TOPIC LIST – GCSE MATHEMATICS – FOUNDATION TIER

Number			
Topic	**Red**	**Amber**	**Green**
Order whole, decimal, fraction and negative numbers			
Use the symbols =, ≠,			
Add, subtract, multiply, divide whole numbers using written and mental methods			
Add, subtract, multiply, divide decimal numbers using written and mental methods			
Add, subtract, multiply, divide negative numbers			
Know all your times tables from 1x1 to 12x12			
Do calculations involving money with and without a calculator			
Add, subtract, multiply and divide fractions without using a calculator			
Multiply and divide a fraction by a whole number			
Convert between a mixed number and a top heavy fraction			
Add, subtract, multiply and divide mixed numbers without the use of a calculator – when dominators are the same or different			
Simplify a fraction fully			
Perform calculations involving fractions (e.g. find $^4/_7$ of £770)			
Convert between fractions, decimals and percentages			
Perform calculations using the correct order of operations (Brackets, Powers, Division, Multiply, Add, Subtract)			
Understand and identify multiples, factors, prime numbers			
Find the lowest common multiple and highest common factor of a set of numbers			
Break down a number as a product of prime factors			
Know the squares of 1 to 15 and the corresponding square roots			
Know the cubes of 1, 2, 3, 4, 5 and 10 and the corresponding cube roots			
Recognise powers of 2, 3, 4, 5 and 10.			
Know then when square rooting there could be 2 answers			
Be able to estimate the power of a positive number			
Know between which two whole numbers the square root and cube root of a positive number lies			
Use index laws for multiplication and division when the index is a whole number (positive or negative)			
Give answers in terms of π			
Understand how to convert a normal number into a standard form number			
Perform calculations involving standard form numbers with and without a calculator			
Order standard form numbers			
Know place value of whole and decimal numbers			
Round numbers and calculations to nearest whole, 10, 100, 1000			
Round numbers and calculations to a specified number of decimal places			
Round numbers and calculations to a specified number of significant figures			
Know the bounds of accuracy of a number which has been rounded			
Estimate calculations by rounding numbers to 1 s.f. or similar			

Algebra			
Topic	**Red**	**Amber**	**Green**
Use algebraic notation and symbols correctly e.g. a×b = ab, y + y + y and 3 x y = 3y, a x a = a^2, a÷b = $^a/_b$			
Substitute numbers into expressions and formulae e.g. convert 30°C into °F using F = $^9/_5$ C + 32			
Know the meaning of the words equation, formula, identity, term, expression, inequality and factor when used algebraically			
Simplify an algebraic expression by collecting like terms			
Simplify expressions using the laws of indices			
Expanding single and double brackets			
Factorise by taking out common factors			
Factorise a quadratic expression of the form x^2 + bx + c including using the difference of two squares			
Change the subject of a formula when the subject appears once			
Understand and use number machines			
Plot coordinates in all four quadrants			
Find the mid-point between two coordinates			
Recognise and use y = mx + c to draw straight-line graphs			
Find the gradient of a line given two coordinates on the line			
Know that graphs with the same gradient are parallel			
Know that for e.g. the graph y = 3x – 5 intersects the y-axis at (0, -5)			
Draw a quadratic graph			
Use a quadratic graph to solve equations, write down roots, the coordinate of the turning point and equation of the line of symmetry			
Sketch and recognise simple cubic functions y = x^3 + k			
Sketch and recognise the reciprocal graph y = $^1/_x$			
Plot a graph representing a real life problem from information given in words or table or formula			
In a real-life graph be able to explain the meaning of the gradient and intercept in the context of the situation			
Plot and interpret distance-time graphs			
Solve linear equations where unknowns and brackets may appear on both sides of the = sign			
Solve linear equations involving algebraic fractions			
Solve quadratic equations of the form x^2 + bx + c = 0			
Solve a pair of simultaneous linear equations algebraically			
Solve a pair of simultaneous linear equations graphically			
Translate a simple situation into a linear equation and solve (e.g. a situation involving angle relationships)			
Display linear inequalities on a number line			
Solve linear inequalities (e.g. 3x + 1 ≥ 5 or -6 < 3x ≤ 12			
Generate the terms of a sequence using an nth term or a Fibonacci type sequence			
Find the nth term for a linear sequence			

