

Mental Method Strategies

Addition and Subtraction

Year 1

Children should understand when to and be able to apply these strategies:

- reorder numbers when adding, e.g. put the larger number first
- count on or back in ones, twos or tens
- partition small numbers, e.g. $8 + 3 = 8 + 2 + 1$
- partition and combine tens and ones
- partition: double and adjust, e.g. $5 + 6 = 5 + 5 + 1$

Year 2

Children should understand when to and be able to apply these strategies:

- reorder numbers when adding
- partition: bridge through 10 and multiples of 10 when adding and subtracting
- partition and combine multiples of tens and ones
- use knowledge of pairs making 10
- partition: count on in tens and ones to find the total
- partition: count on or back in tens and ones to find the difference
- partition: add a multiple of 10 and adjust by 1
- partition: double and adjust

Year 3:

Children should understand when to and be able to apply these strategies:

- reorder numbers when adding
- identify pairs totalling 10 or multiples of 10
- partition: add tens and ones separately, then recombine

- partition: count on in tens and ones to find the total
- partition: count on or back in tens and ones to find the difference
- partition: add or subtract 10 or 20 and adjust
- partition: double and adjust
- partition: count on or back in minutes and hours, bridging through 60 (analogue times)

Year 4

Children should understand when to and be able to apply these strategies:

- count on or back in hundreds, tens and ones
- partition: add tens and ones separately, then recombine
- partition: subtract tens and then ones, e.g. subtracting 27 by subtracting 20 then 7
- subtract by counting up from the smaller to the larger number
- partition: add or subtract a multiple of 10 and adjust, e.g. $56 + 29 = 56 + 30 - 1$, or $86 - 38 = 86 - 40 + 2$
- partition: double and adjust
- use knowledge of place value and related calculations, e.g. work out $140 + 150 = 290$ using $14 + 15 = 29$
- partition: count on or back in minutes and hours, bridging through 60 (analogue and digital times)

Year 5

Children should understand when to and be able to apply these strategies:

- count on or back in hundreds, tens, ones and tenths
- partition: add hundreds, tens or ones separately, then recombine
- subtract by counting up from the smaller to the larger number
- add or subtract a multiple of 10 or 100 and adjust
- partition: double and adjust
- use knowledge of place value and related calculations, e.g. $6.3 - 4.8$ using $63 - 48$
- partition: count on or back in minutes and hours, bridging through 60 (analogue and digital times)

Year 6

Children should understand when to and be able to apply these strategies:

- count on or back in hundreds, tens, ones, tenths and hundredths
- use knowledge of place value and related calculations, e.g. $680 + 430$, $6.8 + 4.3$, $0.68 + 0.43$ can all be worked out using the related calculation $68 + 43$
- use knowledge of place value and of doubles of two-digit whole numbers
- partition: double and adjust
- partition: add or subtract a whole number and adjust, e.g. $4.3 + 2.9 = 4.3 + 3 - 0.1$, $6.5 - 3.8 = 6.5 - 4 + 0.2$
- partition: count on or back in minutes and hours, bridging through 60 (analogue and digital times, 12-hour and 24-hour clock)

Mental Method Strategies

Multiplication and Division

Year 1

Children should understand when to and be able to apply these strategies:

- use patterns of last digits, e.g. 0 and 5 when counting in fives

Year 2

Children should understand when to and be able to apply these strategies:

- partition: double the tens and ones separately, then recombine
- use knowledge that halving is the inverse of doubling and that doubling is equivalent to multiplying by two
- use knowledge of multiplication facts from the 2, 5 and 10 times-tables, e.g. recognise that there are 15 objects altogether because there are three groups of five

Year 3

Children should understand when to and be able to apply these strategies:

- partition: when doubling, double the tens and ones separately, then recombine
- partition: when halving, halve the tens and ones separately, then recombine
- use knowledge that halving and doubling are inverse operations
- recognise that finding a unit fraction is equivalent to dividing by the denominator and use knowledge of division facts
- recognise that when multiplying by 10 or 100 the digits move one or two places to the left and zero is used as a place holder

Year 4

Children should understand when to and be able to apply these strategies:

- partition: double or halve the tens and ones separately, then recombine
- use understanding that when a number is multiplied or divided by 10 or 100, its digits move one or two places to the left or the right and zero is used as a place holder
- use knowledge of multiplication facts and place value, e.g. $7 \times 8 = 56$ to find 70×8 , 7×80
- use partitioning and the distributive law to multiply,
e.g. $13 \times 4 = (10 + 3) \times 4 = (10 \times 4) + (3 \times 4) = 40 + 12 = 52$

Year 5

Children should understand when to and be able to apply these strategies:

- multiply or divide by 4 or 8 by repeated doubling or halving
- form an equivalent calculation, e.g. to multiply by 5, multiply by 10, then halve; to multiply by 20, double, then multiply by 10
- use knowledge of doubles/ halves and understanding of place value, e.g. when multiplying by 50 multiply by 100 and divide by 2
- use knowledge of division facts, e.g. when carrying out a division to find a remainder
- use understanding that when a number is multiplied or divided by 10 or 100, its digits move one or two places to the left or the right relative to the decimal point, and zero is used as a place holder
- use knowledge of multiplication and division facts and understanding of place value, e.g. when calculating with multiples of 10
- use knowledge of equivalence between fractions and percentages, e.g. to find 50%, 25% and 10%
- use knowledge of multiplication and division facts to find factor pairs

Year 6

Children should understand when to and be able to apply these strategies:

- partition: use partitioning and the distributive law to divide tens and ones separately,
e.g. $92 \div 4 = (80 + 12) \div 4 = 20 + 3 = 23$
- form an equivalent calculation,
e.g. to divide by 25, divide by 100, then multiply by 4; to divide by 50, divide by 100, then double
- use knowledge of the equivalence between fractions and percentages and the relationship between fractions and division
- recognise how to scale up or down using multiplication and division,
e.g. if three oranges cost 24p: one orange costs $24 \div 3 = 8$ p four oranges cost $8 \times 4 = 32$ p
- Use knowledge of multiplication and division facts to identify factor pairs and numbers with only two factors