Edexcel GCSE Maths   FOUNDATION Topic List

TOPIC	Knowledge, skills and understanding	GRADES
NUMBER		
Add, subtract, multiply, divide N2	☐ Write numbers in words ☐ Write numbers from words ☐ Add, subtract, multiply, divide whole numbers, integers, negatives, fractions, and decimals and numbers in index form (see later sections) ☐ Multiply and divide any number between 0 and 1. ☐ Divide decimals up to 2 decimal places ☐ Solve a problem involving division by a decimal (up to two decimal places) ☐ Know the fraction-to-decimal conversion of familiar fractions	-2 to 3
Order numbers N1	☐ Put in order of size, integers, decimals and fractions ☐ Understand and use positive and negative numbers on a number line ☐ Order positive and negative integers and use the inequality symbols ($< > \geq \leq \neq$)	-2 to 1

Factors, multiples and primes
 	
N4
	Understand the terms;
	   ☐ Odd and even
	   ☐ Factor
	   ☐ Multiple
	   ☐ Common factor
	   ☐ Highest common factor
	   ☐ Lowest (least) common multiple
	   ☐ Prime number
	☐ Be able to identify factors, multiples and primes from a list of numbers
	☐ Express a number as a product of prime factors (factor tree); give answer in index form
	☐ Find common multiples or common factors of two numbers
	☐ Find the highest common factor (HCF) or the lowest common multiple (LCM) of two numbers.
		0 to 4

Squares, square roots, cubes and cube roots N6	☐ Know all the square numbers from $2^2 = 4$ up to $15^2 = 225$	-2 to 2
	☐ Know all the cube numbers from $2^3 = 8$ up to $5^3 = 125$ and also $10^3 = 1000$	
	☐ Find squares and cubes	
	☐ Give positive and negative square roots, and cube roots	
	☐ Recognise the first few triangular numbers	
	☐ Be able to estimate square roots of non-square numbers less than 100	
Index notation N7	☐ Use index notation for squares and cubes, eg. 5^3	2 to 3
	☐ Use index notation for powers of 10, eg. 10^6	
	☐ Understand indices in calculations	
Index laws N3 / N6	☐ Multiply and divide by adding or subtracting indices	3 to 4
	☐ Calculate using index laws when indices are fractions or negative, both with and without a calculator	
Fractions N2 / N3	☐ Find equivalent fractions	1 to 5
	☐ Simplify a fraction to its simplest form	
	☐ Convert between improper fractions and mixed numbers	
	☐ Add and subtract fractions	
	☐ Multiply and divide fractions	
Decimals, including recurring decimals N10 / N12	☐ Know fraction to decimal conversions for simple fractions	0 to 3
	☐ Convert between fractions and decimals	
	☐ Learn fractional equivalents to key recurring decimals e.g. 0.333333…, 0.66666666…, 0.11111… and by extension 0.222222…	
Percentages N1 / N12	☐ Understand percentages	1 to 2
	☐ Convert between fractions, decimals and percentages	

	☐ Use percentages to calculate and use
	     o Simple / Compound interest
	     o Prices after an increase or decrease
	     o Percentage after an increase or decrease	

Using fractions, decimals and percentages N2 / N12	☐ Find a fraction of a quantity ☐ Find a percentage of a quantity ☐ Use decimals to find quantities ☐ Use a multiplier to increase or decrease a quantity (eg. use x 1.05 to increase by 5%, or 0.88 to decrease by 12%)) ☐ Find one number as a fraction of another number ☐ Find one number as a percentage of another number ☐ Multiply using percentages, fractions or decimals as operators	0 to 2
Ratio N11	☐ Write a ratio in its simplest form ☐ Divide a quantity in a given ratio ☐ Solve problems using ratios ☐ Work with fractions in ratio problems	3
Number operations and the relationships between them, including order of operations and inverse operations N2 / N3 / N6	☐ Understand multiplying and dividing, and that one is the inverse of the other ☐ Use inverse operations ☐ Understand the use of brackets in calculations ☐ Understand the hierarchy of operations (BIDMAS) ☐ Solve word problems ☐ Understand and find reciprocals ☐ Understand and use 1 over a number is the inverse of multiplying by that number ☐ Know the effect on an inequality of multiplying both sides by the same negative number	-1 to 4
Rounding and approximation N14 / N15	☐ Round to the nearest integer (whole number) ☐ Round numbers to any given power of 10 ☐ Round to a number of decimal places ☐ Round to a number of significant figures ☐ Estimate the answer to a calculation by using rounding	-2 to 5
Standard form N9	☐ Convert between large and small numbers in standard form ☐ Add and subtract in standard form ☐ Multiply and divide in standard form	4 to 5

