



Progression
in
Mental Calculation Skills



ADDITION AND SUBTRACTION

<u>Curriculum Objectives</u>	<u>Mental calculation skills</u> Working mentally – with jottings if needed – children should be able to do the following:	<u>Mental methods or strategies</u> Children should be able to apply the following strategies/methods appropriately:
<h2 style="color: red; margin: 0;">YEAR 1</h2>		
<ul style="list-style-type: none"> • represent and use number bonds and related subtraction facts within 20 • add and subtract one-digit and two-digit numbers to 20, including zero • addition doubles for all numbers to 10 (NB key skill but not explicit in the curriculum) 	<ul style="list-style-type: none"> • add or subtract a pair of single digit numbers, e.g. $3 + 8$, $8 - 3$ • add or subtract a single digit number to or from a teens number, e.g. $13 + 5$, $17 - 4$ • add or subtract a single digit number to or from 10 and add a multiple of 10 to a single digit number, e.g. $10 + 7$, $7 + 30$ • add near doubles, e.g. $6 + 7$ 	<ul style="list-style-type: none"> • reorder numbers when adding, e.g. put the larger number first • count on or back in ones, twos and tens • partition to help add and subtract a single digit to or from a teens number, e.g. $8 + 3 = 8 + 2 + 1$ and $17 - 4 = 17 - 2 - 2$ • partition and combine tens and ones, e.g. $10 + 7 = 17$ • partition to add near doubles: double and adjust, e.g. $6 + 7 = 6 + 6 + 1$

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<p>YEAR 2</p>		
<ul style="list-style-type: none"> • recall and use addition and subtraction facts to 20 fluently and derive and use related facts up to 100 • addition doubles for all numbers to 20 and multiples of 10 to 50 • add and subtract numbers mentally, including: <ul style="list-style-type: none"> ○ a two-digit number and ones ○ a two-digit number and tens ○ two two-digit numbers ○ adding three one-digit numbers • to know addition doubles for all numbers to 20 and find half of even numbers up to 40. (NB key skills but not explicit in the curriculum) 	<ul style="list-style-type: none"> • add or subtract 2 or more single digit numbers, e.g. $3 + _ + 2 = 9$, $6 + 7 + 4$ or $9 + 6 - _ = 11$ • add and subtract any single-digit number to or from a multiple of 10, eg $60 + 5$, $_ = 80 - 7$ • add or subtract a single digit number to or from a 2-digit number, including crossing the tens boundary, e.g. $34 + 5$, $57 - 4$, then $_ = 28 + 5$, $52 - 7$ • finding a small difference between a pair of 2-digit numbers lying either side of a multiple of 10, e.g. $23 - 18$ or $64 - 58$ • add or subtract a multiple of 10 to or from any 2-digit number, e.g. $27 + 60$, $72 - 50$ • add or subtract 9, 19, 29, ... or add or subtract 11, 21, 31 add near doubles, e.g. $13 + 14$, $39 + 40$ 	<ul style="list-style-type: none"> • reorder numbers, e.g. use knowledge of pairs making 10 and 20 • partition and combine multiples of tens and ones • partition - bridge through 10 and multiples of 10 when adding and subtracting, e.g. $28 + 5 = 28 + 2 + 3 = 33$ • partition - count up from the smallest number to find a difference bridging through multiples of 10, e.g. $23 - 18$, $18 + _ = 23$, $18 + \underline{2} + \underline{3} = 23$, $18 + \underline{5} = 23$ • partition and recombine - count on or back in tens to find the total or to find the difference, e.g. $60 + 27 = 60 + 20 + 7 = 80 + 7 = 87$ • partition (compensating) – add a multiple of 10 and adjust by 1, e.g. $56 + 9 = 56 + 10 - 1 = 65$ or $87 - 9 = 87 - 10 + 1 = 78$