Ratio, proportion and rates of change

Topic	Red	Amber	Green
Find one quantity as a fraction of another			
Understand ratio notation & write one number as a ratio of another			
Simplify ratios and write a ratio in the form 1 : n or n : 1			
Perform calculations using ratio's including best buy problems			
Convert between fractions and ratio's			
Understand the meaning of a percentage			
Find the percentage of a quantity			
Find the value after a quantity has been increased or decreased by a percentage			
Find one number as a percentage of another			
Find the percentage change given the initial and final values			
Find the original quantity after a percentage change (reverse %)			
Perform calculations involving simple interest			
Perform calculations involving compound percentages			
Solve simple growth/decay problems – e.g. how many years will it take for a population to double given its annual % increase			
Solve problems involving direct proportion			
Understand the meaning of inverse proportion			
Use compound measures such as speed and density and pressure			

Geometry and measures

Topic	Red	Amber	Green
Understand the meaning of the words point, line, vertices, edges, planes, parallel and perpendicular lines, right angles, polygons, regular polygons			
Use a ruler and compass to draw a perpendicular bisector of a line , angle bisector, perpendicular to/from a given point/line			
Solve problems involving loci			
Categorise angles as acute, obtuse or reflex			
Know angles on a line add to 180°			
Know angles around a point add to 360°			
Know that vertically opposite angles are equal			
Know the conditions for alternate, corresponding and interior angles			
Know that the three internal angles of a triangle add to 180°			
Know that the four internal angles of a quadrilateral add to 360°			
Know how to calculate the angle sum of the internal angles of any polygon with n sides using 180(n – 2)			
Know that interior + exterior angle of a polygon = 180°			
Know that the sum of all exterior angles of a polygon = 360°			
Solve angle problems involving one or more of the above			
Be able to explain the above relationships when used in calculations			
Classify the different types of triangle			
Classify the different types of quadrilaterals			
Recognise pentagons, hexagons, octagons, decagons			
Understand congruence and identify congruent shapes			
Know the conditions for congruence: SSS, SAS, ASA and RHS.			
Understand the word similar			
Recognise similar shapes			
Find missing sides from two similar shapes by finding a scale factor			
Understand the meaning of reflection, rotation, translation and enlargement			

Topic	Red	Amber	Green
Reflect shapes in a mirror line (mirror line could be the equation of a horizontal/vertical line) – find the equation of the mirror line			
Rotate a shape about any point – describe fully a rotation			
Translate a shape by a given vector – describe a translation fully			
Enlarge a shape (centre may or may not be given) using positive whole number/fractional scale factors – describe an enlargement fully			
Understand the meaning of radius, diameter, circumference, tangent, arc, sector, segment			
Know and use the formulae for area and circumference of a circle			
Draw/Interpret the net of a 3D shape			
Change between standard units of time, length, area, volume/capacity, mass			
Use conversions between imperial and metric units for e.g. 5 miles ≈ 8km, 1 gallon ≈ 4.5 litres, 2.2 pounds ≈ 1kg, 1 inch ≈ 2.5cm			
Understand and use scale factors on maps and diagrams			
Make sensible estimates of measurements in real life situations			
Understand, find and draw bearings			
Know and use formulae to calculate the area of triangles, rectangles, parallelograms, trapezia			
Know and use the formulae to find the volume of a cuboid, prism or cylinder.			
Find area of composite shapes			
Find the surface area and volume of spheres, pyramids, cones and composite solids			
Find the arc length and sector area of a circle			
Know and use Pythagoras' Theorem			
Know and use the trigonometric ratios sine, cosine and tangent to find lengths and angles			
Know the exact values for sine, cosine & tangent for 0°, 30°, 45°, 60°, 90°			
Understand and use vector notation			
Add and subtract vectors, multiply a vector by a number			

Probability			
Topic	**Red**	**Amber**	**Green**
Design and use two-way tables			
Know the meaning of and use relative frequency			
Draw/complete a frequency tree			
Find the probability of an event as a fraction or a decimal			
Know that the sum of probabilities for a set of exhaustive events is 1			
Know that mutually exclusive events have a probability sum of 1			
Draw and use a tree diagram to solve a probability problem			
Understand how to draw a Venn diagram and understand the various parts of a Venn diagram – perform calculations involving Venn diagrams			
List all possible outcomes for two events in a systematic way			
Understand the meaning of independent events			
Know when to add and when the multiply probabilities			

Statistics			
Topic	**Red**	**Amber**	**Green**
Draw and interpret bar charts, multiple bar charts, dual and composite bar charts, pictograms, pie charts, frequency polygons			
Classify data as discrete or continuous			
Understand the difference between primary and secondary data			
Understand the difference between populations and samples			
Plot and use time-series graphs			
Find the mean, mode, median, range from a set of data			
Find the mean, mode, median and range from an ungrouped frequency table			
Estimate the mean from a grouped frequency table			
Find the modal and median class in a grouped frequency table			
Draw a scatter graph and a line of best fit			
Use the line of best fit to estimate results			
Know the difference between interpolation and extrapolation and their reliability			