**WHITE ROSE HUB SMALL STEPS FOR EACH NC OBJECTIVE (Years 5 & 6)**

**Each set of small steps links to where the areas are within the WHITE ROSE HUB materials to help with FLUENCY, REASONING & PROBLEM-SOLVING.**

**It is only a guide to be used with your own teaching assessment of the class. It is not necessarily split into terms, it is where the WRH material is for those steps.**

**PLEASE ENSURE: FLUENCY, REASONING & PROBLEM-SOLVING is being included in lessons, whether it be at a whole class level or opportunities for activities to ensure that learning is being deepened. Where there are only objectives for one term, please follow the outline for the year and split the objectives accordingly.**

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|  **YEAR 5: PLACE VALUE**  | **YEAR 6: PLACE VALUE**  |
| 1. read, write, order, compare and understand place value of numbers to at least 1 000 000 and determine the value of each digit (1a-c)
2. count forwards or backwards in steps of powers of 10 (steps of 1000/100,000 too) for any given number up to 1 000 000
3. interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero (1d)
4. round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000 (1e)
5. solve number problems and practical problems that involve all of the above (1f)
6. read Roman numerals to 1000 (M) and recognise years written in Roman numerals
7. Recognise and describe linear number sequences including those involving fractions and decimals and find the term to term rule and express it in words
8. Pupils extend and apply their understanding of the number system to the decimal numbers and fractions they have met so far
9. Use the vocabulary on estimation and approximation. Make and justify estimates of large numbers, and estimate simple proportions such as 1/3, 7/10
 | 1. read, write, order and compare numbers up to 10 million and determine the value of each digit (1a)
2. round any number to a required degree of accuracy (1c)
3. use negative numbers in context, and calculate intervals across zero (1i)
4. recognise binary numerals to 15 (1111) and convert between binary and decimal numerals.
5. Solve number and practical problems involving all of the above. (12)
6. say numbers accurately
7. demonstrate understanding of multiplying or dividing a whole number or a decimal by 10, 100 or 1000
8. estimate calculations
9. use negative numbers in a range of contexts [not just temperature]
10. describe, extend and explain number sequences and patterns with whole numbers and decimals
11. round decimals to a required degree of accuracy in a range of contexts
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| **(AUT):**-Roman numbers to 1000-Numbers to 10,000-Numbers to 100,000-Numbers to 1,000,000-Read and write numbers to 1,000,000-Powers of 10-10/100/1000/10000/100000 more or less-Partition numbers to 1,000,000-Number line to 1,000,000-Compare and order numbers to 100,000-Compare and order numbers to 1,000,000-Round to nearest 10, 100 and 1000-Numbers within 100,000-Round within 1,000,000 |  | **(SUM): NEGATIVE NUMBERS**-Understand negative numbers-Count through zero in 1s-Count through zero in multiples-Compare and order negative numbers-Find the difference. | **(AUT):**-Numbers to 1,000,000-Numbers to 10 million-Read and write numbers to 10 million-Powers of 10.-Number line to 10 million-Compare and order any integer-Round any integer-Negative numbers  |  |  |

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|  **YEAR 5: ADDITION & SUBTRACTION**  | **YEAR 6: ADDITION & SUBTRACTION**  |
| 1. add and subtract whole numbers with more than 4 digits (5-digits first), including using formal written methods (columnar addition and subtraction) (2a-b)
2. add and subtract numbers mentally with increasingly large numbers (revising smaller numbers first of all). (2c)
3. use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy (2d)
4. solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why. (2e)
5. Addition – to reorder numbers in a calculation
 | 1. perform mental calculations, including with mixed operations and large numbers (2a-b)
2. Show confidence in column addition and subtraction with bigger numbers (2c-d)
3. Add/subtract amounts of money (2e-f)
4. use their knowledge of the order of operations to carry out calculations involving the four operations
5. solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why
6. solve problems involving addition, subtraction, multiplication and division (12)
7. use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.
8. use negative numbers in context and calculate intervals across zero
9. find what to add to a decimal with units, 10ths and 100ths to make the next higher whole number or 10th
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| **(AUT):**-Mental strategies-Add whole numbers with more than 4-digits (column)-Sub whole numbers with more than 4-digits (column)-Round to check answers-Inverse operations (add/sub)-Multi-step add/sub problems-Compare calculations-Find missing numbers |  |  | **(AUT):**-Add/subtract integers |  |  |

