WK		TOPIC	DETAILS			
1		**Recap**	**Review chain rule and connected rates of change, product and quotient rules** Differentiate functions (including e and ln, not including trig) using the product and quotient rules, Differentiate products including chain rule **Convex, concave functions, Points of Inflection**			
2		**Trig I**	Reciprocal trig functions including relationships to sin/cos/tan, graphs, domain and range. New Pythagorean identities Inverse trig graphs			
3		**Trig II**	Compound angle formulae, double angle formula Geometric proofs of these. Harmonic functions			
4		**Trig III**	Small angle approximations – use standard ones Derivatives of sine/cosine from first principles Differentiating trigonometric functions (sin kx, cos kx etc)			
5		**Integration by inspection**	Integration of standard functions ($e^x, \frac{1}{x}, \sin x, \cos x$) Integration of partial fractions			
6		**Integration by substitution**	Simple cases of integration using a substitution Understand as the reverse process of the chain rule. Include $\int \sin^2 t \cos t \, dt$ problems **APPLICATION INTO NON-CONSTANT ACCELERATION**			
HT						
7		**Summing Series**	Arithmetic series, term and sum, Proof of sum Recurrence relation & sigma notation Periodic sequences and their order Geometric series, term and sum, Proof of sum Problems in context			
8		**Binomial Expansion**	Expanding $(1+ax)^n$ Approximating			
9 **RW**		**Implicit differentiation**	First derivative only. Including a^x			
10		**The Normal Distribution**	**The shape of the model** Links to histogram. The bell curve shape, its symmetry and points of inflection ($x = \mu \pm \sigma$)			

			Understand and use the normal distribution as a model Find the mean, standard deviation. Understand what z values are, and how to 'code' real data into a standardised normal. Find probabilities using the normal distribution (sketching the graph) Find z values from probabilities. Find μ and σ and use simultaneous equations			
11		**The Normal Distribution**	**The sample mean from a Normal** Know that finding probabilities about a sample mean requires an adaption to the model $X \sim N\left(\mu, \left(\frac{\sigma}{\sqrt{n}}\right)^2\right)$ where n is the sample size. **Using the normal for other tests and distributions** Be able to use the normal to approximate binomial distribution (e.g. for large n and $p \approx 0.5$) Be able to apply a continuity correction Be able to conduct a hypothesis test on a normal distribution using the mean of a sample.			
12		**Parametrics**	**Convert parametric equations to Cartesian form** Using trigonometry or algebra, Recognise parametric functions as describing familiar curves Implications on the domain/range of Cartesian function Parametric equations from modelling (links to paper 3) Understand this as a consequence of the chain rule. Parametric integration. Parametric equations for motion			
13		**Integration by parts** PR teachers	Simple cases of integration by parts including multiple uses (but excluding the reduction formulae) Understand as the reverse process of the product rule.			
XH						
14		**Trapezium Rule**				
15		**Log/Line things**	**Use logarithmic graphs to estimate parameters in relationships of the form $y = ax^n$ and $y = kb^x$, given data for x and y.** Plot log y against log x and obtain a straight line where the intercept is log a and the gradient is n. Plot log y against x and obtain a straight line where the intercept is log k and the gradient is log b.			

			Simplify using a change of variables (i.e. $y = ax^n, y = kb^x$ into a linear function			
16		**Correlation & Regression Hypothesis testing on the PMCC**	Know the difference between the explanatory and response variables. Be able to calculate the PMCC & interpret the correlation (correlation coefficients as measures of how close data points lie to a straight line). Know that correlation does not imply causation and understand the dangers of extrapolation Interpret correlation coefficient using p-value or critical value.			
17		**Moments**	1. Why moments work and the simple cases: single forces with a perpendicular or non-perpendicular distance to the pivot. Get to grips with basic ideas: clockwise and anti-clockwise moments, using τ to represent 'taking moments', what the **line of action** is. 2. Multiple forces: idea of labelling and collecting together all clockwise moments and anti-clockwise moments (labelling one as positive and the other negative). An idea of **resultant moment** (which must include the direction of the resultant moment) and also **equilibrium**. THESE ONES SOLID. Use old Edexcel M1 to practice in simple contexts? 3. Contexts – emphasise the 4 types and make sure to include the modelling notes in your discussions. Maybe teach through examples? **Additional practice on non-uniform questions may be needed. (Share if find!)**	Integral maths: moments section 1: exercise level 1		
18		**Moments II**				
19		**Vectors**	**Use vectors in two dimensions and in three dimensions** Students should be familiar with column vectors and with the use of i and j unit vectors in two dimensions and i, j and k unit vectors in three dimensions. **Revisit all key concepts using 3D vectors** **Vectors in mechanics** Be able to sum vectors and apply laws of equilibrium to solve problems. **Properties of kite, rhombus and trapezium and proving these with vectors** Newton's second for motion in a straight line (// and perp. or as simple 2D vectors) **APPLICATION INTO NON-CONSTANT ACCELERATION WITH VECTORS**		A good F=ma question A good collinear/parallelogram problem Use textbook questions involving Rhombus kites etc, not just proving midpoints	
20		**Differential Equations**	Connected rates of change Construct differential equations in pure maths and in context Solving differential equation by separating variables Finding particular solutions			
HT						
21		**Differential Equations**	**See above**			

22		**Projectiles**	Model motion under gravity in a vertical plane using vectors: projectiles. Initial velocity could be given as a value which needs resolving, as a vector or as an unknown.			
23		**Numerical methods** PR self-assessment	Change of sign and continuity Iteration methods Be able to draw cobweb and staircase diagrams Solve $f(x) = 0$ numerically using Newton Raphson & other recurrence relations Understand how such methods can fail			
24		**Proof**	Proof by Contradiction			
25		**Revision**				
(26)		**Revision**				
EH						
27		**Revision**				
28		**Revision**				
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