Chapter	Subtopic	Learning objectives	Mixed Exercise Questions and Exam Questions	Recommended IM quizzes
CP1ch1 Complex numbers Pre-req: Y1P1, Y1P2	1.1 Imaginary and complex numbers 1.2 Multiplying complex numbers 1.3 Complex conjugation 1.4 Roots of quadratic equations 1.5 Solving cubic and quartic equations	Understand and use the definitions of imaginary and complex numbers Add and subtract complex numbers Multiply complex numbers Understand the definition of a complex conjugate Divide complex numbers Solve quadratic equations that have complex roots	3☐ 4☐ 7☐ 11☐ 15☐ 18☐ 20☐ CP1ch1_XMQs_and_MS.pdf	CP1ch1 C1 (Complex numbers intro) CP1ch1 G1 (Modulus and argument)
CP1ch2 Argand diagrams Pre-req: Y1P6, Y1P9, Y2P5, CP1ch1	2.1 Argand diagrams 2.2 Modulus and argument 2.3 Modulus-argument form of complex numbers 2.4 Loci in the Argand diagram 2.5 Regions in the Argand diagram	Show complex numbers on an Argand diagram Find the modulus and argument of a complex number Write a complex number in modulus-argument form Represent loci on an Argand diagram Represent regions on an Argand diagram	2☐ 5☐ 9☐ 13☐ 14☐ 18☐ 20☐ CP1ch2_XMQs_and_MS.pdf	CP1ch2 C2 (Argand diagram) CP1ch2 G2 (Loci on the Argand diagram)
CP1ch3 Series Pre-req: Y1P1, Y2P3	3.1 Sums of natural numbers 3.2 Sums of squares and cubes	Use standard results for $\Sigma 1$ and Σr Use standard results for Σr^2 and Σr^3 Evaluate and simplify series of the form $\Sigma f(r)$, where f(r) is linear, quadratic or cubic	4☐ 5☐ 7☐ 9☐ 10☐ CP1ch3_XMQs_and_MS.pdf	CP1ch3 S1 (Summing series)
CP1ch4 Roots of polynomials Pre-req: Y1P4, Y1P7, CP1ch1	4.1 Roots of a quadratic equation 4.2 Roots of a cubic equation 4.3 Roots of a quartic equation 4.4 Expressions relating to the roots of a polynomial 4.5 Linear transformations of roots	Derive and use the relationships between the roots of a quadratic equation Derive and use the relationships between the roots of a cubic equation Derive and use the relationships between the roots of a quartic equation Evaluate expressions relating to the roots of polynomials Find the equation of a polynomial whose roots are a linear transformation of the roots of a given polynomial	2☐ 4☐ 6☐ 10☐ 12☐ CP1ch4_XMQs_and_MS.pdf	CP1ch4 R1 (Roots of polynomials) CP1ch4 R2 (Complex roots)
CP1ch5 Volumes of revolution Pre-req: Y1P13	5.1 Volumes of revolution around the x-axis 5.2 Volumes of revolution around the y-axis 5.3 Adding and subtracting volumes 5.4 Modelling with volumes of revolution	Find the volume of revolution when a curve is rotated around the x-axis Find the volume of revolution when a curve is rotated around the y-axis Find more complicated volumes of revolution Model real-life objects using volumes of revolution	3☐ 4☐ 5☐ 7☐ 8☐ CP1ch5_XMQs_and_MS.pdf	CP1ch5 VR1 (Volumes of revolution)
CP1ch6 Matrices Pre-req: Y1P3, Y1P11	6.1 Introduction to matrices 6.2 Matrix multiplication 6.3 Determinants 6.4 Inverting a 2 x 2 matrix 6.5 Inverting a 3 x 3 matrix 6.6 Solving systems of equations using matrices	Understand the concept of a matrix Define the zero and identity matrices Add and subtract matrices Multiply a matrix by a scalar Multiply matrices Calculate the determinant of a matrix Find the inverse of a matrix Use matrices to solve systems of equations Interpret simultaneous equations geometrically	2☐ 3☐ 4☐ 6☐ 11☐ 12☐ CP1ch6_XMQs_and_MS.pdf	CP1ch6 M1 (Matrices Intro) CP1ch6 I1 (Determinants and inverses) CP1ch6 I3 (Matrices and simultaneous equations) CP1ch6 I2 (Inverse of a 3 by 3 matrix)
