Marlfields Primary Academy

CALCULATION POLICY

The National Curriculum for Mathematics aims to ensure that all pupils:

- become **fluent** in the fundaments of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils have conceptual understanding and are able to recall and apply their knowledge rapidly and accurately to problems;
- **reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language;
- can **solve problems** by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems in to a series of simpler steps and persevering in seeking solutions.

The expectation is that the majority of pupils will move through the programmes of study at broadly the same pace. However, decisions about when to progress should always be based on the security of the pupils' understanding and their readiness to progress to the next stage. Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content. Those who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice, before moving on.

MENTAL CALCULATIONS – EYFS		
OBJECTIVES	MENTAL STRATEGIES	MENTAL CALCULATIONS
• find one more or one less than a number from 1 to 10	• say and use number names in order in familiar contexts • know that numbers identify how many objects are in a set • count reliable up to 10 everyday objects • estimate how many objects they can see and check by counting • count aloud in ones, twos, fives or tens • use language such as 'more' or 'less' to compare two numbers • use ordinal numbers in different contexts • recognise numerals 1 to 9	•

MENTAL CALCULATIONS – ADDITION

YEAR 1

OBJECTIVES	MENTAL STRATEGIES	MENTAL CALCULATIONS
• represent and use number bonds and related subtraction facts within 20 • add and subtract one-digit and two-digit numbers to 20, including zero • read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs	• count on in ones • 1 more than a number • 10 more than a multiple of 10 • add by counting on from the larger number • reorder numbers in a calculation • look for pairs that make 10 • look for doubles and near doubles • begin to bridge through 10 when adding a one-digit number • use known facts and place value to add pairs of one-digit numbers • partition and recombine by breaking units of 6, 7, 8 or 9 into '5 and a bit' • add 9 to single-digit numbers by adding 10 then subtracting 1 • use patterns of similar calculations	• add two one-digit numbers without crossing 10, e.g. 3 + 5, 6 + ☐ = 9 • add two one-digit numbers crossing 10, e.g. 8 + 6, 5 + ☐ = 12 • add a single-digit number to 10 • add a single-digit to a 'teens' number without crossing 20, e.g. 13 + 5, ☐ + 3 = 17 • also include adding zero, e.g. 3 + 0, 15 + 0, 0 + ☐ = 5

YEAR 2

OBJECTIVES	MENTAL STRATEGIES	MENTAL CALCULATIONS

• recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100
• add and subtract numbers using concrete objects, pictorial representations, and mentally, including:
  ○ a two-digit number and ones
  ○ a two-digit number and tens
  ○ two two-digit numbers
  ○ adding three one-digit numbers
• show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot
	• count on in tens or ones
	• reorder numbers in a calculation
	• add three 1-digit numbers; put the largest number first; using known facts (pairs to 10, doubles)
	• add by partitioning into tens and ones then recombine
	• bridge through a multiple of 10
	• use number facts and place value to add pairs of numbers
	• add 9, 19, 11 or 21 by rounding and compensating
	• use patterns of similar calculations
		• add three one-digit numbers, e.g. 6 + 8 + 4, 6 + 3 + 6, 8 + 9 + 7
		• add a two-digit number and ones, e.g. 43 + 5, 31 + ☐ = 38, 27 + 6, 46 + ☐ = 52
		• add a two-digit number and tens, e.g. 23 + 40, 47 + ☐ = 77, ☐ + 30 = 81
		• add pairs of two-digit numbers, e.g. 41 + 32, 31 + ☐ = 54, 35 + 47, 27 + ☐ = 82
		• add to any two-digit number to make the next ten, e.g. 64 + ☐ = 70
		• add a multiple of ten to any other multiple of ten, e.g. 50 + 30, 40 + 60, 70 + 80, 30+ 80 + 50

YEAR 3		
OBJECTIVES	MENTAL STRATEGIES	MENTAL CALCULATIONS

• add and subtract numbers mentally, including:
  ○ a three-digit number and ones
  ○ a three-digit number and tens
  ○ a three-digit number and hundreds
	• count on in hundreds, tens or ones
	• add mentally a 'near multiple of 10'
	• add 3 or 4 small numbers
	• partition into hundreds, tens and ones in different ways, then recombine (724 = 700 + 20 + 4, 724 = 600 + 110 + 14)
	• reorder numbers in a calculation
	• bridge through a multiple of 10, the adjust
	• use known facts and place value to add
	• use patterns of similar calculations
	• use the relationship between addition and subtraction
		• add a three-digit number and ones, e.g. 231 + 6, 241 + ☐ = 248, 175 + 8
		• add a three-digit number and tens, e.g. 249 + 50, 167 + 60, 431 + ☐ = 481
		• add a three-digit number and hundreds, e.g. 381 + 400, 751 + 300, 231 + ☐ = 531
		• add pairs of two-digit numbers, e.g. 72 + 41, 87 + ☐ = 121, 65 + 57
		• add to any three-digit number to make the next ten or hundred, e.g. 247 + ☐ = 250, 647 + ☐ = 700
		• add three small numbers, e.g. 13 + 8 + 7, 8 + 13 + 8, 8+ 15 + 17

YEAR 4		
OBJECTIVES	MENTAL STRATEGIES	MENTAL CALCULATIONS
• add and subtract numbers mentally with increasingly large numbers	• count on in steps of 1, 10, 100 or 1000 • reorder numbers in a calculation • add 3 or 4 small numbers • partition, adding the most significant digit first • use known facts and place value to add • add the nearest multiple of 10 or 100 then adjust • use the relationship between addition and subtraction	• add a four-digit number and ones, e.g. 4312 + 6, 3441 + ☐ = 3443, 1029 + 5 • add a four-digit number and tens e.g. 1735 + 40, 2143 + ☐ = 2193, 3781 + 70 • add four-digit number and hundreds e.g. 2175 + 400, 3248 + ☐ = 3948, 4505 + 600 • add a 4-digit number and thousands, e.g. 1367 + 4000, 5648 + ☐ = 7648 • add a two-digit number to a three-digit tens, e.g. 430 + 54, 610 + ☐ = 637, 560 + 76 • add any pair of three-digit multiple 10, e.g. 430 + 260, 570 + 250 • add to any three-digit number to make the next multiple of 1000, e.g. 370 + ☐ = 1000, 1452 + ☐ = 2000 • add three two-digit numbers, e.g. 34 + 13 + 43, 33 + 52 + 21

YEAR 5		
OBJECTIVES	MENTAL STRATEGIES	MENTAL CALCULATIONS
• add and subtract numbers mentally with increasingly large numbers • add and subtract tenths, and one-digit whole numbers and tenths • calculate complements to 1 (0.83 + 0.17 = 1)	• count on in steps of 0.1, 1, 10, 100 or 100 • reorder numbers in a calculation • partition, adding the most significant digit first • use known facts and place value to add • add the nearest multiple of 1, 10 or 100 then adjust • develop further the relationship between addition and subtraction	• add tenths to a one-digit whole number and tenths, e.g. 5.4 + 0.3, 2.6 + 0.8, 4.3 + ☐ = 4.9 • add two one-digit whole numbers and tenths, e.g. 5.4 + 2.5, 2.4 + 8.1, 2.4 + ☐ = 7.6 • add four-digit multiple of 100 to a five-digit number, e.g. 32,634 + 2,100, 18,251 + 7,100 • add to a decimal fraction with units and tenths to make the next whole number, e.g. 4.3 + ☐ = 5, 7.3 + ☐ = 8 • add any pair of three-digit multiples of 10, e.g. 390 + 340, 570 + 780, ☐ + 350 = 810 • add two numbers with tenths and hundredths, e.g. 0.57 + 0.32, 0.48 + 0.69, 0.24 + ☐ = 0.71
YEAR 6		
OBJECTIVES	MENTAL STRATEGIES	MENTAL CALCULATIONS
• perform mental calculations, including with mixed operations and large numbers • use their knowledge of the order of operations to carry out calculations involving the four operations	• consolidate all strategies from previous years • partition, adding the most significant digit first • use known facts and place value to add • add the nearest multiple of 0.1, 10, 100 or 1000, then adjust • continue to use the relationship between addition and subtraction	• add large numbers, e.g. 129,000 + 34,000 • add negative numbers in context, e.g. rise from -3°C by 1°C, from -6°C by 9°C • add several one-digit whole numbers and tenths, e.g. 2.3 + 5.7 +3.9, 1.2 + 4.6 + ☐ = 7.3 • add decimals with different number of places, e.g. 0.67 + 0.2, 0.5 + ☐ = 0.87 • add to any number with two decimals places to make the next tenth or whole, e.g. 3.65 + ☐ = 4, 7.36 + ☐ = 1.4 • add any pair of 4-digit multiples of 100, e.g. 5700 + 2500, 2400 + 8700

