MATHEMATICS SYLLABUS

Forms 4 and 5 Track 2

Contents

Mathematics Syllabus

Form 4 Track 2

Ch	Mod	Learning Outcome:	Pg	Level	SEC	Notes
6	NN28	i. Recognise multiples, factors, prime numbers. Find and use least common multiples.	49		Core	
	NN28	ii. Use index notation and the rules for multiplying powers.				• Estimate and use a calculator to evaluate powers and roots.
9	NN28	iii. Round numbers to a given number of significant figures.	68			• Revise rounding to a given number of decimal places. Estimate a result by rounding to one significant figure.
11	NN28	iv. Add and subtract mixed numbers.	93			
	NN28	v. Change decimals to fractions and vice versa.				• Know that some fractions can be written as recurring decimals. Understand that fractions whose denominators are multiples of only 2 and/or 5 are non-recurring fractions
15	NA29	i. Understand and use the elementary ideas of direct and inverse proportion.	129		Core	
		ii. Calculate an unknown quantity from quantities that vary in direct or inverse proportion.				• For inverse proportion use additional exercises. See FOM C2 Pg 78
23a	NN30	i. Use and interpret positive and negative integer indices, including zero.	195		Core	
	NN30	ii. Use the rules for multiplying and dividing integer powers with the same number base.				E.g. $7^8 \times 7^{-5} = 7^3$ $(-1/3)^6 \div (-1/3)^2 = (-1/3)^4$ $(2^3)^5 = 2^{15}$
40	NN30	iii. Write ordinary numbers in standard form and vice versa.	345			• Include positive and negative powers of 10 and the use of a calculator.
32	NA31	i. Determine the speed of an object given the distance and time.	274		Core	• Include average speed as the rate of change between the total distance travelled and the total time taken.
	NA31	ii. Determine the distance travelled by an object given the speed and time.				
	NA31	iii. Determine the time taken by an object given the distance and speed.				
	NA31	iv. Read and interpret travel graphs.				• Include velocity-time graphs but exclude: the interpretation of the gradient as the acceleration of an object; the interpretation of the area as the distance travelled by an object.

Form IV – Track 2: Number and Applications (ii)						
SMP Interact Mathematics for Malta : Intermediate Level						
Ch	Mod	**Learning Outcome:**	Pg	Level	SEC	Notes
33	NN32	i. Understand that the reciprocal of a number is its multiplicative inverse.	285		Core	• For revision exercises use chapters 11 and 17. • Use mixed numbers for multiplication and division.
	NN32	ii. Multiply and divide one fraction by another fraction.				
37	NA33	i. Divide a quantity in a given ratio.	314		Core	• Include problems on ratios.
	NA33	ii. Write a ratio in the form 1 : k or k : 1				
36	NA33	iii. Understand and use simple map ratios.	308			
	NA33	iv. Work out the map distance given the scale and the actual distance.				
	NA33	v. Work out the actual distance given the scale and the map distance.				
	NA33	vi. Determine the map scale from map and actual distances.				

Form IV - Track 2: Algebra (i)							
SMP Interact Mathematics for Malta: Intermediate Level							
Ch	Mod		**Learning Outcome:**	Pg	Level	SEC	Notes
2	AL23	i.	Simplify algebraic fractions with numerical denominators.	12		Core	• To include the use of brackets.
8	AL24	i.	Use letter symbols to represent unknown quantities in a formula.	63		Core	• Students should be able to create a formula from pictorial data or data presented in tabular form.
	AL24	ii.	Change the subject of the formula which includes two operations.				
12	AL25	i.	Evaluate practical formulae by substituting variables with numbers.	100		Core	• E.g formulae for area, volume and temperature. • Students should be given opportunities to use a spreadsheet to evaluate formulae.
14	AL26	i.	Extend patterns and sequences of numbers.	119		Core	• Students should be given opportunities to use a spreadsheet to generate sequences of numbers that they can describe both verbally and symbolically.
	AL26	ii.	Generate terms of a sequence using term definitions of the sequence.				E.g. Find the 4^{th} term given that the n^{th} term is $2n + 5$.
	AL26	iii.	Use expressions to describe the n^{th} term of a simple sequence.				
	AL26	iv.	Recognize geometric and number patterns.				
19	AL27	i.	Simplify algebraic expressions by collecting like terms.	167		Core	• To include simple use of brackets.
	AL27	ii.	Add/subtract algebraic fractions with numerical denominators.				E.g. $\frac{2x}{3} \pm \frac{3(x+1)}{2}$
	AL27	iii.	Solve linear equations in one unknown that involve two or more operations.				

