East Sheen Primary School

Progression in Mental Calculations

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This policy aims to aims to give teachers at East Sheen Primary School guidance as to the progression in teaching and learning of mental calculations from Reception to Year 6.

Introduction

The long term intent of our mathematics teaching is that children should be able to select and use an appropriate and efficient method to solve any given problem.

The ability to calculate mentally forms the basis of all methods of calculation and should be seen as being complementary to written methods. Without efficient mental strategies, children can often struggle to quickly and fluently calculate and every written method incorporates an element of mental processing.

Children should be encouraged to recognize when and how to use mental methods, sometimes with jottings, to work out a calculation. For those which they cannot do mentally, they should be able to select an appropriate written method which they can use accurately and with confidence (see the Calculation Policy). Formal written recording helps children to clarify their thinking and assists the development of more fluent and sophisticated processes.

This document also identifies the facts that children should be able to **rapidly recall** alongside the strategies children should be able to use and the types of calculations that they should be able to calculate mentally, sometimes with the support of jottings. Rapid recall of number facts is important because, being able to recall number facts automatically allows children to free up their working memory when faced with questions and problems across the whole maths curriculum.

EYFS

Counting / Using Number	**40-60** - Counts up to three or four objects by saying one number name for each item. - Counts actions or objects which cannot be moved. - Counts objects to 10, and beginning to count beyond 10. - Counts out up to six objects from a larger group. - Counts an irregular arrangement of up to 10 objects. - Estimates how many objects they can see and checks by counting them. - Says the number that is one more than a given number. -
Number Recognition	**40-60** - Recognise some numerals of personal significance. - Recognises numerals 1 to 5 - Selects the correct numeral to represent 1 to 5, then 1 to 10 objects
Applying knowledge to mathematical problems	**40-60** - Uses the language of 'more' and 'fewer' to compare two sets of objects. - Finds the total number of items in two groups by counting all of them. - Says the number that is one more than a given number. - Finds one more or one less from a group of up to five objects, then ten objects. - In practical activities and discussion, beginning to use the vocabulary involved in adding and subtracting. - Records, using marks that they can interpret and explain. - Begins to identify own mathematical problems based on own interests and fascinations.
. Early Learning Goal	Children count reliably with numbers from one to 20, place them in order and say which number is one more or one less than a given number. Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer. They solve problems, including doubling, halving and sharing

Year 1

Rapid Recall	- All pairs of numbers with a total to 20. (e.g. 3+7, 14+6)) - Addition and subtraction facts for each number to 10. (e.g. 2+4=6 8-3=5) - Addition doubles of all numbers to at least 10+10 - Halves of even numbers to 20. - 1 and 2 more/ less than any number up to 100. - 10 more/ less than multiples of 10 - 5 more/less than multiples of 5
Mental Strategies **To be used, as appropriate for mental calculations**	- Count on /back in ones, twos, fives and tens - Reorder numbers in calculation - Begin to bridge through 10 (and later 20) when adding a single-digit number - Use known number facts and place value to add or subtract pairs of single-digit numbers - Add 9 to single digit numbers by adding 10 then subtracting 1 - Subtract 9 by subtracting 10 then adding 1 - Identify near doubles, using known doubles - Use patterns of similar calculations
Mental Calculations That should be able to be calculated mentally	- Add or subtract a single digit to or from a single digit, without crossing 10. - Add or subtract a single digit to or from 10. - Add or subtract a single digit from a 'teens' number without crossing 20 or 10 (e.g. 13 +5, 17-3) - Double all numbers to 10 (e.g. double 8, 6+6)