MENTAL CALCULATIONS - SUBTRACTION

YEAR 1

OBJECTIVES	MENTAL STRATEGIES	MENTAL CALCULATIONS
• represent and use number bonds and related subtraction facts within 20 • add and subtract one-digit and two-digit numbers to 20, including zero • read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs	• count back in ones • 1 less than a number • 10 less than a multiple of 10 • take away a small number by counting back • find a small difference by counting on (using concrete resources) • begin to bridge through 10, when subtracting a one-digit number • use known number facts and place value to subtract one-digit numbers • use patterns of similar calculations	• subtract a small number from one-digit numbers, e.g. 9 - 2, 8 - 3, 8 - ☐ = 7 • subtract two one-digit numbers (small difference), e.g. 8 - 6, 9 - ☐ = 6 • subtract a ones from a 'teens' number, e.g. 16 - 5, 14 - 6, ☐ - 3 = 11, 14 - ☐ = 9 • subtract zero, e.g. 3 - 0, 15 - 0, 12 - ☐ = 7 • subtract ones from 10 or 20, e.g. 10 - 4, 20 - 4, 10 - ☐ = 2, 20 - ☐ = 11

YEAR 2

OBJECTIVES	MENTAL STRATEGIES	MENTAL CALCULATIONS

• recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100
• add and subtract numbers using concrete objects, pictorial representations, and mentally, including:
  ○ a two-digit number and ones
  ○ a two-digit number and tens
  ○ two two-digit numbers
  ○ adding three one-digit numbers
• show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot
	• count back in tens or ones
	• subtract mentally a 'near multiple of 10'
	• take away a small number by counting back
	• find a small difference by counting up from the smaller to the larger number (on a number line)
	• bridge through a multiple of 10, then adjust
	• use knowledge of number facts and place value to subtract pairs of numbers
	• subtract by partitioning the second number and subtracting tens then ones
	• use patterns of similar calculations
		• subtract ones from a two-number, e.g. 48 - 5, 36 - ☐ = 31, 23 - 6, 56 - ☐ = 59
		• subtract tens from a two-digit number, e.g. 73 - 30, 51 - ☐ = 21, ☐ - 30 = 61
		• subtract pairs of two-digit numbers, e.g. 47 - 22, 85 - ☐ = 55, 63 - 47, 72 - ☐ = 56
		• subtract pairs of two-digit numbers (difference less than 10), e.g. 47 - 42, 63 - 58, 71 - ☐ = 61
		• subtract tens from a tens number, e.g. 80 - 40, 70 - ☐ = 20, 100 - 20, 120 - 50

YEAR 3		
OBJECTIVES	MENTAL STRATEGIES	MENTAL CALCULATIONS

• add and subtract numbers mentally, including:
  ○ a three-digit number and ones
  ○ a three-digit number and tens
  ○ a three-digit number and hundreds
	• count back in hundreds, tens or ones
	• subtract mentally a 'near multiple of 10'
	• find a small difference by counting up from the smaller to the larger number (on a number line)
	• bridge through a multiple of 10, then adjust
	• use knowledge of number facts and place value to subtract pairs of numbers
	• subtract a 2-digit number by partitioning it, subtracting its tens then ones
	• use patterns of similar calculations
	• use the relationship between addition and subtraction
		• subtract ones from a three-digit number, e.g. 237 - 6, 258 - ☐ = 252, 375 - 8, 301 - 3
		• subtract tens from a three-digit number, e.g. 475 - 40, 217 - 60, 581 + ☐ = 521, 213 - 40
		• subtract hundreds from a three-digit number, e.g. 981 - 400, 957 - 800, 631 - ☐ = 231
		• subtract pairs of three-digit numbers (difference less than 10), e.g. 458 - 451, 305 - 297, 603 - 597
		• subtract ones from a three-digit tens number, e.g. 280 - 5, 800 -4, 500 - ☐ = 498
		• subtract a two-digit number from a one hundred three-digit number, e.g. 127 - 71, 143 - 86

YEAR 4		
OBJECTIVES	MENTAL STRATEGIES	MENTAL CALCULATIONS
• add and subtract numbers mentally with increasingly large numbers	• count back in steps of 1, 10, 100 or 1000 • use known facts and place value to subtract • find a difference by counting up through the next multiple of 10, 100 or 1000 • subtract the nearest multiple of 10 or 100, then adjust • use the relationship between addition and subtraction	• subtract ones from a four-digit number, e.g. 4319 - 6, 3486 - ☐ = 3481, 2023 - 5 • subtract tens from a four-digit number, e.g. 1375 - 40, 5163 + ☐ = 5113, 3731 - 70 • subtract hundreds from a four-digit number, e.g. 5629 - 400, 4648 - ☐ = 4148, 4505 - 600 • subtract a four-digit number and thousands, e.g. 6173 - 4000, 8649 - ☐ = 3649 • subtract three-digit multiple of 10 from a three-digit number, e.g. 742 - 210, 516 - ☐ = 146, ☐ - 340 = 685 • subtract three-digit multiple of ten from a thousand number, e.g. 3000 - 230, 7000 - ☐ = 6480, 5000 - 540 • subtract a pair of numbers lying either side of a thousand number, e.g. 7003 - 6988, 6004 - ☐ = 19

YEAR 5		
OBJECTIVES	MENTAL STRATEGIES	MENTAL CALCULATIONS
• add and subtract numbers mentally with increasingly large numbers • add and subtract tenths, and one-digit whole numbers and tenths • calculate complements to 1 (0.83 + 0.17 = 1)	• count back in steps of 0.1, 1, 10, 100 or 1000 • use known facts and place value to subtract • find a difference by counting up through the next multiple of 10, 100 or 1000 • subtract the nearest multiple of 1, 10 or 100 then adjust • develop further the relationship between addition and subtraction	• subtract tenths from a one digit whole number and tenths, e.g. 5.4 - 0.3, 2.6 - 0.8, 4.3 - ☐ = 3.9 • subtract two one-digit whole numbers and tenths, e.g. 5.4 - 2.5, 8.2 - 5.7, 2.4 - ☐ = 1.6 • subtract four-digit multiple of 100 from a five-digit number, e.g. 25,935 - 2,100, 19,412 - 7,500 • subtract a pair of numbers lying either side of a thousand number, e.g. 5001 - 1997, 8006, 2993, 4005 - 1997 • subtract two numbers with tenths and hundredths, e.g. 0.57 - 0.32, 0.41 - 0.26, 0.64 - ☐ = 0.37 • subtract a one-digit whole number and tenths from a whole number, e.g. 7 - 5.4, 12 - 7.6, 21 - ☐ = 17.6, 20 - 2.7
YEAR 6		
OBJECTIVES	MENTAL STRATEGIES	MENTAL CALCULATIONS
• perform mental calculations, including with mixed operations and large numbers • use their knowledge of the order of operations to carry out calculations involving the four operations	• consolidate all strategies from previous years • use known facts and place value to subtract • find a difference by counting up through the next multiple of 10, 100 or 1000 • subtract the nearest multiple of 0.1, 10, 100 or 1000, then adjust • continue to use the relationship between addition and subtraction	• subtract large numbers, e.g. 269,000 - 42,000 • subtract negative numbers in context, e.g. decrease from 2°C to 4°C, reduce -6°C by 5 °C • subtract four-digit multiples of 100, e.g. 6200 - 3800, 6100 - ☐ = 3700 • subtract any number with three decimal places from a whole number, e.g. 5 - 0.314, 12 - 0.176, 1 - ☐ = 0.368 • subtract decimals with a different number of decimals places, e.g. 0.67 - 0.2, 0.9 - ☐ = 0.53

