**Primary Mathematics Scheme of Work: Stage 3**

|  |  |  |  |
| --- | --- | --- | --- |
| *Unit* | *Lessons* | *Key ‘Build a Mathematician’ (BAM) Indicators* | *Essential knowledge* |
| [Numbers and the number system](#NNS)  | 8 | * [Read and write numbers up to 1000 in numerals and in words](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M1_BAM.pdf)
* [Compare and order whole numbers up to 1000](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M2_BAM.pdf)
* [Count from zero in multiples of 4, 8, 50 and 100](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M3_BAM.pdf)
* [Add and subtract numbers mentally including a three-digit number and ones, tens and hundreds](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M4_BAM.pdf)
* [Use columnar addition and subtraction with numbers up to three digits](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M5_BAM.pdf)
* [Use known facts to multiply and divide mentally within the 2, 3, 4, 8 and 10 multiplication tables](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M6_BAM.pdf)
* [Multiply a two-digit number by a one-digit number](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M7_BAM.pdf)
* [Understand fractions as proportions](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M8_BAM.pdf)
* [Understand fractions as numbers](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M9_BAM.pdf)
* [Count forward and backwards in tenths](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M10_BAM.pdf)
* [Tell the time using analogue and digital 12-hour clocks](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M11_BAM.pdf)
* [Measure length (mm, cm, m), mass (g, kg) and capacity (ml, l)](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M12_BAM.pdf)
* [Measure perimeters of shapes](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M13_BAM.pdf)
 | * Know the place value headings of tenths, ones, tens and hundreds
* [Know multiplication facts for the 3, 4 and 8 multiplication tables](http://kangaroomaths.com/free_resources/display/chinese_tables.docx)
* Know division facts related to the 3, 4 and 8 multiplication tables
* Know that a right angle is ¼ of a turn
* Know the number of days in each month
* Know the number days in a year and a leap year
* Know that 60 seconds = 1 minute
* Know the Roman numerals from I to XII
* Know the vocabulary of time including o’clock, a.m., p.m., morning afternoon, noon and midnight
* Know the meaning of ‘perimeter’
 |
| [Counting and comparing](#CC) | 12 |
| [Visualising and constructing](#VC) | 8 |
| [Calculating: addition and subtraction](#CAS) | 12 |
| [Calculating: multiplication and division](#CMD) | 12 |
| [Exploring time](#ET) | 12 |
| [Exploring fractions](#EF) | 12 |
| [Measuring space](#MS) | 12 |
| [Investigating angles](#IA) | 8 |
| [Calculating fractions and decimals](#CFD) | 8 |
| [Exploring money](#EM) | 8 |
| [Presentation of data](#PD) | 8 |
| Preventing the gap / Going deeper | 20 |  |  |
| Total: | 140 | [Stage 3 BAM Progress Tracker Sheet](http://kangaroomaths.com/free_resources/planning/stage3_tracker.pdf) |  |

|  |  |
| --- | --- |
| **Maths Calendar** | *Based on 4 maths lessons per week, with at least 35 'quality teaching' weeks per year*  |
| Week 1 | Week 2 | Week 3 | Week 4 | Week 5 | Week 6 | Week 7 | Week 8 | Week 9 | Week 10 | Week 11 | Week 12 | Week 13 |
| [Numbers and the number system](#NNS) | [Counting and comparing](#CC) | [Visualising and constructing](#VC) | [Calculating: addition and subtraction](#CAS) | [Calculating: multiplication and division](#CMD) |
| [3M1 BAM](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M1_BAM.pdf) | [3M2 BAM](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M2_BAM.pdf), [3M3 BAM](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M3_BAM.pdf) |  | [3M4 BAM](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M4_BAM.pdf), [3M5 BAM](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M5_BAM.pdf) | [3M6 BAM](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M6_BAM.pdf), [3M7 BAM](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M7_BAM.pdf) |
| Week 14 | Week 15 | Week 16 | Week 17 | Week 18 | Week 19 | Week 20 | Week 21 | Week 22 | Week 23 | Week 24 | Week 25 | Week 26 |
| Assessment and enrichment | [Exploring time](#ET) | [Exploring fractions](#EF) | [Measuring space](#MS) | Preventing the gap / Going deeper |
|  | [3M11 BAM](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M11_BAM.pdf) | [3M8 BAM](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M8_BAM.pdf), [3M9 BAM](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M9_BAM.pdf) | [3M12 BAM](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M12_BAM.pdf), [3M13 BAM](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M13_BAM.pdf) |  |
| Week 27 | Week 28 | Week 29 | Week 30 | Week 31 | Week 32 | Week 33 | Week 34 | Week 35 | Week 36 | Week 37 | Week 38 | Week 39 |
| Assess / enrich | [Investigating angles](#IA) | [Calculating fractions & decimals](#CFD) | [Exploring money](#EM) | [Presentation of data](#PD) | Assess / enrich | Preventing the gap / Going deeper |
|  |  | [3M10 BAM](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M10_BAM.pdf) |  |  |  |  |

|  |  |
| --- | --- |
| *Numbers and the number system* | *8 lessons* |
| **Key concepts (National Curriculum statements)** | **The Big Picture**: [Number and Place Value progression map](http://kangaroomaths.com/free_resources/planning/KM_MathematicsProgression_NumberPlaceValue.xlsx) |
| * recognise the place value of each digit in a three-digit number (hundreds, tens, ones)
* read and write numbers up to 1000 in numerals and in words
* identify, represent and estimate numbers using different representations
* solve number problems and practical problems involving these ideas
 |
| [Return to overview](#Overview) |
| Possible themes | Possible key learning points |
| * Work with numbers up to 1000
* Explore ways of representing numbers
* Develop skills of estimation
* Solve problems involving numbers and the number system

**Bring on the Maths+: Lower Key Stage 2**Number and Place Value: Place value I, Place value headings, Reading and writing numbers | * Understand place value in numbers up to 1000
* Write numbers up to 1000
* Read numbers up to 1000
* Use zero as a place holder in numbers up to 1000
* Interpret numbers up to 1000 on a number line
* Represent numbers up to 1000 using a number line
* Interpret and use scales representing measurements with numbers up to 1000
* Use scales to represent measurements with numbers up to 1000
 |
| Prerequisites | Mathematical language | Pedagogical notes |
| * Understand place value in numbers up to two digits
* Read and write numbers up to 100
* Use zero as a place holder in two-digit numbers
* Use and interpret a number line to represent numbers
 | Place valueDigitHundredsTensOnesEstimateNumber lineScale | Pupils should be given opportunity to explain reasoning both verbally and in writingNCETM: [Glossary](https://www.ncetm.org.uk/public/files/17308038/National%2BCurriculum%2BGlossary.pdf)Useful resources: Dienes apparatus, place value cards, digit cards, number lines, bead strings, unifix or multi link cubes, cuisenaire rods, Numicon, 100 square**Common approaches***Every classroom displays a number line up to 1000**Every classroom has a place value chart on the wall* |
| Reasoning opportunities and probing questions | Suggested activities | Possible misconceptions |
| * Show me a three-digit number with a tens unit of ‘6’. And another. And another …
* Benny writes the number three hundred and six as ‘3006’. Do you agree with Benny?
* Using a number line, show me the number 243, 567, 909, etc.