Year 2

Rapid Recall	- All pairs of numbers with a total to 20. (e.g. 13+7) - Addition and subtraction facts for all numbers to at least 10. (e.g. 2+4=6 8-3=5) - All pairs of multiples of 10 with a total of 100 (e.g. 70+30) - Addition doubles of all numbers to at least 10+10 (then 20) and the corresponding halves. - Multiplication facts for the 2, 10 and 5 x tables - Division facts for the 2, 10 and 5 x tables
Mental Strategies **To be used, as appropriate for mental calculations**	- Count on or back in tens or ones - Find a small difference by counting up from the smaller to the larger number - Re-order numbers in a calculation - Add 3 small numbers by putting the largest first and/or finding a pair totaling 10 - Partition additions into tens and ones and then recombine - Bridge through 0 or 20 - Use known number facts and pace value to add or subtract pairs of numbers - Partition into '5 and a bit' when adding 6,7,8 (or 9) - Add or subtract 9,19,11 or 21 by adding 10/20 and compensating - Identify near doubles - Use patterns of calculations - Use knowledge of inverse relationship between addition and subtraction - Use knowledge of number facts and place value to multiply or divide by 2,5,10 - Use doubles and halves and halving as the inverse of doubling
Mental Calculations That should be able to calculated mentally	- Add/subtract any single digit number to/ from a 2-digit number, without crossing the tens boundary (e.g. 62+4, 38-7) - Add/subtract and single digit number to a multiple of 10 - Add/subtract any 'teens' number to any 2-digit number, without crossing the tens boundary (e.g. 23+14, 48-13) - Find what must be added to a 2-digit multiple of 10 to make 100 - Add/subtract a multiple of 10 to/from a 2-digit number, without crossing 100 - (e.g. 47+30, 78-20) - Subtract any 2-digit number from another 2-digit number where the difference is less than 10 (e.g.. 78-71, 52-48) - Doubles of all numbers to at least 15 - Double any multiple of 5 up to 50 - Halve any multiple of 10 up to 100

Year 3

Rapid Recall	- Addition and subtraction facts for each number to 20 (e.g.. 13 +4) - Addition and subtractions facts for multiples of 10 to 100 and multiples of 100 to 1000 - Number pairs that total 100 (e.g. 46+54) - Multiplication and division facts for the 2,3,4,5, 8 and 10 times tables
Mental Strategies To be used, as appropriate for mental calculations	- Count on/back in tens or ones from any given number - Count on from 0 in steps of 4,8, 50 and 100s - Find a small difference by counting up from the smaller to the larger number - Re-order numbers in a calculation - Add 3 or 4 small numbers by putting the largest first and/or finding a pair totaling 9,10,11 - Partition into tens and ones and recombine - Bridge through a multiple of ten and adjust - Use knowledge of number facts and place value to add/subtract pairs of 2-digit numbers - Add/subtract mentally a 'near multiple of 10' to/from a 2/3-digit number by adding/subtracting a multiple of 10 and adjusting. - Identify near doubles and use doubles facts to calculate near doubles - Use inverse operations ((addition/subtraction or multiplication/division, doubling/halving) - Multiply a number by 10/100 (digits move up the place value chart by one/ two places) - Use knowledge of number facts and place value to multiply and divide by 2/5/10/100
Mental Calculations That should be able to calculated mentally	- Add/ subtract mentally a three-digit number and ones - Add/subtract mentally a three-digit number and tens - Add /subtract mentally a three-digit number and hundreds - Use place value/number facts/partitioning to add/ subtract any pair of 2-digit numbers, without crossing a tens boundary and including crossing the tens boundary (67+5, 82-7) - Apply knowledge of number facts to find what must be added to/subtracted from a 3-digit number to make the next higher/lower multiple of 10. - Subtract any 3-digit number from another 3-digit number where the difference is less than 10 (e.g. 458-451, 603-597) - Double any number to at least 20 (e.g. double 18) and corresponding halves (e.g. double 18, halve 36; double 60, halve 120; double 35, halve 70 etc.) - Find out what must be added to any 2-digit number to make 100