Accuracy and Bounds N15 / N16	☐ Know that a measurement may be in error by up to half a unit in either direction	3
	☐ Identify upper and lower bounds for rounding of discrete and continuous data	
	☐ Use inequality notation to specify simple error intervals due to rounding	
Use a calculator effectively N9	☐ Simple and complex calculations, including involving time or money	3
	☐ Use the following functions	
	☐ +, -, x, ÷	
	☐ x^2 and $\sqrt{x}$	
	☐ x^3 and $\sqrt[3]{x}$	
	☐ memory functions	
	☐ brackets	
	☐ Understand that rounding too early can causes inaccuracy	
	☐ Know how to enter numbers in standard form	
Compound Measures N13	☐ Use standard units of mass, length, time, money and other measures (including standard compound measures)	3 to 4
	☐ Understand and use compound measures: density; pressure; speed	
	☐ Be able to convert between measures, and currencies	

ALGEBRA		
Algebraic notation A1 / A21 / A3 / A7	☐ Understand notation and symbols used in algebra	0 - 1
	☐ Understand the difference between "expression", "formula" and "equation"	
	☐ Be able to select an expression, formula or equation from a list	
	☐ Be able to write an expression to solve a problem	
	☐ Interpret simple expressions as functions with inputs and outputs	
Manipulate algebraic expressions A1 / A2 / A4	☐ Simplify by collecting like terms	0 - 5
	☐ Multiply out a single bracket	
	☐ Factorise a single bracket by taking out a common factor	
	☐ Simplify expressions involving indices (and surds)	
	☐ Use algebraic expressions to solve problems	
	☐ Substitute values into expressions and formulae	
	☐ Expand double brackets	
	☐ Factorise quadratics, including the difference of two squares	
Solve linear equations A17 / A18 / A19 / A21	☐ Set up simple equations for a problem	2 - 5
	☐ Rearrange simple equations	
	☐ Solve simple equations	
	☐ Solve equations with the unknown on either side	
	☐ Solve equations with the unknown on both sides	
	☐ Solve quadratic equations by factorising	
	☐ Solve equations that include brackets	
	☐ Solve equations with negatives, including negative answers	
	☐ Solve equations involving fractions	
	☐ Be able to set up and solve two simultaneous equations	
	☐ Find approximate solutions using a graph	

Using formulae A2 / A5 / A6	☐ Derive and use formulae	1 - 4
	☐ Substitute numbers (positive or negative) into a formula, including formulae with x^2 or x^3 terms	
	☐ Change the subject of a simple formula	
	☐ Know the difference between an equation and an identity	
Solve linear inequalities A22	☐ Use inequality signs correctly ($<,>,\leq,\geq$)	0 - 4
	☐ Show inequalities on a number line	
	☐ Solve a simple linear inequality with one variable	
	☐ Show the solution to a linear inequality on a number line	
Sequences A23 / A24	☐ Understand odd and even numbers	0 - 5
	☐ Generate number sequences from diagrams	
	☐ Describe the rule for a number sequence (term to term, position to term)	
	☐ Find a particular term in a sequence, or explain why a particular number is not in a sequence	
	☐ Recognise and use triangular, square, cube number sequences; Fibonacci, quadratic and simple geometric progressions	
Nth term of a sequence A25	☐ Find the nth term expression for a sequence	2 - 5
	☐ Use the nth term expression to find a particular number in the sequence (eg. the 20th term)	
Coordinates A8	☐ Use axes and coordinates, in all 4 quadrants	-1 - 0
	☐ Find the coordinates of a point	
	☐ Plot a point given the coordinates	
	☐ Find the coordinates of the mid-point of a line	
	☐ Calculate the length of a line using coordinates	

Graphs A9 / A10 / A14	☐ Draw, label and add a scale to axes	0 - 5
	☐ Understand that an equation of the form y = mx + c corresponds to a straight line graph	
	☐ Plot straight line graphs from their equations in the form y = mx + c	
	☐ Find the equation of a straight line graph, identify gradients and y-intercepts	
	☐ Identify parallel lines from equations of the form y = mx + c	
	☐ Find the equation of a line through two given points or through one point with a given gradient	
Graphs from quadratic and other functions A11 / A12	☐ Recognise, sketch and interpret quadratic functions, simple cubic functions and reciprocal function	4 - 5
	☐ Plot graphs of quadratic functions	
	☐ Identify roots, intercepts, turning points of quadratic functions	
Real life graphs A8 / A14	☐ Plot a linear graph	1 - 3
	☐ Use real life graphs, for example, for fuel bills, telephone tariffs, currency conversion	
	☐ Use distance-time graphs	
	☐ Interpret information on linear (straight line) and non-linear (curved) graphs	

