UK Mathematics R-Yr 9 National Curriculum Outcomes Addressed Within Numbers Up! 2 Baggin' the Dragon

Age	Level	Curriculum Level	National Curriculum Objectives
4-5	1	R	**Measures, Shape and Space** **Length, Mass and Capacity** Use language such as *more or less, longer or shorter, heavier or lighter…*to compare directly two lengths, masses or capacities; extend to three or more quantities. **Time** Begin to understand and use the vocabulary related to time; sequence familiar events; begin to know the days of the week in order and read o'clock time. **Shape and Space** Use language to describe the shape and size of solids and flat shapes, begin to name shapes and use them to make pictures and patterns. Start to become aware of some properties of solid shapes when comparing them. Use language to describe the shape and size of solids and flat shapes, begin to name 3D and 2D shapes such as *cube, cone, sphere… circle, triangle, square, rectangle…* **Patterns and Symmetry** Put sets of objects in order of size. Recognise and recreate patterns. **Position, Direction and Movement** Use everyday words to describe position, direction and movement. **Handling Data** Solve a given problem by collecting, sorting and organising information in simple ways.
6-7	2	Year 1	**Measures** Understand and use the vocabulary related to length, mass and capacity; begin to know relationships between standard metric units. Measure and compare: 1. By direct (side-by-side) comparison; 2. Using uniform non-standard units; 3. Using standard units. Suggest suitable units to measure or estimate length, mass or capacity. Read and interpret number scales with some accuracy. **Time** Understand and use the vocabulary related to time; know and use units of time and the relationships between them; read the time from clocks; solve problems involving time. Know that: 1 week = 7 days 1 day = 24 hours Know in order the days of the week. Order familiar events in a day or week, or in a story. Read the time to the hour or half hour on an analogue clock. **Shape and Space** Describe and classify common 3D and 2D shapes according to their properties. Make shapes and patterns with increasing accuracy, and describe their features. Recognise line symmetry in simple cases. Describe positions and directions. Describe movements (in a straight line and turning) and understand angles as a measure of turn.

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			Handling Data Solve a given problem by collecting, sorting and organising information in simple ways.
7-8	3	Year 2	**Measures** Understand and use the vocabulary related to length, mass and capacity; begin to know relationships between standard metric units. Measure and compare: 1. By direct comparison; 2. Using uniform non-standard units; 3. Using standard units. Know that: 1 metre =100 centimetres 1 kilogram = 1000 grams 1 litre = 1000 millilitres Suggest suitable units to estimate or measure length, mass or capacity e.g. suggest things that could be measured using metres, centimetres, kilograms, grams, litres, millilitres… Read and interpret number scales with some accuracy. Read a simple scale to the nearest labelled division. **Time** Understand and use the vocabulary related to times; know and use units of time and the relationships between them; read time from clocks; solve problems involving time. Know that 1 hour = 60 minutes 1 minute = 60 seconds Know in order the months and seasons of the year. Read the time to the nearest half or quarter hour on a digital or analogue clock. **Shape and Space** Describe and classify common 2D and 3D shapes according to their properties. Use mathematical vocabulary to name, classify and describe some features of 2D and 3D shapes, extending the shapes used to…*pyramid, pentagon, hexagon, octagon…* Sort 2D and 3D shapes in different ways according to the properties of their faces. Choose an example of a 2D or 3D shape to match given properties. Make shapes and patterns with increasing accuracy, and describe their features. **Symmetry** Recognise line symmetry in simple cases. Understand, use and begin to read *line of symmetry, mirror line, reflection, symmetrical…* Complete a symmetrical pattern by completing the other 'half'. **Position** Describe positions and directions. Extend vocabulary to include *clockwise, anticlockwise…* Describe the position of a feature on a simple map. Describe directions. **Angle** Describe movements (in a straight line and turning), and understand angle as a measure of turn. Recognise whole, half and quarter turns.