Year 4

Rapid Recall	Rehearse all previous facts plus: - Multiplication and division facts for the 6,7,9,11 and 12 times tables (with prior learning - all facts up to 12x12 and corresponding division facts)
Mental Strategies To be used, as appropriate for mental calculations	- Count on/back in repeated steps of 1.100.1000 - count from 0 in multiples of 25 and 1000 - count from 0 in multiples of 6, 9, 7, 11 and 12 - reorder numbers in a calculation (largest first or identifying known pairs) - Add/subtract mentally 9,19 ,29,11,21, 31 etc. to/from a 2/3-digit number by adding/subtracting the nearest multiple of 10 and compensating/adjusting. - Use knowledge of number facts and place value to add/ subtract any pairs of 2 and 3 digit numbers - Double any 2-digit number by doubling the tens first - Bridge through 100 - Partition to carry out multiplication - Multiply any 2-digit number by 10/100 and divide a multiple of 100 by 10 - Multiply and 2 digit multiple of 10 by any single digit number (e.g. 30x6) - Use inverse operations
Mental Calculations That should be able to calculated mentally	- Find out what must be added to any 2-digit number to make 100 - Find out what must be added to / subtracted from any 2 or 3-digit number to make the next higher/lower multiple of 100 (e.g. 374+? = 400, 826-?= 800) - Double any whole number to 50 and find corresponding halves (e.g. double 48, halve 96) - Double any multiple of 10 to 500 and find corresponding halves (e.g. double 380, halve 760) - Double any multiple of 5 to 100 (e.g. double 65) - Add/subtract pairs of 2-digit numbers - Subtract any 4-digit number from another 4-digit number where the difference is small (e.g. 3641-3628, 60002-5991) -

Year 5

Rapid Recall	All previous facts - Multiplication facts up to 12x12 and corresponding division facts - Know all addition and subtraction facts for decimals that total 1 and 10 (one DP) - Find all the factor pairs of a number - Know all prime numbers to 19 - Know squares of all numbers up to 12
Mental Strategies To be used, as appropriate for mental calculations	- Count forwards and backwards from any given number, in any steps, crossing boundaries and into negative numbers - Count forwards and backwards in steps of powers of 10 for any given number up to 1 000 000 - Count up through the next multiple of 10,100,1000 - Reorder numbers in a calculation - Use known number facts and place value and partitioning to add/subtract pairs of numbers mentally, including those to 1 decimal place - Use factors - Partition to carry out multiplication - Use doubling and halving - Use closely related facts to carry out multiplication and division - Use inverse operations - Use knowledge of number facts and place value to multiply and divide - Use rounding and adjusting to add/subtract numbers
Mental Calculations That should be able to calculated mentally	- Derive sums and difference of decimals (e.g. 6.5+ 2.7, 5.5-2.7) - Derive double and halves of decimals - Find out what must be added to a decimal fraction to make the next higher whole number. - Add or subtract pairs of decimal fractions up to 2 decimal places. - Subtract any 4-digit number from another 4-digit number where the difference is small (e.g. 3641-3628, 60002-5991) - Multiply 2/3/4-digit numbers by 10/100/1000 - Double any whole numbers to 100 and find corresponding halves. - Find 50%,25%,10% of small whole numbers or quantities.

Year 6

Rapid Recall	All previous facts - Multiplication and division facts involving decimals (e.g. 0.8x7) - Square of numbers to 12x12 - Squares of multiples of 10 - Know all square roots to 10 x 10 - Know the square roots to 15 x 15 - Know all prime numbers within 50 - Know the prime numbers within 100
Mental Strategies To be used, as appropriate for mental calculations	Consolidate all strategies from previous years - Count forwards and backwards from any given number, in any steps, crossing boundaries and into negative numbers - Know the decimal and percentage equivalents of the fractions 1⁄2, 1⁄4, 3⁄4, 1⁄3, 2⁄3, tenths and fifths - Use known number facts , place value and partitioning to add/subtract pairs of numbers mentally, including those to 1 decimal place - Use rounding and adjusting to add/subtract numbers - Partition to carry out multiplication
Mental Calculations That should be able to calculated mentally	- Multiply and 2/3-digit number by a single digit (e.g. 34 x6) - Multiply any 2-digit number by 50 or 25 - Multiply/ divide any whole number by 10/100/1000 giving any remainder as a decimal - Find squares of multiples of 10 to 100 - Find any multiple of 10% of a whole number or quantity (e.g. 70% of £350, 50% of 5kg, 20% of 2 metres)