HELP YOUR CHILD WITH MENTAL MATHS

Key Stage 2

P5, P6 and P7

Mental Maths is a group of skills that allow us all to do maths "in our head" without using pencil and paper or a calculator. The ability to perform mental calculations is a key skill of being numerate and being able to apply this knowledge to everyday situations. Mental Maths can help children understand maths concepts better and calculate answers faster.

KS2 children at Ashgrove Primary are given daily opportunities to experience a rich programme of mental maths activities. They are given time to develop and discuss the strategies they use so that they learn to calculate accurately and efficiently.

There are 5 Aspects to Mental Maths

QUICK RECALL

The number facts children should be able to recall quickly and accurately.

CALCULATIONS

The range of calculations children should be able to perform mentally.

STRATEGIES

The strategies children will use to calculate effectively and efficiently.

Counting on/back
Reorder
Round and Adjust
Partition
Inverse Operations
Factors
Equivalence

KNOWLEDGE

Having knowledge and understanding of the number system.

ESTIMATION

The use of rounding to estimate a reasonable answer.

QUICK RECALL

By Key Stage 2 (KS2) children should have good recall of the basic facts to 20.

E.g. $3 + 5 = 8$, $12 + 4 = 16$, $20 - 3 = 17$, $13 - 4 = 9$.

During Key Stage 2 (KS2) children work to develop quick recall of number facts which include:

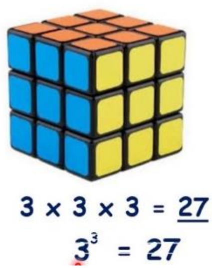
- Multiplication facts up to 12×12.
- Division facts corresponding to multiplication facts up to 12×12.
- Fraction, decimal and percentage equivalences

  E.g. $\frac{1}{4} = 0.25 = 25\%$

  $2/5 = 0.4 = 40\%$

- Square numbers up to 12^2

  E.g. $7^2 = 7 \times 7 = 49$



- Cubes of numbers 1-5 and 10.

  $1^3 = 1 \times 1 \times 1 = 1$ $2^3 = 2 \times 2 \times 2 = 8$

  $3^3 = 3 \times 3 \times 3 = 27$ $4^3 = 4 \times 4 \times 4 = 64$

  $5^3 = 5 \times 5 \times 5 = 125$ $10^3 = 10 \times 10 \times 10 = 1000$

Children also need to be able to use their multiplication tables knowledge to help them work out division facts with remainders.

E.g. $27 \div 4$

Knowing $4 \times 6 = 24$ helps them work out that $27 \div 4 = 6$R3

It is also important that children can use quick recall to work out new facts:

E,g.	$7 + 5 = 12$	$37 + 5 = 42$
	$8 - 2 = 6$	$80 - 20 = 60$
	$8 \times 3 = 24$	$80 \times 3 = 240$
	$9 \times 7 = 63$	$90 \times 70 = 630$
	$6 \times 8 = 48$	$6 \times 0.8 = 4.8$

MENTAL MATHS STRATEGIES

There are many ways of approaching calculations mentally, so children need to be able decide which of the following strategies is the best to use and apply.

COUNTING ON AND BACK – P1 to P7

Count on and back in 1s, 2s, 5s, 10s, 100s, 1000s, decimals, fractions, negative numbers and when giving change.

REORDERING NUMBERS – P1 to P7

Numbers are reordered to make calculations easier:

- When adding several numbers

  3 + 9 + 2 + 14 + 9 + 7 + 6 + 18

  Look for numbers which make multiples of 10 → 14 + 6 = 20
3 + 7 = 10
2 + 18 = 20

  Look for doubles → 9 + 9 = 18

  20 + 10 + 20 + 18 = 68

- When multiplying

  E.g. 5 x 18 is the same as 18 x 5

ROUNDING AND ADJUSTING – P2 to P7

This strategy is useful when adding or subtracting:

- Numbers that are close to a multiple of 10, 100 and 1000.

  E.g. 870 + 190 is the same as 870 + 200 – 10

  (190 is rounded to 200 and then adjusted by subtracting 10)

- Near doubles.

  E.g. 7 + 8 = double 7 and then add 1 = 15
OR double 8 and then subtract 1 = 15

It is also useful when multiplying. E.g. 7 packets of biscuits at £1.95

Round £1.95 to £2.00 and multiply by 7 £2 x 7 = £14.
Adjust the answer by subtracting 35p 5p x 7 = 35p

£14 – 35p = £13.65

PARTITIONING – P2 to P7

This strategy breaks numbers into parts to make calculations easier.

43 + 21

580 - 150

Keep one number intact and split the other → 43 + 20 + 1 = 64

580 – 100 – 50 = 430 OR

Split both numbers → (40 + 20) + (3 +1) = 60 + 4 = 64

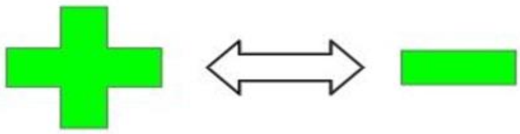
(500 – 100) + (80 – 50) = 400 + 30 = 430

Partitioning is also useful when mentally multiplying.

