Mental Maths Policy

Introduction

We believe that Mental Maths should:

- Mean more than just mental calculation
- Be taught every day, giving children a range of practical opportunities to develop key skills
- Include reasoning and communicating

The overall aim is that when children leave our schools they:

- Have a secure knowledge of number facts
- Are able to solve problems mentally, selecting an efficient strategy from a range of known approaches
- Make use of diagrams and informal notes to help record steps when using mental methods that generate more information than can be kept in their heads
- Can quickly identify when a mental strategy is not appropriate and in these cases have an efficient, reliable written method which they can turn to (see calculations strategy for mode details of how these are taught)

We use Big Maths strategies to support the teaching of maths throughout the School. All children in years 1-6 complete Big Maths Beat That (focussing on rapid recall of number facts) and CLIC (core mental and written strategies) assessments every week. Staff identify common areas of weakness from these assessments and focus on these in their setting of half-termly targets and Mental Maths sessions within daily maths lessons. Children in Years 3-6 also complete a Mental Maths test (in the style of SATs and Optional SATs) every week, to improve their speed of working and ability to tackle questions of this type.

Teaching rapid recall

It is unreasonable to expect our children to learn number bonds, addition facts and multiplication tables by simply saying them over and over again. Our aim is for children to be able to recall all these facts instantaneously (responding as quickly as if they were asked "What is your name?"), and this requires explicit teaching using a wide range of strategies. All teachers select key Learn-It facts to be taught each half-term (typically 3 number facts in Foundation and KS1 and a focus table in KS2), which they spend at least 5 minutes teaching every day. Children in KS2 are tested weekly on their times table knowledge by class TAs, progressing through Bronze, Silver and Gold Awards as their recall improves, and take home Tables Practice Packs to support them in home learning with their parents / carers.

Year 1

Rapid Recall

- All pairs of numbers with a total of 10, e.g. 3+7
- Addition and subtraction facts for all numbers to at least 5;
- Work out the corresponding subtraction facts
- Doubles of all numbers to at least 10 and the corresponding halves
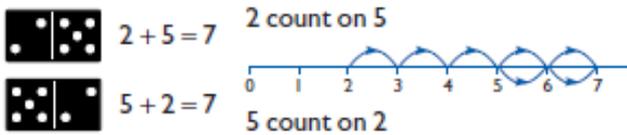
Counting & Number

- Count reliably 20 objects
- Position numbers to 20 on a number line
- Count on and back in 1's, 2's, 5's and 10's and use this to derive the multiples of 2, 5 and 10 to the tenth multiple
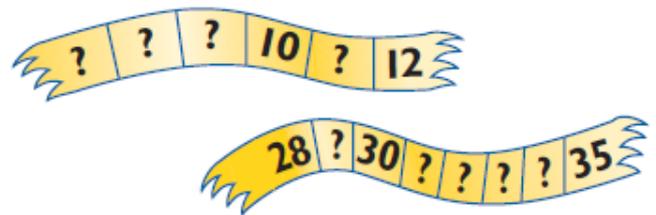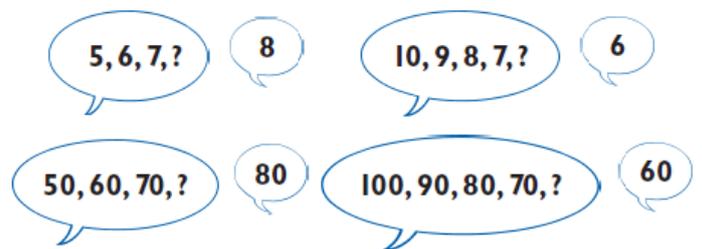
- Estimate a number of objects and check by counting

Addition & Subtraction

- Reorder numbers in a calculation
- Relate addition to counting on

$2+5=7$ 2 count on 5

$5+2=7$ 5 count on 2

- Understand that addition can be done in any order
- Begin to bridge through 10, and later 20, when adding a single digit number
- Use known number facts and place value to add and subtract pairs of single digit numbers

$20=11+9$ $9+11=20$
$20-9=11$ $20-11=9$
$(10+1+9=10+10=20)$

$20=12+8$ $8+12=20$
$20-8=12$ $20-12=8$
$(10+2+8=10+10=20)$

$20=13+7$ $7+13=20$
$20-7=13$ $20-13=7$
$(10+3+7=10+10=20)$

etc.

