Mapping FS Maths L2 to GCSE

This document is intended for use by schoolteachers who are running FS maths alongside GCSE mathematics.
GCSE content that is not covered in FS is not listed.

DfE Subject Content for GCSE maths	DfE subject content for maths FS	Mapping Comment
Number		
1. Order positive and negative integers, decimals and fractions; use the symbols =, ≠, ≤, ≥	L2 N1. Read, write, order and compare positive and negative numbers of any size L2 N9. Order, approximate and compare decimals	In FS, learners do not need to understand ≠, but do need to understand ≤ and ≥
2. Apply the four operations, including formal written methods, to integers, decimals and simple fractions (proper and improper), and mixed numbers – all both positive and negative; understand and use place value (e.g. when working with very large or very small numbers, and when calculating with decimals)	L2 N2. Carry out calculations with numbers up to one million including strategies to check answers including estimation and approximation L2 N7. Order, add, subtract, and compare amounts or quantities using proper and improper fractions and mixed numbers L2 N4 Identify and know the equivalence between fractions, decimals and percentages L2 N10. Add, subtract, multiply and divide decimals up to three decimal places	
3. Recognise and use relationships between operations, including inverse operations (e.g. cancellation to simplify calculations and expressions; use conventional notation for priority of operations, including brackets, powers, roots and reciprocals	L2 N12. Follow the order of precedence of operators, including indices	FS maths does not include reciprocals and powers tend not go higher than 3.
4. Use the concepts and vocabulary of prime numbers, factors (divisors), multiples, common factors, common multiples, highest common factor, lowest		This is not in the FS subject content, but it will help learners to simplify fractions if they understand common factors

common multiple, prime factorisation, including using product notation and the unique factorisation theorem		
6. Use positive integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5; estimate powers and roots of any given positive number	L2 N12. Follow the order of precedence of operators, including indices	Learners need to be able to understand powers of 2 (squared) and 3 (cubed) and square roots for calculations involving area and volume
11. Identify and work with fractions in ratio problems		Learners need to be able to understand ratio, however fractions will not be used in ratio questions
12. Interpret fractions and percentages as operators.		This is not stated explicitly in the FS subject content statements, but learners do need to understand how to use fractions and percentages as operators.
13. Use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate	L1 M20. Convert between units of length, weight, capacity, money and time, in the same system L2 M14. Convert between metric and imperial units of length, weight and capacity using a) a conversion factor and b) a conversion graph L2 M15. Calculate using compound measures including speed, density and rates of pay	
14. Estimate answers; check calculations using approximation and estimation, including answers obtained using technology	L1 N12. Approximate by rounding to a whole number or to one or 2 decimal places L1 N15. Estimate answers to calculations using fractions and decimals	

	L2 N2. Carry out calculations with numbers up to one million including strategies to check answers including estimation and approximation	
15. Round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures); use inequality notation to specify simple error intervals due to truncation or rounding	L1 N12. Approximate by rounding to a whole number or to one or 2 decimal places	At level 2, rounding is not listed in the subject content statements, however learners need to be able to add, subtract, multiply and divide decimals up to 3 decimal places, so will need to be able to round numbers to 3dp.
Algebra		
1. Use and interpret algebraic notation, including: • ab in place of a × b • 3y in place of y + y + y and 3 × y • a^2 in place of a × a, a^3 in place of a × a × a, a^2b in place of a × a × b • $\frac{a}{b}$ in place of a ÷ b • coefficients written as fractions rather than as decimals • brackets	L2 N3. Evaluate expressions and make substitutions in given formulae in words and symbols	
2. Substitute numerical values into formulae and expressions, including scientific formulae	L2 N3. Evaluate expressions and make substitutions in given formulae in words and symbols L2 M16. Calculate perimeters and areas of 2-D shapes including triangles and circles and composite shapes including non-rectangular shapes (formulae given except for triangles and circles)	In FS maths the formulae may be given that learners need to substitute values into and calculate.

	L2 M17. Use formulae to find volumes and surface areas of 3-D shapes including cylinders (formulae to be given for 3-D shapes other than cylinders)	
5. Understand and use standard mathematical formulae; rearrange formulae to change the subject		Although the subject content in FS does not explicitly specify rearranging formulae, at level 2 learners may be required to do this to find solutions.
8. Work with coordinates in all four quadrants	L2 M19. Use coordinates in 2-D, positive and negative, to specify the positions of points	
Ratio, proportion, and rates of change		
1. Change freely between related standard units (e.g. time, length, area, volume/capacity, mass) and compound units (e.g. speed, rates of pay, prices, density, pressure) in numerical and algebraic contexts	L2 M15. Calculate using compound measures including speed, density and rates of pay L2 N3. Evaluate expressions and make substitutions in given formulae in words and symbols	Learners need to be able to substitute standard units into given formulae to calculate compound measures.
2. Use scale factors, scale diagrams and maps	L2 M18. Calculate actual dimensions from scale drawings and create a scale diagram given actual measurements	
3. Express one quantity as a fraction of another, where the fraction is less than 1 or greater than 1	L2 N8. Express one number as a fraction of another	
4. Use ratio notation, including reduction to simplest form	L2 N11. Understand and calculate using ratios, direct proportion, and inverse proportion	
5. Divide a given quantity into two parts in a given part:part or part:whole ratio; express the division of a quantity into two parts as a ratio; apply ratio to real contexts and problems (such as those involving	L2 N11. Understand and calculate using ratios, direct proportion, and inverse proportion	