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			Know that a quarter turn is called a right angle. **Handling Data** Solve a given problem by collecting, sorting and organising information in simple ways. Make or read a simple block graph. Construct or read a pictogram where one symbol represents one unit.
8-9	4	Year 3	**Measures** Understand and use the vocabulary related to length, mass and capacity; begin to know relationships between standard metric units. Measure and compare: . By direct comparison; . Using uniform non-standard units; . Using standard units. Know that: 1 kilometre = 1000 metres 1 metre =100 centimetres 1 kilogram = 1000 grams 1 litre = 1000 millilitres Begin to recognise that 3.5m represents three and a half metres, and that 3.05 metres is three metres and five centimetres. Suggest suitable units to estimate or measure length, mass or capacity e.g. suggest things that could be measured using metres, centimetres, kilograms, grams, litres, millilitres… Read and interpret number scales with some accuracy. Read a simple scale to the nearest labelled division. **Time** Understand and use the vocabulary related to time; know and use units of time and the relationships between them; read time from clocks; solve problems involving time. Know that 1 year = 365 days or 52 weeks or 12 months 1 week = 7 days Use a calendar and write the date correctly. Read the time to the nearest five minutes on a digital or analogue clock. **Shape and Space** Describe and classify common 2D and 3D shapes according to their properties. Extend vocabulary to include *right-angled, vertex, vertices.* Use mathematical vocabulary to name, classify and describe some features of 2D and 3D shapes, extending the shapes used to…*prism, hemi-sphere, quadrilateral, semicircle…* Sort 2D and 3D shapes in different ways according to the properties of their faces. Choose an example of a 2D or 3D shape to match given properties. Sort a set of flat shapes and display them on a Venn or Carroll diagram according to properties such as the number of vertices or sides. Make shapes and patterns with increasing accuracy, and describe their features. Relate 3D shapes to pictures of them. **Symmetry** Recognise more than one line of symmetry in simple cases. Complete a symmetrical pattern by completing the other 'half'. **Position** Describe and find the position of a square on a grid of squares with rows and columns labelled. Extend vocabulary to include *clockwise, anticlockwise…*

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			Recognise the four compass directions N, S, E and W. Describe the position of a feature on a simple map. Describe a route as being e.g. 2 squares east and 2 squares south. **Angle** Describe movements (in a straight line and turning), and understand angle as a measure of turn. Recognise whole, half and quarter turns. Know that a quarter turn is called a right angle and a straight line is 2 right angles. Sort 2D shapes according to whether they have all, some or no right angles. Use a template to measure whether angles are right angles, or greater/smaller than right angles. **Handling Data** Solve a given problem by collecting, sorting and organising information in simple ways. Make or read a simple bar chart. Make or read a simple pictogram where the symbol represents 2 units.
	5	Year 4	**Measures** Use vocabulary related to measures. Know relationships between standard metric units. Know that: 1 kilometre = 1000 metres 1 metre =100 centimetres 1 kilogram = 1000 grams 1 litre = 1000 millilitres Know the equivalents of one half, one quarter, three quarters and one tenth 0f 1km, 1m, 1kg and 1L in m, cm, g and mL respectively. Begin to write, for example, 1.6m in centimetres and vice versa. Suggest suitable units to estimate or measure length, mass or capacity. Read a simple scale to the nearest labelled division. Measure and calculate the perimeter and area of simple shapes. **Time** Understand and use the vocabulary related to times; suggest suitable units of time to estimate and measure. Know that 1 millennium = 1000 years 1 century = 100 years Use a calendar and write the date correctly. Read the time from clocks, calendars and timetables. Read the time to the minute on a 12-hour digital clock and an analogue clock. Use **am** and **pm.** **Shape and Space** Describe and visualise common 2D and 3D shapes; classify them according to their properties. Make shapes and patterns with increasing accuracy, and describe their features. Identify simple nets of 3D shapes. Relate 3D shapes to pictures of them. **Symmetry** Recognise reflective symmetry in 2D shapes, reflections and translations. Complete a symmetrical pattern by completing the other 'half'. **Position**

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			Recognise positions and directions, and use co-ordinates. Describe and find the position of a point on a grid of squares where the lines are numbered. Recognise and identify simple examples of horizontal and vertical lines or edges. Recognise the eight compass directions N, S, E and W, NE, NW, SE, SW. **Angle** Estimate and measure angles; recognise rotations. Know that angles are measured in degrees and that: One whole turn is 360 degrees or four right angles; One quarter turn is 90 degrees or one right angle; Half a right angle is 45 degrees. Know that the angles at the corners of rectangles and squares are 90 degrees, and the angles of an equilateral triangle are 60 degrees. Describe clockwise and anticlockwise turns in degrees. Make and describe turns using compass directions. Start to order angles; place in order a set of angles, each less than two right angles. **Handling Data** Solve a problem by collecting, organising, representing, extracting and interpreting data in tables, graphs and charts. Make or read a tally chart. Make or read a pictogram where the symbol represents several units. Interpret bar charts. Use sorting diagrams such as two-way Venn and Carroll diagrams to display information about shapes or numbers.
10-11	6	Year 5	**Measures** Use vocabulary related to measures. Know and use relationships between standard metric units. Know that: 1 kilometre = 1000 metres 1 metre =100 centimetres 1 kilogram = 1000 grams 1 litre = 1000 millilitres Use correctly the abbreviations *km, m, cm, mm, kg, g, L, mL* and *cm2, m2, mm2* for square centimetres, square metres and square millimetres. Know the equivalents of one half, one quarter, three quarters and one tenth 0f 1km, 1m, 1kg and 1L in m, cm, g and mL respectively. Begin to write, for example, 1.6m in centimetres and vice versa. Suggest suitable units to estimate or measure length, mass or capacity. Read measuring scales between divisions. Begin to round decimal measurements to the nearest whole unit. Express the formula for perimeter of a rectangle, first in words, then in letters. Use a formula for finding the perimeter of a regular polygon. Express the formula for area of a rectangle, first in words, then in letters. **Time** Understand and use the vocabulary related to times; suggest suitable units of time to estimate and measure. Know that 1 decade = 10 years 1 leap year = 366 days Use a calendar and write the date correctly.