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|  **YEAR 5: MULTIPLICATION & DIVISION** | **YEAR 6: MULTIPLICATION & DIVISION**  |
| 1. identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers. (3h)(3l – problems)
2. know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers and recognise and use squared and cubed numbers.(3k)
3. establish whether a number up to 100 is prime and recall prime numbers up to 19 (3i-j)
4. multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers (short and long) (3d-e)
5. multiply and divide numbers mentally drawing upon known facts (3a-b)
6. divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context (3f-g)
7. multiply and divide whole numbers and those involving decimals by 10, 100 and 1000 (3c)
8. Solve problems involving multiplying and dividing (3m-n)
9. Apply all of the multiplication tables and related division facts frequently, commit them to memory and use them confidently to make larger calculations (3a)
10. Pupils interpret non-integer answers to division by expressing results in different ways according to the context, including with remainders, as fractions, as decimals or by rounding (e.g. 98 ÷ 4 = 24 r 2 = 24 ½ = 24.5 = 25)
11. Pupils use multiplication and division as inverses to support the introduction of ratio in Year 6, for example, by multiplying and dividing by powers of 10 in scale drawings or by multiplying or dividing by powers of 1000 in converting between units such as km and m
12. Distributivity can be expressed as a(b + c) = ab + ac
13. They understand the terms factor, multiple and prime, square and cube numbers and use them to construct equivalent statements (for example, 4 x 35 = 2 x 2 x 35; 3 x 270 = 3 x 3 x 9 x 10 = 92 x 10)
14. Pupils use and explain the = sign to indicate, equivalence, including missing number problems (for example, 13 + 24 = 12 + 25; 33 = 5 x □)
15. Know and apply tests of divisibility by 2,4,5,10 or 100.
16. Begin to use brackets
17. Use the principles of the arithmetic laws as they apply to multiplication.
18. To reorder numbers in a multiplication
 | 1. multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication (3e)
2. divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context (3f)
3. divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context (3f)
4. perform mental calculations, including with mixed operations and large numbers (3a-d)
5. identify common factors, common multiples and prime numbers (3h-k)
6. use their knowledge of the order of operations to carry out calculations involving the four operations
7. solve problems involving addition, subtraction, multiplication and division (41-g) (12)
8. use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.
9. use brackets: know that they determine the order of operations, and that their contents are worked out first
10. use written division methods in cases where the answer has up to two decimal places
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| **(AUT):**-Multiples-Common multiples-Factors-Common factors-Prime numbers-Square numbers-Cube numbers-Multiply by 10, 100 and 1000-Divide by 10, 100 and 1000-Multiples of 10, 100 and 1000  | **(SPR):**-Multiply up to a 4-digit by 1-digit-Multiply a 2-digit by a 2-digit (area model)-Multiply 2-digits by 2-digit-Multiply 3-digit by 2-digit-Multiply 4-digit by 2-digit-Solve problems with multiplication-Short division-Divide 4-digit by 1-digit-Divide with remainders-Efficient division-Solve problems with multiplication and division  |  | **(AUT):**-Common factors-Common multiples-Rules of divisibility-Square and cubed numbersMultiply up to a 4-digit by 2-digit number-Solve problems with multiplication-Short division-Division using factors-Long division (intro)-Long division (with remainders)-Solve problems with division-Solve multi-step problems-Order of operations-Mental calculations and estimation (all 4)-Reasoning from known facts (all 4)  |  |  |

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|  **YEAR 5: FRACTIONS/DECIMALS/PERCENTAGES** | **YEAR 6: FRACTIONS/DECIMALS/PERCENTAGES**  |
| FRACTIONS1. compare and order fractions whose denominators are all multiples of the same number (4a)
2. identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths (4b)
3. recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number [for example, 2/5 + 4/5 = 6/5 = 1 1/5 (4c-d)
4. add and subtract fractions with the same denominator and denominators that are multiples of the same number (Extend understanding to calculations that exceed 1 as a mixed number) (4e-f)
5. multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams (related to scaling and problems involving simple rates) (4g)