Form IV - Track 2: Algebra (ii)							
SMP Interact Mathematics for Malta: Intermediate Level							
Ch	Mod		**Learning Outcome:**	Pg	Level	SEC	Notes
21	AL28	i.	Generate and plot coordinate pairs that satisfy a linear rule.	176		Core	
	AL28	ii.	Use straight-line graphs to find the value of one coordinate given the other.				
	AL28	iii.	Draw quadratic graphs and identify maxima/minima.				
	AL28	iv.	Use quadratic graphs to find the value of one coordinate(s) given the other.				
23b	AL29	i.	Use and interpret positive and negative integer indices including zero.	195		Core	
	AL29	ii.	Use the index laws in simple instances.				
	AL29	iii.	Solve simple exponential equations by inspection.				E.g. $3^x = 81$, $2^x = \frac{1}{16}$
28	AL30	i.	Simplify algebraic expressions by collecting, cancelling and multiplying terms of an expression.	240		Core	
	AL30	ii.	Factorise expressions completely by taking out a common factor.				
	AL30	iii.	Multiply a single term over a bracket.				
	AL30	iv.	Use letter symbols to represent unknown quantities in a formula.				E.g Formulae for the surface area and volume of composite shapes and solids.

Form IV – Track 2: Shape, Space and Measurement (i)						
SMP Interact Mathematics for Malta: Intermediate Level						
Ch	Mod	**Learning Outcome:**	Pg	Level	SEC	Notes
1	GG21	i. Demonstrate Pythagoras Theorem through drawing and measurement.	4		Core	
	GG21	ii. Understand a proof of Pythagoras Theorem.				
	GG21	iii. Use Pythagoras theorem to find the side of a right-angled triangle given the other two sides.				
	GG21	iv. Identify Pythagorean triads.				
	GG21	v. Use the converse of Pythagoras Theorem.				• See also FOM C2 pg 51.
10	GM22	i. Work out the area of a parallelogram and a triangle.	74		Core	
	GM22	ii. Work out the area and perimeter of composite shapes.				
	GM22	iii. Derive and use the formula to find the area of the trapezium by dividing it into two triangles.				• Refer to FOM B2 Pg 142
	GM22	iv. Use the formula to find the area of a triangle to find the base and height.				
	GM22	v. Use the formulae $C = \pi d$ and $C = 2\pi r$ to find the circumference of a circle and $A = \pi r^2$ to find the area of a circle.				
	GM22	vi. Use formulae for the circumference and area to find the radius/diameter.				
	GM22	vii. Work out the length of an arc and the area of a sector as fractions of a circle.				
	GM22	viii. Work out the area of composite flat shapes by dividing them into simple shapes including circles.				
16	GM23	i. Solve problems involving the volume of a prism.	136		Core	
	GM23	ii. Use $V = Ah$ to find volume/area/height of a prism.				
	GM23	iii. Use the formula $V = \pi r^2 h$ to find the volume, radius or height of a cylinder.				
	GM23	iv. Derive and use the formulae for the surface area of a cylinder.				• Curved and total surface area.
	GM23	v. Use appropriate units for area and volume.				• Convert from cm^2 to m^2, cm^3 to m^3 and vice versa.
25	GG24	i. Recognise and use the relationship between corresponding, alternate and interior angles in relation to parallel lines.	220		Core	
	GG24	ii. Show that two lines are parallel.				• When two alternate angles are equal. When two corresponding angles are equal. When two interior angles are supplementary.