MENTAL CALCULATIONS – MULTIPLICATION		
YEAR 1		
OBJECTIVES	MENTAL STRATEGIES	MENTAL CALCULATIONS
• count in multiples of twos, fives and tens • recall doubles of all numbers to 10	• counting in twos, fives and tens • repeated addition • links to doubling • use arrays	• give children experience of counting equal group of objects in 2s, 5s and 10s • present practical problem solving activities involving counting equal sets or groups • doubles of all numbers to 10
YEAR 2		
OBJECTIVES	MENTAL STRATEGIES	MENTAL CALCULATIONS
• count in steps of 2, 3, and 5 from 0, and in tens from any number, forward or backward • recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers • show that multiplication of two numbers can be done in any order **(commutative)** and division of one number by another cannot	• counting in 2s, 5s, and 10s • repeated addition • use arrays • use known facts and place value to multiply by 2, 5 or 10 • links to doubling • reorder a calculation, knowing multiplication can be done in any order (commutative)	• multiplication facts for x2, x5 and x10, e.g. 2 x 5, 5 x 6, 10 x 5, 5 x ☐ = 20 • doubles to 20, e.g. double 11, double 16, 13 + 13

YEAR 3		
OBJECTIVES	MENTAL STRATEGIES	MENTAL CALCULATIONS
• count from 0 in multiples of 4, 8, 50 and 100 • recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables • write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods	• counting in 2s, 5s, 10s, 3s, 4s and 8s • repeated addition • use known facts and place value to multiply by 2, 3, 4, 5, 8 or 10 • use doubles to link x2, x4 and x8 tables • reorder a calculation using **commutativity** • use the rule of **associativity** • **scaling** up using known facts • use the relationship between multiplication and division	• multiplication facts for x3, x4 and x8, e.g. 8 x 6, 3 x 6, 4 x 7, 3 x ☐ = 24 • multiply a 'teens' number by 2, 3, 4, 5 or 8, e.g. 14 x 3, 17 x 4 • multiply a one-digit by a multiple of 10, e.g. 30 x 2, 5 x 40, 8 x ☐ = 320 • multiply a two-digit by a one-digit number, e.g. 32 x 3, 4 x 23, 5 x ☐ = 155 • doubles to 50 • multiply 3 numbers within known tables, e.g. 3 x 2 x 8, 4 x 3 x 5
YEAR 4		
OBJECTIVES	MENTAL STRATEGIES	MENTAL CALCULATIONS
• count in multiples of 6, 7, 9, 25 and 1 000 • (copied from Number and Place Value) • recall multiplication and division facts for multiplication tables up to 12 × 12 • use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers • recognise and use factor pairs and commutativity in mental calculations • recognise and use factor pairs and commutativity in mental calculations (repeated)	• counting in 6, 7, 9, 25 and 1000 • use commutativity and tables to multiply • use partitioning and **Distributive Law** to multiply • use factor pairs and the **Associative Law** to multiply • use known facts and place value to multiply • use related facts to multiply • scaling up using known facts	• multiply numbers to 12 x 12, e.g. 8 x 12, 9 x 7, 12 x 6, 11 x ☐ = 121 • multiplying 3 numbers, e.g. 8 x 7 x 5, 5 x 14 x 4, 15 x 4 x 2 • multiply by 1 and 0 • multiply a number to 12 by a multiple of 10, e.g. 12 x 70, 90 x 6, 8 x ☐ = 560 • multiply a number to 12 by a multiple of 100, e.g. 300 x 7, 9 x 400, 900 x ☐ = 8100 • multiply a 'teens' number by a 1-digit number, e.g. 15 x 8, 16 x 9, 6 x 17 • doubles of any 2-digit number

YEAR 5		
OBJECTIVES	MENTAL STRATEGIES	MENTAL CALCULATIONS
• count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000 • multiply and divide numbers mentally drawing upon known facts • multiply and divide whole numbers and those involving decimals by 10, 100 and 1000 • recognise and use square numbers and cube numbers, and the notation for squared (^{2}) and cubed (^{3})	• counting in steps of powers of 10 • use commutativity and tables to multiply • use partitioning and **Distributive Law** to multiply • use factor pairs and the **Associative Law** to multiply • use known facts and place value to multiply • use related facts to multiply • scaling up using known facts • use the relationship between multiplication and division • recognise and use square and cube numbers	• multiply a two-digit by a one-digit number, e.g. 4 x 35, 23 x 6, 28 x ☐ = 140 • multiply numbers by 10, 100 and 1000, e.g. 327 x 10, 96 x 100, 83 x 1000 • multiply decimals by 10 , 100 and 1000, e.g. 3.27 x 100, 5.1 x 100, 0.82 x ☐ = 82 • multiply a multiple of 10 by a multiple of 10, e.g. 50 x 60, 90 x 70, 60 x ☐ = 42,000 • multiplying 3 numbers (including tens), e.g. 3 x 40 x 6, 70 x 5 x 20 • double any multiple of 5 up to 500
YEAR 6		
OBJECTIVES	MENTAL STRATEGIES	MENTAL CALCULATIONS
• perform mental calculations, including with mixed operations and large numbers • multiply one-digit numbers up to two decimal places by whole numbers • multiply and divide by 10, 100 and 1000 where the answers are up to three decimal places • multiply decimals by whole numbers, starting with the simplest cases, such as 0.4 x 2 = 0.8 and in practical contexts, such as measures and money • associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. $^3/_8$)	• use commutativity and tables to multiply • use partitioning and **Distributive Law** to multiply • use factor pairs and the **Associative Law** to multiply • use known facts and place value to multiply • use related facts to multiply • scaling up using known facts • use the relationship between multiplication and division	• multiply a tenth number by a one-digit number, e.g. 0.4 x 9, 6 x ☐ = 4.8, ☐ x 7 = 4.9 • multiply a hundredths number by a one-digit number, e.g. 0.06 x 3.9, 9 x 0.03, 8 x ☐ = 0.56 • multiply a multiple of 10 by a multiple of 100, e.g. 30 x 500, 900 x 50, 60 x ☐ = 42,000 • multiply a tenths number by a multiple of ten, e.g. 0.7 x 20 , 50 x 0.3, 0.2 x 20 • multiply a ones and tenths number by a one-digit number, e.g. 3.7 x 5, 4.2 x 4, 3.9 x 6 • double a ones and tenths and decimal number less than 1 (2 decimal places)