CP1ch7 Linear transformations Pre-req: CP1ch6	7.1 Linear transformations in two dimensions 7.2 Reflections and rotations 7.3 Enlargements and stretches 7.4 Successive transformations 7.5 Linear transformations in three dimensions 7.6 The inverse of a linear transformation	Understand the properties of linear transformations and represent them using matrices Perform reflections and rotations using matrices Carry out enlargements and stretches using matrices Find the coordinates of invariant points and the equations of invariant lines Carry out successive transformations using matrix products Understand linear transformations in three dimensions	1☐ 2☐ 4☐ 7☐ 12☐ CP1ch7_XMQs_and_MS.pdf	CP1ch7 M2 (Matrices and transformations) CP1ch7 M3 (Invariance)
CP1ch8 Proof by induction Pre-req: Y1P7, CP1ch3, CP1ch6	8.1 Proof by mathematical induction 8.2 Proving divisibility results 8.3 Proving statements involving matrices	Understand the principle of proof by mathematical induction and prove results about sums of series Prove results about divisibility using induction Prove results about matrices using induction	3☐ 4☐ 6☐ 8☐ 9☐ CP1ch8_XMQs_and_MS.pdf	CP1ch8 S2 (Induction for series)
CP1ch9 Vectors Pre-req: Y1P5, Y2P12	9.1 Equation of a line in three dimensions 9.2 Equation of a plane in three dimensions 9.3 Scalar product 9.4 Calculating angles between lines and planes 9.5 Points of intersection 9.6 Finding perpendiculars	Understand and use the vector and Cartesian forms of the equation of a straight line in three dimensions Understand and use the vector and Cartesian forms of the equation of a plane Calculate the scalar product for two 3D vectors Calculate the angle between two vectors, two lines, a line and a plane, or two planes Understand and use the scalar product form of the equation of a plane Determine whether two lines meet and determine the point of intersection Calculate the perpendicular distance between: two lines, a point and a line, or a point and a plane	5☐ 7☐ 10☐ 14☐ 16☐ 19☐ 25☐ CP1ch9_XMQs_and_MS.pdf	CP1ch9 V1 (Scalar product) CP1ch9 V3 (Equation of a plane) CP1ch9 V2 (Equation of a line) CP1ch9 V4 (Finding distances)

CP2ch1 Complex numbers Pre-req: Y1P8, Y2P3, CP1ch1, CP1ch2	1.1 Exponential form of complex numbers 1.2 Multiplying and dividing complex numbers 1.3 De Moivre's theorem 1.4 Trigonometric identities 1.5 Sums of series 1.6 nth roots of a complex number 1.7 Solving geometric problems	Express a complex number in exponential form Multiply and divide complex numbers in exponential form Understand de Moivre's theorem Use de Moivre's theorem to derive trigonometric identities - pages Use de Moivre's theorem to find sums of series Know how to solve completely equations of the form z ^n - a - ib = 0, giving special attention to cases where a = 1 and b = 0 Use complex roots of unity to solve geometric problems	4☐ 5☐ 9☐ 10☐ 13☐ 14☐ 15☐ CP2ch1_XMQs_and_MS.pdf	CP2ch1 C1 (De Moivre's theorem) CP2ch1 C2 (Applications of De Moivre's theorem)
CP2ch2 Series Pre-req: Y2P3, Y2P9, CP1ch3	2.1 The method of differences 2.2 Higher derivatives 2.3 Maclaurin series 2.4 Series expansions of compound functions	Understand and use the method of differences to sum finite series Find and use higher derivatives of functions Know how to express functions as an infinite series in ascending powers using Maclaurin series expansion Be able to find the series expansions of compound functions	2☐ 5☐ 6☐ 8☐ 11☐ 17☐ 19☐ CP2ch2_XMQs_and_MS.pdf	CP2ch2 S1 (Method of differences) CP2ch2 M1 (Maclaurin series)
CP2ch3 Methods in calculus Pre-req: Y2P1, Y2P9, Y2P11	3.1 Improper integrals 3.2 The mean value of a function 3.3 Differentiating inverse trigonometric functions 3.4 Integrating with inverse trigonometric functions 3.5 Integrating using partial fractions	Evaluate improper integrals Understand and evaluate the mean value of a function Integrate rational functions using trigonometric substitutions Integrate using partial fractions	1☐ 2☐ 4☐ 6☐ 8☐ 12☐ 14☐ CP2ch3_XMQs_and_MS.pdf	CP2ch3 FC3 (Partial fractions and inverse trig) CP2ch3 FC1 (Improper integrals) CP2ch3 FC2 (Integrating with inverse trig)
