

Wk	Strand I	Strand II
1	<p>QUADRATICS</p> <p>Solution of quadratic equations (by factorising, formula, calculator, completing sq). Solving quadratics in context (which may include evaluating the use of quadratics & lines as modelling tools).</p> <p>Quadratic equations in a function of the unknown Hidden quadratics within indices, trigonometric expressions etc.</p> <p>Completing the square Sketching inc. vertex/turning point, roots. Working backwards from sketch to equation. Completing the square with non-integer numbers (i.e. context)</p> <p>The discriminant of a quadratic function, including conditions for real and repeated roots. Know where the discriminant comes from, Solving given unknowns, situations (e.g. an unknown such that one function is tangent to another)</p> <p>Solve linear and quadratic inequalities in a single variable and interpret such inequalities graphically Solving standard expressions: $ax + b > cx + d, px^2 + qx + r \geq 0$ Solving expressions such as $px^2 + qx + r < ax + b$ and recognising this as the range of x for which the curve $y = px^2 + qx + r$ is below the equation $y = ax + b$ Including inequalities with brackets and fractions (e.g. $\frac{4}{y} > 3$)</p> <p>Express inequalities through the correct use of 'and' and 'or' or through set notation. Appropriate uses for \cup and \cap, $\{x: x > a\}, x \in \mathbb{R}$ etc. Be able to simplify set notation expressions into single sets.</p> <p>Be able to represent, and interpret, inequalities graphically. Shading and use of dotted and solid line convention is required.</p>	<p>TRIGONOMETRY 1: RADIANS, GRAPHS, IDENTITIES & SOLVING</p> <p>Introduce radian measure.</p> <p>Understand and use the sine, cosine and tangent functions Use of x and y coordinates of points on the unit circle to give cosine and sine respectively. Special triangles as a consequence of the triangles Know and use exact values of sin and cos for $0, \frac{\pi}{6}, \frac{\pi}{4}, \frac{\pi}{3}, \frac{\pi}{2}, \pi$ and multiples of thereof, and exact values of tan for $0, \frac{\pi}{6}, \frac{\pi}{4}, \frac{\pi}{3}, \frac{\pi}{2}, \pi$ and multiples of thereof.</p> <p>Know and use symmetry and periodicity of the graphs Recognise the effect of graph transformations on trigonometric functions</p> <p>Solving simple trig problems in given range Including quadratic equations in sin, cos and tan, and equations involving multiples of the unknown angle in both degrees and radians e.g. $\sin\left(2x - \frac{\pi}{6}\right) = \frac{1}{2}$ OR $\sin(x + 70) = 0.5$ OR $3 + 5 \cos 2x = 1$ OR $6 \cos^2 x + \sin x - 5 = 0$</p>
2	<p>COMPLEX NUMBERS I</p> <p>Be able to solve a quadratic with real coefficients. Given sufficient information (a root or quadratic factor) be able to factorise and find roots for cubic or quartic polynomials 4 operations on complex numbers Understand and use the complex conjugate</p>	<p>TRIGONOMETRY II</p> <p>Pythagorean Identities Use $\sin^2 x + \cos^2 x \equiv 1$ and $\frac{\sin x}{\cos x} = \tan x$ to solve trigonometric equations, Use identities to construct proofs involving trigonometric identities.</p> <p>Reciprocal and inverse trig functions Understand and use the definitions of secant, cosecant, and cotangent, their relationships to sin/cos/tan, graphs, domain and range. Understand and use the definitions of arcsin, arccos, and arctan, their relationships to sin/cos/tan, graphs, domain and range.</p> <p>Further Pythagorean Identities Use $\sec^2 \theta = 1 + \tan^2 \theta$ and $\operatorname{cosec}^2 \theta = 1 + \cot^2 \theta$ to solve trigonometric equations, and to construct proofs involving trigonometric identities.</p>
3	<p>CIRCLE AND COORDINATE GEOMETRY</p> <p>Understand and use the equation of a straight line, including the forms $y - y_1 = m(x - x_1)$ and $ax + by + c = 0$ Be able to use the above construction form and information in a variety of forms to create the equation of a line (e.g. given two points, given gradient and point)</p>	<p>TRIGONOMETRY III: TOOLS</p> <p>Work with radian measure, including use for arc length and area of sector in problems. Use area of triangle formula $A = \frac{1}{2}ab \sin C$ (T) Use area of sector formula $A = \frac{1}{2}r^2\theta$ (O)</p>

