

C4 (EDEXCEL)

Topic	Objectives	ICT Resources including Bring on the Maths (BOTM) Match Up Maths (MUM)	GlosMaths Resources	Assessment	Success For All and other resources
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C4 Mindmap

Algebra and Functions	Prior Knowledge: ☺ <i>Simplification of rational expressions including factorising and cancelling (C3)</i>				
	Rational functions. Partial fractions (denominators not more complicated than repeated linear terms).	*BOTM* Identifying partial fractions Finding partial fractions Improper partial fractions The mixed bag		On Target True, Never, Sometimes; Teacher Notes Mathsnet Exam Questions	NRich Complex Partial Fractions (first part of this problem)
Things to make you go hmmmmmm.....					

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Coordinate Geometry	Prior Knowledge: ☺ Plot graphs of linear, quadratic, cubic functions, the reciprocal function $y = 1/x$, $x \neq 0$, the exponential function $y = k^x$ for integer values of x and simple positive values of k , the trigonometrical functions, using a spreadsheet of graph plotter as well as pencil and paper; recognise the characteristic shapes of all these functions (C1) ☺ Solution of simultaneous equations. Analytical solution by substitution (C1)				
	Cartesian and parametric equations of curves and conversion between the two forms.	*BOTM* Cartesian or parametric Points on parametrics Parametric pictures		On Target True, Never, Sometimes: Teacher Notes Mathsnet Exam Questions	A14 EXPLORING EQUATIONS IN PARAMETRIC FORM RISP 27 RISP 29 NRich Folium of Descartes
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Sequences and Series	Prior Knowledge: ☺ Binomial expansion of $(1+x)^n$ for a positive integer n (C2) ☺ The notations $n!$ and $\binom{n}{r}$ (C2) ☺ Multiplying fractions and integers				
	Binomial series for any rational n .	*BOTM* Valid expansions Rational powers Binomial with a twist Partial binomials		On Target True, Never, Sometimes; Teacher Notes Mathsnet Exam Questions	RISP 19 RISP 22 NRich Discrete Trends
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Differentiation	Prior Knowledge: ☺ Cartesian and parametric equations of curves and conversion between the two forms. ☺ $y = a^x$ and its graph (C2) ☺ Indefinite integration as the reverse of differentiation (C1) ☺ Integration of x^n (C1)				
	Differentiation of simple functions defined implicitly or parametrically.	<u>*BOTM*</u> Implicit functions Implicit differentiation Parametric differentiation Parametric areas Areas with a twist		On Target	NRich Squareness Folium of Descartes
	Exponential growth and decay			True, Never, Sometimes; Teacher Notes	
	Formation of simple differential equations	<u>*BOTM*</u> Differential equations		Mathsnet Exam Questions	RISP 28 RISP 30 NRich Integral Equation
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Integration	Prior Knowledge: ☺ Indefinite integration as the reverse of differentiation (C1) ☺ Integration of x^n (C1) ☺ Evaluation of definite integrals (C2) ☺ Interpretation of the definite integral as the area under a curve (C2) ☺ Approximation of area under a curve using the trapezium rule (C2) ☺ Differentiation of e^x , $\ln x$, $\sin x$, $\cos x$ and $\tan x$ and their sums and differences (C3) ☺ Differentiation using the product rule, the quotient rule, the chain rule (C3) ☺ The use of $\frac{dy}{dx} = 1/\frac{dx}{dy}$ (C3) ☺ Simplification of rational expressions including factorising and cancelling (C3) ☺ Partial fractions (C4) ☺ Formation of simple differential equations (C4) ☺ Solve problems involving volumes of right prisms, cylinders, cones and spheres				
	Integration of e^x , $\frac{1}{x}$, $\sin x$, $\cos x$	<u>*BOTM*</u> Standard functions Logarithms	Log cabin or beachhut? Maths poetry E Jokes SIC is negative Find your buddy	On Target	

