C3 (EDEXCEL)

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

C3 Mindmap (link down)

Prior Knowledge:
☺ *Understand equivalent fractions, simplifying a fraction by cancelling all common factors;*
☺ *Add and subtract fractions by writing them with a common denominator;*
☺ *Multiply and divide a given fraction by an integer, by a unit fraction and by a general fraction*
☺ *Understand that the transformation of algebraic entities obeys and generalises the well-defined rules of generalised arithmetic;*
☺ *Simplify simple algebraic fractions to produce linear expressions*
☺ *Solve equations involving simple algebraic fractions including compound expressions as numerators and/or denominators*
☺ *Substitute positive and negative numbers into expressions such as $3x^2 + 4$ and $2x^3$*
☺ *Solve linear equations that require prior simplification of brackets, including those that have negative signs occurring anywhere in the equation, and those with a negative (or fractional) solution*
☺ *Manipulate algebraic expressions by collecting like terms, multiplying a single term over a bracket, taking out common factors, expand the product of two linear expressions*
  eg $(ax \pm p)(bx \pm q)$; factorising quadratic expressions including the difference of two squares and cancelling common factors in rational expressions
☺ *Plot graphs of linear, quadratic, cubic functions, the reciprocal function $y = \frac{1}{x}$, $x \neq 0$, 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)*
☺ *Knowledge of the effect of simple transformations on the graph of $y = f(x)$ as represented by $y = af(x)$, $y = f(x) + a$, $y = f(x+a)$, $y = f(ax)$ (C1)*

Algebra and Functions

Simplification of rational expressions including factorising and cancelling.	*BOTM* Simplifying fractions Manipulating algebra	On Target True, Never, Sometimes; Teacher Notes	RISP 21 **NRich** Problem and article – Telescoping Functions

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	Definition of a function. Domain and range of functions.	**BOTM** Range and domain	Introduction to the history and language of functions Identifying mappings; Teacher notes A graph or not a graph; Teacher Notes When odd is even? Partners Please; Teacher Notes	*Function Summary Loop* Function True, Never, Sometimes; Teacher Notes	RISP 4 RISP 16 RISP 18
	Composition of functions.	**BOTM** Composite functions AUTOGRAPH Composite Snap	*We will, we will combine you; Teacher Notes* Composite Song	*Treasure Hunt; Teacher Notes*	
	Inverse functions and their graphs.	*BOTM Inverse functions* AUTOGRAPH Inverse Snap	Can we always reverse? Teacher Notes *Inverse loop; Teacher Notes* Why is the inverse a reflection on the line y=x? Student sheet		A7 INTERPRETING FUNCTIONS,

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	The modulus function	BOTM Modulus functions Solving functions AUTOGRAPH Modulus	Intro to modulus loop; Teacher Notes Solving Modulus equations tutorial *TRIO*; Teacher Notes *Modulus challenge*; Teacher Notes	Mathsnet Exam Questions	NRich Slide
	Combinations of the transformations y = f(x) as represented by y = af(x), y = f(x) + a, y = f(x+a), y = f(ax).	*BOTM* Transforming graphs			A12 EXPLORING TRIGONOMETRICAL GRAPHS NRich Parabolas Again

Things to make you go hmmmmmm…….

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Topic	Objectives	ICT Resources including Bring on the Maths (BOTM) Match Up Maths (MUM)	GlosMaths Resources	Assessment	Success For All and other resources
Exponentials and Logarithms	**Prior Knowledge:** ☺ $y = a^x$ and its graph (C2) ☺ The laws of logarithms (C2) ☺ The solution of equations of the form $a^x = b$ (C2) ☺ Inverse functions and their graphs.(C3)				
	The function e^x and its graph. (Link with 'Differentiation' section - Differentiation of $y=a^x$)	*BOTM* Exponential graphs AUTOGRAPH Differentiating $y=a^x$	Who is e? The Enigmatic number e Who's best - E or Pi ?	On Target	RISP 13
	ln x as the inverse function of e^x	*BOTM* Solving equations I Solving equations II		True, Never, Sometimes; Teacher Notes	RISP 29
	The function ln x and its graph	*BOTM* Natural logarithms		Mathsnet Exam Questions	
		Things to make you go hmmmmmm…….			

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Topic	Objectives	ICT Resources including Bring on the Maths (BOTM) Match Up Maths (MUM)	GlosMaths Resources	Assessment	Success For All and other resources
Trigonometry	**Prior Knowledge:** ☺ *Sine, cosine and tangent functions. Their graphs, symmetries and periodicity. (C2)* ☺ *The sine and cosine rules; Area of a triangle = ½absinC* ☺ *Radian measure (C2)* ☺ *Knowledge and use of tanx = sinx/cosx and sin²θ +cos²θ=1. (C2)* ☺ *Solution of simple trigonometric equations in a given interval. (C2)* ☺ *Inverse functions and their graphs.(C3)*				
	Knowledge of secant, cosecant and cotangent and of arcsin, arccos and arctan. Their relationships to sine, cosine and tangent. Understanding of their graphs and appropriate restricted domains.	*BOTM* Trigonometrical graphs GSP Back to the unit circle AUTOGRAPH Inverse Sine	0=1? A brief history The Trig Family Song Drawing the graph of inverse sine; Teacher Notes *Special Angles*; Teacher Notes	On Target True, Never, Sometimes; Teacher Notes	
	Knowledge and use of $1 + \tan^2\theta = \sec^2\theta$ $1 + \cot^2\theta = \csc^2\theta$	BOTM Identities I MUM Trig Identities GSP Back to the unit circle	*Identity match* *Trio*; Teacher Notes	*Treasure Hunt Identities*; Teacher Notes	**NRich** t for Tan Octa Flower