- Add 9 to single digit numbers by adding 10 then subtracting 1
- Understand subtraction as take away
- Find the difference by counting back

$13—5 = 8$

-1 -1 -1 -1 -1

0 1 2 3 4 5 6 7 8 9 10 11 12 13
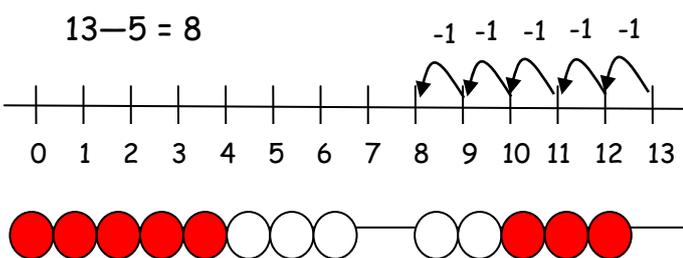
Multiplication & Division

- Double units
- Identify near doubles, using doubles already known
- Children will experience equal groups of objects, and will count in 2s and 10s and begin to count in 5s. They will work on practical problem solving activities involving equal sets or groups.

Year 2

Rapid Recall

- Addition and subtraction facts for all numbers to at least 10
- All pairs of numbers with a total of 20, eg 13+7
- All pairs of multiples of 10 with a total of 100, eg 30+70
- Multiplication facts for the 2, 5 and 10 times tables and corresponding division facts;

Counting & Number

- Count on and back in 10, 5, 2's and 1's to at least 100
- Count up to 100 objects by grouping
- Know the value of each digit in 2 digit numbers including where '0' is a place holder
- Partition two digit numbers in different ways:

30p + 4p = 34p
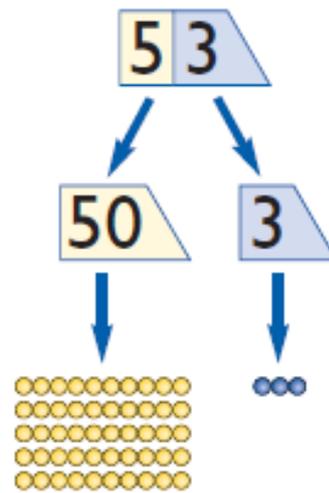
41p could be made from 10p + 10p + 10p + 10p + 1p

or 20p + 20p + 1p

- Use knowledge of number facts and operations to estimate and calculate
- Recognise odd and even numbers
- Order a set of 2-digit numbers and position them on a number line
- Round 2-digit numbers to the nearest 10

Addition & Subtraction

- Find a difference by counting up from the smaller to the larger number
- Solve addition by counting on in tens and units

34 + 23 = 57


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        +10           +10
                              +3

34            44            54      57
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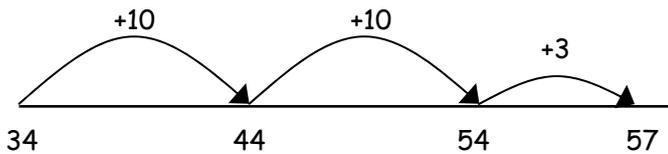
- Add or subtract 9, 19, 11 or 21 by rounding and compensating;
- Add/subtract mentally a 1 digit number or multiple of 10 to or from any 2 digit number
- Add three small numbers by putting the largest number first and/or find a pair totalling 10
- Reorder numbers in a calculation, and find three corresponding facts ('switchers') for any given addition / subtraction fact, eg:

  16 + 5 = 21

  So 5 + 16 = 21

  21 - 5 = 16

  21 - 16 = 5

- Say or write a subtraction statement corresponding to a given addition statement

Multiplication & Division

- Use knowledge of number facts and place value to multiply or divide by 2,5 or 10
- Recognise multiples of 2, 5 and 10 up to 100
- Begin to double 2-digit numbers by partitioning, doubling tens, doubling units and recombining. Doubles and halves of numbers to 20 should be secure.