GEOMETRY		
Angles on intersecting lines, in triangles and quadrilaterals, and on parallel lines G1 / G3	☐ Understand acute, obtuse, reflex and right angles ☐ Angles round a point add up to 360° ☐ Angles on a straight line add up to 180° ☐ Know the properties of scalene, isosceles, equilateral and right-angled triangles ☐ Angles in a triangle add up to 180° ☐ Vertically opposite angles are equal ☐ Be able to identify and mark parallel and perpendicular lines on a diagram ☐ Be able to use letters to name lines, eg. XY or AB, and angles, eg. angle ACD ☐ Understand and use alternate and corresponding angles on parallel lines ☐ Calculate angles and give reasons ☐ Understand that the exterior angle of a triangle is equal to the sum of the interior angles at the other two vertices	1-5
Interior and exterior angles of polygons G3	☐ Calculate the sum of interior angles in a polygon ☐ Understand the polygon names; pentagon, hexagon, heptagon, octagon and decagon ☐ Use the angle sum of an irregular polygon in a problem ☐ Calculate and use the sum of the interior angles of a regular polygon ☐ Understand and use fact that the exterior angles of a polygon add up to 360° and the fact that an interior and exterior angle at one vertex of a polygon add up to 180° ☐ Be able to calculate the interior and exterior angle of a regular polygon ☐ Be able to deduce the number of sides of a regular polygon, given one of its angles	3 - 5

Properties of quadrilaterals G4	Remember the definitions and properties (including equal sides, equal angles, parallel sides, lines of symmetry, etc.) of special quadrilaterals, ie. ☐ Square ☐ Rectangle ☐ Parallelogram ☐ Trapezium ☐ Rhombus ☐ Kite ☐ Be able to sketch each type of quadrilateral ☐ List or classify quadrilaterals by their properties	1 - 4
Reflection and rotation symmetry in 2D shapes G1 /	☐ Recognise reflection symmetry and be able to draw lines of symmetry on a shape ☐ Recognise rotation symmetry of 2D shapes ☐ Find the order of rotational symmetry of a shape ☐ Complete a diagram given the line or lines of symmetry ☐ State a line of symmetry on a grid as a simple algebraic equation, eg. $x = 2$ or $y = x$ ☐ Complete diagrams with a given order of rotational symmetry	1 - 3
Congruence and similarity G5 / G6 / G7 / G19	☐ Understand what congruent and similar mean ☐ Identify shapes that are congruent ☐ Understand what similar means ☐ Understand that two shapes that are similar have the same angles ☐ Use SSS SAS ASA RHS congruence criteria for triangles ☐ Understand and apply the relationship between lengths in similar figures	4 - 5
Pythagoras' theorem G6 / G20 / G21	☐ Understand and use Pythagoras' theorem in triangles ☐ Know the trigonometric ratios and apply them to find angles and lengths in right angled triangles ☐ Know the exact values of sin and cos for 0, 30, 45, 60, 90; and tan for 0, 30, 45, 60	5

Parts of a circle
G9
	☐ Draw a circle with compasses, given either the diameter or radius
	
	Understand and remember parts of a circle:
	        ☐ Centre
	        ☐ Radius
	        ☐ Diameter
	        ☐ Chord
	        ☐ Circumference
	        ☐ Tangent
	        ☐ Arc
	        ☐ Sector
	        ☐ Segment
		2 - 5

Using 2D diagrams to represent 3D shapes
G12 / G13
	☐ Understand the words face, edge and vertex
	
	Identify or name these solid shapes:
	        ☐ Cube
	        ☐ Cuboid
	        ☐ Cylinder
	        ☐ Prism
	        ☐ Pyramid
	        ☐ Sphere
	        ☐ Cone
	☐ Use isometric grids
	☐ Draw nets and show how they fold to make a 3D solid shape
	☐ Understand and draw front and side elevations and plans of simple solids
	☐ Draw a sketch of a 3D solid shape given the front and side elevations and plan of the solid
		4 - 5

Transformations G7	☐ Identify, describe and construct congruent and similar shapes by considering rotation, reflection, translation and enlargement (including fractional scale factors) ☐ Understand the effect of enlargement on perimeter, area and volume	4 - 5