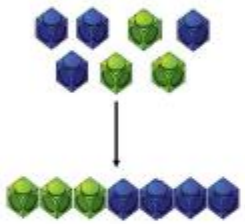
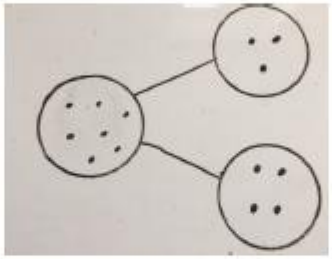
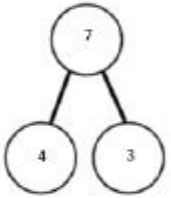
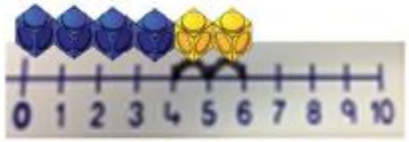
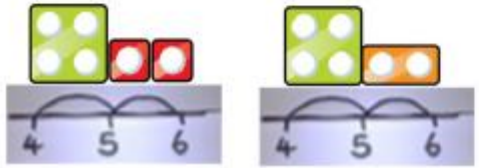
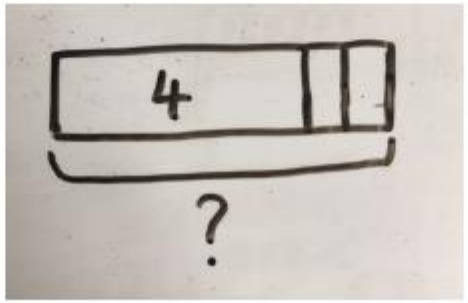
MENTAL CALCULATIONS - DIVISION		
YEAR 1		
OBJECTIVES	MENTAL STRATEGIES	MENTAL CALCULATIONS
• group and share small quantities • finding simple fractions of objects, numbers and quantities	• counting in twos, fives and tens • linking to halving • use arrays	• share an amount between two, e.g. share 6 pencils between two people, put half of the animals in the ark, how many children can have two squares of chocolate from a bar of 8 squares • halves of corresponding doubles to 10
YEAR 2		
OBJECTIVES	MENTAL STRATEGIES	MENTAL CALCULATIONS
• count in steps of 2, 3, and 5 from 0, and in tens from any number, forward or backward • recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers • show that multiplication of two numbers can be done in any order **(commutative)** and division of one number by another cannot	• counting in twos, fives and tens • link to arrays • use known facts and place value to divide • partition in different ways to divide • link to halving	• division facts for the 2, 5 & 10 times tables, e.g. 10 ÷ 5, 30 ÷ 5, 50 ÷ 5, 20 ÷ ☐ = 4 • halves of corresponding doubles to 20, e.g. half of 22, half of 32 • divide a two-digit number by 2, 5 or 10 to give a 'teens' answer, e.g. 70 ÷ 5, 35 ÷ 2

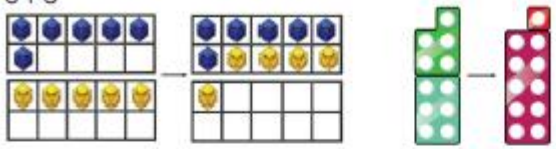
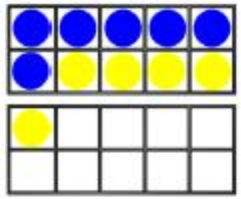
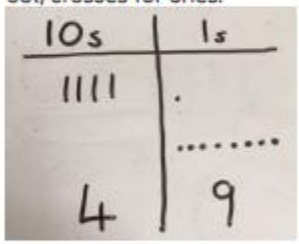
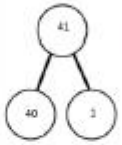
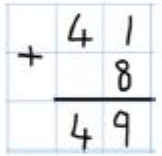
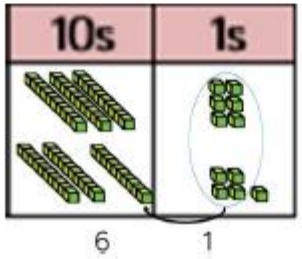
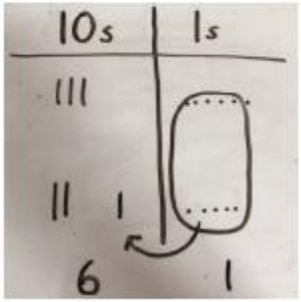
YEAR 3		
OBJECTIVES	MENTAL STRATEGIES	MENTAL CALCULATIONS
• count from 0 in multiples of 4, 8, 50 and 100 • recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables • write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods	• counting in 2s, 5s, 10s, 3s, 4s and 8s • use known facts and place value to divide by 2, 3, 4, 5, 8 or 10 • partition in different ways to divide • use halving to link ÷ 8, ÷ 4, ÷ 2 tables • scalling down using known facts • use the relationship between multiplication and division	• division facts for the 3, 4 and 8 times tables, e.g. 48 ÷ 6, 18 ÷ 6, 28 ÷ 7, 24 ÷ ☐ = 3 • divide a number by 3, 4 or 8 to give a 'teens' answer, e.g. 42 ÷ 3, 68 ÷ 4, 104 ÷ 8 • divide a tens number by a one-digit or tens number, e.g. 60 ÷ 3, 200 ÷ 40, 320 ÷ ☐ = 4 • divide a two or three-digit number by 3, 4 or 8, e.g. 96 ÷ 3, 92 ÷ 4, 184 ÷ 8 • halves of corresponding doubles to 50
YEAR 4		
OBJECTIVES	MENTAL STRATEGIES	MENTAL CALCULATIONS
• count in multiples of 6, 7, 9, 25 and 1 000 • (copied from Number and Place Value) • recall multiplication and division facts for multiplication tables up to 12 × 12 • use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers • recognise and use factor pairs and commutativity in mental calculations • recognise and use factor pairs and commutativity in mental calculations (repeated)	• counting in 6, 7, 8, 9, 25 and 100 • use partitioning and the **Distributive Law** to divide • use known facts and place value to divide • use related facts to divide • use factor pairs to divide • scaling down using known facts • use the relationship between multiplication and division • include calculations with remainders	• division facts for the tables to 12 x 12, e.g. 96 ÷ 12, 63 ÷ 7, 72 ÷ 6, 121 ÷ ☐ = 121 • dividing by 1 • division linked to tables facts times a multiple of 10, e.g. 840 ÷ 70, 540 ÷ 6, 560 ÷ ☐ = 80 • division linked to tables facts times a multiple of 100, e.g. 2100 ÷ 7, 3600 ÷ 400, 8100 ÷ ☐ = 900 • divide a number to give a 'teens' answer, e.g. 105 ÷ 7, 144 ÷ 9, 96 ÷ 6 • halves of corresponding doubles of any two-digit numbers

YEAR 5		
OBJECTIVES	MENTAL STRATEGIES	MENTAL CALCULATIONS
• count forwards or backwards in steps of powers of 10 for any given number up to • 1 000 000 • multiply and divide numbers mentally drawing upon known facts • multiply and divide whole numbers and those involving decimals by 10, 100 and 1000 • recognise and use square numbers and cube numbers, and the notation for squared (^{2}) and cubed (^{3})	• counting in steps of powers of 10 • use partitioning and the **Distributive Law** to divide • use known facts and place value to divide • use related facts to divide • use factor pairs to divide • scaling down using known facts • use the relationship between multiplication and division • include calculations with remainders	• divide a three-digit number by a one-digit, e.g. 154 ÷ 7, 138 ÷ 6, 208 ÷ 8 • divide whole numbers by 10, 100 and 1000, e.g. 32,700 ÷ 10, 9,600 ÷ 100, 830,000 ÷ 1000 • divide decimals by 10, 100 and 1000, e.g. 32.7 ÷ 10, 251.4 ÷ 1000, 82.34 ÷ ☐ = 8.234 • division linked to a multiple of 10 times a multiple of 10, e.g. 3000 ÷ 60, 6300 ÷ 70 • halves of corresponding dobules of any multiple of 5 up to 500 • division involving remainders expressed in different ways, e.g. 98 ÷ 4 = $^{98}/_4$ = 24 r2 = 24 ½ = 24.5 = 25
YEAR 6		
OBJECTIVES	MENTAL STRATEGIES	MENTAL CALCULATIONS
• perform mental calculations, including with mixed operations and large numbers • multiply and divide by 10, 100 and 1000 where the answers are up to three decimal places • divide decimals numbers by one-digit whole numbers • associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. $^3/_8$)	• counting in steps of powers of 10 • use partitioning and the **Distributive Law** to divide • use known facts and place value to divide • use related facts to divide • use factor pairs to divide • scaling down using known facts • use the relationship between multiplication and division • include calculations with remainders	• division linked to tenths times a one-digit number, e.g. 3.6 ÷ 9, 4.8 ÷ ☐ = 0.6, ☐ ÷ 7 = 0.7 • division linked to a hundredths number times a one-digit number, e.g. 0.18 ÷ 3, 0.17 ÷ 9, 0.56 ÷ ☐ = 8.234 • division linked to a multiple of 10 times a multiple of 100, e.g. 42,000 ÷ 600, 45,000 ÷ 50 • division linked to a tenths times a multiple of ten, e.g. 14 ÷ 20, 15 ÷ 0.3, 56 ÷ 70 • halves of corresponding doubles of ones and tenths and decimals less than 1 (2 decimal places)