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              217
     200      10      7

     400      20      14
              434
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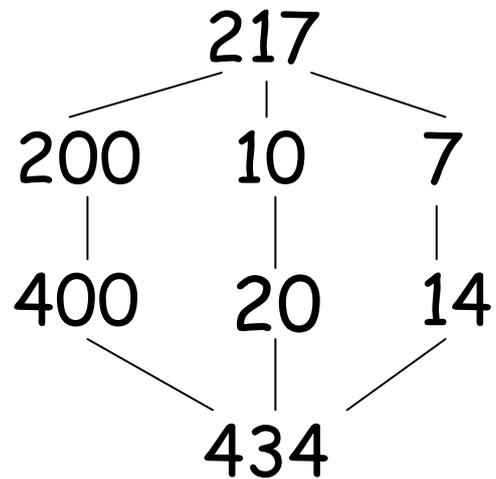
- Recognise repeated addition as multiplication
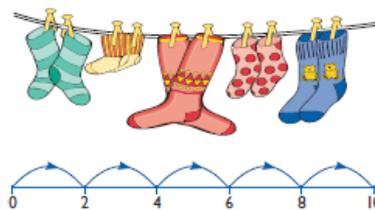
2 + 2 + 2 + 2 + 2 = 10
2 × 5 = 10
2 multiplied by 5
5 pairs
5 hops of 2
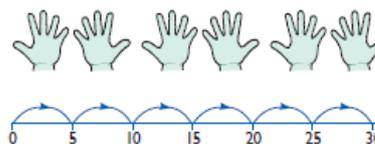
5 + 5 + 5 + 5 + 5 + 5 = 30
5 × 6 = 30
5 multiplied by 6
6 groups of 5
6 hops of 5

- Find 1/2, 1/4 and 3/4 of shapes and sets of objects

Year 3

Rapid Recall

- Addition and subtraction facts for all numbers to 20
- Number bonds to 100
- All pairs of multiples of 100 with a total of 1000
- Multiplication facts for the 2, 3, 4, 5, 6 and 10 times-tables and corresponding division facts
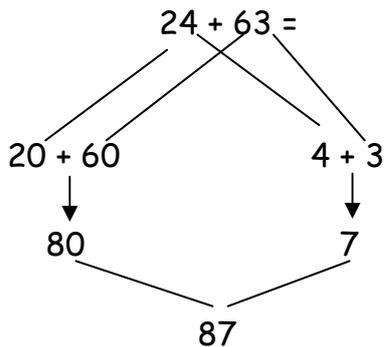
Counting & Number

- Count on or back to zero in single digit or multiples of 10;
- Read, write and order whole numbers to at least 1000, and position them on a number line
- Partition 3-digit numbers into multiples of 100, 10 & 1.
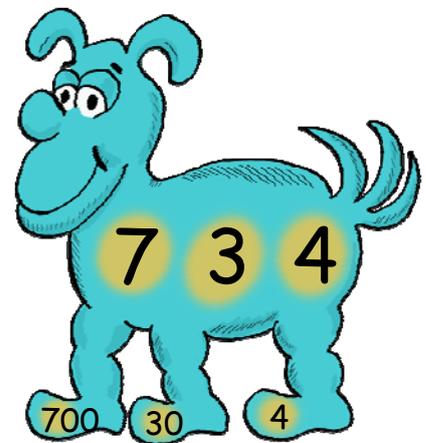
- Round 3-digit numbers to the nearest 10
- Use knowledge of number operations and corresponding inverses, including doubling and halving, to estimate and check calculations

Addition & Subtraction

- Add three or four small numbers by putting the largest number first and/or by finding pairs totalling 9, 10 or 11
- Partition into tens and units then re-combine

$$24 + 63 =$$

```
        24 + 63 =
        /  \  /  \
   20 + 60      4 + 3
      |            |
     80            7
       \          /
          87
```

- Find a small difference by counting up from the smaller to the larger number
- Bridge through a multiple of 10, then adjust
- Use knowledge of number facts and place value to add or subtract pairs of numbers
- Add or subtract combinations of one digit and 2 digit numbers
- Add or subtract mentally a 'near multiple of 10' to or from a two-digit number;
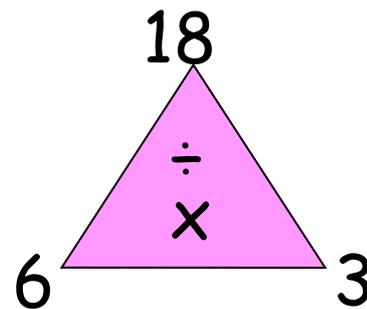
Multiplication & Division