CP2ch4 Volumes of revolution Pre-req: Y2P11, CP1ch5	4.1 Volumes of revolution around the x-axis 4.2 Volumes of revolution around the y-axis 4.3 Volumes fo revolution of parametrically defined curves 4.4 Modelling with volumes of revolution	Find volumes of revolution around the x-axis Find volumes of revolution around the y-axis Find volumes of revolution for curves defined parametrically Model real-life applications of volumes of revolution	3☐ 4☐ 7☐ 9☐ 10☐ CP2ch4_XMQs_and_MS.pdf	CP2ch4 AI1 (Further volumes of revolution)
CP2ch5 Polar coordinates Pre-req: Y2P9, Y2P11, CP1ch2	5.1 Polar coordinates and equations 5.2 Sketching curves 5.3 Area enclosed by a polar curve 5.4 Tangents to polar curves	Understand and use polar coordinates Convert between polar and Cartesian coordinates Sketch curves with r given as a function of θ Find the area enclosed by a polar curve Find tangents parallel to, or at right angles to, the initial line	4☐ 8☐ 9☐ 12☐ 13☐ CP2ch5_XMQs_and_MS.pdf	CP2ch5 P1 (Polar curves) CP2ch5 P2 (Areas of polar curves)
CP2ch6 Hyperbolic functions Pre-req: Y1P14, Y2P6, Y2P11, CP2ch2	6.1 Introduction to hyperbolic functions 6.2 Inverse hyperbolic functions 6.3 Identities and equations 6.4 Differentiating hyperbolic functions 6.5 Integrating hyperbolic functions	Understand the definitions of hyperbolic functions Sketch the graphs of hyperbolic functions Understand and use the inverse hyperbolic functions Prove identities and solve equations using hyperbolic functions Differentiate and integrate hyperbolic functions	3☐ 6☐ 7☐ 8☐ 12☐ 21☐ 24☐ 25☐ CP2ch6_XMQs_and_MS.pdf	CP2ch6 H1 (Hyperbolics intro) CP2ch6 H2 (Inverse hyperbolics)
CP2ch7 Methods in differential equations Pre-req: Y2P11	7.1 First-order differential equations 7.2 Second-order homogeneous differential equations 7.3 Second-order non-homogeneous differential equations 7.4 Using boundary conditions	Solve first-order differential equations using an integrating factor Solve second-order homogeneous differential equations using the auxiliary equation Solve second-order non-homogeneous differential equations using the complimentary function and the particular integral Find particular solutions to differential equations using given boundary conditions	2☐ 3☐ 8☐ 10☐ 13☐ 14☐ 15☐ 20☐ 23☐ 25☐ CP2ch7_XMQs_and_MS.pdf	CP2ch7 F2 (Integrating factors) CP2ch7 SD1 (Homogeneous second order DEs) CP2ch7 SD2 (Non-homogeneous second order DEs) CP2ch7 F1 (First order DEs)
CP2ch8 Modelling with differential equations Pre-req: CP2ch7	8.1 Modelling with first-order differential equations 8.2 Simple harmonic motion 8.3 Damped and forced harmonic motion 8.4 Coupled first-order simultaneous differential equations	Model real-life situations with first-order differential equations Use differential equations to model simple harmonic motion Model damped and forced oscillations using differential equations Model real-life situations using coupled first-order differential equations	4☐ 6☐ 7☐ 9☐ 10☐ 15☐ 16☐ CP2ch8_XMQs_and_MS.pdf	CP2ch8 SD3 (Coupled differential equations)

FP1ch1 Vectors Pre-req: CP1ch9	1.1 Vector product 1.2 Finding areas 1.3 Scalar triple product 1.4 Straight lines 1.5 Solving geometric problems	Find the vector product a x b of two vectors a and b Interpret |a x b| as an area Find the scalar triple product a.b x c of three vectors a, b and ¢, and be able to interpret it as a volume Write the vector equation of a line in the form (r-a) x b = 0 Find the direction ratios and direction cosines of a line Use vectors in problems involving points, lines and planes and use the equivalent Cartesian forms for the equations of lines and planes	2☐ 3☐ 5☐ 11☐ 13☐ 16☐ 18☐ 20☐ FP1ch1_XMQs_and_MS.pdf	FP1ch1 V1 (Vector product) FP1ch1 V2 (Scalar triple product) FP1ch1 FV1 (Further planes)
