Name: Further Core Pure – Topic Checklist

Topic Area	Ref	You need to know how to:	☹	😕	☺	Revised?	Practised?
Complex Numbers	1.1.1	Define imaginary and complex numbers					
		Add and subtract complex numbers					
	1.1.2	Multiply complex numbers					
	1.1.3	Understand the term complex conjugate					
	1.1.3	Divide complex numbers					
	1.1.4	Solve quadratics with complex roots					
	1.1.5	Solve cubics or quartics with complex roots					
	2.1.1	Express a number in exponential form					
	2.1.2	Multiply and divide complex numbers in exponential form					
	2.1.3	Understand de Moivre's theorm					
	2.1.4	Use de Moivre's theorem to derive trig identities					
	2.1.5	Use de Moivre's theorem to evaluate series					
	2.1.6	Understand how to find nth roots of unity					
		Solve equations in the form $z^n - a - ib = 0$					
	2.1.7	Use roots of unity to solve geometric tasks					
Argand Diagrams	1.2.1	Use an Argand diagram for a complex number					
	1.2.2	Find the modulus and argument of a complex number					
	1.2.3	Write a complex number in mod-arg form					
	1.2.4	Represent loci on an Argand diagram					
	1.2.5	Represent regions on an Argand diagram					
Series	1.3.1	Understand sigma notation					
		Use standard results for linear series					
	1.3.2	Use standard results for quadratic & cubic series					
		Evaluate and simplify series linear, quadratic or cubic sequence functions					
	2.2.1	Use the method of differences					
	2.2.2	Find higher derivatives of functions					
	2.2.3	Express series using Maclaurin's expansion					
	2.2.4	Expand series of compound functions					

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Roots of Polynomials	1.4.1	Derive and use the roots of a quadratic equation					
	1.4.2	Derive and use the roots of a cubic equation					
	1.4.3	Derive and use the roots of a quartic equation					
	1.4.4	Evaluate expressions of roots of polynomials					
	1.4.5	Find the equation of a new polynomial whose roots are a linear transformation of other roots					
Volumes of Revolution	1.5.1 2.4.1	Find the volume of revolution when a curve is rotated around the x axis					
	1.5.2 2.4.2	Find the volume of revolution when a curve is rotated around the y axis					
	1.5.3	Find volumes of revolution by combining curve and line rotations around either axis					
	1.5.4	Model situations using Cartesian equations					
	2.4.3	Find volumes of revolution for parametric curves					
	2.4.4	Model situations using parametric equations					
Matrices	1.6.1	Define the size of a matrix					
		Define the zero and identity matrices					
		Add and subtract matrices					
		Multiply a matrix by a scalar					
	1.6.2	Multiply matrices					
	1.6.3	Calculate the determinant of a matrix					
	1.6.4	Find the inverse of a 2x2 matrix					
	1.6.5	Find the inverse of a 3x3 matrix					
	1.6.6	Use matrices to solve systems of equations					
		Interpret simultaneous equations geometrically					
Linear Transformations	1.7.1	Represent linear transformations in two dimensions using matrices					
	1.7.2	Use matrices to define reflections and rotations					
	1.7.3	Use matrices with enlargements and stretches					
		Find the coordinates of invariant points					
		Find the equations of invariant lines					
	1.7.4	Define successive transformations					
	1.7.5	Use three dimensional linear transformations					
	1.7.6	Use inverse matrices to reverse transformations					

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Proof by Induction	1.8.1	Recall the steps to perform proof by induction					
		Prove results about series					
	1.8.2	Prove results about divisibility					
	1.8.3	Prove results about matrices					
Vectors	1.9.1	Change between the vector and Cartesian forms of the equation of a straight line in three dimensions					
		Use the vector and Cartesian forms of the equation of a straight line in three dimensions					
	1.9.2	Change between the vector and Cartesian forms of the equation of a plane					
		Use the vector and Cartesian forms of the equation of a plane					
	1.9.3	Calculate the scalar product					
		Calculate the angle between two vectors					
	1.9.4	Calculate the angle between two lines					
		Calculate the angle between a line and a plane					
		Calculate the angle between two planes					
	1.9.5	Establish whether two lines meet					
		Find the point of intersection of two lines					
		Find the point of intersection between a line and a plane					
	1.9.6	Calculate the perpendicular distance between two lines					
		Calculate the perpendicular distance between a point and a line					
		Calculate the perpendicular distance between a point and a plane					
Methods in Calculus	2.3.1	Evaluate improper integrals					
	2.3.2	Evaluate the mean value of a function					
		Find the mean value of transformed functions					
	2.3.3	Differentiate inverse trig functions					
	2.3.4	Integrate rational functions using trig substitutions					
	2.3.5	Integrate using partial fractions					

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Polar Coordinates	2.5.1	Understand polar coordinates					
		Convert between polar and Cartesian coordinates					
	2.5.2	Sketch curves given in polar form					
	2.5.3	Find the area enclosed by a polar curve					
	2.5.4	Find tangents to polar curves which may be parallel or perpendicular to the initial line					
Hyperbolic Functions	2.6.1	Understand the definitions of hyperbolic functions					
		Sketch the graphs of hyperbolic functions					
	2.6.2	Use the inverse of hyperbolic functions					
	2.6.3	Prove identities using hyperbolic functions					
		Know and use Osborn's rule					
		Solve equations using hyperbolic functions					
	2.6.4	Differentiate hyperbolic functions					
	2.6.5	Integrate hyperbolic functions					
Methods in Differential Equations	2.7.1	Solve first-order differential equations using an integrating factor					
	2.7.2	Solve second-order homogenous differential equations using the auxiliary equation					
	2.7.3	Solve second-order non-homogenous differential equations using the complimentary function and the particular integral					
	2.7.4	Find particular solutions to differential equations using given boundary conditions					
Modelling with Differential Equations	2.8.1	Model real-life situations with first-order differential equations					
	2.8.2	Use differential equations to model simple harmonic motion					
	2.8.3	Model damped and forced oscillations using differential equations					
	2.8.4	Model real-life situations using coupled first-order differential equations					