- Recognise multiples of 2, 5 or 10 up to 1000
- Double and halve 2-digit numbers
- Multiply any two-digit number by 10 or 100.
- Use knowledge of number facts and place value to multiply or divide by 2, 5, 10 or 100
- Use Smile Multiplication to multiply multiples of 10 and 100

$$400 \times 30 =$$

12

12 000

- Recognise the relationship between multiplication and division:

18

÷

×

6   3

- Find three corresponding facts ('switchers') for any given x / ÷ fact, eg:

$$6 \times 11 = 66$$
So $$11 + 6 = 66$$
$$66 \div 11 = 6$$
$$66 \div 6 = 11$$

- Find unit fractions of numbers and quantities (1/2, ¼, 1/3, & 1/6)

Year 4

Rapid Recall
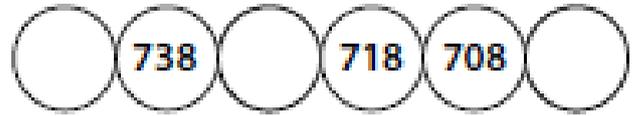
- Know by heart all multiplication facts up to 10x10; and derive quickly all corresponding division facts
- Use tables facts to quickly multiply multiples of 10
- Know that 1/2 = 0.5, 1/4 = 0.25 and 1/10 = 0.1

Counting & Number

- Count back in repeated steps of 1, 10 and 100;

- Count through the nearest multiple of 10, 100 or 1000
- Round to the nearest 10, 100 or 1000
- Partition 4-digit numbers
- Partition one-place decimals
- Position negative numbers on a number line
- Recognise and continue number sequences (counting on and back in steps of constant size)
- Use knowledge of rounding, number operations and inverses to estimate and check calculations

Addition & Subtraction

- Select an appropriate strategy to add or subtract mentally pairs of 2 digit whole numbers
- Add two 2-digit numbers by partitioning in to tens and units, adding the tens first
- Add or subtract 9,19,29,11,21 or 31 by rounding and compensating
- Add or subtract the nearest multiple of 10, then adjust
- Use counting-on and counting-back to solve subtraction problems (using blank number line for jottings where necessary)

84 - 56 = 4 + 20 + 4 = 28
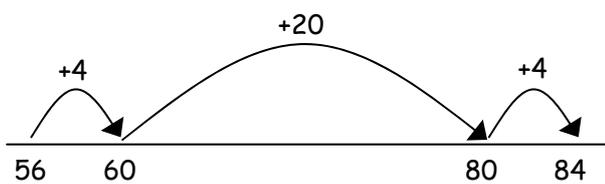
- Add three 2-digit multiples of 10;
- Use knowledge of addition and subtraction facts and place value to derive sums and differences of pairs of multiples of 10, 100 or 1000

Multiplication & Division

- Identify the doubles of two-digit numbers; use these to calculate doubles of multiples of 10 and 100 and derive the corresponding halves
- Double any two-digit number by partitioning, doubling tens and units, then recombining. Use this to double multiples of 10 and 100 to 1000
- Multiply or divide numbers to 1000 by 10 and then 100 (whole number answers), eg:

  45 x 100 =

H	T	U	1/10	1/100
	4	5		
		4	5	
		0	4	5

- Partition to carry out multiplication, eg:

  $$23 \times 4 \quad = 20 \times 4 + 3 \times 4$$
  $$= \quad 80 \; + \; 12$$
  $$= \quad\quad 92$$

- Use closely related facts to carry out multiplication and division
- Find fractions of numbers, quantities or shapes (e.g 1/2, 3/8)
- Identify pairs of fractions that total 1
- Use divisibility rules to identify multiples of 2, 3, 5, 10

Year 5

Rapid Recall

- Know multiplication facts to 10x10 and use these to multiply pairs of multiples of 10, 100
- Division facts corresponding to tables up to 10x10
- Know that 1/2 = 0.5, 1/4 = 0.25, 3/4 = 0.75, 1/10 = 0.1, 2/10 = 0.2 etc
- Know one-place decimal bonds to 1 and 10.

