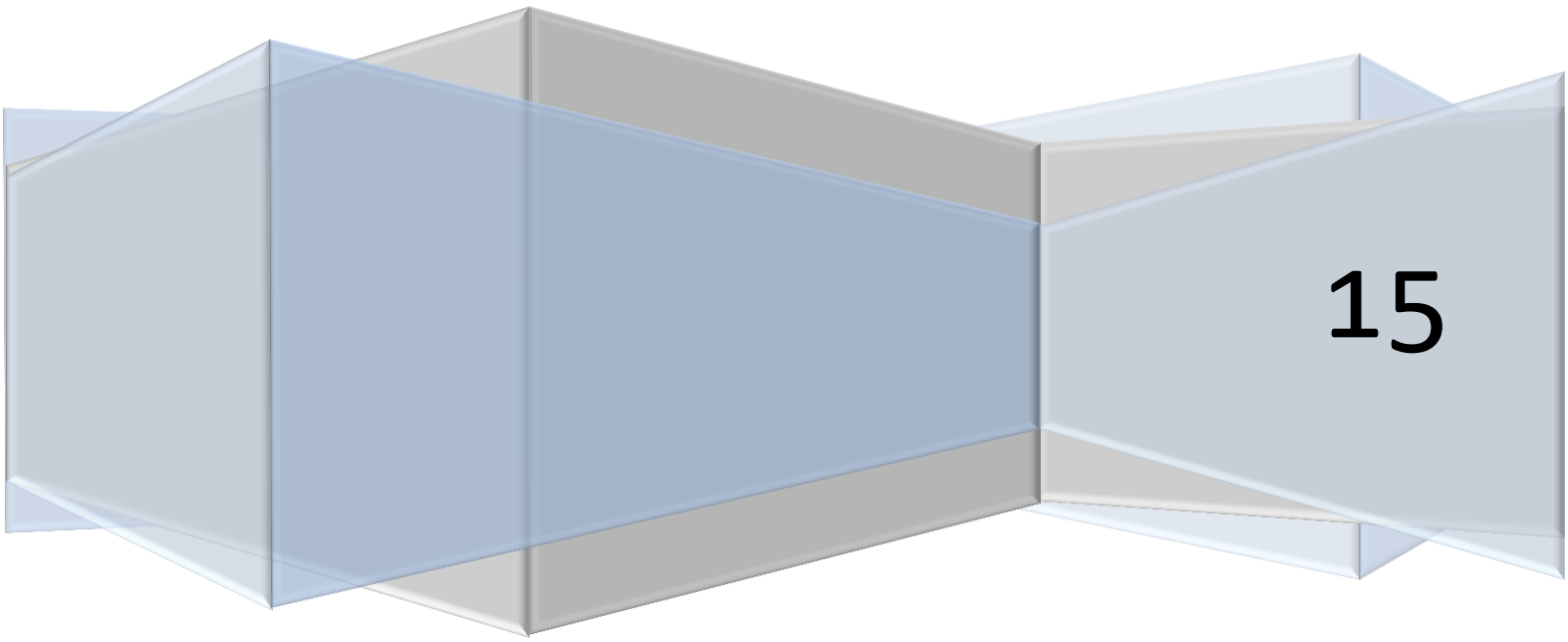
KINGSWOOD
SECONDARY ACADEMY

Mathematics Department

Scheme of Learning KS3

Proposed programme of study commencing February 2015 (Year 7 & 8)

G.Wicks



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January 2015

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Scheme of Learning KS3

- Students in KS3 will follow 'blocks' of topics termly – see below.
- Higher ability student will cover all areas linked directly to KS4 programme.
- Lower ability students will have extra focus on Number/Algebra.
- Each block will begin with a 'Where I am at' Assessment informing a starting level
- Each block will culminate with 'End of Block Assessment' informing progress.
- Each block is accompanied with an Assessing Pupils Progress grid for learning with defined learning objectives – see below.
- Assessment will relate directly to APP grid.
- Results from End of Block Assessment will lead to skills Audit for further 'intervention'.
- Flight-paths will be used to display Progress at each Assessment stage.