DECIMALS1. read and write decimal numbers as fractions [for example, 0.71 = 71/100 (4h)
2. recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents (4i)
3. round decimals with two decimal places to the nearest whole number and to one decimal place (4j)
4. read, write, order and compare numbers with up to three decimal places (4k)
5. solve problems involving number up to three decimal places and are confident in checking the reasonableness of their answers to problems (4l)

PERCENTAGES1. recognise the per cent symbol (%) and understand that per cent relates to ‘number of parts per hundred’, and write percentages as a fraction with denominator 100, and as a decimal (4m-o)
2. solve problems which require knowing percentage and decimal equivalents of ½, ¼, 1/5, 2/5, 4/5 and those fractions with a denominator of a multiple of 10 or 25. (4p)
 | FRACTIONS1. use common factors to simplify fractions; use common multiples to express fractions in the same denomination (5a-b)
2. compare and order fractions, including fractions > 1 (5c)
3. add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions (5d)
4. multiply fractions by whole numbers and simple pairs of proper fractions, writing the answer in its simplest form [for example, ¼ x ½ = 1/8] (5e-f)
5. divide proper fractions by whole numbers [for example, 1/3 ÷ 2 = 1/6] (5g)
6. associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, 8/3]
7. reduce a fraction to its simplest form by cancelling common factors

DECIMALS1. identify the value of each digit to three decimal places and multiply and divide numbers up to three decimal place by 10, 100 and 1000 (1b, d, e-h)
2. multiply and divide numbers with up to two decimal places by 1-digit and 2-digit whole numbers.

PERCENTAGES1. use percentages for comparison and calculate percentages of whole numbers or measures such as 15% of 360
2. recall and use equivalences between fractions, decimals and percentages. (5k-l)
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| **Fractions (AUT):**-Find fractions equivalent to unit fractions-Equivalent fractions to non-unit fractions-Recognise equivalent fractions-Improper fractions to mixed numbers-Mixed numbers to improper fractions-Compare fractions less than 1-Order fractions less than 1/-Compare and order fractions greater than 1-Add/subtract fractions (same denominator)-Add fractions within 1-Add fractions with total greater than 1-Add a mixed number-Add 2 mixed numbers-Subtract fractions-Subtract from a mixed number-Subtract from a mixed number: breaking the whole-Subtract two mixed numbers | **Decimals and %:**-Decimals up to 2DP-Equivalent fractions and decimals (tenths)-Equivalent fractions and decimals (hundredths)-Equivalent fractions and decimals-Thousandths as fractions-Thousandths as decimals-Thousandths on a place value chart-Order and compare decimals (same number of decimal places)-Order and compare any decimals with up to 3DP-Round to the nearest whole number-Round to 1DP-Understand %-% as fractions-% as decimals-Equivalent F.D.P  | **Decimals (SUM):**-Use known facts to Add and subtract decimals within 1-Complements to 1-Adding and subtracting decimals: crossing whole-Adding decimals with same number of decimal places-Subtract decimals with the same number of decimal places-Add decimals with different number of decimal places-Sub decimals with different number of decimal places-Efficient strategies for adding and subtracting decimals-Decimal sequences-Multiplying decimals by 10, 100 and 1000-Dividing decimals by 10, 100 and 1000.-Multiply and divide decimals: missing values  | **(AUT):**-Equivalent fractions and simplifying-Equivalent Fractions on a number line-Compare and order fractions by the denominator-Compare and order fractions by the numerator-Add/sub simple fractions-Add/sub any two fractions-Add mixed numbers-Subtract mixed numbers-Multi-step problems -Multiply fractions by integer-Multiply fractions by fractions-Divide a fraction by an integer-Divide any fraction by an integer-Mixed questions about fractions-Fraction of an amount-Fraction of an amount – finding the whole | **Decimals (SPR):**-Place value within 1-Place value – integers and decimals-Round decimals-Add/subtract decimals-Multiply by 10, 100 and 1000-Divide by 10, 100 and 1000-Multiply decimals by integers-Divide decimals by integers-Multiply and divide decimals in context.-Decimal and fraction equivalents-Fractions as division**Percentages:**-Understand %Fractions to percentages-Equivalent FDP-Order FDP-Percentage of an amount (1-step)-Percentage of an amount (multi-step)-Percentages: missing values-Ordering FDP  |  |