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Topic	Objectives	ICT Resources including Bring on the Maths (BOTM) Match Up Maths (MUM)	GlosMaths Resources	Assessment	Success For All and other resources
	Knowledge and use of formulae for sin (A±B), cos (A±B) and tan (A±B); Knowledge and use of double angle formulae	*BOTM* Identities II Compound Angles	Proof; Teacher Notes Sin75° > 1 Back to Malta! Unjumble proof 1 Unjumble proof 2 Unjumble proof 3 Unjumble proof 4 Teacher Notes		RISP 26 RISP 29 **NRich** Shape and Territory
	Knowledge and use of the expressions for $acos\theta +bsin\theta$ in the equivalent forms of $rcos(\theta \pm \alpha)$ or $rsin(\theta \pm \alpha)$	BOTM Further Compound Angles problems	*Trio*; Teacher Notes Equation hierachy	*Treasure Hunt rcos/rsin*; Teacher Notes Mathsnet Exam Questions	**NRich** Loch Ness (Involves modulus function & differentiation)

Things to make you go hmmmmmm…….

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Topic	Objectives	ICT Resources including Bring on the Maths (BOTM) Match Up Maths (MUM)	GlosMaths Resources	Assessment	Success For All and other resources
Differentiation	**Prior Knowledge:** ☺ The derivative of f(x) as the gradient of the tangent to the graph of y = f (x) at a point; the gradient of the tangent as a limit; interpretation as a rate of change. Second order derivatives. ☺ Differentiation of x^n and related sums and differences. ☺ Applications of differentiation to gradients, tangents and normals. ☺ Applications of differentiating to maxima and minima and stationary points, increasing and decreasing functions ☺ ln x as the inverse function of e^x				
	Differentiation of i) e^x ii) sinx,cosx iii) and their sums and differences.	*BOTM* Trigonometrical functions I Trigonometrical functions II Further Differentiation Second derivatives Even further differentiation MUM Harder Differentiation Trig Differentiation AUTOGRAPH Differentiating sine and cosine Differentiating $y=a^x$ EXCEL Discovering e by differentiating $y=a^x$ from first principles	i) Discovering e by differentiating $y=a^x$ from first principles Unjumble differentiating a^x E jokes ii) Small angles; Teacher Notes First principles; Teacher Notes Trig First Principles Game; Teacher Notes *Find your 'standard' buddy*; Teacher Notes	On Target True, Never, Sometimes; Teacher Notes Differentiation 3 in a line; Teacher Notes	

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Topic	Objectives	ICT Resources including Bring on the Maths (BOTM) Match Up Maths (MUM)	GlosMaths Resources	Assessment	Success For All and other resources
	Differentiation using the product rule, the quotient rule, the chain rule. Differentiation of tanx	**BOTM** Tangent and cosecant Cotangent and secant Product rule Quotient Rule Chain Rule **MUM** Finding gradients using any method	Deriving the rules for: Product Quotient Chain Which method? Teacher Notes *Product loop*; Teacher Notes **Quotient Treasure Hunt**; Teacher Notes Quotient Song Differentiating tanx	Mathsnet Exam Questions	RISP 21
	The use of $\dfrac{dy}{dx} = 1/\dfrac{dy}{dx}$ Differentation of lnx	*BOTM* Even further differentiation (Differentiation of y=lnx)	*Trio*; Teacher Notes		**NRich** Exponential Trend Quick Route

Things to make you go hmmmmmm.......

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Topic	Objectives	ICT Resources including Bring on the Maths (BOTM) Match Up Maths (MUM)	GlosMaths Resources	Assessment	Success For All and other resources
Numerical Methods	**Prior Knowledge:** ☺ *Substitute positive and negative numbers into expressions such as 3x² + 4 and 2x³* ☺ *Sequences, including those given by a formula for the nth term and those generated by a simple relation in the form $x_{n+1} = f(x_n)$ (C1)*				
	Location of the roots of f(x)=0 by considering changes of sign of f(x) in an interval of x in which f(x) is continuous.	*BOTM* Roots in a range		On Target	**NRich** Spokes
	Approximate solutions of equations using simple iterative methods, including recurrence relations of the form $x_{n+1} = f(x_n)$.	*BOTM* Iteration I Iteration II		Mathsnet Exam Questions True, Never, Sometimes; Teacher Notes	**NRich** Equation Attack Two Trees

Things to make you go hmmmmmm…….

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

Trigonometry

$$\cos{}^2 A + \sin{}^2 A \equiv 1$$

$$\sec{}^2 A \equiv 1 + \tan{}^2 A$$

$$\operatorname{cosec}{}^2 A \equiv 1 + \cot{}^2 A$$

$$\sin 2A \equiv 2 \sin A \cos A$$

$$\cos 2A \equiv \cos^2 A - \sin^2 A$$

$$\tan 2A \equiv \frac{2 \tan A}{1 - \tan^2 A}$$

Differentiation

Function	Derivative
$\sin kx$	$k \cos kx$
$\cos kx$	$-k \sin kx$
e^{kx}	ke^{kx}
$\ln x$	$\dfrac{1}{x}$
$f(x) + g(x)$	$f'(x) + g'(x)$
$f(x) g(x)$	$f'(x) g(x) + f(x) g'(x)$
$f(g(x))$	$f'(g(x)) g'(x)$