Year	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
7 Low	Number & Algebra (1)	Geometry & Number	Statistics	Measure & Number	Algebra & Number (2)	Algebra & Number (2)
7 High	Number & Algebra (1)	Geometry & Number	Statistics	Measure & Number	Algebra & Number (2)	Probability & Number
8 Low	Number & Algebra (1)	Measure & Number	Geometry & Number	Algebra & Number (2)	Statistics	Functional Skills
8 High	Number & Algebra (1)	Measure & Number	Geometry & Number	Algebra & Number (2)	Statistics	Probability & Number
9 Low	Number & Algebra (1)	Algebra & Number (2)	Probability & Number	Statistics (project)	Geometry & Number	Measure & Number
9 High	Number & Algebra (1)	Algebra & Number (2)	Statistics (project)	Statistics (project)	Geometry & Number	Measure & Number

The Number system

Measure

Probability

Calculating

Statistics

Algebra

Geometry

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Number & Algebra (1)

Level	Number and basic algebra skills	Additional Notes
2	Use mental recall of addition and subtraction facts to 10	
	Choose the appropriate operation when solving addition and subtraction problems	
	Begin to understand the place value of each digit; use this to order numbers up to 100	
3	Understand place value in numbers to 1000	
	Derive associated division facts from known multiplication facts	
	Add and subtract two-digit numbers mentally	
	Use mental recall of addition and subtraction facts to 20 in solving problems involving larger numbers	
	Solve whole number problems including those involving multiplication or division that may give rise to remainders	
	Add and subtract three digit numbers using written methods	
	Use place value to make approximations	
	Begin to understand the role of '=' (the 'equals' sign)	
4	Begin to use formulae expressed in words	
	Recognise and describe number relationships including multiple, factor and square	**multiples, factors, primes square numbers, square roots**
	Use a range of mental methods of computation with all operations	**mental arithmetic**
	Recall multiplication facts up to 10 × 10 and quickly derive corresponding division facts	**mental multiplication and division**
	Use efficient written methods of addition and subtraction and of short multiplication and division	**addition and subtraction**
	Solve problems with or without a calculator	**estimating and approximating, using a calculator**
	Check the reasonableness of results with reference to the context or size of numbers	**Approximation**

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Number & Algebra (1) cont.

5	Understand and use an appropriate non-calculator method for solving problems that involve multiplying and dividing any three digit number by any two-digit number	**written multiplication and division**
	Solve simple problems involving ordering, adding, subtracting negative numbers in context	**calculating with integers**
	Construct, express in symbolic form, and use simple formulae involving one or two operations	**simplifying expressions, using brackets, using formulae and expressions, indices**
6	Use systematic trial and improvement methods and ICT tools to find approximate solutions to harder equations	**trial and improvement**
7	Square a linear expression, and expand and simplify the product of two linear expressions of the form $(x \pm n)$ and simplify the corresponding quadratic expression	**expanding two brackets**
	Use formulae from mathematics and other subjects; substitute numbers into expressions and formulae; derive a formula and, in simple cases, change its subject	**using formulae in context, rearranging changing subject**
	Use a calculator efficiently and appropriately to perform complex calculations with numbers of any size, knowing not to round during intermediate steps of a calculation	**using a calculator**
8	Factorise quadratic expressions including the difference of two squares,	**Factorising**
	Manipulate algebraic formulae, equations and expressions, finding common factors and multiplying two linear expressions	**algebraic fractions** **multiplying two brackets**
	Derive and use more complex formulae and change the subject of a formula	**change subject of formula**
	Evaluate algebraic formulae, substituting fractions, decimals and negative numbers	**algebraic fractions substitution**
	Solve problems involving calculating with powers, roots and numbers expressed in standard form, checking for correct order of magnitude and using a calculator as appropriate	**indices and standard form** **surds**

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Number & Algebra (2)