E.g. 76 x 3 is the same as (70 x 3) + (6 x 3)

210 + 18 = 228

INVERSE OPERATIONS – P3 to P7

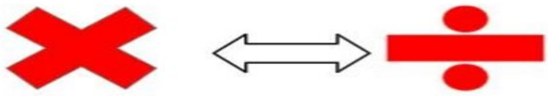


This strategy uses the relationship:

- Between addition and subtraction….

24 – 13 = _____ 13 + _____ = 24

and



- Between multiplication and division.

3 x ____ = 27 27 ÷ 3 = ____

This strategy is also very useful in money calculations where finding change can be worked out by counting on.

E.g. I buy a sandwich costing £3.19. How much change do I get from £5.

Start at £3.19 +	1p	= £3.20
£3.20 +	80p	= £4.00
£4.00 +	£1.00	= £5.00

Change = £1.81

FACTORS – P3 to P7

When multiplying, knowing how to double and halve numbers can be a useful strategy to help with mental calculations.

E.g. 33 x 4 is the same as 33 x 2 x 2 = 132 or 66 x 2 = 132

Using multiples of 10 as a factor of one of the numbers is also useful.

E.g. 70 x 9 is the same as 7 x 10 x 9 = 7 x 9 = 63 → 63 x 10 = 630

EQUILVALENCE – P6 AND P7

This strategy involves knowing the most suitable form of fractions, decimals or percentages to use for a calculation.

E.g. 25% of £2.40 is the same as $\frac{1}{4}$ of £2.40 which can be calculated by halving and then halving again.

$\frac{1}{2}$ of £2.40 = £1.20 → $\frac{1}{2}$ of £1.20 = 60p so $\frac{1}{4}$ of £2.40 is 60p

When working with percentages near the end of P6 and P7, we encourage pupils to use mental strategies such as halving and dividing by 10:

To find:

10% → divide by 10

5% → divide by 10 and then halve the answer

75% → halve the number (50%), halve it again (25%) and then add the two answers together (50% + 25%)

90% → find 10% (divide by 10) and then subtract the answer from the original amount (100% - 10%)

We aim to teach children to continually REASON about the numbers (and their answers) and allow them to grow to understand when each strategy is the most efficient to use.

KNOWLEDGE AND UNDERSTANDING OF THE NUMBER SYSTEM

By **the end** of KS2, children should:

- have developed understanding of numbers up to 1 million – odd or even, place value, ordering, rounding, factors, multiples, etc.
- be able to add and subtract whole numbers of any size.
- be able to multiply whole numbers by any number up to 99
- be able to divide whole numbers by a single digit.
- have understandings of fractions, decimals and percentages and their equivalences.
- understand different types of numbers such as square, cube, triangular, prime and negative numbers.
- be able to calculate shopping bills, change and % discounts.

This knowledge will allow children to decide whether to solve a calculation mentally (in their head), or use a formal written method.

MENTAL CALCULATIONS

Children need to be able to identify the operations they need to use – addition, subtraction, multiplication, division, doubling and halving – and then think about how to make the numbers involved easier to use.

QUESTIONS TO ASK WHEN FACED WITH A CALCULATION

- Can I do this in my head?
- What operation(s) do I use?
- What will a *rough* answer be?
- Do I need to use a written method?
- Is this a reasonable answer? (After completing calculation)

Encourage your child to estimate, answer and then reason.

ROUNDING AND ESTIMATING

It is important that children can use rounding appropriately to estimate the answer to a calculation.

Children need to develop the ability to round numbers to the nearest:

- 10
- 100
- 1000 and
- whole number (decimals) to help make estimates for calculations.

EXAMPLES OF ESTIMATED CALCULATIONS

4982 + 3017	→	5000 + 3000 = 8000
61 x 88	→	60 x 90 = 5400
12.9 x 3.2	→	13 x 3 = 39

How many boxes of chocolate costing £3.97 can be bought with £20.

£20 ÷ £4 = 5 boxes

WHAT CAN YOU DO?

Encourage your child to use Doodle Tables for 10 minutes every day.

Make flashcards to learn basic facts and multiplication tables.

Put a large poster of the multiplication facts in a regularly viewed position eg. The back of the bathroom/toilet door.

Ask your child 'quick fire' basic facts and multiplication tables as they are helping you with household chores, when you are travelling in the car or when the opportunity arises.

Talk to your child about how you work mental calculations out.

Ask your child to explain how s/he solved a calculation, ensuring mathematical language is used.

Timetables

- Ask your child to work out how long the journey between two places will take.
- Use a TV Guide and work out how long a programme lasts.

Shopping

- Estimate the total cost of items.
- Look at offers
    - Packets of biscuits cost £1.20 per packet. How much will a packet cost if you use a "3 for 2" offer?
    - Biscuits cost £1.80. The cost is reduced by 25%. How much do the biscuits now cost?

Target Number

- Choose 4 numbers E.g. 2 7 5 4
  Use these numbers to make a target number. Let's make 24.
  7 + 5 = 12 12 ÷ 2 = 6 6 x 4 = 24
- Use mental strategies for keeping scores in a game of darts.

The bulk of this leaflet was compiled by:

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Changes to the presentation, additions and omissions have been made by Mrs C Ewing. The original leaflet can be viewed in the link below.

https://drive.google.com/file/d/1Mm6ldhxyBGp9sYydRyhQ__lwK3jMeEvy/view