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			Read the time from clocks, calendars and timetables. Read the time to the minute on a 24-hour digital clock and an analogue clock. Use timetables to solve problems. **Shape and Space** Describe and visualise common 2D and 3D shapes; classify them according to their properties. Continue to name and describe shapes, extending to *scalene triangle…octahedron.* Name and classify triangles, and know some of their properties. Understand the term *congruent.* Make shapes and patterns with increasing accuracy, and describe their features. Identify the different nets for an open cube.. Visualise 3D shapes from 2D drawings. **Symmetry** Recognise reflective symmetry in 2D shapes, reflections and translations. investigate the lines of symmetry in regular polygons. Complete symmetrical patterns with two lines of symmetry at right angles. Identify the position of a simple shape after it has been translated. **Position** Recognise positions and directions, and use co-ordinates. Read and plot points using co-ordinates in the first quadrant. Know Recognise and identify simple examples of horizontal and vertical lines or edges. Recognise the eight compass directions N, S, E and W, NE, NW, SE, SW. **Angle** Estimate and measure angles; recognise rotations. Know that angles are measured in degrees and that: One whole turn is 360 degrees or four right angles; One quarter turn is 90 degrees or one right angle; Half a right angle is 45 degrees. Know that the angles at the corners of rectangles and squares are 90 degrees, and the angles of an equilateral triangle are 60 degrees. Sort 2D shapes according to whether they have all, some or no right angles. Use a template to measure whether angles are right angles, or greater/smaller than right angles. **Handling Data** Interpret a bar chart or a bar line chart showing the frequency of an event. Develop understanding of the mode (most common item) and the range (difference between greatest and least) in a set of data. Interpret a line graph.
11-12	7	Year 6	**Measures** Use vocabulary related to measures. Know and use relationships between standard metric units. Know that: 1 kilometre = 1000 metres 1 metre =100 centimetres 1 kilogram = 1000 grams

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			1 litre = 1000 millilitres 1 tonne = 1000 kilograms Use correctly the names of standard metric units: *tonne* Know the equivalents of one thousandth of 1km, 1kg and 1L in m, g and mL respectively. Convert a larger metric unit to a smaller and begin to convert a smaller unit to a larger. Suggest suitable units to estimate or measure length, mass or capacity. Read measuring scales, converting the unit to an equivalent metric unit e.g. read a mass in grams from a scale showing divisions in kilograms. Record measured lengths, weights or capacities in decimal form : e.g. write 4125g in kilograms and grams. Round a measurement to the nearest whole unit or tenth of a unit. Calculate the perimeters of compound shapes that can be split into rectangles. Find the area of a right-angled triangle by considering it as half of a rectangle. **Time** Understand and use the vocabulary related to times; suggest suitable units of time to estimate and measure. Extend vocabulary to include *Greenwich mean time, British summer time.* understand different times from around the world. Use a world time chart to answer questions related to relative time in different places. Use a calendar and write the date correctly. Read the time from clocks, calendars and timetables. Read the time to the minute on a 24-hour digital clock and an analogue clock. Use timetables to solve problems. **Shape and Space** Describe and visualise common 2D and 3D shapes; classify them according to their properties. Extend vocabulary to include *concentric, circumference.* Continue to name and describe shapes, extending to *parallelogram, rhombus, kite, trapezium, dodecahedron.* Name and begin to classify quadrilaterals, and know some of their properties. Make shapes and patterns with increasing accuracy, and describe their features. Identify the different nets for a closed cube. Visualise 3D shapes from 2D drawings. **Symmetry** Recognise reflective symmetry in 2D shapes, reflections and translations. investigate the lines of symmetry in regular polygons. Identify the reflection of a simple shape in a mirror line touching it at one point, where the edges of the shape are not necessarily parallel or perpendicular to the mirror line. Identify the reflections of simple shapes in two mirror lines at right angles. Identify positions of simple shapes after they have been translated. **Position** Recognise positions and directions, and use co-ordinates. Extend vocabulary to include *intersecting, intersection, plane.* Read and plot points using co-ordinates beyond the first quadrant.

