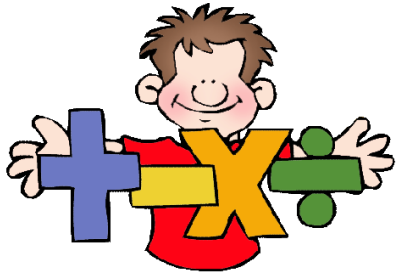
Progression in Mental Calculation Skills



PROGRESSION IN MENTAL CALCULATION SKILLS

Curriculum Objectives	Mental calculation skills **Working mentally – with jottings if needed – children should be able to do the following:**	Mental methods or strategies **Children should be able to apply the following strategies/methods appropriately:**
	YEAR 1	
• 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)**	• 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	• 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
	YEAR 2	
• 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 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	• reorder numbers, e.g. use knowledge of pairs making 10 and 20 • **partition** and combine multiples of tens and ones

• add and subtract numbers mentally, including:
  ○ 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)**
	• 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
		• **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 **+ 2 + 3** = 23, 18 + **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
		
		partition to add near doubles: double and adjust, e.g. 39 + 40 = 40 + 40 – 1 = 79

PROGRESSION IN MENTAL CALCULATION SKILLS

YEAR 3

Curriculum Objectives	Mental calculation skills **Working mentally – with jottings if needed – children should be able to do the following:**	Mental methods or strategies **Children should be able to apply the following strategies/methods appropriately:**
• 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)**	• 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	• **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 + ___ = 120, 90 + **10 + 20** = 120, 90 + **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 • identify pairs totalling ten and add multiples of 10

	• find number pairs to total 100 e.g. 33 + __ 100, 100 - __ = 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 • 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 whole (e.g. $^{5}/_{7} + {}^{1}/_{7} = {}^{6}/_{7}$)	• **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 + ___ = 605, 596 **+ 4 + 5** = 605, 596 + **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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YEAR 4		
Curriculum Objectives	**Mental calculation skills** **Working mentally – with jottings if needed – children should be able to do the following:**	**Mental methods or strategies** **Children should be able to apply the following strategies/methods appropriately:**
• 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)**	• 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 + __ = 600 or 278 + ___ = 300	• **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 – 1 – 4 = 60 – 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 + ___ = 7003, 6988 **+ 2 + 10 + 3** = 7003, 6988 + **15** = 7003 • use knowledge of number bonds to 10 and 100

	• add or subtract 2-digit or 3-digit multiples of 10, e.g. 120 – 40, 140 + 150, 370 – 180 • 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	• 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

PROGRESSION IN MENTAL CALCULATION SKILLS

YEAR 5		
Curriculum Objectives	**Mental calculation skills** **Working mentally – with jottings if needed – children should be able to do the following:**	**Mental methods or strategies** **Children should be able to apply the following strategies/methods appropriately:**
• 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)**	• 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 + _____ = 5000 • add or subtract any pairs of decimals with ones and tenths, e.g. 5.7 + 2.5, 6.3 – 4.8	• **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 + _____ = 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 • 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

	• add and subtract fractions with the same denominator and multiples of the same number, e.g. $^{4}/_{6} + {}^{2}/_{3} = {}^{4}/_{3} = 1{}^{1}/_{3}$ • decimal bonds to 1, e.g. 0.83 + 0.17	• **partition** – count on and back in fractions with different denominators, linking to decimal and percentage equivalents

PROGRESSION IN MENTAL CALCULATION SKILLS

YEAR 6		
Curriculum Objectives	**Mental calculation skills** **Working mentally – with jottings if needed – children should be able to do the following:**	**Mental methods or strategies** **Children should be able to apply the following strategies/methods appropriately:**

• 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)**	• 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. $^{3}/_{4} - {}^{2}/_{16} = {}^{5}/_{8}$	• 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 • **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