		<ul style="list-style-type: none">• partition to add near doubles: double and adjust, e.g. $39 + 40 = 40 + 40 - 1 = 79$
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<h2 style="color: red; text-decoration: underline;">YEAR 3</h2>		
<ul style="list-style-type: none"> • add and subtract numbers mentally, including: a three-digit number and ones, tens and hundreds • double any number up to 100 and halve even numbers up to 100 (NB key skills but not explicit in the curriculum) 	<ul style="list-style-type: none"> • add or subtract a 2-digit number to or from a multiple of 10, including crossing the hundreds boundary, e.g. $70 + 38$, $110 - 27$ • add or subtract multiples of 10 crossing the hundreds boundary, e.g. $50 + 80$, $120 - 90$ • add or subtract 2-digit numbers e.g. $34 + 65$, $68 - 35$ • find pairs of numbers that total 100 e.g. $33 + \dots = 100$ $100 - \dots = 27$ • add or subtract a 3-digit number to a 1-digit number, e.g. $325 + 6$, $453 - 7$ • finding a small difference between a pair of 2-digit numbers lying either side of a multiple of 100, e.g. $605 - 596$ 	<ul style="list-style-type: none"> • partition - count on or back in tens to find the total or difference as well as knowledge of number bonds to 10, e.g. $110 - 27 = 110 - 20 - 7 = 90 - 7 = 83$ • partition – bridging through a 100 and multiples of 100 when adding and subtracting, e.g. $50 + 80 = 50 + 50 + 30 = 80 + 20 + 30 = 100 + 30 = 130$ • subtract by counting up from the smaller to the larger number when the numbers are close together, e.g. for $120 - 90$ • $90 + \underline{\quad} = 120$, $90 + \underline{10 + 20} = 120$, $90 + \underline{30} = 120$ • partition – add tens and ones separately then recombine. • Sequencing (partitioning only one number) – e.g. $55 + 42 = 55 + 40 + 2 = 97$ or for $54 - 27 = 54 - 20 - 7 = 27$

	<ul style="list-style-type: none"> • double any multiples of 10 to 100, e.g. $90 + 90$, $70 + 70$ • add near doubles, e.g. $60 + 70$, $18 + 16$ • add or subtract fractions with the same denominator within one e.g. $\frac{5}{7} + \frac{1}{7} = \frac{6}{7}$ 	<ul style="list-style-type: none"> • Identify pairs totalling 10 and add multiples of 10 • partition - bridge through multiples of 10 when adding and subtracting, e.g. $325 + 6 = 325 + 5 + 1 = 331$, $453 - 7 = 453 - 3 - 4 = 450 - 4 = 446$ • partition - count up from the smallest number to find a difference, e.g. $605 - 596$, $596 + \underline{\quad} = 605$, • $596 + \underline{4} + \underline{5} = 605$, $596 + \underline{9} = 605$ • use knowledge of place value and related facts, e.g. use $9 + 9 = 18$ to work out $90 + 90$ • partition to add near doubles: double and adjust, e.g. $18 + 16 = 17 + 17 = 20 + 14$ • partition – count on and back in fractions with different denominators
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<p>YEAR 4</p>		
<ul style="list-style-type: none"> continue to practise...mental methods...with increasingly large numbers to aid fluency. double any number up to 100 and halve even numbers up to 100 (NB key skills but not explicit in the curriculum) 	<ul style="list-style-type: none"> add or subtract any pair of 2-digit numbers, including crossing the tens and hundreds boundary, e.g. $47 + 58$, $91 - 35$ add or subtract a near multiple of 10, e.g. $56 + 29$, $86 - 38$ finding a small difference between a pair of 2-digit numbers lying either side of a multiple of 1000, e.g. $7003 - 6988$ add any 2 numbers together to total a multiple of 100, e.g. $521 + \underline{\quad} = 600$ or $278 + \underline{\quad} = 300$ add or subtract 2 or 3 digit multiples of 10 e.g. $120 - 40$, $150 + 160$ 	<ul style="list-style-type: none"> partition – add tens and ones separately then recombine. Sequencing (partitioning only one number) – e.g. $47 + 58 = 58 + 40 + 7 = 98 + 7 = 98 + 2 + 5 = 100$ $+ 5 = 105$ or $91 - 35 = 91 - 30 - 5 = 61 - 5 = 61 - 4 = 56$ partition – round to add or subtract a multiple of 10 and adjust, e.g. $56 + 29 = 56 + 30 - 1 = 85$ or $86 - 38 = 86 - 40 + 2 = 48$ partition - count up from the smallest number to find a difference, e.g. $7003 - 6988$, $6988 + \underline{\quad} = 7003$, $6988 + \underline{2} + \underline{10} + \underline{3} = 7003$, $6988 + \underline{15} = 7003$ use knowledge of number bonds to 10 and 100