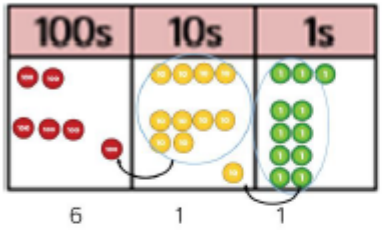
Calculation policy: Addition

Key language: sum, total, parts and wholes, plus, add, altogether, more, 'is equal to' 'is the same as'.

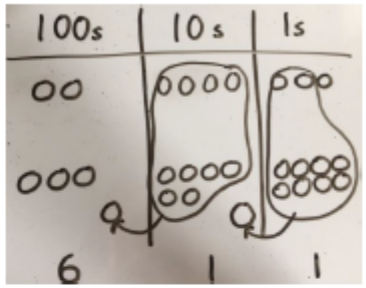
Concrete	Pictorial	Abstract
Combining two parts to make a whole (use other resources too e.g. eggs, shells, teddy bears, cars). 	Children to represent the cubes using dots or crosses. They could put each part on a part whole model too. 	4 + 3 = 7 Four is a part, 3 is a part and the whole is seven. 
Counting on using number lines using cubes or Numicon.  	A bar model which encourages the children to count on, rather than count all. 	The abstract number line: What is 2 more than 4? What is the sum of 2 and 4? What is the total of 4 and 2? 4 + 2 

Regrouping to make 10; using ten frames and counters/cubes or using Numicon. 6 + 5 	Children to draw the ten frame and counters/cubes. 	Children to develop an understanding of equality e.g. $6 + \square = 11$ $6 + 5 = 5 + \square$ $6 + 5 = \square + 4$
TO + O using base 10. Continue to develop understanding of partitioning and place value. 41 + 8 	Children to represent the base 10 e.g. lines for tens and dot/crosses for ones. 	41 + 8  1 + 8 = 9 40 + 9 = 49 
TO + TO using base 10. Continue to develop understanding of partitioning and place value. 36 + 25 	Chidlren to represent the base 10 in a place value chart. 	Looking for ways to make 10. 36 + 25= 1 5 30 + 20 = 50 5 + 5 = 10 50 + 10 + 1 = 61 Formal method: 36 +25 61 1

Use of place value counters to add HTO + TO, HTO + HTO etc. When there are 10 ones in the 1s column- we exchange for 1 ten, when there are 10 tens in the 10s column- we exchange for 1 hundred.

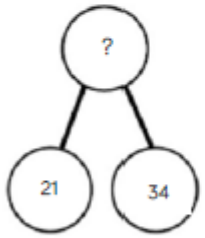


Chidren to represent the counters in a place value chart, circling when they make an exchange.



$$\begin{array}{r} 243 \\ +368 \\ \hline 611 \\ \hline 1\ 1 \end{array}$$

Conceptual variation; different ways to ask children to solve 21 + 34



?	
21	34

Word problems:
In year 3, there are 21 children and in year 4, there are 34 children.
How many children in total?

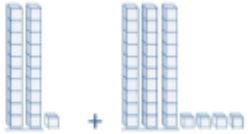
21 + 34 = 55. Prove it

$$\begin{array}{r} 21 \\ +34 \\ \hline \\ \hline \end{array}$$

21 + 34 =

$\square$ = 21 + 34

Calculate the sum of twenty-one and thirty-four.

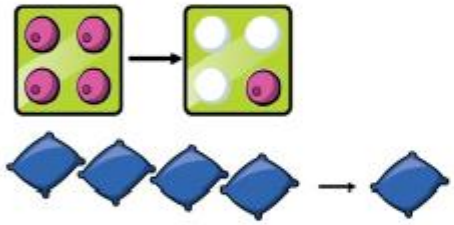
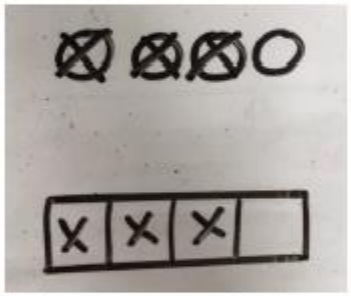
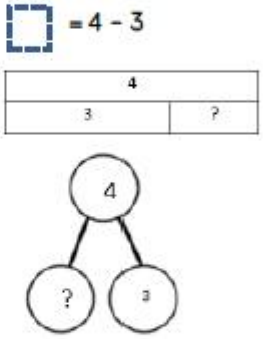
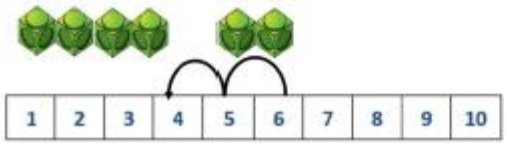
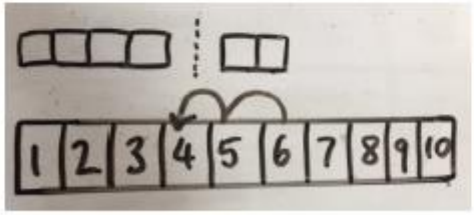


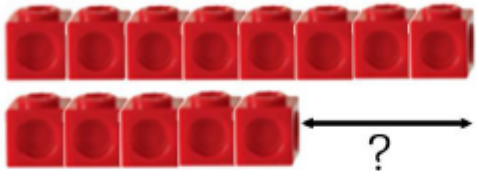
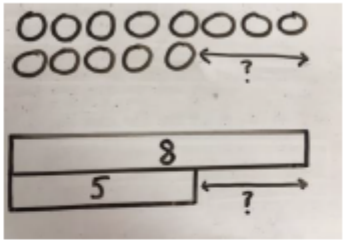
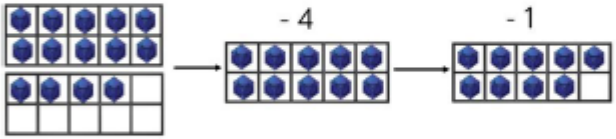
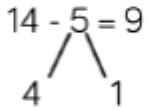
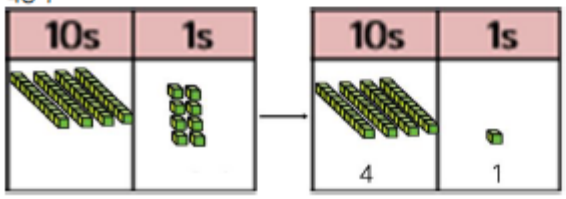
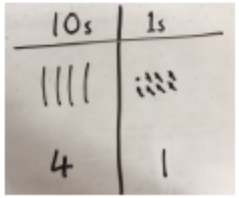
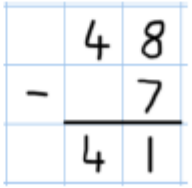
Missing digit problems:

10s	1s
	?
?	5

Calculation policy: Subtraction

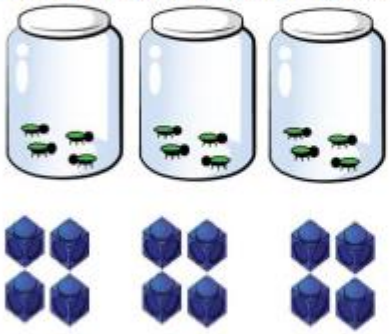
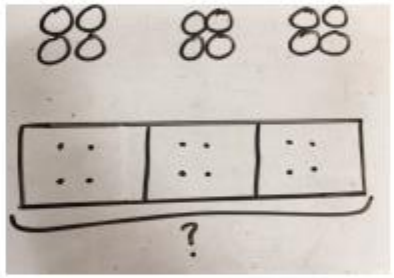
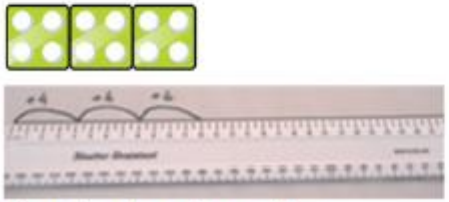
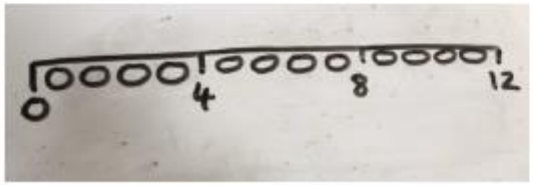
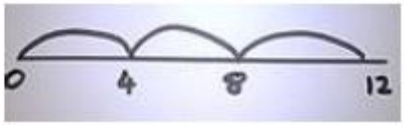
Key language: take away, less than, the difference, subtract, minus, fewer, decrease.

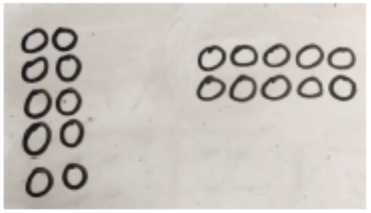
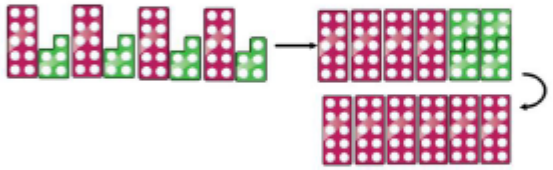
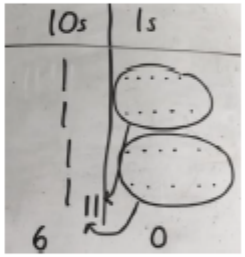
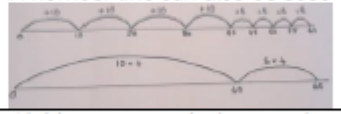
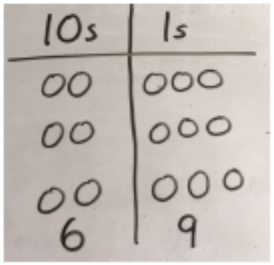
Concrete	Pictorial	Abstract
Physically taking away and removing objects from a whole (ten frames, Numicon, cubes and other items such as beanbags could be used). 4 – 3 = 1 	Children to draw the concrete resources they are using and cross out the correct amount. The bar model can also be used. 	4- 3 = 
Counting back (using number lines or number tracks) children start with 6 and count back 2. 6 – 2 = 4 	Children to represent what they see pictorially e.g. 	Children to represent the calculation on a number line or number track and show their jumps. Encourage children to use an empty number line  

Finding the difference (using cubes, Numicon or Cuisenaire rods, other objects can also be used). Calculate the difference between 8 and 5. 	Children to draw the cubes/other concrete objects which they have used or use the bar model to illustrate what they need to calculate. 	Find the difference between 8 and 5. 8 – 5, the difference is ☐ Children to explore why 9 - 6 = 8 – 5 = 7 – 4 have the same difference.
Making 10 using ten frames. 14 – 5 	Children to present the ten frame pictorially and discuss what they did to make 10. 	Children to show how they can make 10 by partitioning the subtrahend.  14 – 4 = 10 10 – 1 = 9
Column method using base 10. 48-7 	Children to represent the base 10 pictorially. 	Column method or children could count back 7. 

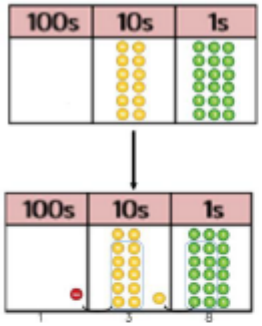
Calculation policy: Multiplication

Key language: double, times, multiplied by, the product of, groups of, lots of, equal groups.

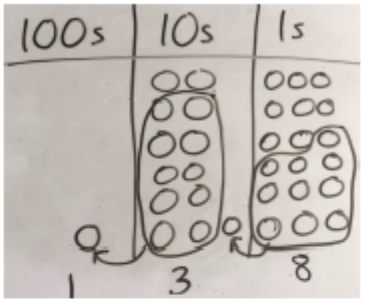
Concrete	Pictorial	Abstract
Repeated grouping/repeated addition 3 × 4 4 + 4 + 4 There are 3 equal groups, with 4 in each group. 	Children to represent the practical resources in a picture and use a bar model. 	3 × 4 = 12 4 + 4 + 4 = 12
Number lines to show repeated groups- 3 × 4  Cuisenaire rods can be used too.	Represent this pictorially alongside a number line e.g.: 	Abstract number line showing three jumps of four. 3 × 4 = 12 

Use arrays to illustrate commutativity counters and other objects can also be used. $2 \times 5 = 5 \times 2$  2 lots of 5 5 lots of 2	Children to represent the arrays pictorially. 	Children to be able to use an array to write a range of calculations e.g. $10 = 2 \times 5$ $5 \times 2 = 10$ $2 + 2 + 2 + 2 + 2 = 10$ $10 = 5 + 5$
Partition to multiply using Numicon, base 10 or Cuisenaire rods. 4×15 	Children to represent the concrete manipulatives pictorially. 	Children to be encouraged to show the steps they have taken. 4×15 $10 \quad 5$ $10 \times 4 = 40$ $5 \times 4 = 20$ $40 + 20 = 60$ A number line can also be used 
Formal column method with place value counters (base 10 can also be used.) 3×23 	Children to represent the counters pictorially. 	Children to record what it is they are doing to show understanding. 3×23 $20 \quad 3$ $3 \times 20 = 60$ $3 \times 3 = 9$ $60 + 9 = 69$ $23 \times 3 = 69$

Formal column method with place value counters.
6 x 23



Children to represent the counters/base 10, pictorially e.g. the image below.



Formal written method

$$6 \times 23 =$$

$$\begin{array}{r} 23 \\ \times\ 6 \\ \hline 138 \\ \hline 1\ 1 \end{array}$$

When children start to multiply 3d × 3d and 4d × 2d etc., they should be confident with the abstract:

To get 744 children have solved 6 × 124.
To get 2480 they have solved 20 × 124.

$$\begin{array}{r} 1\ 2\ 4 \\ \times\ \ \ 2\ 6 \\ \hline 7\ 4\ 4 \\ 2\ 4\ 8\ 0 \\ \hline 3\ 2\ 2\ 4 \\ \hline 1\ 1 \end{array}$$

Answer: 3224

Conceptual variation; different ways to ask children to solve 6 × 23

Mai had to swim 23 lengths, 6 times a week.
How many lengths did she swim in one week?