FP1ch2 Conic sections 1 Pre-req: Y1P3, Y1P4, Y1P12	2.1 Parametric equations 2.2 Parabolas 2.3 Rectangular hyperbolas 2.4 Tangents and normals 2.5 Loci	Plot and sketch a curve expressed parametrically Work with the Cartesian equation and parametric equations of a parabola and a rectangular hyperbola Find the equation of tangents and normals to parabolas and rectangular hyperbolas Understand the focus-directrix property of a parabola Solve locus problems involving the parabola and rectangular hyperbola	2☐ 4☐ 6☐ 9☐ 12☐ 13☐ FP1ch2_XMQs_and_MS.pdf	FP1ch2 C1 (Parabola and rectangular hyperbola)
FP1ch3 Conic sections 2 Pre-req: Y1P6, Y2P9	3.1 Ellipses 3.2 Hyperbolas 3.3 Eccentricity 3.4 Tangents and normals to an ellipse 3.5 Tangents and normals to a hyperbola 3.6 Loci	Identify an ellipse or a hyperbola from its Cartesian or parametric equations Find the foci, directrices, and eccentricity for an ellipse or a hyperbola Find tangents and normals to these curves Solve simple loci questions	5☐ 8☐ 9☐ 11☐ 13☐ 16☐ 18☐ FP1ch3_XMQs_and_MS.pdf	FP1ch3 FCS1 (Ellipse and hyperbola)
FP1ch4 Inequalities Pre-req: Y1P3, Y2P2	4.1 Algebraic methods 4.2 Using graphs to solve inequalities 4.3 Modulus inequalities	Manipulate inequalities involving algebraic fractions Use graphs to find solutions to inequalities Solve inequalities involving modulus signs	4☐ 7☐ 10☐ 11☐ 16☐ FP1ch4_XMQs_and_MS.pdf	FP1ch4 I1 (Inequalities) FP1ch4 FI1 (Modulus inequalities)
FP1ch5 The t-formulae Pre-req: Y2P6, Y2P7	5.1 The t-formulae 5.2 Applying the t-formulae to trigonometric identities 5.3 Solving trigonometric equations 5.4 Modelling with trigonometry	State the t-formulae Apply the t-formulae to trigonometric identities Use the t-formulae to solve trigonometric equations Use the t-formulae for modelling with trigonometry	6☐ 7☐ 11☐ 15☐ 17☐ 19☐ FP1ch5_XMQs_and_MS.pdf	FP1ch5 T1 (The t formulae)
FP1ch6 Taylor series Pre-req: Y2P9, CP2ch2, CP2ch7	6.1 Taylor series 6.2 Finding limits 6.3 Series solutions of differential equations	Derive and use Taylor series for simple functions Use series expansions to evaluate limits Use the Taylor series method to find a series solution to a differential equation	2☐ 4☐ 8☐ 11☐ 18☐ 21☐ 24☐ FP1ch6_XMQs_and_MS.pdf	FP1ch6 FC1 (Series and limits)
FP1ch7 Methods in calculus Pre-req: Y2P9, FP1ch5	7.1 Leibnitz's theorem and nth derivatives 7.2 L'Hospital's rule 7.3 The Weierstrass substitution	Apply Leibnitz's theorem for differentiating products Understand the use of derivatives to evaluate limits of indeterminate forms using L'Hospital's rule Use tangent half-angle substitutions to find definite and indefinite integrals using Weierstrass substitution	4☐ 5☐ 6☐ 10☐ 13☐ FP1ch7_XMQs_and_MS.pdf	FP1ch7 FC2 (Leibnitz's theorem and L'Hospital's rule) FP1ch7 FC3 (Weierstrass substitution)
FP1ch8 Numerical methods Pre-req: Y1P5, Y2P11, CP2ch7	8.1 Solving first-order differential equations 8.2 Solving second-order differential equations 8.3 Simpson's rule	Find numerical solutions to first-order differential equations using Euler's method and the midpoint method Extend Euler's method to find numerical solutions to second-order differential equations Use Simpson's rule to find an approximation for a given definite integral	2☐ 3☐ 5☐ 7☐ 9☐ FP1ch8_XMQs_and_MS.pdf	FP1ch8 N1 (Numerical methods for DEs) FP1ch8 FN1 (Simpson's rule)
FP1ch9 Reducible differential equations Pre-req: Y2P11, CP2ch7	9.1 First-order differential equations 9.2 Second-order differential equations 9.3 Modelling with differential equations	Use a given substitution to transform a first-order differential equation into one that can be solved Use a given substitution to transform a second-order differential equation into one that can be solved Solve modelling problems involving reducible differential equations	2☐ 5☐ 8☐ 9☐ 13☐ FP1ch9_XMQs_and_MS.pdf	FP1ch9 FD1 (Reducible DEs)