NCETM: [Place Value Reasoning](https://www.ncetm.org.uk/public/files/18416215/1_Progression_Map_Place_Value_Reasoning.pdf) | NRICH: [Which scripts?](http://nrich.maths.org/774)NRICH: [Which is quicker?](http://nrich.maths.org/1817)**Learning review**KM: [3M1 BAM Task](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M1_BAM.pdf)NCETM: [NC Assessment Materials (Teaching and Assessing Mastery)](https://www.ncetm.org.uk/resources/46689) | * Some pupils may write three-digit numbers literally, for example, four hundred and six as ‘4006’
* Some pupils may ignore place value and simply write the digits mentioned in a number, for example, four hundred and six as ‘46’
 |

|  |  |
| --- | --- |
| *Counting and comparing* | *12 lessons* |
| **Key concepts (National Curriculum statements)** | **The Big Picture**: [Number and Place Value progression map](http://kangaroomaths.com/free_resources/planning/KM_MathematicsProgression_NumberPlaceValue.xlsx) |
| * compare and order numbers up to 1000
* count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number
* solve number problems and practical problems involving these ideas
 |
| [Return to overview](#Overview) |
| Possible themes | Possible key learning points |
| * Work with numbers up to 1000
* Explore ways of counting
* Solve problems involving counting and comparing

**Bring on the Maths+: Lower Key Stage 2**Number and Place Value: Ordering numbers, Counting I, Counting II | * Order numbers up to 1000
* Compare numbers up to 1000
* Count (from 0) in multiples of 4
* Count (from 0) in multiples of 8
* Count (from 0) in multiples of 50
* Count (from 0) in multiples of 100
* Find 10 more than a given number
* Find 10 less than a given number
* Find 100 more than a given number
* Find 100 less than a given number
 |
| Prerequisites | Mathematical language | Pedagogical notes |
| * Understand place value in numbers up to 1000
* Use <, > and = symbols
* Count in steps of 2, 3 and 5 from 0
* Count in tens from any number, forward and backward
 | Place valueDigitMultipleMoreLessPositiveNumber line**Notation**Use of <, > and = symbols when comparing numbers | Zero is neither positive nor negative.It is expected that all pupils should count from 0 in multiples of 4, 8, 50 and 100, but they should also be given the opportunity to start with any given number.NCETM: [Glossary](https://www.ncetm.org.uk/public/files/17308038/National%2BCurriculum%2BGlossary.pdf)Useful resources: Dienes apparatus, place value cards, digit cards, number lines, bead strings, unifix/multi link cubes, Cuisenaire rods, Numicon, 100 square**Common approaches***Every classroom displays a number line up to 1000**Every classroom has a place value chart on the wall* |
| Reasoning opportunities and probing questions | Suggested activities | Possible misconceptions |
| * Show me the largest three-digit number with a tens unit of ‘6’, hundreds unit ‘2’. And Another. And another …
* What is the same and what is different: *345, 435, 545, 455* ?
* Convince me that 765 > 567.

NCETM: [Place Value Reasoning](https://www.ncetm.org.uk/public/files/18416215/1_Progression_Map_Place_Value_Reasoning.pdf) | NRICH: [The Deca Tree](http://nrich.maths.org/2006)NCETM: [Ordering numbers](https://www.ncetm.org.uk/resources/42469): Activity ANCETM: [The value of place](https://www.ncetm.org.uk/resources/42469): Activity E**Learning review**KM: [3M2 BAM Task](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M2_BAM.pdf), [3M3 BAM Task](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M3_BAM.pdf)NCETM: [NC Assessment Materials (Teaching and Assessing Mastery)](https://www.ncetm.org.uk/resources/46689) | * Some pupils may write three-digit numbers literally, for example, four hundred and six as ‘4006’
* Some pupils may ignore place value and simply write the digits mentioned in a number, for example, four hundred and six as ‘46’
 |

|  |  |
| --- | --- |
| *Visualising and constructing* | *8 lessons* |
| **Key concepts (National Curriculum statements)** | **The Big Picture**: [Properties of Shape progression map](http://kangaroomaths.com/free_resources/planning/KM_MathematicsProgression_GeometryPropertiesShape.xlsx) |
| * identify horizontal and vertical lines and pairs of perpendicular and parallel lines
* draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them
 |
| [Return to overview](#Overview) |
| Possible themes | Possible key learning points |
| * Classify lines
* Construct 2D shapes
* Explore 3D shapes
 | * Identify and draw horizontal and vertical lines
* Identify and draw parallel lines
* Identify and draw perpendicular lines
* Sketch common 2D shapes
* Draw and measure a line in centimetres
* Construct common 2D shapes using a ruler
* Make and identify 3D shapes using modelling materials
* Describe 3D shapes using mathematical language
 |
| Prerequisites | Mathematical language | Pedagogical notes |
| * Know the names of common 2D shapes
* Know the names of cuboids, prisms, spheres, pyramids and cones
* Know the meaning of side, edge, vertex (vertices) and face
* Use a straight edge to construct lines and shapes
 | HorizontalVerticalPerpendicularParallelFace, Edge, Vertex (Vertices)Cube, Cuboid, Prism, Cylinder, Pyramid, Cone, SphereQuadrilateralSquare, Rectangle, Parallelogram, (Isosceles) Trapezium, Kite, RhombusTriangle, CirclePolygon, Hexagon, Pentagon, Octagon, Decagon**Notation**Arrow notation to represent parallel linesRight angle notation for perpendicular lines | Pupils should be able to draw and measure a line in centimetres when the dimensions are whole numbers.Suitable modeling materials include Polydron, Geomag, pipe cleaners and even (uncooked!) spaghetti and marshmallows for a bit of messy fun!NCETM: [Glossary](https://www.ncetm.org.uk/public/files/17308038/National%2BCurriculum%2BGlossary.pdf)**Common approaches***Every classroom has a set of* [*3D shape posters*](http://kangaroomaths.com/free_resources/display/solids.pdf) *and* [*quadrilateral posters*](http://kangaroomaths.com/free_resources/display/quadrilaterals.pdf) *on the wall* |
| Reasoning opportunities and probing questions | Suggested activities | Possible misconceptions |
| * Show me a pair of parallel lines, perpendicular lines, a vertical line, a horizontal line. And Another …
* Always/Sometimes/Never: Perpendicular lines are horizontal and vertical.
* Convince me that parallel lines can be curved.
* Convince me that a square is a rectangle.

