmetic and how they are used to increase mental fluency: • Commutativity $a \times b = b \times a$ • Associativity $a \times (b \times c) = (a \times b) \times c$ • Distributivity $a \times (b + c) = ab + ac$	Work out $1668 \div 8$ using an informal method ($\div 2 \div 2 \div 2$) Work out using an informal method $8.4 \times 3 + 8.4 \times 7$ $6.7 \times 5 - 0.67 \times 50$ $93 \times 0.2 + 0.8 \times 93$ $7.2 \times 4 + 3.6 \times 8$ A box of labels costs £24. There are 100 sheets in the box. There are 10 labels on each sheet. Calculate the cost of one label, in pence. Put the following numbers into groups: $\frac{3}{4}$, $\frac{3}{2}$, 0.5, 1.25, $\frac{3}{8}$, 0.125. Explain your choices. Last month Kira saved $\frac{3}{5}$ of her £10 pocket money. She also saved 15% of her £20 birthday money. How much did she save altogether? You can buy 3 pots of banana yoghurt for £2.40 How much will it cost to buy 12 pots of banana yoghurt? If I share equally a 3 m ribbon between 5 people, how long will each person's ribbon be? Which method would you use? Explain why: $144 \div 16$ $516 \div 12$ $140 \div 14$ $300 \div 50$ $280 \div 24$ $1000 \div 15$ Which is harder and which is easier? $693 \div 7$ $300 \div 7$ $287 \div 7$ $5600 \div 7$