Level	Number & Algebra 2	Additional Notes
2	Recognise sequences of numbers, including odd and even numbers	
3	Recognise a wider range of sequences	
4	Use and interpret coordinates in the first quadrant	**co-ordinates**
	Recognise and describe number patterns	**term to term rules**
5	Use and interpret coordinates in all four quadrants	**co-ordinates**
	Recognise and use number patterns and relationships	**multiples, factors, primes** **prime factors** **roots**
6	Construct and solve linear equations with integer coefficients, using an appropriate method	**writing expressions, solving equations, mappings**
	Generate terms of a sequence using term-to-term and position-to-term definitions of the sequence, on paper and using ICT; write an expression to describe the n^{th} term of an arithmetic sequence.	**term to term rules** **position to term rules** **nth term rule**
	Plot the graphs of linear functions, where y is given explicitly in terms of x; recognise that equations of the form y = mx+c correspond to straight-line graphs	**drawing straight line graphs using y = mx+c**
	Construct functions arising from real-life problems and plot their corresponding graphs; interpret graphs arising from real situations	**time series graphs** **real life graphs**
7	Use algebraic and graphical methods to solve simultaneous linear equations in two variables	**simultaneous equations**
	Solve inequalities in one variable and represent the solution set on a number line	**Inequalities**
	Find the next term and n^{th} term of quadratic sequences and functions and explore their properties	**recursive sequences quadratic sequences**
	Plot graphs of simple quadratic and cubic functions	**quadratic & cubic graphs**
8	Solve inequalities in two variables and find the solution set	**Inequalities**
	Sketch, identify and interpret graphs of linear, quadratic, cubic and reciprocal functions, and graphs that model real situations	**parallel & perpendicular** **real life graphs**
	Understand the effect on a graph of addition of (or multiplication by) a constant	

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Geometry & Number

Level	Geometry & Number	Additional Notes
2	Use mathematical names for common 3-D and 2-D shapes	
	Describe their properties, including number of sides and corners	
	Describe the position of objects	
	Distinguish between straight and turning movements, recognise right angles in turns and understand angle as a measurement of turn	
3	Classify 3-D and 2-D shapes in various ways using mathematical properties such as reflective symmetry for 2-D shapes	
	Begin to recognise nets of familiar 3-D shapes, e.g. cube, cuboid, triangular prism, square-based pyramid	
	Recognise shapes in different orientations and reflect shapes, presented on a grid, in a vertical or horizontal mirror line	
	Describe position and movement	
4	Use the properties of 2-D and 3-D shapes	
	Make 3-D models by linking given faces or edges and draw common 2-D shapes in different orientations on grids	**3D shapes**
	Reflect simple shapes in a mirror line, translate shapes horizontally or vertically and begin to rotate a simple shape or object about its centre or a vertex	**reflection and rotation symmetry**
	Begin to understand simple ratio	**Ratio**
5	Use a wider range of properties of 2-D and 3-D shapes and identify all the symmetries of 2-D shapes	**reflection and rotation symmetry**
	Solve simple problems involving ratio and direct proportion	**ratio and proportion**
	Understand simplifying ratio	**Ratio**
	Reason about position and movement and transform shapes	**reflect, rotate, translate and enlarge shapes**

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Geometry & Number cont…

6	Classify quadrilaterals by their geometric properties	**Properties of shapes**
	Divide a quantity into two or more parts in a given ratio and solve problems involving ratio and direct proportion	**ratio and proportion**
	Use proportional reasoning to solve a problem, choosing the correct numbers to take as 100%, or as a whole	**proportional reasoning** **reverse percentages**
	Visualise and use 2-D representations of 3-D objects	**nets, plans and elevations**
	Enlarge 2-D shapes, given a centre of enlargement and a positive whole-number scale factor	**Enlargements and scale drawings**
	Know that translations, rotations and reflections preserve length and angle and map objects on to congruent images	**reflect, rotate, translate and enlarge shapes** **congruency**
	Use straight edge and compasses to do standard constructions	**Constructions**
7	Enlarge 2-D shapes, given a centre of enlargement and a fractional scale factor, on paper and using ICT; recognise the similarity of the resulting shapes	**enlargements**
7	Calculate the result of any proportional change using multiplicative methods	**percentage change**
7	Find the locus of a point that moves according to a given rule, both by reasoning and using ICT.	**Loci**
7	Understand and use proportionality	**proportional reasoning, financial maths**
8	Use fractions or percentages to solve problems involving repeated proportional changes or the calculation of the original quantity given the result of a proportional change	**finaincial maths** **problem solving**
8	Understand and use congruence and mathematical similarity	**congruence & similarity**