NCETM: [Geometry - Properties of Shapes Reasoning](https://www.ncetm.org.uk/public/files/18438967/8_Progression_Map_Geometry_properties_of_shapes_Reasoningv2.pdf) | NCETM: [The Art of Mathematics](https://www.ncetm.org.uk/resources/42835): Activity DNCETM: [Making shapes and solids](https://www.ncetm.org.uk/resources/42835): Activity A**Learning review**NCETM: [NC Assessment Materials (Teaching and Assessing Mastery)](https://www.ncetm.org.uk/resources/46689) | * Pupils may believe, incorrectly, that:
* perpendicular lines have to be horizontal / vertical
* only straight lines can be parallel
* Some pupils may think that a square and rectangle are two different shapes.
* Pupils may believe, incorrectly, that all 3-D shapes are prisms
 |

|  |  |
| --- | --- |
| *Calculating: addition and subtraction* | *12 lessons* |
| **Key concepts (National Curriculum statements)** | **The Big Picture**: [Calculation progression map](http://kangaroomaths.com/free_resources/planning/KM_MathematicsProgression_NumberCalculation.xlsx) |
| * add and subtract numbers mentally, including: a three-digit number and ones; a three-digit number and tens; a three-digit number and hundreds
* add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction
* estimate the answer to a calculation and use inverse operations to check answers
* solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction
 |
| [Return to overview](#Overview) |
| Possible themes | Possible key learning points |
| * Extend mental methods of addition and subtraction
* Develop written methods of addition and subtraction
* Estimate answers to calculations
* Solve problems involving addition and subtraction

**Bring on the Maths+: Lower Key Stage 2**Calculating: Addition and subtraction using mental methods, Addition and subtraction using written methods I | * Add three-digit numbers and ones or tens mentally
* Add three-digit numbers and hundreds mentally
* Subtract three-digit numbers and one or tens mentally
* Subtract three-digit numbers and hundreds mentally
* Use column addition for numbers with up to three digits when carrying is not required
* Use column addition for three-digit and two-digit numbers when carrying is required
* Use column addition for numbers with three-digits when carrying is required
* Use column subtraction for numbers with up to three digits when exchanging is not required
* Use column subtraction for three-digit and two-digit numbers when exchanging is required
* Use column subtraction for numbers with up to three-digits when exchanging is required
* Estimate the answer to a calculation
* Identify when addition or subtraction is needed as part of solving a problem
 |
| Prerequisites | Mathematical language | Pedagogical notes |
| * Know that addition and subtraction are inverse operations
* Recall addition and subtraction facts to 20
* Derive addition and subtraction facts to 100
* Add and subtract two-digit numbers and ones (or tens) mentally
 | CalculationCalculateAdditionSubtractionSum, TotalDifference, Minus, LessColumn additionColumn subtractionExchangeOperationEstimateInverseOperation | Interpret ‘mentally’ as ‘can you do the calculation in your head or with jottings?’. The Kangaroo Maths [Interactive Target Boards](http://www.kangaroomaths.com/kenny1.php#ar) are very powerful in supporting this important message. Ensure that pupils can deal with column subtractions that include a 0 within the first number; e.g. 8027 – 437 KM: [Progression: Addition and Subtraction](http://kangaroomaths.com/free_resources/hod/bouncebuzz_addition_subtraction_v4.pdf) and [Calculation overview](http://kangaroomaths.com/free_resources/hod/bouncebuzz_calculation_overview_v4.pdf)NCETM: [The Bar Model](https://www.ncetm.org.uk/resources/44567), [Subtraction](https://www.ncetm.org.uk/resources/40532), [Glossary](https://www.ncetm.org.uk/public/files/17308038/National%2BCurriculum%2BGlossary.pdf)Useful resources: Digit cards, number lines, bead strings, place-value cards, base 10, 100 squares, place-value counters**Common approaches***All teachers use ‘sum’ to refer only to the result of an addition. Teachers must say ‘complete these calculations’ instead of ‘complete these sums’. All pupils use books / paper with 1cm squares and ensure that each digit is written in one square. When carrying, those numbers being carried are placed beneath the answer line. During column subtraction the language of ‘exchanging’ is used instead of ‘borrowing’. When exchanging, those numbers being altered or moved are written above the calculation*  |
| Reasoning opportunities and probing questions | Suggested activities | Possible misconceptions |
| * Provide examples of column addition and subtraction with missing digits. Challenge pupils to find these digits and explain their reasoning.
* Show me an example of a column addition (that does not includes carrying) with the answer 576. And Another …
* Show me an example of a column addition (that includes carrying) with the answer 512. And Another …
* Convince me that 428 – 136 = 292

NCETM: [Addition and Subtraction Reasoning](https://www.ncetm.org.uk/public/files/18416326/2_Progression_Map_Addition_and_Subtraction_Reasoning.pdf) | KM: [Interactive target boards](http://kangaroomaths.com/free_resources/teaching/number/KangarooMaths_Interactive_Target_Boards.xlsm)KM: [Maths to Infinity: Addition and subtraction foundations](http://kangaroomaths.com/free_resources/teaching/number/KangarooMaths_TheFoundations_AddSub.xlsm)NRICH: [Reach 100](http://nrich.maths.org/1130)**,** [Twenty Divided Into Six](http://nrich.maths.org/1047)**,** [Consecutive Numbers](http://nrich.maths.org/31)NCETM: [Triangular cards](https://www.ncetm.org.uk/resources/42536): Activity ENCETM: [Interactive Base 10 Blocks](https://www.ncetm.org.uk/resources/42536): Activity F, G and HNCETM: [Estimating differences](https://www.ncetm.org.uk/resources/42543): Activity F**Learning review**KM: [3M4 BAM Task](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M4_BAM.pdf), [3M5 BAM Task](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M5_BAM.pdf)NCETM: [NC Assessment Materials (Teaching and Assessing Mastery)](https://www.ncetm.org.uk/resources/46689) | * Some pupils may carry the wrong carry digit (i.e. the ones digit rather than the tens digit)
* Some pupils incorrectly assume and use commutativity within column subtraction; for example:

|  |  |  |  |
| --- | --- | --- | --- |
|  | 9 | 2 | 6 |
| – | 7 | 3 | 4 |
|  | 2 | 1 | 2 |