With the counters, prove that 6 x 23 = 138

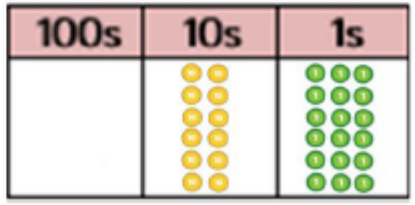
Find the product of 6 and 23

6 × 23 =

□ = 6 × 23

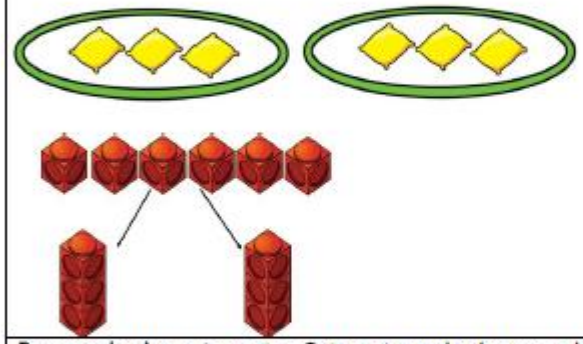
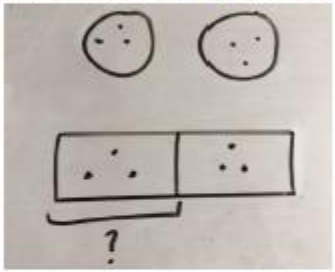
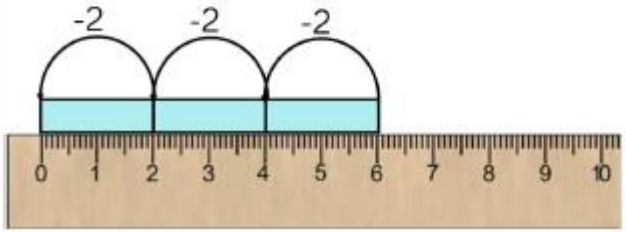
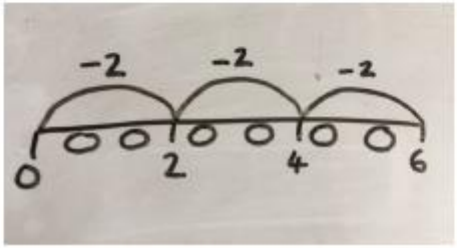
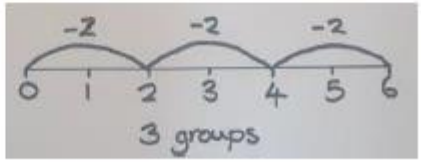
$$\begin{array}{r} 6 \\ \times\ 23 \\ \hline \\ \hline \end{array} \qquad \begin{array}{r} 23 \\ \times\ 6 \\ \hline \\ \hline \end{array}$$

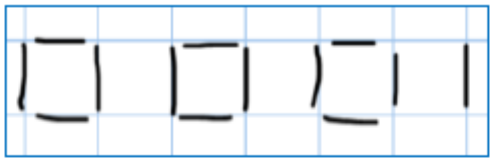
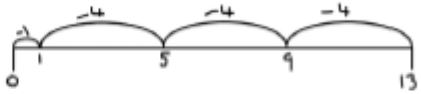
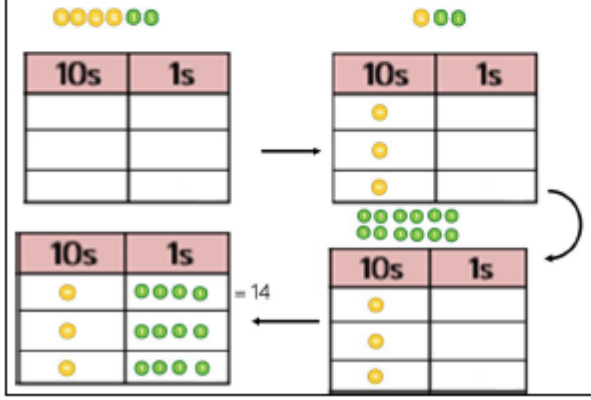
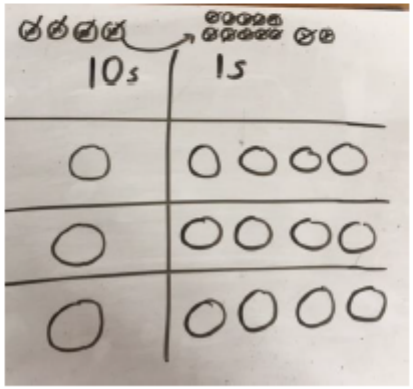
What is the calculation?
What is the product?



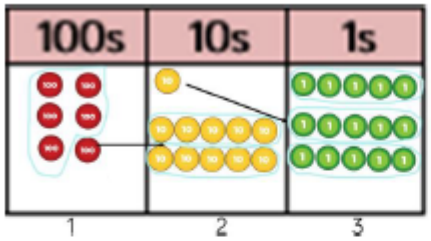
Calculation policy: Division

Key language: share, group, divide, divided by, half.

Concrete	Pictorial	Abstract
Sharing using a range of objects. 6 ÷ 2 	Represent the sharing pictorially. 	6 ÷ 2 = 3 3 | 3 Children should also be encouraged to use their 2 times tables facts.
Repeated subtraction using Cuisenaire rods above a ruler. 6 ÷ 2  3 groups of 2	Children to represent repeated subtraction pictorially. 	Abstract number line to represent the equal groups that have been subtracted. 

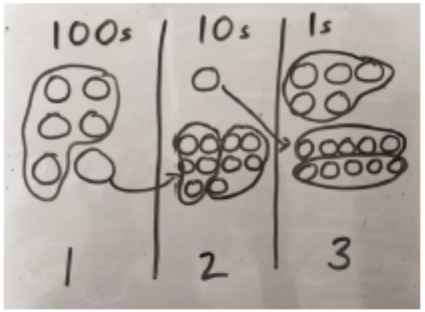
2d ÷ 1d with remainders using lollipop sticks. Cuisenaire rods, above a ruler can also be used. 13 ÷ 4 Use of lollipop sticks to form wholes- squares are made because we are dividing by 4.  There are 3 whole squares, with 1 left over.	Children to represent the lollipop sticks pictorially.  There are 3 whole squares, with 1 left over.	13 ÷ 4 = 3 remainder 1 Children should be encouraged to use their times table facts; they could also represent repeated addition on a number line. '3 groups of 4, with 1 left over' 
Sharing using place value counters. 42 ÷ 3 = 14 	Children to represent the place value counters pictorially. 	Children to be able to make sense of the place value counters and write calculations to show the process. 42 ÷ 3 42 = 30 + 12 30 ÷ 3 = 10 12 ÷ 3 = 4 10 + 4 = 14

Short division using place value counters to group.
615 ÷ 5



1. Make 615 with place value counters.
2. How many groups of 5 hundreds can you make with 6 hundred counters?
3. Exchange 1 hundred for 10 tens.
4. How many groups of 5 tens can you make with 11 ten counters?
5. Exchange 1 ten for 10 ones.
6. How many groups of 5 ones can you make with 15 ones?

Represent the place value counters pictorially.

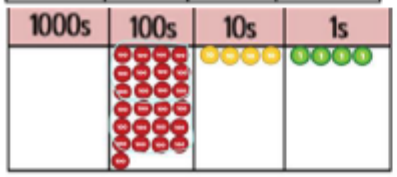


Children to the calculation using the short division scaffold.

$$5\overline{)615}\quad 123$$

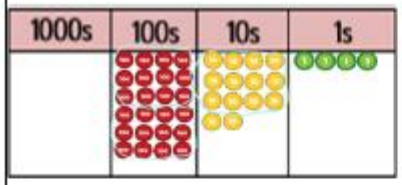
Long division using place value counters
2544 ÷ 12

We can't group 2 thousands into groups of 12 so will exchange them.