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Statistics

Level	Statistics	Additional Notes
2	Sort objects and classify them using more than one criterion	
	Understand vocabulary relating to handling data	
	Collect and sort data to test a simple hypothesis	
	Record results in simple lists, tables, pictograms and block graphs	
	Communicate their findings, using the simple lists, tables, pictograms and block graphs they have recorded	
3	Gather information	
	Construct bar charts and pictograms, where the symbol represents a group of units	
	Use Venn and Carroll diagrams to record their sorting and classifying of information	
	Extract and interpret information presented in simple tables, lists, bar charts and pictograms	**Bar charts**
4	Collect and record discrete data.	**collecting data,**
	Group data, where appropriate, in equal class intervals	**frequency tables two way tables**
	Continue to use Venn and Carroll diagrams to record their sorting and classifying of information	**venn diagrams**
	Construct and interpret frequency diagrams and simple line graphs	**stem and leaf and frequency diagrams**
	Understand and use the mode and range to describe sets of data	**Averages**
5	Ask questions, plan how to answer them and collect the data required	**designing a survey**
	Understand and use the mean of discrete data and compare two simple distributions, using the range and one of mode, median or mean	**Averages**
	Interpret graphs and diagrams, including pie charts, and draw conclusions	**pie charts interpreting graphs**
	Create and interpret line graphs where the intermediate values have meaning	**time series conversion graphs**

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6	Design a survey or experiment to capture the necessary data from one or more sources; design, trial and if necessary refine data collection sheets; construct tables for large discrete and continuous sets of raw data, choosing suitable class intervals; design and use two-way tables	**designing a survey** **two way tables**
6	Select, construct and modify, on paper & using ICT: - pie charts for categorical data; - bar charts and frequency diagrams for discrete and continuous data; - simple time graphs for time series; - scatter graphs.Identify which are most useful in the context of the problem	**Charts**
6	Communicate interpretations and results of a statistical survey using selected tables, graphs and diagrams in support	**writing a report**
7	Suggest a problem to explore using statistical methods, frame questions and raise conjectures; identify possible sources of bias and plan how to minimise it	**designing a survey**
7	Select, construct and modify, on paper and using ICT, suitable graphical representation to progress an enquiry, including frequency polygons and lines of best fit on scatter graphs	**scatter graphs** **frequency polygons** **histograms**
7	Estimate the mean, median and range of a set of grouped data and determine the modal class, selecting the statistic most appropriate to the line of enquiry	**averages from grouped data** **moving averages**
7	Compare two or more distributions and make inferences, using the shape of the distributions and measures of average and range	**comparing distributions**
7	Examine critically the results of a statistical enquiry, and justify the choice of statistical representation in written presentations	**communication results**
8	Estimate and find the median, quartiles and interquartile range for large data sets, including using a cumulative frequency diagram	**cumulative frequency**
8	Compare two or more distributions and make inferences, using the shape of the distributions and measures of average and spread including median and quartiles	**comparing distributions** **box plots**

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Measure & Number

Level	Measure	Additional Notes
2	Begin to use a wider range of measures including to use every day non-standard and standard units to measure length and mass	
	Count sets of objects reliably	
	Use mental calculation strategies to solve number problems including those involving money and measures	
	Record their work in writing	
	Begin to understand that numbers can be used not only to count discrete objects but also to describe continuous measures	
3	Use a wider range of measures including non-standard units and standard metric units of length, capacity and mass in a range of contexts	
	Recognise negative numbers in contexts such as temperature	
	Use standard units of time	
4	Choose and use appropriate units and instruments	**metric measures** **using a protractor**
	Multiply a simple decimal by a single digit	**mental multiplication and division**
	Use place value to multiply and divide whole numbers by 10 or 100	**powers of 10** **mental multiplication and division**
	Interpret, with appropriate accuracy, numbers on a range of measuring instruments	
	Find perimeters of simple shapes and find areas by counting squares	**Area and perimeter**

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Measure & Number cont.