* Some pupils may not use place value settings correctly (especially when the numbers have a different number of digits)
 |

|  |  |
| --- | --- |
| *Calculating: multiplication and division* | *12 lessons* |
| **Key concepts (National Curriculum statements)** | **The Big Picture**: [Calculation progression map](http://kangaroomaths.com/free_resources/planning/KM_MathematicsProgression_NumberCalculation.xlsx) |
| * 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
* solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects
 |
| [Return to overview](#Overview) |
| Possible themes | Possible key learning points |
| * Develop mental arithmetic skills
* Develop knowledge of multiplication tables
* Explore ways of writing calculations
* Solve problems involving multiplication and division

**Bring on the Maths+: Lower Key Stage 2**Times tables: The three times table, The four times table, The eight times table | * Recall and use multiplication facts for the 3 times table
* Recall and use multiplication facts for the 4 times table
* Recall and use multiplication facts for the 8 times table
* Recall and use division facts for the 3 times table
* Recall and use division facts for the 4 times table
* Recall and use division facts for the 8 times table
* Understand the distributive law applied to a multiplication of a two-digit number by a one-digit number
* Identify the correct operation(s) required in order to solve a problem and create mathematical statements
* Use known and derived facts when multiplying and dividing mentally
* Use efficient methods to multiply a two-digit number by a one-digit number
* Identify when a scaling (or correspondence problem) can be solved using multiplication or division
 |
| Prerequisites | Mathematical language | Pedagogical notes |
| * Recall multiplication and division facts for 2, 5 and 10 multiplication tables
* Understand that multiplication and division are inverse operations
* Understand that multiplication is commutative
 | CalculationCalculateMental arithmeticMultiplication table, Times tableMultiply, MultiplicationTimesProductCommutativeDivide, DivisionInverseOperationEstimate | Pupils make the connection between arrays, multiplying using the distributive law and the compact grid method. The transition from arrays to a compact grid method aids conceptual understanding of short and long multiplication. It also supports the multiplication of algebraic expressions at a later stage.KM: [Progression: Multiplication and Division](http://kangaroomaths.com/free_resources/hod/bouncebuzz_multiplication_division_v4.pdf) and [Calculation overview](http://kangaroomaths.com/free_resources/hod/bouncebuzz_calculation_overview_v4.pdf)NCETM: [The Bar Model](https://www.ncetm.org.uk/resources/44568), [Multiplication](https://www.ncetm.org.uk/resources/40530) and [division](https://www.ncetm.org.uk/resources/43589)NCETM: [Multiplicative reasoning](https://www.ncetm.org.uk/resources/43669)NCETM: [Glossary](https://www.ncetm.org.uk/public/files/17308038/National%2BCurriculum%2BGlossary.pdf)Useful resources: Counters, Hundred squares, Times table squares, Counting stick, Cuisenaire rods, Place value discs**Common approaches***Knowing the times tables is understood as knowing multiplication facts, knowing division facts and related facts.**All classrooms display a* [*times table poster with a twist*](http://kangaroomaths.com/free_resources/display/chinese_tables.docx)*Connecting the compact grid method with arrays is essential* |
| Reasoning opportunities and probing questions | Suggested activities | Possible misconceptions |
| * Show me a multiplication (division) fact from the 3 multiplication table, 4 multiplication table, 8 multiplication table. And Another …
* Ask pupils to complete the statement: ‘*If I know 7* × 4 = 28, then …’
* Show me a problem that can be solved using multiplication, division. And Another …
* Convince me that 40 × 8 = 320
* Convince me that 43 × 8 = 344

NCETM: [Multiplication and Division Reasoning](https://www.ncetm.org.uk/public/files/18438909/3_Progression_Map_Multiplication_and_Division_Reasoningv2.pdf) | KM: [Interactive target boards](http://kangaroomaths.com/free_resources/teaching/number/KangarooMaths_Interactive_Target_Boards.xlsm)KM: [Maths to Infinity: Multiplication and division foundations](http://kangaroomaths.com/free_resources/teaching/number/KangarooMaths_The%20Foundations_MultDiv.xlsm)KM: [Times Tables resources](http://www.kangaroomaths.com/kenny1.php#tt)NRICH: [Andy’s Marbles](http://nrich.maths.org/2421/index)NCETM: [Always, Sometimes, Never](https://www.ncetm.org.uk/resources/42591): Activity ANCETM: [Pendulum Counting](https://www.ncetm.org.uk/resources/42591): Activity BNCETM: [Multiplying Numbers](https://www.ncetm.org.uk/resources/42591): Activity D**Learning review**KM: [3M6 BAM Task](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M6_BAM.pdf), [3M7 BAM Task](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M7_BAM.pdf)NCETM: [NC Assessment Materials (Teaching and Assessing Mastery)](https://www.ncetm.org.uk/resources/46689) | * Some pupils ‘see’ the times tables as a list of 12 unconnected facts
* Some pupils do not understand multiplication is commutative.
* Some pupils may write statements such as 2 ÷ 8 = 4
* Some pupils think because 3 × 5 = 5 × 3 then 15 ÷ 3 = 3 ÷ 15
 |

|  |  |
| --- | --- |
| *Exploring time* | *12 lessons* |
| **Key concepts (National Curriculum statements)** | **The Big Picture**: [Measurement and mensuration progression map](http://kangaroomaths.com/free_resources/planning/KM_MathematicsProgression_GeometryMeasurementMensuration.xlsx) |
| * tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks
* estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes and hours; use vocabulary such as o’clock, a.m./p.m., morning, afternoon, noon and midnight
* know the number of seconds in a minute and the number of days in each month, year and leap year
* compare durations of events [for example to calculate the time taken by particular events or tasks]
 |
| [Return to overview](#Overview) |
| Possible themes | Possible key learning points |
| * Understand and use Roman numerals
* Tell the time
* Estimate time
* Solve problems involving time