conversion, comparison, scaling, mixing, concentrations)		
7. Understand and use proportion as equality of ratios	L2 N11. Understand and calculate using ratios, direct proportion and inverse proportion	
8. Relate ratios to fractions and to linear functions	L2 N11. Understand and calculate using ratios, direct proportion and inverse proportion	
9. Define percentage as 'number of parts per hundred'; interpret percentages and percentage changes as a fraction or a decimal, and interpret these multiplicatively; express one quantity as a percentage of another; compare two quantities using percentages; work with percentages greater than 100%; solve problems involving percentage change, including percentage increase/decrease and original value problems, and simple interest including in financial mathematics	L2 N5. Work out percentages of amounts and express one amount as a percentage of another L2 N6. Calculate percentage change (any size increase and decrease), and original value after percentage change L2 M13. Calculate amounts of money, compound interest, percentage increases, decreases and discounts including tax and simple budgeting	
10. Solve problems involving direct and inverse proportion, including graphical and algebraic representations	L2 N11. Understand and calculate using ratios, direct proportion and inverse proportion	
11. Use compound units such as speed, rates of pay, unit pricing, density and pressure	L2 M15. Calculate using compound measures including speed, density and rates of pay	
16. Set up, solve and interpret the answers in growth and decay problems, including compound interest and work with general iterative processes.	L2 M13. Calculate amounts of money, compound interest, percentage increases, decreases and discounts, including tax and simple budgeting	Learners do not need to know the formula for compound interest (an iterative process as the interest is calculated repeatedly on an annual basis), they tend not to be asked to calculate compound interest for more than 3 years.

	Geometry and measures	
1. Use conventional terms and notations: points, lines, vertices, edges, planes, parallel lines, perpendicular lines, right angles, polygons, regular polygons and polygons with reflection and/or rotation symmetries; use the standard conventions for labelling and referring to the sides and angles of triangles; draw diagrams from written description	L2 M21. Draw 3-D shapes to include plans and elevations	3 letter notations may be used for angles.
3. Apply the properties of angles at a point, angles at a point on a straight line, vertically opposite angles; understand and use alternate and corresponding angles on parallel lines; derive and use the sum of angles in a triangle (e.g. to deduce and use the angle sum in any polygon, and to derive properties of regular polygons)	L2 M22. Calculate values of angles and/or coordinates with 2-D and 3-D shapes	The level of angle knowledge in FS maths does not extend as far as in GCSE: students need to know the sum of angles in a triangle and a quadrilateral, and that vertically opposite angles are equal.
4. Derive and apply the properties and definitions of: special types of quadrilaterals, including square, rectangle, parallelogram, trapezium, kite and rhombus; and triangles and other plane figures using appropriate language	L2 M16. Calculate perimeters and areas of 2-D shapes including triangles and circles and composite shapes including non-rectangular shapes (formulae given except for triangles and circles)	In order to calculate area and perimeter of different shapes, learners will need to be able to derive and apply the properties and definitions of common shapes
6. Apply angle facts, triangle congruence, similarity and properties of quadrilaterals to conjecture and derive results about angles and sides, including Pythagoras' Theorem and the fact that the base angles of an isosceles triangle are equal, and use known results to obtain simple proofs	L2 M22. Calculate values of angles and/or coordinates with 2-D and 3-D shapes L2 M16. Calculate perimeters and areas of 2-D shapes including triangles and circles and composite shapes including non-rectangular shapes (formulae given except for triangles and circles)	Students do not have to know similarity concepts or Pythagoras' Theorem; knowing the angle facts of an isosceles triangle would be beneficial but not mandatory.