Form IV – Track 2: Shape, Space and Measurement (ii)							
SMP Interact Mathematics for Malta: Intermediate Level							
Ch	Mod		**Learning Outcome:**	Pg	Level	SEC	Notes
36	GG25	i.	Draw simple scale drawings from given data and interpret scale drawings.	308		Core	
	GG25	ii.	Use three-figure bearings, measured clockwise from the north to describe the position of one point from another.				
	GG25	iii.	Find the distance/bearing of one object from another by making a scale drawing.				
42a	GG26	i.	Understand the tangent function as the ratio between the opposite and the adjacent side of an angle in a right-angled triangle.	366		Core	
	GG26	ii.	Use the tangent ratio to find**:** a. the opposite side given an angle and its adjacent side; b. the adjacent side given an angle and its opposite side; c. the angle given two sides other than the hypotenuse**.**				
45	GG27	i.	Understand a proof that the angle sum of a triangle is 180º.	393		Core	
	GG27	ii.	Understand a proof that the exterior angle of a triangle is equal to the sum of the interior angles at the other two vertices.				
	GG27	iii.	Understand a proof that the angle sum of a quadrilateral is 360º.				
	GG27	iv.	Solve problems involving the angles of triangles.				
	GG27	v.	Understand and use the properties of the square, rectangle, parallelogram, trapezium, rhombus and kite.				
	GG27	vi.	Calculate and use the sums of the interior and exterior angles of regular and irregular polygons.				• Derive and use a formula, such as $(2n - 4)$ right angles or $180(n - 2)$, for the sum of the interior angles of a polygon with n sides.
	GG27	vii.	Solve problems involving angles of polygons.				

Form IV – Track 2: Shape, Space and Measurement (iii)							
SMP Interact Mathematics for Malta: Intermediate Level							
Ch	Mod		**Learning Outcome:**	Pg	Level	SEC	Notes
49a	GG28	i.	Understand the sine and cosine function as the ratio between pairs of sides of a right-angled triangle.	433		Core	• One side of which is the hypotenuse.
	GG28	ii.	Use the sine and cosine ratios to find: a. the opposite side given an angle and the hypotenuse. b. the adjacent side given an angle and the hypotenuse. c. an angle given the opposite side or the adjacent side and the hypotenuse. d. the hypotenuse given an angle and the opposite or the adjacent side.				
53			Transform points and shapes using:	472		Core	
	GG29	i.	Translation.				• Use a given column vector.
	GG29	ii.	Reflection.				• Use $y = \pm c$, $x = \pm c$, $y = \pm x$, as mirror lines.
	GG29	iii.	Rotation.				• Use angles of rotation in multiples of 90º.
	GG29	iv.	Enlargement.				• Use positive integers or fractions as scale factor. • Recognise that reflections, rotations and translations preserve length and angle so that any figure is congruent to its image under any of these transformations. • Recognise that enlargements preserve angle and not length. • Understand and use the effect of enlargement on the perimeter of 2D shapes.
16	GM30	i.	Find the surface area of simple compound solid shapes involving cubes, cylinders and/or pyramids.	143		Core	

Form IV – Track 2: Data Handling						
SMP Interact: Mathematics for Malta: Intermediate Level						
Ch	Mod	**Learning Outcome:**	Pg	Level	SEC	Notes
5	DH10	i. Construct and interpret information tables.	36		Core	
	DH10	ii. Understand, compute and interpret the mean, mode, median and range of a set of discrete/continuous ungrouped data only.				
	DH10	iii. Draw a histogram *(frequency diagram)* with equal intervals from an un/grouped frequency table.				
34	DH11	i. Understand and work out the probability of an event.	289		Core	• Questions involving playing cards will not be set in the examination.
	DH11	ii. Work out the probability of an event by experiment.				
	DH11	iii. Work out the probability of an event from a frequency table.				
	DH11	iv. Compile a possibility space.				
	DH11	v. Work out the combined probability outcomes of two independent events.				E.g. Tossing a coin and a dice using a possibility space.