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|  **YEAR 5: GEOMETRY (PROPERTIES OF SHAPE)** | **YEAR 6: GEOMETRY (PROPERTIES OF SHAPE)** |
| 1. identify 3-D shapes, including cubes and other cuboids, from 2-D representations (6a)
2. know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles (6b)
3. draw given angles, and measure them in degrees (o) (6c)
4. identify: angles at a point and one whole turn (total 360o), angles at a point on a straight line and ½ a turn (total 180o), other multiples of 90o (6d-e)
5. use the properties of rectangles to deduce related facts and find missing lengths and angles (6f)
6. distinguish between regular and irregular polygons based on reasoning about equal sides and angles (6g-h)
7. Pupils become accurate in drawing lines with a ruler to the nearest mm, and measuring with a protractor. They use conventional markings for parallel lines and right angles
8. Pupils use the term diagonal and make conjectures about the angles formed by diagonals and sides and other properties of quadrilaterals, for example using dynamic geometry ICT tools
9. Pupils use angle sum facts and other properties to make deductions about missing angles and relate these to missing number problems
10. Classify triangles (brackets isosceles, equilateral, scalene) using criteria such as equal sides, equal angles, lines of symmetry.
11. Recognise reflective symmetry in regular polygons.
12. Complete symmetrical patterns with two lines of symmetry at right angles (using squared paper or pegboard)
13. Make shapes with increasing accuracy. Visualise 3-D shapes from 2D drawings and identify different nets from an open cube.
 | 1. draw 2-D shape using given dimensions and angles and nam and describe (9a)
2. recognise, describe and build simple 3-D shapes, including making nets (9a, d)
3. compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons (9b-c)
4. illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius (9h)
5. recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles (9e-g)
6. use properties such as perpendicular and parallel faces or edges
7. continue to name and describe shapes
8. classify quadrilaterals using criteria such as parallel sides, equal angles, equal sides
9. identify, estimate, order, measure and calculate acute, obtuse, reflex and right angles
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|  |  | **(SUM):**-Understand and use degrees-Classify angles-Estimate angles-Measure angles up to 180-Draw lines and angles accurately-Calculate angles around a point-Calculate angles on a straight line-Calculating lengths and angles in shapes-Regular and irregular polygons-3D shapes  |  |  | **(SUM):**-Measure and classify angles-Calculate angles-Vertically opposite angles-Angles in a triangle-Angles in a triangle: special cases-Angles in a triangle: missing angles-Angles in quadrilaterals-Angles in polygons-Circles-Draw shapes accurately-Nets of 3D shapes |

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|  **YEAR 5: GEOMETRY (DIRECTION)** | **YEAR 6: GEOMETRY (DIRECTION)**  |
| 1. identify, describe and represent the position of a shape following a reflection or translation, using the appropriate language, and know that the shape has not changed. (7a-c)
2. Pupils recognise and use reflection and translation in a variety of diagrams including continuing to use a 2D grid and coordinates in the first quadrant, moving on to 4 quadrants. Reflection should be in lines that are parallel to the axes
 | 1. describe positions on the full coordinate grid (all four quadrants) (10c)
2. draw and translate simple shapes on the coordinate plane, and reflect them in the axes (10b)
3. plot positions on the full coordinate grid (all four quadrants)
4. Sketch the position of a simple shape after a rotation of 90° or 180° about a vertex
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|  |  | **(SUM):**-Read and plot coordinates-Problem solving with coordinates-Translation-Translations with coordinates-Lines of symmetry-Reflection in horizontal and vertical lines  | **(AUT):**  |  | SUMMER:-Co-ordinates in the 1st quadrant-Plotting co-ordinates in four quadrants-Solve problems with coordinates-Translations-Reflections |