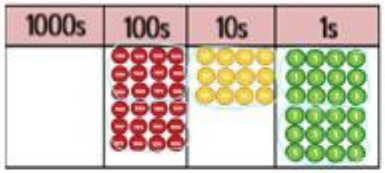
We can group 24 hundreds into groups of 12 which leaves with 1 hundred.

$$12\overline{)2544}\quad 02$$
$$24$$
$$1$$



After exchanging the hundred, we have 14 tens. We can group 12 tens into a group of 12, which leaves 2 tens.

$$\begin{array}{r} 0\,2\,1 \\ 12\overline{)\,2544} \\ 24 \\ \hline 14 \\ 12 \\ \hline 2 \end{array}$$

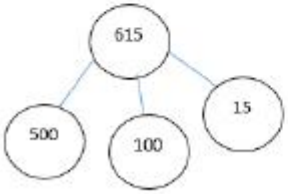


After exchanging the 2 tens, we have 24 ones. We can group 24 ones into 2 group of 12, which leaves no remainder.

$$\begin{array}{r} 0\,2\,1\,2 \\ 12\overline{)\,2544} \\ 24 \\ \hline 14 \\ 12 \\ \hline 24 \\ 24 \\ \hline 0 \end{array}$$

Conceptual variation; different ways to ask children to solve 615 ÷ 5

Using the part whole model below, how can you divide 615 by 5 without using short division?



I have £615 and share it equally between 5 bank accounts. How much will be in each account?

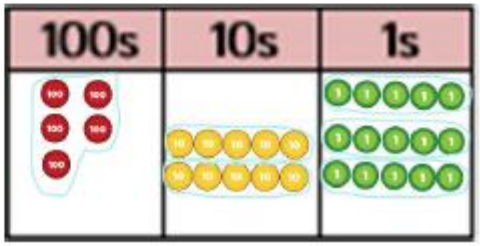
615 pupils need to be put into 5 groups. How many will be in each group?

$$5\overline{)\,615}$$

615 ÷ 5 =

□ = 615 ÷ 5

What is the calculation?
What is the answer?



	EYFS/Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Addition	Combining two parts to make a whole: part whole model. Starting at the bigger number and counting on- using cubes. Regrouping to make 10 using ten frame.	Adding three single digits. Use of base 10 to combine two numbers.	Column method- regrouping. Using place value counters (up to 3 digits).	Column method- regrouping. (up to 4 digits)	Column method- regrouping. Use of place value counters for adding decimals.	Column method- regrouping. Abstract methods. Place value counters to be used for adding decimal numbers.
Subtraction	Taking away ones Counting back Find the difference Part whole model Make 10 using the ten frame	Counting back Find the difference Part whole model Make 10 Use of base 10	Column method with regrouping. (up to 3 digits using place value counters)	Column method with regrouping. (up to 4 digits)	Column method with regrouping. Abstract for whole numbers. Start with place value counters for decimals- with the same amount of decimal places.	Column method with regrouping. Abstract methods. Place value counters for decimals- with different amounts of decimal places.

Multiplication	Recognising and making equal groups. Doubling Counting in multiples Use cubes, Numicon and other objects in the classroom	Arrays- showing commutative multiplication	Arrays 2d × 1d using base 10	Column multiplication- introduced with place value counters. (2 and 3 digit multiplied by 1 digit)	Column multiplication Abstract only but might need a repeat of year 4 first(up to 4 digit numbers multiplied by 1 or 2 digits)	Column multiplication Abstract methods (multi-digit up to 4 digits by a 2 digit number)
Division	Sharing objects into groups Division as grouping e.g. I have 12 sweets and put them in groups of 3, how many groups? Use cubes and draw round 3 cubes at a time.	Division as grouping Division within arrays- linking to multiplication Repeated subtraction	Division with a remainder-using lollipop sticks, times tables facts and repeated subtraction. 2d divided by 1d using base 10 or place value counters	Division with a remainder Short division (up to 3 digits by 1 digit- concrete and pictorial)	Short division (up to 4 digits by a 1 digit number including remainders)	Short division Long division with place value counters (up to 4 digits by a 2 digit number) Children should exchange into the tenths and hundredths column too

Addition and subtraction

789 + 642 becomes

$$\begin{array}{r} 7\ 8\ 9 \\ +\ 6\ 4\ 2 \\ \hline 1\ 4\ 3\ 1 \\ \hline 1\ \ 1 \end{array}$$

Answer: 1431

874 – 523 becomes

$$\begin{array}{r} 8\ 7\ 4 \\ -\ 5\ 2\ 3 \\ \hline 3\ 5\ 1 \end{array}$$

Answer: 351

932 – 457 becomes

$$\begin{array}{r} {\scriptstyle 8\ \ 12\ \ 1} \\ 9\ \not{3}\ \not{2} \\ -\ 4\ 5\ 7 \\ \hline 4\ 7\ 5 \end{array}$$

Answer: 475

932 – 457 becomes

$$\begin{array}{r} {\scriptstyle 1\ \ \ 1} \\ 9\ 3\ 2 \\ -\ \not{4}\ \not{5}\ 7 \\ {\scriptstyle 5\ \ 6} \\ \hline 4\ 7\ 5 \end{array}$$

Answer: 475

Short multiplication

24 × 6 becomes

$$\begin{array}{r} 2\ 4 \\ \times\ \ 6 \\ \hline 1\ 4\ 4 \\ \hline 2\ \ \end{array}$$

Answer: 144

342 × 7 becomes

$$\begin{array}{r} 3\ 4\ 2 \\ \times\ \ \ 7 \\ \hline 2\ 3\ 9\ 4 \\ \hline 2\ \ 1\ \ \end{array}$$

Answer: 2394

2741 × 6 becomes

$$\begin{array}{r} 2\ 7\ 4\ 1 \\ \times\ \ \ \ 6 \\ \hline 1\ 6\ 4\ 4\ 6 \\ \hline 4\ \ 2\ \ \ \ \end{array}$$

Answer: 16 446

Long multiplication

24 × 16 becomes

$$\begin{array}{r} {\scriptstyle 2} \\ 24 \\ \times\ 16 \\ \hline 240 \\ 144 \\ \hline 384 \end{array}$$

Answer: 384

124 × 26 becomes

$$\begin{array}{r} {\scriptstyle 1\ 2} \\ 124 \\ \times\ 26 \\ \hline 2480 \\ 744 \\ \hline 3224 \\ {\scriptstyle 1\ 1} \end{array}$$

Answer: 3224

124 × 26 becomes

$$\begin{array}{r} {\scriptstyle 1\ 2} \\ 124 \\ \times\ 26 \\ \hline 744 \\ 2480 \\ \hline 3224 \\ {\scriptstyle 1\ 1} \end{array}$$

Answer: 3224

Short division

98 ÷ 7 becomes

$$\begin{array}{r} 14 \\ 7\overline{)\,98} \end{array}$$

Answer: 14

432 ÷ 5 becomes

$$\begin{array}{r} 86\ r2 \\ 5\overline{)\,432} \end{array}$$

Answer: 86 remainder 2

496 ÷ 11 becomes

$$\begin{array}{r} 45\ r1 \\ 11\overline{)\,496} \end{array}$$

Answer: $45\frac{1}{11}$

Long division

432 ÷ 15 becomes

$$\begin{array}{r} 28\ \text{r}\ 12 \\ 15\overline{)\,432} \\ -\,300 \\ \hline 132 \\ -\,120 \\ \hline 12 \end{array}$$

Answer: 28 remainder 12

432 ÷ 15 becomes

$$\begin{array}{r} 28 \\ 15\overline{)\,432} \\ -\,300 \quad (15\times 20) \\ \hline 132 \\ -\,120 \quad (15\times 8) \\ \hline 12 \end{array}$$

$\frac{\cancel{12}}{\cancel{15}} = \frac{4}{5}$

Answer: $28\ \frac{4}{5}$

432 ÷ 15 becomes

$$\begin{array}{r} 28\cdot 8 \\ 15\overline{)\,432\cdot 0} \\ -\,300 \\ \hline 132 \\ -\,120 \\ \hline 120 \\ -\,120 \\ \hline 0 \end{array}$$

Answer: 28·8