13. Construct and interpret plans and elevations of 3D shapes.	L2 M20. Understand and use common 2-D representations of 3-D objects L2 M21. Draw 3-D shapes to include plans and elevations	
14. Use standard units of measure and related concepts (length, area, volume/capacity, mass, time, money, etc.)	L2 M14. Convert between metric and imperial units of length, weight and capacity using a) a conversion factor and b) a conversion graph L2 M16. Calculate perimeters and areas of 2-D shapes including triangles and circles and composite shapes including non-rectangular shapes (formulae given except for triangles and circles)	
15. Measure line segments and angles in geometric figures, including interpreting maps and scale drawings and use of bearings	L2 M18. Calculate actual dimensions from scale drawings and create a scale diagram given actual measurements L1 M26. Use angles when describing position and direction, and measure angles in degrees EL3 M20. Use appropriate positional vocabulary to describe position and direction including eight compass points and including full/half/quarter turns	Measuring angles is not listed at L2, however, it is in the subject content statements at L1. Use of bearings is not mentioned in the subject content statements at L2, however, from EL3 learners do need to understand compass points.
16. Know and apply formulae to calculate: area of triangles, parallelograms, trapezia; volume of cuboids and other right prisms (including cylinders)	L2 M16. Calculate perimeters and areas of 2-D shapes including triangles and circles and composite shapes including non-rectangular shapes (formulae given except for triangles and circles) L2 M17. Use formulae to find volumes and surface areas of 3-D shapes including	Learners must know the formula for area of a triangle and circle and how they would use this to calculate volume. The formula for parallelograms and trapezia does not need to be known.

	cylinders (formulae to be given for 3-D shapes other than cylinders)	
17. Know the formulae: circumference of a circle = 2πr = πd, area of a circle = πr^2; calculate: perimeters of 2D shapes, including circles; areas of circles and composite shapes; surface area and volume of spheres, pyramids, cones and composite solids	L2 M16. Calculate perimeters and areas of 2-D shapes including triangles and circles and composite shapes including non-rectangular shapes (formulae given except for triangles and circles) L2 M17. Use formulae to find volumes and surface areas of 3-D shapes including cylinders (formulae to be given for 3-D shapes other than cylinders)	
20. Know the formulae for: Pythagoras' theorem, $a^2 + b^2 = c^2$; and the trigonometric ratios; sinθ = $\frac{\text{opposite}}{\text{hypotenuse}}$, cosθ = $\frac{\text{adjacent}}{\text{hypotenuse}}$, and tanθ = $\frac{\text{opposite}}{\text{adjacent}}$; apply them to find angles and lengths in right-angled triangles and, where possible, general triangles in two and three dimensional figures		It may be useful for learners to be familiar with Pythagoras' theorem, however they do not need to memorise the formula.
Probability		
3. Relate relative expected frequencies to theoretical probability, using appropriate language and the 0 - 1 probability scale	L2 H26. Work out the probability of combined events including the use of diagrams and tables, including 2-way tables	

	L2 H27. Express probabilities as fractions, decimals and percentages	
4. Apply the property that the probabilities of an exhaustive set of outcomes sum to one; apply the property that the probabilities of an exhaustive set of mutually exclusive events sum to one	L2 H26. Work out the probability of combined events including the use of diagrams and tables, including 2-way tables	Learners need to understand that the probabilities of an exhaustive set of outcomes sum to one. Problems may include working out the probability of an event occurring using one minus the probability of the event not occurring.
6. Enumerate sets and combinations of sets systematically, using tables, grids, Venn diagrams and tree diagrams	L2 H26. Work out the probability of combined events including the use of diagrams and tables, including 2-way tables	Learners may be required to solve problems containing probability tree diagrams
8. Calculate the probability of independent and dependent combined events, including using tree diagrams and other representations, and know the underlying assumptions	L2 H26. Work out the probability of combined events including the use of diagrams and tables, including 2-way tables	Learners will not be required to solve problems with dependent events.
Statistics		
2. Interpret and construct tables, charts and diagrams, including frequency tables, bar charts, pie charts and pictograms for categorical data, vertical line charts for ungrouped discrete numerical data, tables and line graphs for time series data and know their appropriate use	L2 H28. Draw and interpret scatter diagrams and recognise positive and negative correlation L1 H27. Represent discrete data in tables, diagrams and charts including pie charts, bar charts and line graphs EL3 H22. Interpret information, to make comparisons and record changes, from different formats including bar charts and simple line graphs	

3. Construct and interpret diagrams for grouped discrete data and continuous data, i.e. histograms with equal and unequal class intervals and cumulative frequency graphs, and know their appropriate use	L1 H27. Represent discrete data in tables, diagrams and charts including pie charts, bar charts and line graphs L1 H28. Group discrete data and represent grouped data graphically	Learners do not need to understand cumulative frequency or histograms for L2 FS maths
4. Interpret, analyse and compare the distributions of data sets from univariate empirical distributions through: • appropriate graphical representation involving discrete, continuous and grouped data, including box plots • appropriate measures of central tendency (median, mean, mode and modal class) and spread (range, including consideration of outliers, quartiles and inter-quartile range)	L2 H23. Calculate the median and mode of a set of quantities L2 H24. Estimate the mean of a grouped frequency distribution from discrete data L2 H25. Use the mean, median, mode and range to compare 2 sets of data	Learners do not need to know quartile and inner quartile range for L2 FS maths.
6. Use and interpret scatter graphs of bivariate data; recognise correlation and know that it does not indicate causation; draw estimated lines of best fit; make predictions; interpolate and extrapolate apparent trends whilst knowing the dangers of so doing	L2 H28. Draw and interpret scatter diagrams and recognise positive and negative correlation	