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Curriculum Plan - Maths

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Year 13	**Golden Treads:** State the big ideas that will be taught across the year (Threshold concepts)				**Enrichment:** What is offered through the year to support learning in the classroom?	**Review and evaluation:** Give date for review of the curriculum
	Topics	**Assessment**	**Substantive Knowledge**	**Misconceptions**	**Key Vocabulary**	**Knowledge tracking**
Term 1 Teacher 1	**Pure Year 2** 7. Trig and modelling	1 fully marked review sheet	Trig and modelling - Addition formulae - Using angle addition formulae - Double-angle formulae - Solving trig equations - Simplifying acosx +- bsinx - Proving trig identities - Modelling with trig functions	• Only solving for a single solution • Neglecting to look for extraneous solutions • Mixing up the definitions and properties of trigonometric functions and their inverses	Identities Double-angle formula	**Before:** **Pure Year 2 Ch7 (from Pure Y1 Ch)** Exact values of trig **Pure Year 2 Ch9 (from GCSE and Ch7,2 and Pure Y1 Ch6 and 14)**
Teacher 2	**Pure Year 2** 3. Sequences and series 8. Parametric equations	In class 1.5hour assessment AS pure with Y2 Chapters 1-3, 5 & 6, AS applied	Sequences and series - Arithmetic sequences - Arithmetic series - Geometric sequences - Geometric series - Sum to infinity - Sigma notation Parametric equations - Parametric equations - Using trig identities - Curve sketching - Points of intersection - Modelling with parametric equations	• Confusing geometric and arithmetic sequences • Misunderstanding when a sequence is convergent • Assuming parametric equations always have to use time. They can involve any parameter that varies continuously.	Arithmetic Geometric Sequence Series Recurrence Periodic Cartesian form Domain Range Intersection	**Before:** **Pure Year 2 Ch3 (from Pure Y1 Ch14)** Exponentials **Pure Year 2 Ch8 (from GCSE and Ch7,2 and Pure Y1 Ch6 and 14)** Rearranging formulae, including exponentials Double angle formulae Ranges and domains of functions Equations of circles
Term 2 Teacher 1	9. Differentiation	1 fully marked review sheet	Differentiation - Trig, exponentials and logs - Chain rule - Product rule - Quotient rule - Parametric - Implicit - 2nd derivatives - Rates of change	• Challenges with applying advanced rules such as the chain rule, differentiating composite functions, and mastering various notations. • Failing to simplify after differentiation, leading to messy solutions and potential errors. • Misapplications of differentiation rules, especially in complex functions, and the failure to identify critical points for maximum, minimum, or inflection points can result in inaccuracies. • In contextual problems, confusing velocity with acceleration or misinterpreting derivatives in real-world contexts.	Inflection Concave Convex	**Before:** **Pure Year 2 Ch3 (from Pure Y1 Ch14)** Exponentials **Pure Year 2 Ch8 (from GCSE and Ch7,2 and Pure Y1 Ch6 and 14)** Rearranging formulae

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	10. Numerical methods		Numerical methods - Locating roots - Iteration - The Newton-Raphson method - Applications to modelling	• Using the wrong starting value • Assuming exactness – in reality numerical methods involve approximations • Ignoring convergence – assuming the running the iterations for more steps will always lead to a more accurate solution • Ignoring the limitations of certation methods = e.g. assuming that the trapezoidal rule for numerical integration will always provide accurate results without considering the smoothness of the function being integrated. • Sometimes students may misapply numerical methods by using them in situations where they are not appropriate or effective.	Continuous Iterative Convergent Divergent Cobweb diagram	**Before:** **From GCSE** Evaluating functions **Pure Year 1 Ch12** Evaluating f'(x) **After:** -
Teacher 2	11. Integration	1 fully marked review sheet	Integration - Exponentials and trig functions - Substitution - By parts - Partial fractions - Parametric - Area under graphs - Trapezium rule - Differential equations	• Confusing integration with differentiation • Treating Integration as the Reverse of Differentiation: While it's often taught that integration is the reverse of differentiation, this oversimplification can lead to misconceptions. • Neglecting the constant of integration	Boundary condition Limits	**Before:** **Pure Year 1 Ch13** Integration **Pure Year 2 Ch3** Partial Fractions **After:** -
Term 3 **Teacher 1**	12. Vectors 4. Binomial expansion	**Y13 Internals – full length (2hours) pure paper (not Ch4) and AS applied**	Vectors - 3D coordinates - Vectors in 3D - Solving geometric problems - Application to mechanics Binomial expansion - Expanding (1+x)^n - Expanding (a+bx)^n - Using partial fractions	• Forgetting that vectors have both magnitude and direction. • Confusion between position vectors and displacement vectors. • Treating Integration as the Reverse of Differentiation: While it's often taught that integration is the reverse of differentiation, this oversimplification can lead to misconceptions. Neglecting the constant of integration	Equilibrium Plane Ascending Descending Validity	**Before:** **Pure Year 1 Ch1** Vector Notation **After:** -