**Bring on the Maths+: Lower Key Stage 2**Measures: Months of the year, Telling the time | * Read Roman numerals up to XII
* Know the vocabulary of telling the time
* Know the number of seconds in a minute
* Know the number of days in each month, year and leap year
* Tell the time from a 12-hour analogue clock to the nearest minute
* Tell the time from a 24-hour analogue clock to the nearest minute
* Tell the time from a clock using Roman numerals to the nearest minute
* Write times using 12-hour format
* Estimate times
* Compare times given in seconds, minutes and/or hours
* Calculate the time taken by particular events or tasks
 |
| Prerequisites | Mathematical language | Pedagogical notes |
| * Know the number of minutes in an hour, hours in a day, and days in a week
* Tell and write the time to the nearest five minutes
 | Analogue12-hour24-houro’clockMorningAfternoonNoon, MidnightSecond, Minute, HourDay, Week, MonthYearLeap yearRoman Numeral**Notation**The Roman numeral for 4 is IV. It is the only exception to the rules of Roman numerals as it is sometimes written IIII on a clock or watchUsing a.m. and p.m. for 12-hour clock notation | In general it is incorrect to repeat a Roman numeral symbol four times (i.e. XXXX). Also, the subtractive method should only be used (1) if subtracting powers of ten (i.e. I, X or C), and (2) if subtracting from the next two higher symbols (for example, I can be subtracted from V or X, but not L, C, D or M). Therefore 49 cannot be written as XXXXIX, or as IL, and must be written as XLIX. See NCETM: [Roman numerals](https://www.ncetm.org.uk/resources/11689) 24 clock notation using four digits. Any time before 10:00 a.m. uses a zero as the second hour digit, for example 9:15 a.m. is written as ‘09:15’.Noon is 12:00 and midnight is 00:00NCETM: [Glossary](https://www.ncetm.org.uk/public/files/17308038/National%2BCurriculum%2BGlossary.pdf)**Common approaches***Explain the origins of the Roman numerals I, V and X are possibly linked to the human body being used to communicate numbers across the marketplace (I – finger, V – shape of the hand with fingers closed together and X – arms crossed)**Use of a colon to write 12- and 24- hour times**Using a.m. and p.m. for 12-hour clock notation**Noon is treated as 12:00 and midnight as 00:00* |
| Reasoning opportunities and probing questions | Suggested activities | Possible misconceptions |
| * Can a 24-hour clock be analogue? For example, try and tell the time using images of the Greenwich Observatory Clock.
* What is the same and what is different: *VII, 7, I, IV* ?
* Always, sometimes, never: Only one month has 28 days.

NCETM: [Measurement Reasoning](https://www.ncetm.org.uk/public/files/18436766/7_Progression_Map_Measurement_Reasoning.pdf) | NRICH: [Two Clocks](http://nrich.maths.org/4806)NCETM: [Virtual Clock](http://time.virneth.co.uk/e-clock/interactive-clock.php): Activity D**Learning review**KM: [3M11 BAM Task](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M11_BAM.pdf)NCETM: [NC Assessment Materials (Teaching and Assessing Mastery)](https://www.ncetm.org.uk/resources/46689) | * The use of IIII on a clock face suggests that a Roman numeral can be repeated four times, but this is a special case. In general, three is the maximum number of repeats and the subtractive method should be used instead (i.e. IV)
* Some pupils may think that all months have the same number of days.
* Some pupils do not have a realistic sense of the length of one minute (usually they count one, two, three … etc. far too quickly!)
 |

|  |  |
| --- | --- |
| *Exploring fractions* | *12 lessons* |
| **Key concepts (National Curriculum statements)** | **The Big Picture**: [Fractions, decimals and percentages progression map](http://kangaroomaths.com/free_resources/planning/KM_MathematicsProgression_NumberFDP.xlsx) |
| * recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators
* recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators
* recognise and show, using diagrams, equivalent fractions with small denominators
* compare and order unit fractions, and fractions with the same denominators
 |
| [Return to overview](#Overview) |
| Possible themes | Possible key learning points |
| * Understand the meaning of a fraction
* Investigate the equivalence of fractions
* Compare fractions

**Bring on the Maths+: Lower Key Stage 2**Fractions & decimals: Fractions as numbers | * Recognise a unit fraction of a set of objects
* Recognise a non-unit fraction of a set of objects
* Write a fraction of a set of objects
* Understand a unit fraction as a number
* Understand a non-unit fraction as a number
* Understand the concept of equivalent fractions
* Recognise equivalent fractions from diagrams
* Complete diagrams to show equivalent fractions
* Create diagrams to show equivalent fractions
* Compare a set of unit fractions
* Compare a set of fractions which have the same denominator
 |
| Prerequisites | Mathematical language | Pedagogical notes |
| * Recognise, find, name and write the fractions 1/3, 1/4, 2/4 and 3/4 of a length, shape, set of objects or quantity
* Write simple fraction statements; e.g. 1/2 of 6 = 3
* Recognise the equivalence of 2/4 and 1/2
 | FractionUnit fractionNon-unit fractionNumeratorDenominatorEquivalent (fraction)CompareGreater than, less than**Notation**Horizontal bar for fractionsDiagonal bar for fractionsUse of <, > and = symbols when comparing fractions | Describe 1/3 as ‘there are three equal parts and I take one’, and 3/4 as ‘there are four equal parts and I take three’. Also make the connection between 3/4  and ‘ 3 of 1/4 ‘ Be alert to pupils reinforcing misconceptions through language such as ‘the bigger half’.To explore the equivalency of fractions make several copies of a diagram with half shaded. Show that splitting these diagrams with varying numbers of lines does not alter the fraction of the shape that is shaded.NCETM: [Teaching fractions](https://www.ncetm.org.uk/resources/44490)NCETM: [The Bar Model](https://www.ncetm.org.uk/resources/44568) NCETM: [Glossary](https://www.ncetm.org.uk/public/files/17308038/National%2BCurriculum%2BGlossary.pdf)**Common approaches***In this unit, pupils work with denominators of at least 2 to 10.**Pupils are expected to use horizontal bar notation for fractions.* |
| Reasoning opportunities and probing questions | Suggested activities | Possible misconceptions |
| * Show me a fraction. And another. And another.
* Which you would prefer, ½ of a cake, 1/3 of a cake or ¼ of a cake?
* Convince me that $\frac{1}{2}=\frac{2}{4} $
* Show me a picture of $\frac{1}{5}$. And another. And another.