	<ul style="list-style-type: none"> • double and halve 3 digit multiples of 10, e.g. double 790, halve 560 add near doubles or 2-digit numbers, e.g. $38 + 37$ • add and subtract fractions with the same denominator 	<ul style="list-style-type: none"> • use knowledge of place value and related calculations, e.g. work out $140 + 150 = 290$ using $14 + 15 = 29$ • partition – add or subtract then recombine use knowledge of place value and related calculations, e.g. work out double 790 from double 79 • partition to add near doubles: double and adjust, e.g. $38 + 37 = 38 + 38 = 76 - 1 = 75$ • partition – count on and back in fractions with different denominators
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YEAR 5		
<ul style="list-style-type: none"> • add and subtract numbers mentally with increasingly large numbers. • halve any number up to 100 (NB key skills but not explicit on the curriculum) • double and halve decimal numbers to 1 dp (NB key skills but not explicit in the curriculum) 	<ul style="list-style-type: none"> • add or subtract a near multiple of 10 or 100 to any 2-digit or 3-digit number, e.g. $235 + 198$ • finding a small difference between a pair of 2-digit numbers lying either side of a multiple of 1000, e.g. $7003 - 6899$ • add any 2 numbers together to total a multiple of 1000, e.g. $4087 + \underline{\quad} = 5000$ • add or subtract any pairs of decimals with ones and tenths, e.g. $5.7 + 2.5$, $6.3 - 4.8$ 	<ul style="list-style-type: none"> • partition (compensating) – add a multiple of 100 and adjust, e.g. $235 + 198 = 235 + 200 - 2 = 435 - 2 = 433$ • partition - count up from the smallest number to find a difference, e.g. $7003 - 6899$, $6899 + \underline{\quad} = 7003$, $6899 + 1 + 100 + 3 = 7003$, $6899 + 104 = 7003$ • use knowledge of number bonds to 10, 100 and 1000 • use knowledge of place value and related calculations, e.g. $6.3 - 4.8$ using $63 - 48$

	<ul style="list-style-type: none">• add and subtract fractions with the same denominator and multiples of the same number, e.g. $\frac{4}{6} + \frac{2}{3} = \frac{4}{3} = 1 \frac{1}{3}$• decimal bonds to 1, e.g. $0.83 + 0.17$	<ul style="list-style-type: none">• partition - add ones and tenths then recombine• Sequencing (partitioning only one number) – e.g. $5.7 + 2.5 = 5.7 + 2 + 0.5 = 7.7 + 0.3 + 0.2 = 8 + 0.2 = 8.2$• partition – count on and back in fractions with different denominators, linking to decimal and percentage equivalents
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<p>YEAR 6</p>		
<ul style="list-style-type: none"> • To perform mental calculations, including with mixed operations and large numbers. • double and halve any three digit number, including decimals (NB key skills but not explicit in the curriculum) 	<ul style="list-style-type: none"> • add or subtract pairs of decimals with ones, tenths or hundredths, e.g. $0.7 + 3.38$ or $0.68 + 0.43$ • to add or subtract a decimal with ones and tenths, which is nearly a whole number, e.g. $4.3 + 2.9$, $6.5 - 3.8$ • to find doubles of decimals each with ones and tenths, e.g. $2.6 + 2.6$ • to add near doubles of decimals, e.g. $3.7 + 3.6$ • add and subtract fractions with different denominators and mixed numbers, e.g. $3/4 - 2/16 = 5/8$ 	<ul style="list-style-type: none"> • count on or back in tenths, hundredths and thousandths • 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 $68 + 43$ • Sequencing (partitioning only one number) – e.g. $5.74 + 2.66 = 5.74 + 2 + 0.66 = 7.74 + 0.66 = 7.74 + 0.26 + 0.4 = 8 + 0.4 = 8.4$ • partition (compensating) – add or subtract a whole number and adjust, e.g. $4.3 + 2.9 = 4.3 + 3 - 0.1 = 7.2$, $6.5 - 3.8 = 6.5 - 4 + 0.2 = 2.7$ • partition - add ones and tenths then recombine

		<ul style="list-style-type: none">• partition to add near doubles: double and adjust, e.g. $3.7 + 3.6 = 3.6 + 3.6 = 7.2 + 0.1 = 7.3$• find a common denominator to help add and subtract fractions partition – count on and back in fractions with different denominators, linking to decimal and percentage equivalents
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