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Teacher 2	**Applied Year 2** Mechanics 4. Moments Mechanics 5. Forces and friction	1 fully marked review sheet	Moments - Moments - Resultant moments - Equilibrium - Centres of mass - Tilting Forces and friction - Resolving forces - Inclined planes	• Confusion between force and moment • Forgetting about perpendicular distance • Using the wrong axis of rotation • Thinking friction always opposes motion • Thinking smooth surfaces have zero friction	Resultant Uniform Equilibrium Magnitude Coefficient of friction Tendency	**Before:** **Applied Year 1 Ch10** Moments **Applied Year 1 Ch10** Moments
Term 4 Teacher 1	**Applied Year 2** Statistics 1. Regression, correlation and hypothesis testing Statistics 2. Conditional probability Starting The Normal Distribution (see T5)	1 fully marked review sheet	Regression, correlation and hypothesis testing - Exponential models - Measuring correlation - Hypothesis testing for zero correlation Conditional probability - Set notation - Conditional probability - Conditional probabilities in Venn diagrams - Probability formulae - Tree diagrams	• Misunderstanding correlation as causation. Just because two variables are correlated does not mean that one causes the other. • Students might struggle with interpreting regression coefficients correctly. • Confusion about p-values and significance levels. Some students may think that a non-significant result means there is no effect, which is not necessarily true. • Mixing up conditional probability (the probability of an event given that another event has occurred) with joint probability (the probability of two events occurring simultaneously). • Assuming events are independent when they are not, or vice versa	Bivariate data Constants Coefficients One-tailed Two-tailed Linear correlation Mutually exclusive Independent Union Complement Intersection	**Before:** **Statistics Year 1 Ch4** Interpreting linear equations **Statistics Year 1 Ch7** Hypothesis testing **Before:** **Statistics Year 1 Ch4** Mutually exclusive & Independent events
Teacher 2	Mechanics 5. Forces and friction Mechanics 6. Projectiles Mechanics 7. Applications of forces	Pure mock – full 2 hour paper in class.	- Friction Projectiles - Horizontal projection - Horizontal and vertical components - Projection at any angle - Projectile motion formulae Applications of forces - Static particles - Modelling with statics - Friction and static particles - Static rigid bodies - Dynamics and inclined planes - Connected particles	• Assuming that the path of a projectile is parabolic in all scenarios • Mixing up horizontal and vertical components. • Assuming an object in equilibrium has no forces acting against it.	Velocity Acceleration Static equilibrium Inextensible	**Pure Year 1 Ch10** Trigonometry **Applied Year 2 Ch 4** Moments

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Term 5 **Teacher 1**	Statistics 3. The normal distribution		The normal distribution - The normal distribution - Finding probabilities for normal distributions - The inverse normal distribution function - The standard normal distribution - Finding μ and σ - Approximating a binomial distribution - Hypothesis testing with the normal distribution	• Assuming normality without verification • Confusing z-scores and Percentiles • Forgetting about standardisation	Normal distribution Cumulative Continuity Correction	**Before:** **Statistics Year 1 Ch6** Using the binomial distribution
Teacher 2	Mechanics 8. Further kinematics	Y2 Applied mock	Further kinematics - Vectors in kinematics - Vector methods with projectiles - Variable acceleration in one dimension - Differentiating vectors - Integrating vectors	• Confusing velocity and acceleration • Neglecting air resistance	Displacement Acceleration	**Before:** **Pure Year 1 Ch11** Vectors **Pure Year 2 Chs9 & 11** Complex differentiation