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			Angle Estimate and measure angles; recognise rotations. Extend vocabulary to include *reflex*. Identify the position of a simple shape after a rotation of 90 or 180 degrees about a vertex. Identify, estimate, order and calculate acute and obtuse angles. **Probability** Discuss events with two or more equally likely outcomes. **Handling Data** Discuss a bar chart where discrete data are grouped. Begin to interpret simple pie charts. Find the mode and range of a simple set of data. Begin to find the mean and the median. Begin to interpret a line graph, where intermediate values have meaning.
12-13	8	Year 7	**Algebra** Use letter symbols and distinguish their different roles in algebra. Know that algebraic operations follow the same conventions and order as arithmetic operations; use index notation and the index laws. Simplify or transform algebraic expressions. Construct and solve linear equations, selecting an appropriate method. Use formulae from mathematics and other subjects. Substitute positive integers into simple linear expressions. Substitute integers into formulae expressed in words. Derive simple algebraic expressions and formulae. Generate and describe sequences. Generate terms of a sequence using term-to-term and position-to-term definitions of the sequence. Find the *n*th term, justifying its form by referring to the context in which it was generated. Express functions and represent mappings. Generate points and plot graphs of functions. Interpret the graphs of functions arising from real-life problems. **Shape, Space and Measure** Use accurately the vocabulary, notation and labelling conventions for lines, angles and shapes; distinguish between conventions, facts, definitions and derived properties. Identify properties of angles and parallel and perpendicular lines, and use these properties to solve problems. Identify and use the geometric properties of triangles, quadrilaterals and other polygons to solve problems. Understand congruence and similarity. Use 2D representations, including plans and elevations, to visualise 3D shapes and deduce some of their properties. Understand and use the language and notation associated with reflections, translations and rotations. Recognise and visualise transformations and symmetries of shapes. Use and interpret maps and scale drawings. Use co-ordinates in all four quadrants. Find simple loci. Use units of measurement to measure, estimate, calculate and solve problems in a range of contexts. Use angle measure; distinguish between and estimate the size of acute, obtuse and reflex angles.

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			Deduce and use formulae to calculate lengths, perimeters, areas and volumes in 2D and 3D shapes. Calculate the surface areas of cubes and cuboids. **Handling Data** Calculate statistics from data, finding the mode, mean, median and range. Interpret diagrams and graphs, and draw inferences. Use the probability scale; find and justify theoretical probabilities.
13-14	9	Year 8	**Algebra** Begin to distinguish the different roles played by letter symbols in equations, formulae and functions; know the meanings of the words *formula* and *function.* Know that algebraic operations follow the same conventions and order as arithmetic operations; use index notation for small positive and negative index powers. Simplify or transform linear expressions by collecting like terms; multiply a single term over a bracket. Construct and solve linear equations with integer coefficients (unknown on either or both sides, without and with brackets) using appropriate methods (e.g. inverse operations, transforming both sides the same way). Substitute integers into simple formulae, including examples that lead to an equation to solve, and positive integers into expressions involving small powers; derive simple formulae. Generate terms of a linear sequence using term-to-term and position-to-term definitions of the sequence. Generate terms in all four quadrants; recognise that equations of the form $y = mx + c$ correspond to straight line graphs. **Shape, Space and Measure** Identify alternate angles and corresponding angles; know that the angle sum of a triangle is 180 degrees and of a quadrilateral is 360 degrees. Know that the exterior angle of a triangle is equal to the sum of the two interior opposite angles. Solve geometric problems using side and angle properties of equilateral, isosceles and right-angled triangles and special quadrilaterals; classify quadrilaterals by their geometric properties. Know that if two 2D shapes are congruent, corresponding sides and angles are equal. Transform 2D shapes by using simple combinations of rotations, reflections and translations. Use and interpret maps and scale drawings. Use co-ordinates in all four quadrants. Find simple loci. Use units of measurement to measure, estimate, calculate and solve problems in a range of contexts involving length, area, volume, capacity, mass, time, angle and bearings. Use bearings to specify direction. Deduce and use formulae for the area of a triangle, parallelogram and trapezium; calculate areas of compound shapes made from rectangles and triangles. Know and use the formula for the volume of a cuboid; calculate volumes and surface areas of cuboids and shapes made from cuboids. **Handling Data** Calculate statistics from data, finding the mode, mean, median and range.