NCETM: [Fractions Reasoning](https://www.ncetm.org.uk/public/files/18416412/4_Progression_Map_Fractions_Reasoning_.pdf) | NRICH: [Fraction Match](http://nrich.maths.org/6938)NRICH: [Matching Fractions](http://nrich.maths.org/8283)NCETM: [Activity F - Comparing Fractions](https://www.ncetm.org.uk/resources/42641)**Learning review**KM: [3M8 BAM Task](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M8_BAM.pdf), [3M9 BAM Task](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M9_BAM.pdf)NCETM: [NC Assessment Materials (Teaching and Assessing Mastery)](https://www.ncetm.org.uk/resources/46689) | * Some pupils may think that diagrams to show fractions must always be circular
* Some pupils may not acknowledge that the parts in a fraction must be equal; e.g. they talk about the ‘bigger half’.
* Some pupils may not appreciate the fact that a non-unit fraction is a multiple of a unit fraction
 |

|  |  |
| --- | --- |
| *Measuring space* | *12 lessons* |
| **Key concepts (National Curriculum statements)** | **The Big Picture**: [Measurement and mensuration progression map](http://kangaroomaths.com/free_resources/planning/KM_MathematicsProgression_GeometryMeasurementMensuration.xlsx) |
| * measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml)
* measure the perimeter of simple 2-D shapes
 |
| [Return to overview](#Overview) |
| Possible themes | Possible key learning points |
| * Develop measurement skills
* Solve problems involving measurement
* Understand perimeter
 | * Use a ruler to measure lengths to the nearest millimetre
* Use a ruler to measure lengths to the nearest centimetre
* Use measuring equipment to measure lengths to the nearest metre
* Use digital and mechanical scales to measure mass to the nearest kg
* Use digital and mechanical scales to measure mass to the nearest g
* Use measuring vessels to measure a volume of liquid
* Choose appropriate units to state the result of a measurement
* Compare the length of two or more objects
* Compare the mass of two or more objects
* Compare the volume of two or more objects
* Compare the capacity of two or more objects
* Find the perimeter of a 2-D shape by measuring
 |
| Prerequisites | Mathematical language | Pedagogical notes |
| * Measure length using m, cm
* Measure mass using kg, g
* Measure volume / capacity using l, ml
 | Length, distanceMassVolumeCapacityMetre, centimetre, millimetreKilogram, gramLitre, millilitrePerimeter2-D**Notation**Abbreviations of units in the metric system: m, cm, mm, kg, g, l, ml | In this unit pupils should only measure perimeter; e.g. with string. Calculating perimeter is in Stage 4.Weight and mass are distinct though they are often confused in everyday language. Weight is the force due to gravity, and is calculated as mass multiplied by the acceleration due to gravity. Therefore weight varies due to location while mass is a constant measurement.The prefix ‘centi-‘ means one hundredth, and the prefix ‘milli-‘ means one thousandth. These words are of Latin origin.The prefix ‘kilo-‘ means one thousand. This is Greek in origin.NCETM: [Glossary](https://www.ncetm.org.uk/public/files/17308038/National%2BCurriculum%2BGlossary.pdf)**Common approaches***Every classroom has a sack of sand (25 kg), a bag of sugar (1 kg), a cheque book (1 cheque is 1 gram), a bottle of water (1 litre, and also 1 kg of water) and a teaspoon (5 ml)**Teachers ensure that pupils correctly position the ‘0’ on the ruler when measuring the line.*  |
| Reasoning opportunities and probing questions | Suggested activities | Possible misconceptions |
| * Show me something in the classroom that is between 20 cm and 40 cm. And another. And another.
* Kenny measures two lines; 1 m and 35 cm. He says the difference is 650 mm. Do you agree with Kenny? Explain your answer.
* Convince me how to find the perimeter of a shape.
* Create a shape with a perimeter greater than 30 cm.

NCETM: [Measurement Reasoning](https://www.ncetm.org.uk/public/files/18436766/7_Progression_Map_Measurement_Reasoning.pdf) | NRICH: [Olympic Starters](http://nrich.maths.org/8170) NRICH: [Car Journey](https://nrich.maths.org/10350)NCETM: [Activity B - Perimeter](https://www.ncetm.org.uk/resources/42725)NCETM: [Activity A - Measures](https://www.ncetm.org.uk/resources/42725)**Learning review**KM: [3M12 BAM Task](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M12_BAM.pdf), [3M13 BAM Task](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M13_BAM.pdf)NCETM: [NC Assessment Materials (Teaching and Assessing Mastery)](https://www.ncetm.org.uk/resources/46689) | * Some pupils may think that you put the end of the ruler (rather than the ‘0’) at the start of a line to measure it.
* Some pupils may think that the conversion factor between all measures is multiply or divide by 10.
* Some pupils may think that milli- refers to ‘million’
 |

|  |  |
| --- | --- |
| *Investigating angles* | *8 lessons* |
| **Key concepts (National Curriculum statements)** | **The Big Picture**: [Position and direction progression map](http://kangaroomaths.com/free_resources/planning/KM_MathematicsProgression_GeometryPositionDirection.xlsx)  |
| * recognise angles as a property of shape or a description of a turn
* identify right angles, recognise that two right angles make a half-turn, three make three quarters of a turn and four a complete turn; identify whether angles are greater than or less than a right angle
 |
| [Return to overview](#Overview) |
| Possible themes | Possible key learning points |
| * Explore angles and turning
* Compare angles

**Bring on the Maths+: Lower Key Stage 2**Properties of Shapes: Turnings | * Understand that angle is a description of turn
* Understand that angles are a feature of shapes
* Identify a right angle as a quarter turn and when a shape has a right angle
* Recognise that two right angles make a half-turn
* Recognise that three right angles make three quarters of a turn
* Recognise that four right angles make a complete turn
* Identify angles that are less than right angle
* Identify angles that are greater than a right angle
 |
| Prerequisites | Mathematical language | Pedagogical notes |
| * Recognise and name the fractions 1/2, 1/4, 2/4, 3/4
 | HalfQuarterThree quartersAngleTurnRight angleGreater than, less than**Notation**Right angle notation | Understanding degrees as a way of measuring angles is not introduced until Stage 5.It is thought that the origin of the name ‘right angle’ is the Latin word for ‘upright’; as in perpendicular to the horizontal base in architectural contexts.NCETM: [Glossary](https://www.ncetm.org.uk/public/files/17308038/National%2BCurriculum%2BGlossary.pdf)**Common approaches***All pupils experience the ‘feel’ of a right angle by turning through quarter turns* |
| Reasoning opportunities and probing questions | Suggested activities | Possible misconceptions |
| * Show me a right angle in this classroom. And another. And another.
* Show me an angle in this classroom less (greater) than a right angle. And another. And another.
* Is this a right angle? Explain your answer.
* Convince me why this is not called a ‘left’ angle!