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	<p>Simple cases of integration by</p> <p>i) substitution</p> <p>and</p> <p>ii) integration by parts.</p> <p>These methods as the reverse process of the chain and product rules respectively.</p>	<p>BOTM</p> <p>Simple substitution</p> <p>Definite substitution</p> <p>Harder substitution</p> <p>Integrating tanx</p> <p>Integrating ln x</p> <p>Trigonometry</p> <p>Definite Integration</p> <p>Making decisions</p>	<p>i) <u>Where does Error! Objects cannot be created from editing field codes. come from?:</u></p> <p><u>Unjumble with a twist:</u> <u>Teacher Notes</u></p> <p>ii) <u>Unjumble cyclic:</u> <u>Teacher Notes</u></p> <p><u>*Gotta be, could be, can't be*:</u> <u>Teacher Notes</u></p> <p><u>Fifty ways to do an integral</u></p>	<p><u>Standard, substitution or parts*:</u> <u>Teacher Notes</u></p> <p><u>True, Never, Sometimes:</u> <u>Teacher Notes</u></p> <p><u>Mathsnet Exam Questions</u></p>	<p><u>RISP 25</u></p>
	Simple cases of integration using partial fractions	<p>BOTM</p> <p>Harder Logarithms</p>			
	Evaluation of volume of revolution.	<p>BOTM</p> <p>Volumes</p> <p>Parametric volumes</p>	<p><u>Deriving Error! Objects cannot be created from editing field codes.</u></p> <p><u>*Trio*:</u> <u>Teacher Notes</u></p> <p><u>Cone Unjumble:</u> <u>Teacher Notes</u></p> <p><u>Sphere Unjumble:</u> <u>Teacher Notes</u></p>		

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	<p>Analytical solution of simple first order differential equations with separable variables.</p> <p>Numerical integration of functions.</p>		<p>*Differential equation buddies*: Teacher Notes</p>		<p>RISP 30</p> <p>NRich Out in Space Mechanical Integration</p>
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[*Things to make you go hmmmmm.....*](#)

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Vectors	Prior Knowledge: ☺ Understand and use vector notation; ☺ Calculate and represent graphically the sum of two vectors, the difference of two vectors and a scalar multiple of a vector; ☺ Calculate the resultant of two vectors; ☺ Understand and use the commutative and associative properties of vector addition; ☺ Solve simple geometrical problems in 2-D using vector methods ☺ Multiplication of integers ☺ Find the gradient of lines given by equations of the form $y = mx + c$ (when values are given for m and c) ☺ Understand that the form $y = mx + c$ represents a straight line and that m is the gradient of the line, and c is the value of the y intercept ☺ The sine and cosine rules ☺ Area of a triangle = $\frac{1}{2}ab\sin C$				
	Vectors in 2 and 3 dimensions. Magnitude of a vector . Algebraic operations of vector addition, subtraction and multiplication by a scalar, and their geometrical interpretations Position vectors. The distance between two points. The orthogonal unit vectors.	BOTM Basic skills Position vectors A mixed bag	Vector Song Quick History * Trio* : Teacher Notes * Vector terminology loop* : Teacher Notes * Vector intro loop* : Teacher Notes * Position vector buddies* : Teacher Notes	On Target * Treasure Hunt (Easy)*	NRich Article: Vectors – What Are They?
	The scalar product. Its use for calculating the angle between two lines.	*BOTM* Dot Product	Deriving the formula: Student version World problem	* Treasure Hunt (Hard)	NRich Article: Multiplication of Vectors Cubestick Flexi Quads Tetra Perp

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	Vector equations of lines.	BOTM Equations of lines Intersecting lines	Cartesian link *Unjumble*: Teacher Notes *Trio Vector Equation*: Teacher Notes *Trio Vector link with Cartesian*: Teacher Notes *Trio Perpendicular and Intersecting lines*: Teacher Notes	True, Never, Sometimes; Teacher Notes Mathsnet Exam Questions -	RISP 29
* Things to make you go hmmmmmm..... * *					

Formulae that students are expected to remember and that may not be included in formulae booklets.

Integration

Function	Integral
$\cos kx$	$\frac{1}{k} \sin kx + C$
$\sin kx$	$-\frac{1}{k} \cos kx + C$
e^{kx}	$\frac{1}{k} e^{kx} + C$
$\frac{1}{x}$	$\ln x + C, x \neq 0$
$f'(x) + g'(x)$	$f(x) + g(x) + C$
$f'(g(x)) g'(x)$	$f(x) + g(x) + C$

Vectors

$$\begin{pmatrix} x \\ y \\ z \end{pmatrix} \bullet \begin{pmatrix} a \\ b \\ c \end{pmatrix} = xa + yb + zc$$