

Module C4.1	Content & Page Reference	Time
Algebra & graphs Topic 7 P3. Topic 1 P2. Topic 6 P3. Topic 4 P3. 10 hours.	<ul style="list-style-type: none"> • Simplify rational expressions, including factorising and cancelling. P3 Ex 7A p89-90 • Divide a polynomial, of degree not exceeding four, by a linear or a quadratic polynomial, and identify the quotient and remainder (which may be zero). P2 Ex 1C p188 (review & extension of C2.3 work) 	1.5 hours. 1.5 hours
	<ul style="list-style-type: none"> • Recall an appropriate form for expressing rational functions in partial fractions and carry out the decomposition, in cases where the denominator is no more complicated than three linear factors or a linear factor and a squared factor and where the degree of the numerator is less than the degree of the denominator. P3 Ex 7B p94-95 & Ex 7C p99 (not the integration questions) 	2 hours.
	<ul style="list-style-type: none"> • Use the expansion of $1 + x$ to the power n where n is a rational number and $-1 < x < 1$ (finding a general term is not included, but adapting the standard series to expand eg expanding $2 - 1/2x$ to the power -1 is included). P3 Ex 6 p78-80 	2 hours.
	<ul style="list-style-type: none"> • Understand the use of a pair of parametric equations to define a curve, and use a given parametric representation of a curve in simple cases. • Convert the equation of a curve between parametric and Cartesian forms. P3 Ex 4A p47-48 [Ex 4C p52-53] 	2 hours.

<p>Module C4.2 Differentiation & Integration. Topic 2 P3. Topic 4 P3. Topic 11 P3. Topic 7 P3. Topic 10 P3. Topic 8 P3. 15 hours.</p>	<ul style="list-style-type: none"> • Use the derivatives of $\sin x$, $\cos x$ and $\tan x$ together with sums, differences and constant multiples. • Extend the idea of 'reverse differentiation' to include the integration of trigonometric functions eg $\cos x$, $\sec x \tan x$. <p>P3 Ex 2A p25-26 selected questions</p> <ul style="list-style-type: none"> • Use trigonometric relations (such as double angle formulae) in order to facilitate the integration of functions such as involving powers of trigonometric functions. <p>P3 Ex 2B p29-30 selected questions</p> <ul style="list-style-type: none"> • Find and use the first derivative of a function which is defined parametrically. <p>P3 Ex 4B p50</p> <ul style="list-style-type: none"> • Find and use the first derivative of a function which is defined implicitly. <p>P3 Ex 11A p146-148 & Ex 11C p155-156</p> <ul style="list-style-type: none"> • Integrate rational functions by means of decomposition into partial fractions (restricted to the type of partial fractions specified in C4.1). <p>P3 Ex 7B p94-95 & Ex 7C p99 (integration questions only)</p> <ul style="list-style-type: none"> • Use a given substitution to simplify and evaluate either a definite or an indefinite integral (the relationship between integration by substitution and the chain rule should be understood). • Recognise an integrand of the form $kf'(x)/f(x)$, and integrate, for example, $\tan x$ <p>P3 Ex 10A p132 & Ex 10C p137-138 only do questions where substitution is given</p> <ul style="list-style-type: none"> • Recognise when an integrand can usefully be regarded as a product, and use integration by parts to integrate, for example, $x \sin 2x$ or $\ln x$ (the relationship between integration by parts and differentiation of a product should be understood). <p>P3 Ex 8B p109</p>	<p>2 hours.</p> <p>2 hours.</p> <p>2 hours.</p> <p>3 hours.</p> <p>2 hours.</p> <p>2 hours.</p> <p>2 hours.</p>
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<p>Module C4.3 First order differential equations. Topic 9 P3. Topic 11 P3. 6 hours.</p>	<ul style="list-style-type: none"> • Formulate a simple statement involving a rate of change as a differential equation, including the introduction, if necessary, of a constant of proportionality. • Find by integration a general form of solution for a differential equation in which the variables are separable. • Use an initial condition to find a particular solution of a differential equation. • Interpret the solution of a differential equation in the context of a problem been modelled by the equation. <p><i>P3 Ex 9A p117-118, Ex 9B p124-125 & Ex 11B p151-153</i></p>	<p>6 hours.</p>
<p>Module C4.4 Vectors. Topic 5 P3. Topic 12 P3. 8 hours.</p>	<ul style="list-style-type: none"> • Use standard notation for vectors eg columns, <i>i j k</i>. • Carry out addition and subtraction of vectors and multiplication of a vector by a scalar, and interpret these operations in geometrical terms. <p><i>P3 Ex 5A p59</i></p> <ul style="list-style-type: none"> • Use unit vectors, position vectors and displacement vectors. <p><i>P3 Ex 5B p62-63</i></p> <ul style="list-style-type: none"> • Understand the significance of all the symbols used when the equation of a straight line is expressed in the form <i>r = a + tb</i>. • Determine whether two lines are parallel, intersect or are skew. <p><i>P3 Ex 5C p66-67 & Ex 5D p69-70</i></p> <ul style="list-style-type: none"> • Calculate the magnitude of a vector, and identify the magnitude of a displacement vector AB as being the distance between points A and B. • Calculate the scalar product of two vectors (in either 2D or 3D) and use the scalar product to determine the angle between two directions and to solve problems involving the perpendicularity of vectors. • Find the angle between two lines, and the point of intersection of two lines when it exists. <p><i>P3 Ex 12A p165-166 & Ex 12B p169 selected questions</i></p>	<p>1 hour.</p> <p>1 hour.</p> <p>3 hours.</p> <p>3 hours.</p>