NCETM: [Geometry - Properties of Shapes Reasoning](https://www.ncetm.org.uk/public/files/18438967/8_Progression_Map_Geometry_properties_of_shapes_Reasoningv2.pdf) | NRICH: [Square It](http://nrich.maths.org/public/viewer.php?obj_id=2526)NCETM: [Activity Set B](https://www.ncetm.org.uk/resources/42835)NCETM: [Activity Set C](https://www.ncetm.org.uk/resources/42835)**Learning review**NCETM: [NC Assessment Materials (Teaching and Assessing Mastery)](https://www.ncetm.org.uk/resources/46689) | * Some pupils may think that right angles have to look like this:

 * Some pupils may think that right angles have to be created from a horizontal and vertical line
* Some pupils may think that all turns have to be in a clockwise direction
 |

|  |  |
| --- | --- |
| *Calculating fractions and decimals* | *8 lessons* |
| **Key concepts (National Curriculum statements)** | **The Big Picture**: [Fractions, decimals and percentages progression map](http://kangaroomaths.com/free_resources/planning/KM_MathematicsProgression_NumberFDP.xlsx) |
| * count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10
* add and subtract fractions with the same denominator within one whole [for example, 5/7 + 1/7 = 6/7]
 |
| [Return to overview](#Overview) |
| Possible themes | Possible key learning points |
| * Develop knowledge of place value
* Explore decimals
* Calculate with fractions

**Bring on the Maths+: Lower Key Stage 2**Fractions & decimals: Counting in tenths | * Recognise that tenths arise from dividing a number or object into ten equal parts
* Write tenths as a fraction and as a decimal
* Count up in tenths
* Count down in tenths
* Add fractions with the same denominator within one whole
* Subtract fractions with the same denominator within one whole
 |
| Prerequisites | Mathematical language | Pedagogical notes |
| * Understand place value in numbers up to 1000
* Connect the ten times table to place value
* Recognise and write unit and non-unit fractions
* Understand unit and non-unit fractions as numbers on a number line
 | Place valueTenthDecimalDivideFractionUnit fractionNon-unit fractionNumeratorDenominatorAddSubtract**Notation**Decimal pointt notation for tenthsHorizontal bar for fractionsDiagonal bar for fractions | Pupils will need to know the place value headings of tenths.Some countries use a comma for a decimal point.It is important to start at different numbers when counting up and down in tenths.Counting should be practised as part of everyday practice: choral counting should not be restricted to this unit.Pictorial representations of calculations involving the addition and subtraction facts are essential for pupils to understand why only the numerators are added or subtracted, not the denominators (e.g. ‘1 of 5 equal parts’ add ‘ 2 of 5 equal parts’ equals ‘3 of 5 equal parts’)NCETM: [Teaching fractions](https://www.ncetm.org.uk/resources/44490)NCETM: [Fractions videos](https://www.ncetm.org.uk/resources/43609)NCETM: [Glossary](https://www.ncetm.org.uk/public/files/17308038/National%2BCurriculum%2BGlossary.pdf)**Common approaches***Pupils are expected to use horizontal bar notation for fractions**Teachers and pupils adopt the mantra: ‘We say one fifth we think one of five equal parts; we say two fifths, we think two of five equal parts, etc’* |
| Reasoning opportunities and probing questions | Suggested activities | Possible misconceptions |
| * Show me a decimal and fraction equivalent pair. And another. And another.
* Jenny is counting in tenths ‘…. 2.7, 2.8, 2.9, 2.10, 2.11 …’. Do you agree with Jenny? Explain your answer.
* Convince me that 6 ÷ 10 = 0.6
* Show me two fractions that add together to make a whole. And another pair. And another pair.
* Kenny thinks that $\frac{1}{4}+ \frac{1}{4}= \frac{2}{8}$ . Do you agree with Kenny? Explain your answer.
* Convince me how to subtract fractions.

NCETM: [Fractions Reasoning](https://www.ncetm.org.uk/public/files/18416412/4_Progression_Map_Fractions_Reasoning_.pdf) | NCETM: [Activity A – visualising fractions along a line](https://www.ncetm.org.uk/resources/42641)NCETM: [Activity E – adding fractions](https://www.ncetm.org.uk/resources/42641)**Learning review**KM: [3M10 BAM Task](http://www.kangaroomaths.com/free_resources/assessment/BAM/3M10_BAM.pdf)NCETM: [NC Assessment Materials (Teaching and Assessing Mastery)](https://www.ncetm.org.uk/resources/46689) | * Some pupils may think that the first place value heading after the decimal point is ‘one-ths’ or ‘unit-ths’
* Some pupils may think that you simply add the numerators and add the denominators when adding fractions.
* Some pupils may think that you simply subtract the numerators and subtract the denominators when subtracting fractions.
* Some pupils may move from 2.9 to 2.10 when counting in tenths
* Some pupils may read the number 2.10 as ‘two point ten’
 |