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|  **YEAR 5: MEASUREMENT** | **YEAR 6: MEASUREMENT** |
| 1. convert between different units of metric measure (for example, kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre) (5a)
2. understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints (5b)
3. measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres (5c)
4. calculate and compare the area of rectangles (including squares), and including using standard units, square centimetres (cm2) and square metres (m2) and estimate the area of irregular shapes (5d-e)
5. estimate volume [for example, using 1 cm3 blocks to build cuboids (including cubes)] and capacity [for example, using water] (5f-g)
6. solve problems involving converting between units of time (for example, days to weeks, expressing the answer as weeks and days) (5h)
7. use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling. (5i)
8. Use the relations of perimeter or area to find unknown lengths. Missing measures questions such as these can be expressed algebraically, for example 4 + 2b = 20 for a rectangle of sides 2cm and b/cm and perimeter of 20cm
9. Calculate the area from scale drawings using given measurements
10. Use units of time; read the time on a 24-hour digital clock and use digital 24-hour clock notation such as 19:53
 | 1. solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate, including time. (8h)
2. use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places (8f, g)
3. convert between miles and kilometres and understand equivalences of metric and common imperial units (8f, g)
4. recognise that shapes with the same areas can have different perimeters and vice versa (8b-d)
5. recognise when it is possible to use formulae for area and volume of shapes (8b-d)
6. calculate the area and perimeter of rectangles, parallelograms and triangles (8b-d)
7. calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm³) and cubic metres (m³), and extending to other units [for example, mm³ and km³] (8e)
8. use, read and interpret timetables
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|   | **Perimeter and area (SPR):**-Perimeter of rectangles-Perimeter of rectilinear shapes-Perimeter of polygons-Area of rectangles-Area of compound shapes-Estimate area | **Converting units (SUM):**-Kilograms and kilometres-Milligrams and millilitres-Convert units of length-Convert between metric and imperial units-Converting units of time-Calculate Timetables**Volume:**-Cubic centimetres-Compare volume-Estimate volume-Estimate capacity  | **Converting units (AUT):**-Metric measures-Convert metric measures-Calculate with metric measures-Miles and kilometres-Imperial measures | **Perimeter, area and volume:**-Shapes: same area-Area and perimeter-Area of a triangle (counting squares)-Area of a triangle (right-angled)-Area of a triangle (any)-Area of a parallelogram-Volume: counting cubes-Volume of a cuboid  |  |

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|  **YEAR 5: STATISTICS**  | **YEAR 6: STATISTICS** |
| 1. solve comparison, sum and difference problems using information presented in a line graph (8a)
2. complete, read and interpret information in tables, including timetables and pie charts. (8b)
3. Pupils connect their work on coordinates and scales to their interpretation of line graphs
4. They begin to decide which representations of data are most appropriate and why
 | 1. interpret and construct pie charts and line graphs and use these to solve problems (11b-c)
2. calculate and interpret the mean as an average (11d)
3. Read and interpret timetables and calendars (11a)
4. calculate and interpret the median, mode and range
5. construct and interpret Venn and Carroll diagrams
6. begin to draw and interpret a line graph, in which intermediate values have meaning
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| **(**  | **(SPR):**-Draw line graphs-Read and interpret line graphs-Read and interpret tables-2-way tables-Read and interpret Timetables |  |  | **(SPR):**-Line graphs-Dual bar charts-Read and interpret pie charts-Pie charts with percentages-Draw pie charts-The mean  |  |

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|  **YEAR 5: RATIO & PROPORTION** | **YEAR 6: RATIO & PROPORTION** |
|  | RATIO & PROPORTION (6a-c)1. use ratios to show the relative sizes of two quantities
2. recognise equivalent ratios and reduce a given ratio to its lowest terms
3. recognise and use division in the context of fractions, percentages and ratio.
4. solve problems involving similar shapes where the scale factor is known or can be found (12)
5. solve problems involving unequal sharing and grouping using knowledge of fractions and multiples (12)
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|  |  |  |  | **(SPR):**-Add or multiply?-Using ratio language-Introducing the ratio symbol-Ratio and fractions-Scale drawing-Using scale factors-Similar shapes-Ratio problems -Proportion problems-Recipes | SUM: SK/MH/CWS done. |

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|  **YEAR 5: ALGEBRA** | **YEAR 6: ALGEBRA** |
| \*NO SPECIFIC OBJ | 1. use simple formulae (7a)
2. generate and describe linear number sequences (7b)
3. express missing number problems algebraically
4. find pairs of numbers that satisfy an equation with two unknowns, e.g. What is 2a+3b if a=2 and b=3?
5. enumerate possibilities of combinations of two variables
6. describe, extend and explain number sequences and patterns
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|  |  |  |  | **(SPR):**-1-step function machines-2-step function machines-Forming expressions-Substitution-Formulae-Forming equations-Solve simple one step equations-Solve two-step equations-Find pairs of values-Solve problems with two unknowns |  |