5	Use language associated with angle and know and use the angle sum of a triangle and that of angles at a point	**angles in a triangle**
	Use understanding of place value to multiply and divide whole numbers and decimals by 10, 100 and 1000 and explain the effect	**powers of 10**
	Round decimals to the nearest decimal place and order negative numbers in context	**Rounding**
	Apply inverse operations and approximate to check answers to problems are of the correct magnitude	**estimating and approximating,**
	Measure and draw angles to the nearest degree, when constructing models and drawing or using shapes	**using a protractor and constructing triangles**
	Read and interpret scales on a range of measuring instruments, explaining what each labelled division represents	**using scales**
	Solve problems involving the conversion of units and make sensible estimates of a range of measures in relation to everyday situations	**metric and imperial measures**
	Understand and use the formula for the area of a rectangle and distinguish area from perimeter	**Area**
6	Solve geometrical problems using properties of angles, of parallel and intersecting lines, and of triangles and other polygons	**angles and lines** **bearings**
	Identify alternate and corresponding angles; understand a proof that the sum of the angles of a triangle is 180° and of a quadrilateral is 360°	**using angle facts**
	Deduce and use formulae for the area of a triangle and parallelogram, and the volume of a cuboid; calculate volumes and surface areas of cuboids	**area** **volume & surface area**
	Know and use the formulae for the circumference and area of a circle	**area and circumference of a circle**
7	Understand and apply Pythagoras' theorem when solving problems in 2-D	**Pythagoras**
	Calculate lengths, areas and volumes in plane shapes and right prisms	**area and volume**
	Make and justify estimates and approximations of calculations; estimate calculations by rounding numbers to one significant figure and multiplying and dividing mentally	**rounding** **upper and lower bounds** **estimating roots**
	Recognise that measurements given to the nearest whole unit may be inaccurate by up to one half of the unit in either direction	**Bounds**
	Understand and use measures of speed (and other compound measures such as density or pressure) to solve problems	**compound measures**
	Understand and use trigonometrical relationships in right-angled triangles, and use these to solve problems, including those involving bearings	**trigonometry** **bearings**
	Understand the difference between formulae for perimeter, area and volume in simple contexts by considering dimensions	**Dimensions**

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Probability & Number

Level	Probability & Number	Additional Notes
2	Begin to use halves and quarters and relate the concept of half of a small quantity to the concept of half of a shape	
2	Use the knowledge that subtraction is the inverse of addition and understand halving as a way of 'undoing' doubling and vice versa	
3	Multiply and divide two digit numbers by 2, 3, 4 or 5 as well as 10 with whole number answers and remainders	
3	Use simple fractions that are several parts of a whole and recognise when two simple fractions are equivalent	
3	Begin to use decimal notation in contexts such as money	
4	Recognise approximate proportions of a whole and use simple fractions and percentages to describe these	**percentages and proportion**
4	Order decimals to three decimal places	**ordering decimals**
5	Use equivalence between fractions and order fractions and decimals	**fractions and decimals** **ratio, proportion, percentages**
5	Use known facts, place value, knowledge of operations and brackets to calculate including using all four operations with decimals to two places	**order of operations, divisibility, calculations with decimals**
5	Use a calculator where appropriate to calculate fractions/percentages of quantities/measurements	**fraction and percentage of a quantity**
5	Reduce a fraction to its simplest form by cancelling common factors	**simplifying fractions**
5	In probability, select methods based on equally likely outcomes and experimental evidence, as appropriate	**probability experiments** **outcomes**
5	Understand and use the probability scale from 0 to 1	**Probability**
5	Understand that different outcomes may result from repeating an experiment	**theoretical probability**
6	Calculate percentages and find the outcome of a given percentage increase or decrease	**percentage of a quantity, percentage change**
6	Add and subtract fractions by writing them with a common denominator, calculate fractions of quantities (fraction answers); multiply and divide an integer by a fraction	**adding and subtracting fractions** **fraction of amounts**
6	Find and record all possible mutually exclusive outcomes for single events and two successive events in a systematic way	**outcomes and events**
6	Use the equivalence of fractions, decimals and percentages to compare proportions	**fractions and decimals**
6	Know that the sum of probabilities of all mutually exclusive outcomes is 1 and use this when solving problems	**mutually exclusive events**

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7	Understand the effects of multiplying and dividing by numbers between 0 and 1	**powers of 10** **calculating decimals**
7	Add, subtract, multiply and divide fractions	**Add, subtract, multiply and divide fractions**
7	Understand relative frequency as an estimate of probability and use this to compare outcomes of an experiment	**relative frequency**
8	Understand the equivalence between recurring decimals and fractions	**recurring decimals**
8	Know when to add or multiply two probabilities	
8	Use tree diagrams to calculate probabilities of combinations of independent events	**tree diagrams**