Mathematics Syllabus

Form 5 Track 2

Form V - Track 2: Number and Applications						
SMP Interact Mathematics for Malta: Intermediate Level						
Ch	Mod	**Learning Outcome:**	Pg	Level	SEC	Notes
44	NA34	i. Solve problems involving percentage increase and decrease.	384		Core	E.g. profit and loss, discount, simple interest, stocks, tax and exchange rate. • As a preview see also Ch 13 p.108.
	NA34	ii. Increase/decrease a quantity using a percentage multiplier.				
	NA34	iii. Calculate the percentage increase/decrease of a quantity.				• To include finding an increase/decrease in a quantity as a percentage.
48	NA35	i. Successive percentage changes.	426		Core	• Do not to include the compound interest formula.
	NA35	ii. Carry out calculations involving reverse percentages.				E.g. to find the cost price given the selling price and percentage profit.
27	NA35	iii. Solve problems on personal and household finance.	237			• Include earnings and insurance.
40	NA36	i. Calculate with numbers in standard form, with and without the use of a calculator.	345		Core	• Include problems.

Form V - Track 2: Algebra (i)							
SMP Interact Mathematics for Malta: Intermediate Level							
Ch	Mod		**Learning Outcome:**	Pg	Level	SEC	Notes
35	AL31	i.	Interpret and understand rates of change as the gradient of a line.	299		Core	• To include negative gradients. E.g. distance-time graphs, conversion graphs and the interpretation of non-linear graphs.
	AL31	ii.	Plot and interpret graphs of simple linear functions arising from real-life situations.				
	AL31	iii.	Calculate the gradient of a line from the coordinates of two points on the line.				
39	AL32	i.	Generate a sequence of ordered pairs of numbers and plot them to produce a straight-line graph.	335		Core	• Students should be given opportunities to use a spreadsheet and/or a CAS to explore algebraic relationships both symbolically and graphically. For example, by representing the relationship of the form $y = mx$ graphically using a CAS, pupils can appreciate that by changing the values of m, the gradient of the line changes accordingly. • Use $y = mx + c$ to draw quick sketches of lines.
	AL32	ii.	Understand the relationship between the equation of a straight-line and its gradient and y intercept.				
	AL32	iii.	Derive the values of m and c from the graph and write the equation of a line in the form $y = mx + c$ from its graph.				
	AL32	iv.	Use the fact that parallel lines have equal gradient to decide when two lines are parallel.				
	AL32	v.	Rearrange an equation in the form $y = mx + c$.				
41	AL33	i.	Solve linear equations in one unknown involving more than two operations.	357		Core	• Include the use of brackets and simple fractions with numerical denominators. • By forming equations from shapes and by forming equations from words.
	AL33	ii.	Solve problems leading to the solution of linear equations in one unknown.				
46	AL34	i.	Solve two simultaneous linear equations algebraically.	401		Core	
	AL34	ii.	Solve problems leading to the solution of simultaneous linear equations.				
	AL34	iii.	Solve two simultaneous linear equations graphically.				

Form V - Track 2: Algebra (ii)							
SMP Interact Mathematics for Malta: Intermediate Level							
Ch	Mod		**Learning Outcome:**	Pg	Level	SEC	Notes
47	AL35	i.	Simplify fractions by taking out the common factor and cancelling.	423		Core	• To include common factors only
50	AL36	i.	Change the subject of the formula that includes squares and square roots.	447		Core	
	AL36	ii.	Change the subject of the formula when the same letter appears more than once.				
	AL36	iii.	Form formulae and change the subject.				
	AL36	iv.	Change the subject of the formula that involves many letters.				• Include $I = \frac{PTR}{100}$ to find P, T and R.
	AL36	v.	Understand and use function notation.				E.g. $f(x) = 3x - 5$

