

Using Spatial Techniques Work Scheme (Pilot 2008-9)

A suggested work scheme for this Foundation (Level 1) FSMQ is given below. This recommends a total of 60 guided learning hours (eg 2 hours per week for 30 weeks, 4 hours per week for 15 weeks, 5 hours per week for 12 weeks). There is plenty of scope for varying the order and time allocation as many of the mathematical techniques can be introduced/revised in several different topic areas. The following should be introduced as soon as possible and used throughout the course:

- geometrical terms: parallel, perpendicular, right angle, bisect, mid-point, line, line segment, regular, congruent, polygons (triangles including obtuse angled, acute angled, equilateral, isosceles and right angled, quadrilaterals including rectangle, square, parallelogram, rhombus, trapezium and kite, pentagon, hexagon, octagon), circle, radius, chord, cuboid, cylinder, triangular prism.
- using appropriate instruments (ruler, tape measure, micrometer, protractor) to make measurements to appropriate levels of accuracy with appropriate units and correct notation
- recording measurements on diagrams or in tables, as appropriate
- checking calculations using estimates, inverse operations and different methods.

Topic Area	Content	Nuffield Resource	Coursework Portfolio Requirements
Plans and elevations (3 hours)	Identify and sketch objects from plans and elevations. Sketch plans and elevations of objects.	What is it? (starter) Identify everyday objects from photos, sketch objects from plans and elevations and sketch plans and elevations from 3D sketches of objects.	(Total time approximately 12 hours) Requirement 1 (2.5 hours) Evidence of use of plan/elevation(s) to a sketch realistically b construct model to size c develop a situation to actual size (including sketches or photographs that show clearly the main features of the situation).
Measure lengths (2 hours)	Use ruler, tape measure, micrometer to measure objects using metric and imperial units (m, cm, mm, in, ft, yd) <ul style="list-style-type: none"> • to the nearest whole unit • to an appropriate level of accuracy Record dimensions in tables and in diagrams (including plans and elevations).	Measure It (starter) Powerpoint presentation to demonstrate and check that students can measure in centimetres and millimetres. Worksheet for recording measurements.	
		Drawing Shapes in Word (starter) Shows students some of the basic drawing techniques available in Word.	
		Make your own shapes in Word (skills activity) Activity that shows students how to draw their own shapes in Word, with and without gridlines.	
Measure and calculate using scales (4 hours)	Carry out calculations with scaling represented in the forms $1/n$, 1 to n or $1/n$ where n is 2, 5, 10, 50, 100, 500, 1000 (or other appropriate scales). (Understand that scaling alters lengths but not angles.)	Plans (skills activity) Choose from 7 plans with scales of varying difficulty.	
Convert measurements (2 hours)	Convert within a system: metric (mm, cm, m, km), imperial (inches, feet, yards, miles)	Convert Lengths (skills activity) Bingo and dominoes games providing practice in length conversions.	
		Convert It! (skills activity) Interactive spreadsheet for practice in converting metric lengths and distances.	



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Use protractor and compass and calculate with angles (3 hours)	Measure and draw angles in degrees. Draw circles accurately. Angles at a point, on a straight line, angle sum of triangle and quadrilateral.	Angles (starter) Powerpoint presentation and activity measuring and classifying angles.	Requirement 2 (3.5 hours) Draw appropriate plans and/or elevations of 2 different 3D situations, at least one involving scaling (at least one done by hand). Include evidence of scaling calculations and key dimensions.
Draw scale diagrams (4 hours)	Draw plans of rooms, elevations of front of buildings and other situations/objects.	Arranging the Furniture (starter) Measuring furniture, considering arrangements and drawing a scaled plan. Wheelchair Access (assignment) Assessing and designing work area for use by a disabled person.	
Calculate perimeters and areas of 2D shapes (4 hours)	<ul style="list-style-type: none"> • Circumference of circle = $p \times \text{diameter}$ • Area of circle = $p \times \text{radius}^2$ • Area of rectangle = length \times width • Area of triangle = $\frac{1}{2} \times \text{base} \times \text{perpendicular height}$ (use p button on calculator or 3.14) Shapes formed by combining two rectangles or triangles or one of each. Use mm^2 , cm^2 , m^2 etc	Perimeter and Area (starter) Powerpoint presentation, information sheet and worksheet covering the perimeter and area of rectangles and shapes made from rectangles. How much will it cost? (skills activity) Taking measurements from scaled elevations of a house, then finding area and cost of painting.	Requirement 3 (3 hours) Solutions to at least one problem involving <ul style="list-style-type: none"> • use of a measuring instrument to take at least 5 different readings • use readings to carry out at least 5 different calculations involving areas and volumes (and perimeters if appropriate) Include all steps in calculations, clear results and correct units of measurement.
Calculate surface area and volume of 3D shapes (4 hours)	Cuboids, triangular prisms and cylinders. Using volume formula: <ul style="list-style-type: none"> • volume = area of cross-section \times length (use p button on calculator or 3.14) Use mm^2 , cm^2 , m^2 , mm^3 , cm^3 , m^3 etc.	Volume (skills activity) Powerpoint presentation, information sheets and worksheet covering the volume of cuboids.	
Solve problems (4 hours)	Solve problems (involving angles, lengths, areas and/or volumes) with more than one stage, deciding on the correct arithmetic to use (adding, subtracting, multiplying, dividing measurements)		



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Recognise and classify plane shapes (4 hours)	<ul style="list-style-type: none"> triangles including obtuse angled, acute angled, equilateral, isosceles and right-angled, quadrilaterals including rectangle, square, parallelogram, rhombus, trapezium and kite, other polygons including pentagons, hexagons, octagons (understanding that regular polygons have equal sides and equal angles) Use rulers, set squares & protractors to draw shapes accurately (including rectangles and triangles).	Name the shape (starter) Powerpoint presentation and activity naming and classifying shapes.	Requirement 4 (1.5 hours) Written description of a 2D situation using geometrical terms and ideas including <ul style="list-style-type: none"> use of terms eg parallel, perpendicular classification of shapes symmetry classification of angles (if appropriate)
		Tessellations in Word (skills activity) Activity that shows students how to draw tessellations in Word, with and without gridlines.	
		Tessellation Shapes (skills activity) Collection of shapes to print on card and laminate.	
Recognise and classify symmetry (4 hours)	Lines of symmetry Rotational symmetry including centre and order.	Crop Circles (skills activity) Sketching and describing crop circles from websites, describing symmetries then producing designs.	
		Symmetry in Word (skills activity) Students use the Rotate and Flip options in Word to draw symmetrical figures.	
		Stained Glass (skills activity) Describe then design sun catchers.	
Constructions (4 hours)	Use a ruler and compasses to construct: <ul style="list-style-type: none"> a line perpendicular to a given line through a given point the mid-point of a line segment the perpendicular bisector of a line segment a regular hexagon inscribed in a circle an equilateral triangle inscribed in a circle 	Geometric Design (assignment) Describe a design then use constructions to create a design.	Requirement 5 (1.5 hours) Two constructions using different techniques. Leave sufficient detail of the construction work.
Revision (6 hours)	Revise topics and try past papers. Discuss Data Sheet – make up and try questions based on it.	Working in 2 & 3 Dimensions Revision Guide	