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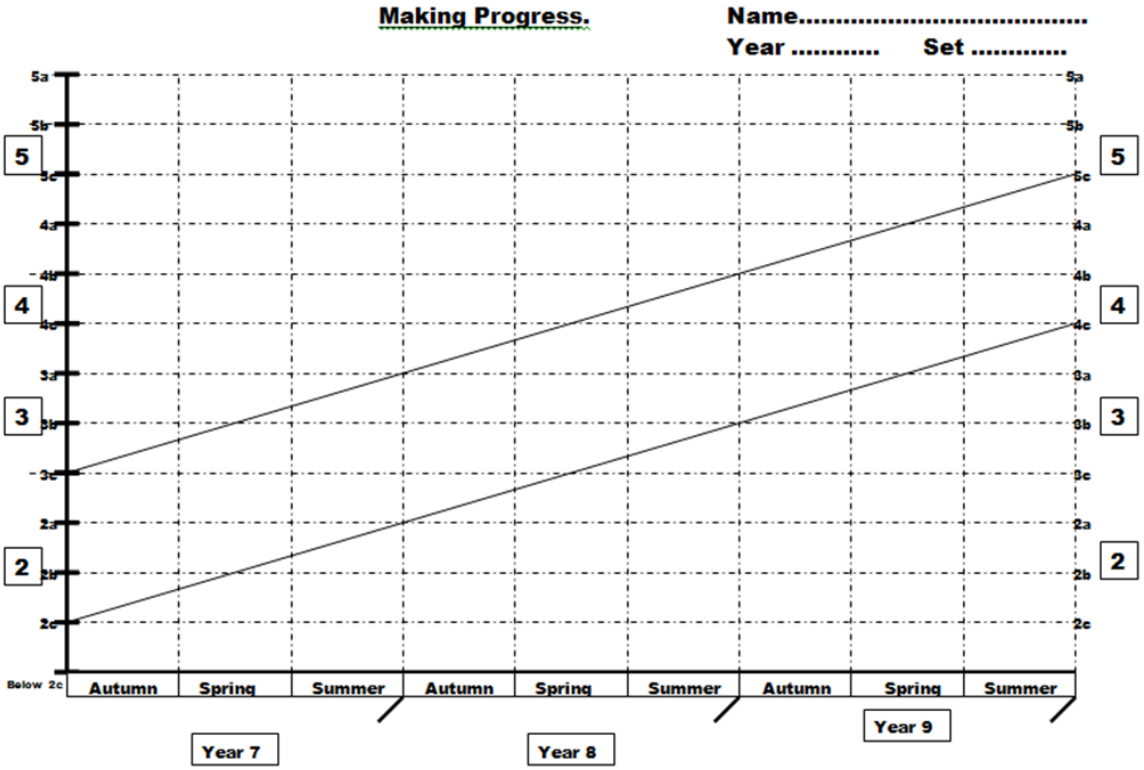
Flight Paths for Books