Form V – Track 2: Shape, Space and Measurement (i)						
SMP Interact Mathematics for Malta: Intermediate Level						
Ch	Mod	**Learning Outcome:**	Pg	Level	SEC	Notes
38	GG31	i. Understand the notion of similar shapes.	322		Core	• Recognise that enlargements preserve angle and not length. • Understand and use the effect of enlargement on the perimeter of 2D shapes. • Appreciate that any two circles and any two squares are mathematically similar, whereas in general, two rectangles are not.
	GG31	ii. Prove triangles similar by showing that: a. The corresponding angles are equal; b. the corresponding sides of each triangle are in the same ratio which is equal to the scale factor (k) of the enlargement; c. there is one pair of equal angles and the sides containing these angles are in the same ratio.				
	GG31	iii. Solve problems involving similarity and length of sides using the scale factor notion.				
42b	GG32	i. Use the tangent ratio to solve practical problems.	366		Core	• To include isosceles triangles and other shapes. • To include angles of elevation and depression and bearings.
49b	GG33	i. Use the sine and cosine ratios to solve practical problems.	433		Core	• To include isosceles triangles and other shapes.
	GG33	ii. Use trigonometric ratios to solve problems involving bearings and angles of elevation and depression.				
54		Use ruler and compasses only to draw:	485		Core	
	GG34	i. triangles, rectangles, regular hexagons and circles;				
	GG34	ii. the perpendicular bisector of a line segment;				
	GG34	iii. the perpendicular from a given point to a line;				
	GG34	iv. the bisector of an angle;				
	GG34	v. angles of 90º, 60º, 30º, 45º;				
	GG34	vi. Understand and apply the following locus properties in two dimensions in practical situations: a. the locus of points which are at a fixed distance from a given point; b. the locus of points which are equidistant from two given points.				

Form V – Track 2: Shape, Space and Measurement (ii)						
SMP Interact Mathematics for Malta: Intermediate Level						
Ch	**Mod**	**Learning Outcome:**	**Pg**	**Level**	**SEC**	**Notes**
60	GG35	i. Understand the terms secant, tangent, arc, sector and segment of a circle.	535		Core	
	GG35	ii. Understand that in any circle: a. the angles in the same segment are equal; b. the angle in a semicircle is a right angle; c. the angle subtended by an arc at the centre is twice the angle subtended by the arc at the circumference; d. the opposite angles of a cyclic quadrilateral are supplementary; e. the exterior angle of a cyclic quadrilateral is equal to the interior opposite angle; f. the angle between the tangent and the radius at the point of contact is a right angle.				• It follows that equal arcs subtend equal angles at the centre and at the circumference.
	GG35	iii. Give reasons to justify the use of the above angle facts in simple riders.				
63	GG36	i. Understand the notion of congruent shapes.	556		Core	• Use RHS , SSS, SAS and ASA/AAS to prove that triangles are congruent.
	GG36	ii. Appreciate that all congruent shapes are similar but similar shapes are not necessarily congruent.				• Appreciate that reflection, rotations and translations preserve length and angle, so that any figure is congruent to its image under any of these transformations.
	GG36	iii. Solve problems involving congruency.				
26	GG37	i. Understand through congruent triangles that: a. the line from the centre of a circle to the midpoint of a chord is perpendicular to the chord. b. tangents drawn to a circle from a point outside the circle are equal. c. equal chords are equidistant from the centre.	231		Core	• See also exercises in Ch 63 on pages 558-561. • Appreciate that the converse is also true. • Appreciate that the converse is also true.

Form V – Track 2: Data Handling						
SMP Interact Mathematics for Malta: Intermediate Level						
Ch	Mod	**Learning Outcome:**	Pg	Level	SEC	Notes
18	DH12	i. Draw Pie Charts from real data.	158		Core	• Use percentages.
52	DH13	i. Understand, compute and interpret the mean, mode, median and range of a set of discrete/continuous ungrouped data only.	462		Core	