Counting & Number

- Count from any given number in whole number and decimal steps. Extend beyond zero when counting backwards. Relate these numbers to their position on a number line.
- Order decimals with one or two places
- Count through the next multiple of 10, 100 or 1000
- Partition 2-place decimals and integers to 1 000 000
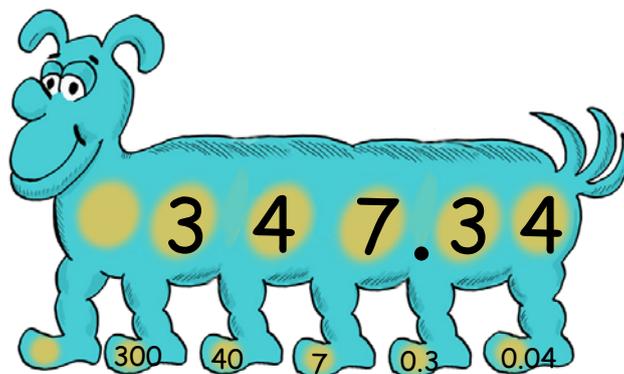
- Round to the nearest 1000, 1000, 10 or whole number
- Use knowledge of rounding, place value, number facts and inverse operations to estimate and check calculations

Addition & Subtraction

- Have a secure method to solve U.t ± U.t (selecting from methods below)
- Partition into hundreds, tens, units, tenths, adding the most significant digit first
- Add or subtract the nearest multiple of 10 or 100 then adjust, eg:

273 + 494 = 767
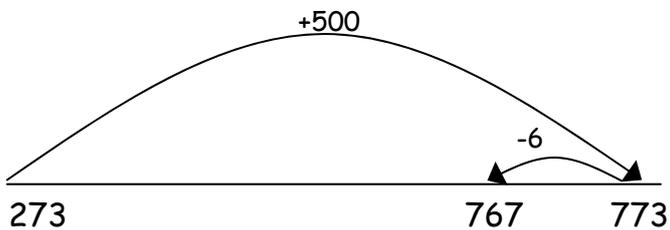
- Count on or back, using a blank number line and bridging to the nearest whole number where necessary
- Add several small numbers;

Multiplication & Division

- Identify pairs of factors of two-digit whole numbers and find common multiples (e.g. for 6 and 9)

- Partition to carry out multiplication and use to solve TU x U mentally
- Multiply and divide decimals by 10 or 100 and integers by 1000, explain the effect.
- Double and halve three-digit numbers and one-place decimals by partitioning and recombining
- Use knowledge of number facts and place value to multiply or divide - eg solve 189 ÷ 9 by counting up or down:

so 189 ÷ 9 = 21
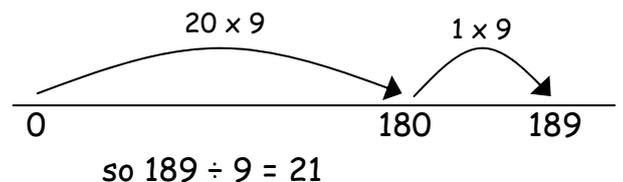
Year 6

Rapid Recall

- Use knowledge of place value and multiplication facts to 10 10 to derive related multiplication and division facts involving decimals (e.g. 0.08 x 7, 40 x 0.6)
- Use knowledge of multiplication facts to derive quickly squares of numbers to 12 12 and the corresponding squares of multiples of 10
- Know that 1/2 = 0.5 = 50%, 1/4 = 0.25 = 25%, 3/4 = 0.75 = 75%, 1/10 = 0.1 = 10%, 2/10 = 0.2 = 20% etc, 1/5 = 0.2 = 20%, 2/5 = 0.4 = 40% etc.

Counting & Number

- Partition 3-place decimals
- Round and order decimals with up to 3 places and position them on a number line
- Recognise that prime numbers have only two factors, identify prime numbers less than 100
- Find the prime factors of two-digit numbers
- Use approximations, inverse operations and tests of divisibility to estimate and check results

Addition & Subtraction

- Be able to select sensibly from a range of known strategies to solve addition and subtraction problems - this list should include: counting on; counting back; near doubles; rounding and adjusting; related facts.
- Find the difference between a positive and negative integer or 2 negative integers

Multiplication & Division

- Be able to select sensibly from a range of known strategies to solve multiplication and division problems - this list should include: partitioning; doubling and halving; known facts and place value; relationship between multiplication and division; near-multiples of 10 & adjusting.
- Calculate TU multiplied/divided by U U.t multiplied/divided by U
- Know tests of divisibility for 2, 3, 4, 5, 6, 9, 10 and use these to identify primes to 100
- Multiply and divide any integer or two-place decimal by 10, 100 or 100
- Use place value and known division facts to find simple fractions and percentages of numbers and amounts (eg. 1%, 5%, 10%, 25%, 50%)