Level 2-4



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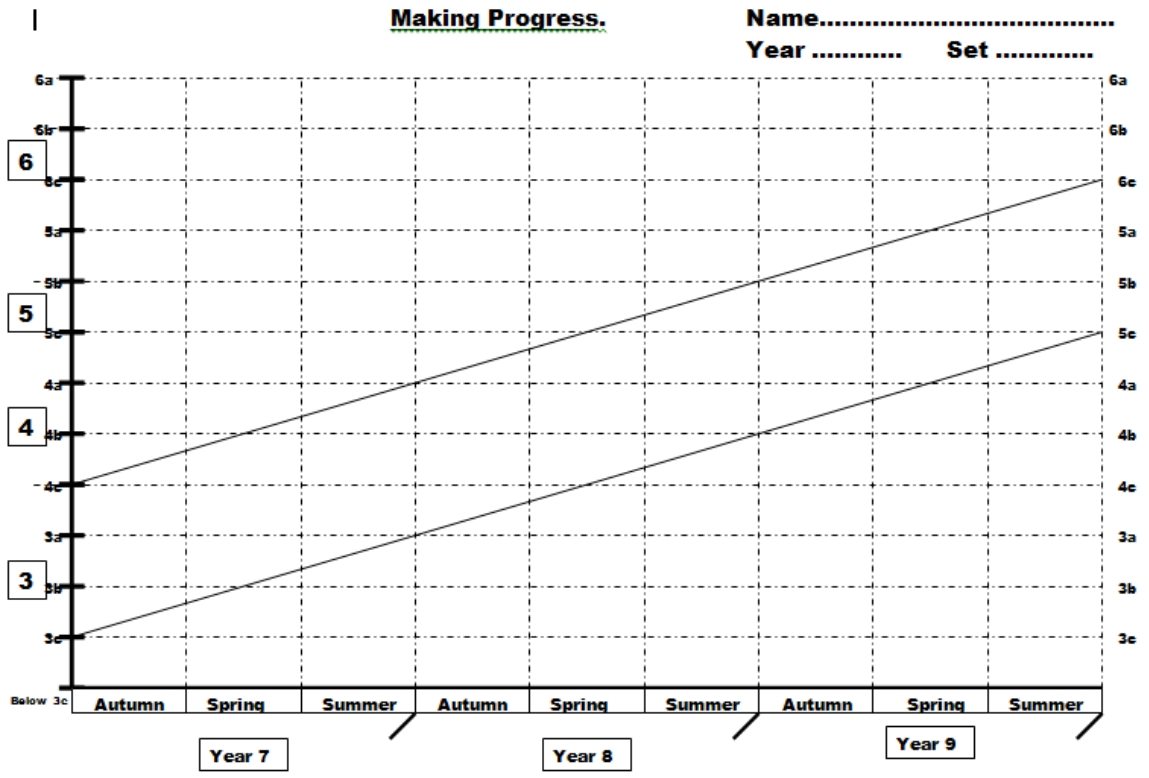
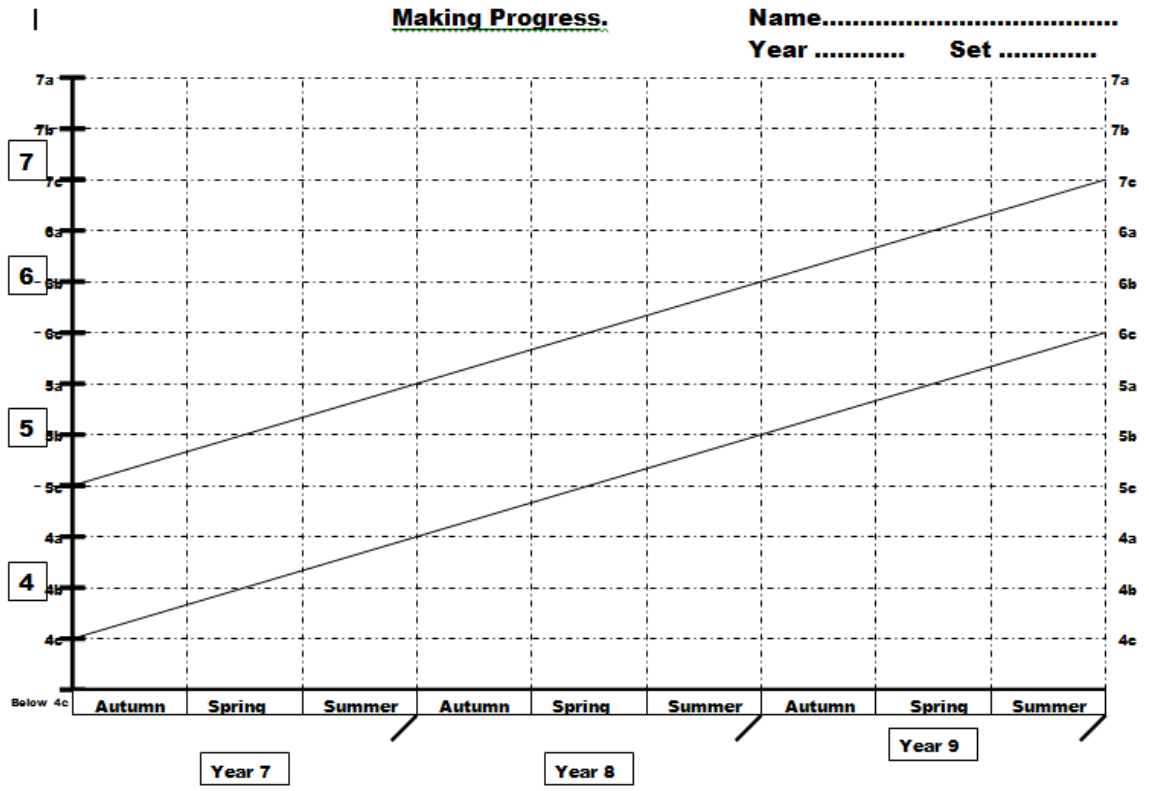
Level 3 – 5



Level 4 – 6



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Level 5+

Making Progress. **Name.....**

Year ..... **Set .....**