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			Use stem-and-leaf diagrams. Interpret tables, diagrams and graphs for both discrete and continuous data, and draw inferences. Use the vocabulary of probability. Know that if the probability of an event occurring is p, then the probability of its not occurring is 1-p; find and record all possible mutually exclusive outcomes for single events in a systematic way, using diagrams and tables.
14-15	10-11	Year 9	**Algebra** Distinguish the different roles played by letter symbols in equations, formulae and functions; know the meanings of the words *formula* and *function.* Use index notation for integer powers and simple instances of the index laws. Simplify or transform algebraic expressions by taking out single-term common factors; add simple algebraic fractions. Construct and solve linear equations with integer coefficients (with and without brackets, negative signs anywhere in the equation, positive or negative solution) using appropriate methods. Substitute integers into expressions and formulae. Generate terms of a linear sequence using term-to-term and position-to-term definitions of the sequence. Generate terms in all four quadrants; recognise that equations of the form $y = mx + c$ correspond to straight line graphs; given values for m and c, find the gradients of lines given by equations of the formula $y = mx + c$. Know simple properties of quadratic functions. **Shape, Space and Measure** Find the sums of the interior and exterior angles of quadrilaterals, pentagons and hexagons, and the interior and exterior angles of regular polygons. Solve geometric problems using properties of angles, of parallel and intersecting lines, and of triangles and other polygons. Understand congruence; apply the conditions SSS, SAS, ASA or RHS to establish the congruence of triangles. Know the definition of a circle and the names of its parts; know that the tangent at any point on a circle is perpendicular to the radius at that point and that the perpendicular drawn from the centre of a circle to a chord bisects the chord. Analyse 3D shapes through 2D projections, including plans and elevations. Transform 2D shapes by using simple combinations of rotations, reflections and translations. Use and interpret maps and scale drawings. Use co-ordinates in all four quadrants. Find simple loci. Use units of measurement to measure, estimate, calculate and solve problems in a range of contexts involving length, area, volume, capacity, mass, time, angle and bearings. Convert between area measures and between volume measures. Understand and use compound measures such as speed, density, pressure. Solve problems involving constant or average rates of change. Know and use formulae for the circumference and area of a circle, and

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			arcs and sectors of circles. Calculate the surface area and volume of right prisms, including cylinders. **Handling Data** Calculate statistics from data, finding the mode, mean, median and range. Use stem-and-leaf diagrams. Interpret tables, diagrams and graphs for both discrete and continuous data, and draw inferences. Use the vocabulary of probability. Know that if the probability of an event occurring is *p*, then the probability of its not occurring is *1-p*; find and record all possible mutually exclusive outcomes for single events in a systematic way, using diagrams and tables.
	11	Year 9 Able pupils	**Algebra** Know and use the index laws in generalised form for multiplication and division of positive integer powers. Square a linear expression, expand the product of two linear expressions of the form *x+ or – n* and simplify the corresponding quadratic expression. Solve a pair of simultaneous linear equations by eliminating one variable; link a graphical representation of an equation to the algebraic solution. Change the subject of a formula. Know simple properties of quadratic functions. Plot the graphs of simple quadratic and cubic functions. **Shape, Space and Measure** Understand and apply Pythagoras's Theorem Understand congruence; apply the conditions SSS, SAS, ASA or RHS to establish the congruence of triangles. Know the definition of a circle and the names of its parts; know that the tangent at any point on a circle is perpendicular to the radius at that point and that the perpendicular drawn from the centre of a circle to a chord bisects the chord. Transform 2D shapes by using simple combinations of rotations, reflections and translations. Use and interpret maps and scale drawings. Use co-ordinates in all four quadrants. Find simple loci. Use units of measurement to measure, estimate, calculate and solve problems in a range of contexts involving length, area, volume, capacity, mass, time, angle and bearings. Convert between area measures and between volume measures. Understand and use compound measures such as speed, density, pressure. Solve problems involving constant or average rates of change. Know and use formulae for the circumference and area of a circle, and arcs and sectors of circles. Calculate the surface area and volume of right prisms, including cylinders. **Handling Data** Calculate statistics from data, finding the mode, mean, median and range. Use stem-and-leaf diagrams.

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			Interpret tables, diagrams and graphs for both discrete and continuous data, and draw inferences. Use the vocabulary of probability. Know that if the probability of an event occurring is *p*, then the probability of its not occurring is *1-p*; find and record all possible mutually exclusive outcomes for single events in a systematic way, using diagrams and tables.