|  |  |
| --- | --- |
| *Exploring money* | *8 lessons* |
| **Key concepts (National Curriculum statements)** | **The Big Picture**: [Calculation progression map](http://kangaroomaths.com/free_resources/planning/KM_MathematicsProgression_NumberCalculation.xlsx) |
| * add and subtract amounts of money to give change, using both £ and p in practical contexts
 |
| [Return to overview](#Overview) |
| Possible themes | Possible key learning points |
| * Explore money
* Solve problems involving money
 | * Recognise the value of coins
* Add amounts of money when the units are the same
* Add amounts of money when the units are different
* Subtract amounts of money when the units are the same
* Subtract amounts of money when the units are different
* Record a practical money problem using £ and/or p notation
* Solve practical problems that involve calculating change in manageable amounts
 |
| Prerequisites | Mathematical language | Pedagogical notes |
| * Recognise the coins: 1p, 2p, 5p, 10p, 20p, 50p, £1 and £2
* Read and say amounts of money using the coins 1p, 2p, 5p, 10p, 20p, 50p, £1 and £2
* Count, say and record amounts of money using the coins 1p, 2p, 5p, 10p, 20p, 50p, £1 and £2
* Recognise the notes: £5 and £10
* Recognise the symbols for pounds (£) and pence (p)
* Record amounts of money using either pounds (£) or pence (p)
* Find different combinations of coins that equal the same amounts of money
* Solve simple problems involving money, including giving change
 | MoneyCoinChangeNote**Notation**Pounds (£)Pence (p) | This unit focuses on pupils solving money problems in practical situations involving either pounds or pence. They are expected to be able to record the solution using £ or p notation. Note: Decimal notation for money is not introduced formally until Stage 4. NCETM: [Glossary](https://www.ncetm.org.uk/public/files/17308038/National%2BCurriculum%2BGlossary.pdf)**Common approaches**£ **and** p are not used together to record an amount of money, for example £3.27 or 327p but not £3.27p |
| Reasoning opportunities and probing questions | Suggested activities | Possible misconceptions |
| * Kenny thinks that ‘the larger the size of the coin, the greater the value of the coin’. Do you agree with Kenny?
* What is the same and what is different: *2p coin, 5p coin, 10p coin, 20p coin?*
* Jenny buys four items and pays with a £5 note. She gets three £1 coins and three 10p coins in her change. Convince me she could have paid for the four items using exactly five coins.
* Benny buys four items costing 10p, 50p, 10p and 5p. He pays with a £1 coin. He only expects to get one coin in his change. Do you agree with Benny? Explain your answer
 | NRICH: [Five Coins](http://nrich.maths.org/142)NRICH: [Money Bags](http://nrich.maths.org/1116)NRICH: [The Puzzling Sweet Shop](http://nrich.maths.org/223)NCETM: [Activity C](https://www.ncetm.org.uk/resources/42725)**Learning review**NCETM: [NC Assessment Materials (Teaching and Assessing Mastery)](https://www.ncetm.org.uk/resources/46689) | * Some pupils may think that the larger the size of the coin, the greater the value of the coin, for example, a 2p coin is greater in value than a 5p coin.
* Some pupils may ignore the units in the first instance and simply add the numerical value of the coins, for example, 10p coin + £1 coin = 11p or £11
* Some pupils may try and use the £ and p notation together, such as £3p rather than £3 or 300p.
 |

|  |  |
| --- | --- |
| *Presentation of data* | *8 lessons* |
| **Key concepts (National Curriculum statements)** | **The Big Picture**: [Statistics progression map](http://kangaroomaths.com/free_resources/planning/KM_MathematicsProgression_Statistics.xlsx) |
| * interpret and present data using bar charts, pictograms and tables
* solve one-step and two-step questions [for example, ‘How many more?’ and ‘How many fewer?’] using information presented in scaled bar charts and pictograms and tables
 |
| [Return to overview](#Overview) |
| Possible themes | Possible key learning points |
| * Explore ways to show data
* Solve problems involving charts and tables

**Bring on the Maths+: Lower Key Stage 2**Statistics: Bar charts and pictograms | * Interpret a pictogram where the symbol represents multiple items
* Construct a pictogram where the symbol represents multiple items
* Interpret a bar chart
* Construct a bar chart
* Interpret data in a table
* Create a table to show data
* Answer one-step questions about data in charts and tables (e.g. ‘How many?’)
* Answer two-step questions about data in charts and tables (e.g. ‘How many more?’)
 |
| Prerequisites | Mathematical language | Pedagogical notes |
| * Interpret and construct block diagrams
* Interpret and construct pictograms where the symbol represents a single item or 2,5 and 10 units.
* Interpret and construct simple tables
* Understand tallying
 | DataPictogramSymbolKeyTallyBar chartTableTotalCompareAxis**Notation**When tallying, groups of five are created by striking through each group of four | The bar chart was introduced by William Playfair, a Scottish economist, in 1786Pupils are expected to understand and use simple scales, such as 2, 5, or 10 units per cm for bar charts and 2, 5, or 10 units per symbol for pictograms.Note: The word ‘data’ is introduced in stage 3. It the plural of *datum*, from the Latin ‘*datum’* meaning "(thing) given,”.NCETM: [Glossary](https://www.ncetm.org.uk/public/files/17308038/National%2BCurriculum%2BGlossary.pdf)**Common approaches***Pupils always construct or identify the key for a pictogram before doing anything else.* |
| Reasoning opportunities and probing questions | Suggested activities | Possible misconceptions |
| * Show me a bar chart. And another. And another.
* Kenny thinks that a bar chart is the same as a block diagram. Do you agree with Kenny? Explain your answer.
* Jenny draws a bar chart with gaps between the bars. Lenny draws a bar chart with no gaps between the bars. Who is correct? Explain your answer.
* Penny draws a bar chart with horizontal bars. Benny says the bars must be vertical. Who is correct? Explain your answer.
* Always/Sometimes/Never**:** One centimetre on the frequency axis of a bar chart represents one unit.

NCETM: [Statistics Reasoning](https://www.ncetm.org.uk/public/files/18437062/10_Progression_Map_Statistics_Reasoning.pdf) | KM: Make a ‘Human’ Bar Chart by asking pupils to stand on a giant set of axes.KM: [Stick on the Maths](http://www.kangaroomaths.com/free_resources/teaching/sotm/level3/3hd2_ewb.doc) [HD2: Bar charts and pictograms](http://www.kangaroomaths.com/free_resources/teaching/sotm/level3/3hd2_ewb.doc)NRICH: [Class 5’s Names](http://nrich.maths.org/7522)NRICH: [Our Sports](http://nrich.maths.org/7779)NRICH: [The Olympic Flame: Are You in the 95%?](http://nrich.maths.org/7822)NCETM: [Activity A](https://www.ncetm.org.uk/resources/42956)NCETM: [Activity B](https://www.ncetm.org.uk/resources/42956)**Learning review**NCETM: [NC Assessment Materials (Teaching and Assessing Mastery)](https://www.ncetm.org.uk/resources/46689) | * Some pupils may not leave gaps between the bars in a bar chart
* Some pupils may think that one centimetre on the frequency axis of a bar chart always represents one unit in a bar chart.
* Some pupils may think that a symbol always represents one unit in a pictogram.
* Some pupils may think that the bars of a bar chart must be vertical.
 |