

Mental Arithmetic Policy

Mental arithmetic is a key part of the mathematics curriculum at Redhill Primary School, involving both the understanding and using of mental methods and written methods for calculations.

One of the three key aims for the New Curriculum (2104) states that all pupils will *'become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.'*

Students exhibit fluency when they demonstrate flexibility in the methods they choose, understand and can explain these methods, and can produce answers efficiently. Therefore, fluency consists of three elements:

- efficiency – a strategy the children can carry out easily and quickly
- accuracy – careful recording, knowledge of number facts and relationships, double checking results
- flexibility – the knowledge of more than one approach to solving a problem and choosing the best strategy for the numbers involved

Why is mental arithmetic important?

'To the person without number sense, arithmetic is a bewildering territory in which any deviation from the known path may rapidly lead to being totally lost.' Dowker (1992)

In order to be fluent with number, children must be both procedurally and conceptually fluent – understand how and why. Without this, children are more likely to have difficulty remembering and using strategies in the future.

To support children to become fluent, we, as teachers, need to make connections between learning and make them at the right time in the child's learning.

- models and images - we learn by moving from the concrete to the pictorial to the abstract so structured apparatus and images are useful for learning about place value, numbers and number facts. They must be directly linked to mental and recorded calculations to be most effective.
- talking about maths – you can't do maths unless you can talk maths! Children must be given opportunities for higher-level skills of comparing, explaining and justifying using age-related mathematical vocabulary (for example: describing why and how a calculation worked or comparing and contrasting different ways of solving a problem and evaluating them)
- consolidation in meaningful contexts – this allows children to make links between the types of situations which a particular strategy might suit: building mathematical memory of connected relationships

Mental Arithmetic At Redhill Primary School

As an important part of the curriculum, it is essential that the teaching of mental arithmetic skills has a high priority in all classrooms. The beginning of each maths lesson should contain a short, sharp starter activity, focusing on the teaching or revision of key skills. Where gaps in children's knowledge are identified, additional mental maths practice should be planned. This could involve a dedicated weekly lesson or additional practice outside of the daily maths lesson.

In year 1 and 2, children develop their skills of subitising further. They should be able to recognise fixed patterns of differing amounts (much like a dice) and should be able to confidently recognise random arrangements of about 6-8 without counting. They focus on practising number bonds to 10 and 20, recognising the inverse relationship between addition and subtraction. They are encouraged to make use of the website, Numbots, at home to develop this knowledge further. In year 2, children will have opportunities to practise with test formats similar to those they will experience in their mental arithmetic test at the end of the year.

In year 3 and 4, weekly times tables tests are completed with results sent home to support parents which their child's learning. These are for all times tables and have three levels: bronze (multiplication facts in order), silver

(random multiplication facts) and gold (mixed problems with multiplication and division facts). Children must complete each challenge with competence before moving on to the next level/times table. In addition, children are encouraged to make use of the website, TT Rockstars, to secure their knowledge and speed for times tables to 12 x 12.

In year 5 and 6, children will continue to revise their times tables, with challenges used in class and at home for children who need this. Children will complete a weekly mental arithmetic test to build speed, fluency and appropriate decision making, working towards end of Key Stage expectations.

In year 2 and 6, additional work with mental arithmetic tests is done to ensure children are familiar with the end of year expectations and test format.

Reference:

- * Mental Calculation Expectations
- * Written Calculation Policy

Mental Arithmetic Expectations

At Redhill Primary Academy, we have specified non-negotiables for mental arithmetic.

Foundation Stage

- Read, write and count with numbers up to 20
- Begin to order numbers to 20
- Develop an understanding of the value of a number (eg: the fourness of 4)
- Recognise an amount (up to 6) without having to count it (subitising)
- Recognise one more or one less than a number
- Develop an understanding of relationship between numbers to 10 (eg: $6 + 4 = 10$)
- Know doubles and halves of numbers to 10

Key Stage 1

- Read, write, count and order with numbers up to 100 (using $<$ $>$ and $=$)
- Partition TU numbers in different ways
- Recognise an amount (up to 8) without having to count it (subitising)
- Develop an understanding of number bonds – to 10, to 20, to 100
- Recognise and understand the effect of adding and subtracting 0, 1 and 10
- Know and use key multiplication facts – $\times 2$, $\times 3$, $\times 5$, $\times 10$
- Use known multiplication facts to solve division problems
- Know doubles and halves of numbers to 20

Key Stage 2

Year 3/4

- Read, write, count and order with numbers up to 10,000
- Partition 3 and 4 digit numbers in different ways
- Round numbers to the nearest 10, 100 and 1000
- Secure an understanding of number bonds – to 100 and 1000
- Recognise and understand the effect of adding and subtracting multiples of 10, 100 and 1000
- Recognise and understand the effect of multiplying and dividing by 0, 1 and 10
- Know and use multiplication and division facts up to 12×12
- Calculate doubles and halves of 2 and 3 digit numbers
- Use mental strategies to multiply together 3 U numbers
- Use the distributive law $39 \times 7 = 30 \times 7 + 9 \times 7$ and associative law $(2 \times 3) \times 4 = 2 \times (3 \times 4)$

Year 5/6

- Read, write, count and order with numbers up to 10,000,000
- Round any number to a required degree of accuracy
- Read, write, count and order with decimal numbers with up to 3 decimal places
- Develop an understanding of decimal number bonds to 1
- Count forwards and backwards in powers of 10
- Recognise and understand the effect of multiplying and dividing by 10, 100 and 1000
- Use and apply place value facts and multiplication tables to multiply and divide mentally (reason how to calculate 30×50 or 0.3×0.05 by using 3×5 ; using rounding to estimate and adjust answers for addition and subtraction, or to balance number equations (eg: $399 + 568 = 400 + 567$; $1003 - 267 = 1000 - 264$))

- Recognise and use square and cube numbers
- Use the order of operations correctly (BODMAS)

At each stage, children should be encouraged to choose the most efficient strategy to solve a calculation question: this may be a mental calculation, with jottings or a formal written method (depending on their stage of education)