Straight edge and compass constructions G2	☐ Construct a perpendicular bisector of a line ☐ Construct a perpendicular from a point to a line ☐ Construct a perpendicular from a point on a line ☐ Bisect an angle ☐ Construct angles of 60°, 90°, 30° and 45° ☐ Construct parallel lines ☐ Draw circles and arcs of a given radius ☐ Construct a regular hexagon inside a circle	4 - 5
Loci G2	☐ Construct a region bounded by a circle and an intersecting line ☐ Construct a loci of a given distance from a point and a given distance from a line ☐ Construct a loci of equal distances from two points ☐ Construct a loci of equal distances from two lines ☐ Identify regions defined by "nearer to" or "greater than" ☐ Find or describe regions satisfying a combination of loci	4 - 5
Measures, Perimeter and area G14 / G15 / G16	☐ Know conversion factors between different metric units ☐ Convert between imperial units (conversion factors will be given in questions) ☐ Use standard units of measure (including time) ☐ Measure line segments and angles ☐ Make an accurate scale drawing from a diagram ☐ Use, interpret and construct maps and scale drawings ☐ Know and apply formulae for area of triangles, parallelograms, trapezia; volume of cuboids, cylinders, prisms ☐ Calculate the perimeter and area of compound shapes made from triangles, rectangles and other shapes ☐ Find the surface area of shapes such as prisms or pyramids by using the formulae for triangles, rectangles and other shapes	-1 to 5
Volumes of prisms G16	☐ Use the formula to calculate the volume of a cuboid ☐ Calculate the volume of a shape made from cuboids ☐ Calculate volume of a prism, such as a triangular prism ☐ Find the volume of a cylinder	3 - 5

Circumference and area of a circle G17 / G18	☐ Find circumference of a circle using C = πd or C = 2πr ☐ Find the area of a circle using A = πr² ☐ Use π = 3.142 or the π button on a calculator ☐ Find the perimeter and area of semcircles and quarter circles ☐ Calculate arc lengths, angles and areas of sectors ☐ Find the surface area of a cylinder ☐ Find the surface area and volume of spheres, cones, pyramids and composite solids.	3 - 5
Bearings G15	☐ Use 3 figure bearings to describe a direction ☐ Mark a point on a diagram, given a bearing and distance from another point ☐ Measure a bearing on a map or scale plan ☐ Given a bearing of one point from another, find the bearing of the first point from the second ☐ Use accurate drawing to solve bearings problems	1 - 4
Compound measures G14	☐ Understand and use compound measures, including speed	4
Vectors G24 / G25	☐ Describe translations as 2D vectors ☐ Apply addition and subtraction of vectors, and multiplication by a scalar	5

PROBABILITY		
Probability language and the probability scale	☐ Impossible, unlikely, even chance, likely and certain events ☐ Mark events or probabilities on a 0 to 1 probability scale ☐ Write probabilities as fractions, decimals or percentages	1 - 3
Estimates of probability and relative frequency	☐ Find probabilities of events using dice, spinners, coins ☐ Understand and use relative frequency as estimates of probability ☐ Calculate an estimate of how many times an event will occur, given its probability and the number of trials	1 - 4
Listing events N5 / P7	☐ List the outcomes for one or two events ☐ Use and draw diagrams to show all possibilities (sample space diagrams)	2
Mutually exclusive outcomes P4	☐ Add simple probabilities ☐ Understand that the sum of all the mutually exclusive outcomes is 1 ☐ Know that if P is a probability of an outcome occurring, then 1 - P is the probability of the same outcome not occurring ☐ Fill in a missing probability in a table	4
Experimental data and theoretical probability P1 / P2 / P3 / P5 / P7	☐ Compare experimental data with theoretical probability ☐ Understand that the same experiment repeated can have different results, and that increasing sample size increases accuracy ☐ Compare results from different sample sizes ☐ Record and analyse probability experiments using table and frequency trees	3 - 4
Venn Diagrams / Sets / Tree diagrams P6 / P8	☐ Analyse sets systematically using tables, grids, Venn diagrams and tree diagrams	4 - 5

STATISTICS		
Charts and diagrams S2	Interpret and draw the following charts or diagrams ☐ Pictogram ☐ Bar chart or dual bar chart ☐ Pie chart ☐ Histogram (with equal class intervals) ☐ Frequency diagram for grouped data ☐ Frequency polygon ☐ Line graph ☐ Scatter graph ☐ Frequency polygon for grouped data ☐ Stem and leaf diagram ☐ Two-way table	1 - 4
Types of average and range S4	Calculate the following ☐ Mean ☐ Mode ☐ Median ☐ Range ☐ Modal class ☐ Interval containing the median ☐ Estimate the mean of grouped data in a frequency table using mid-points ☐ Find the median for grouped data ☐ Estimate the mean for grouped data	3 4 - 5
Scatter graphs / Lines of best fit S6	☐ Draw a line of best fit ☐ Understand positive, negative and no correlation ☐ Understand that correlation doesn't necessarily mean one variable is the cause of the other one ☐ Predict values using a line of best fit ☐ Understand that "no correlation" does not necessarily mean no relationship between the values, just no linear relationship	4 - 5

Comparing data	☐ Compare two sets of data using mean and range	4 - 5
S4	☐ Compare two pie charts, and understand that the sizes represented in each depend on the total represented by each	
	☐ Compare data from dual bar charts	
	☐ Understand the advantages and disadvantages of different types of average	