	<p>Equation of perpendicular bisector</p> <p>Gradient conditions for two straight lines to be parallel or perpendicular.</p> <p>Be able to use straight line models in a variety of contexts.</p> <p>Understand and use the coordinate geometry of the circle including using the equation of a circle in the form $(x - a)^2 + (y - b)^2 = r^2$</p> <p>Complete the square to find the centre and radius of a circle</p> <p>Use the following properties:</p> <ul style="list-style-type: none"> The angle in a semicircle is a right angle The perpendicular from the centre to a chord bisects the chord The radius of a circle at a given point on its circumference is perpendicular to the tangent to the circle at that point. Use the above to find the circumcircle of a triangle with given vertices. <p>Other geometric problems</p> <ul style="list-style-type: none"> The distance from a point to the circumference of a circle The length of a line from a point outside of the circle to a point on the circle. <p>ALGEBRAIC FRACTIONS, FACTOR THEOREM, PARTIAL FRACTIONS</p> <p>Manipulate polynomials algebraically, expanding brackets and collecting like terms.</p> <p>Factorisation and simple algebraic division</p> <ul style="list-style-type: none"> Four operations on algebraic fractions Simplify rational expressions, including by factorising and cancelling. Linear or quadratic denominators of rational expressions Factorise expressions such $x^3 + 3x^2 - 4$ and $6x^3 + 11x^2 - x - 6$ Algebraic division (by linear terms only) <p>Use of the factor theorem</p> <ul style="list-style-type: none"> Algebraic division by linear expressions only. As applied to cubics (sketching cubics) <p>Partial Fractions</p> <ul style="list-style-type: none"> Decompose rational functions into partial fractions Denominators at most $(ax + b)^2$, no more than 3 terms. 	<p>Use arc length formula $l = r\theta$ (O)</p> <p>Use cosine rule (L) and sine rule (S)</p> <p>Explore the ambiguous case of the sine rule.</p>
4	<p>COMPLEX NUMBER II</p> <p>Argand diagrams</p> <ul style="list-style-type: none"> Know and understand how to represent complex numbers on argand diagram Be able to convert to modulus/argument form and multiply/divide in mod/arg form <p>GRAPH SKETCHING & TRANSFORMATIONS</p> <p>Understand and use graphs of functions, sketch curves defined by simple equations</p> <ul style="list-style-type: none"> Sketch graphs of $y = \frac{a}{x}$, $y = \frac{a}{x^2}$, $y = a^x$, $y = \sqrt{x}$, quadratics, cubics, quartics Including asymptotes (and equations of), intercepting points with coordinate axes. Strategies for sketching unfamiliar graphs. Intercepts, asymptotes, as x increases... <p>Interpret algebraic solution of equations graphically; use intersection points of graphs to solve equations.</p> <p>Understand and use proportional relationships and their graphs</p> <ul style="list-style-type: none"> Sketching from a context/modelling a situation given information (e.g. the circumference of a circle is proportional to its diameter) 	<p>DRAWING FORCE DIAGRAMS</p> <p>Understand and use fundamental quantities and units in the S.I. system: mass, gravity</p> <p>Understand and use derived quantities and units: velocity, acceleration, force, weight, acceleration due to gravity.</p> <ul style="list-style-type: none"> Understand the limitations of models. List the assumptions made when modelling (particle – centre of mass is in the centre of the object), air resistance is negligible, resistive forces are constant. Understand that while g is assumed constant (9.8 m s^{-2}) it is not a universal constant but depends on location. <p>Understand the concept of a force: normal reaction, tension, thrust or compression, resistance</p> <ul style="list-style-type: none"> Understand and use Newton's first law. Understand and use Newton's second law for motion in a straight line with constant acceleration and forces acting parallel and/or perpendicular to the motion.

	<p>Understand the effect of simple transformations on the graph of $y = f(x)$, including sketching associated graphs</p> <p>The effect of $f(ax)$, $af(x)$, $f(x+a)$ and $f(x) + a$ on graphs Describe the transformation given the equation (including multi-ways) State the resulting coordinates of a specified point and transformation Describe the transformation given the graphs</p> <p>Use trig graphs as examples!!</p>	
5	<p>DIFFERENTIATION I</p> <p>Differentiation from first principles (polynomials with small positive integer powers of x, $\sin x$ and cosine x. Be able to differentiate polynomials Sketch the gradient function and use gradient function to sketch original function Gradient at a point, Equations of tangent/normal Increasing and decreasing functions Sketch the gradient function The second derivative, stationary points. Links graphically Problem solving in context: optimising problems Convex and concave functions</p>	<p>Resolving Forces and Friction</p> <p>Extend to situations where the forces need to first be resolved. Understand and use Newton's third law and use to solve problems in equilibrium.</p> <p>Understand and use the $F \leq \mu R$ model for friction; Be able to calculate the coefficient of friction and use within a question Recognise that the motion of a body on a rough surface will imply friction Know what limiting friction is and when to apply it Use frictional forces within statics questions. (e.g. $F = \mu R$ when moving, $F \leq \mu R$ when in equilibrium)</p>
6	<p>PROBABILITY 1</p> <p>Understand and use mutually exclusive and independent events when calculating probabilities.</p> <p>Venn diagrams and tree diagrams, sample spaces Use of set notation to describe events. Use of probability formula (test for independence, conditional probability formula)</p> <p>Link to discrete and continuous data Understand that probability is the area under the curve of a continuous data probability density function.</p> <p>Modelling with probability Critiquing assumptions, the effect of more realistic assumptions</p>	<p>KINEMATICS</p> <p>Understand and use fundamental quantities and units in the S.I. system: length, time Understand and use derived quantities and units: velocity, acceleration, May be required to convert between units (e.g. km h^{-1} to m s^{-1})</p> <p>Understand and use the language of kinematics: position; displacement; distance travelled; velocity; speed; acceleration.</p> <p>Understand, use and interpret graphs in kinematics for motion in a straight line: displacement against time and interpretation of gradient; velocity against time and interpretation of gradient and area under the graph. May require solving for unknowns (e.g. time or velocity), and comparing multiple particles on different journeys</p> <p>Understand & derive the formulae for constant acceleration for motion in a straight line. Use a velocity-time graph to derive the 5 'suvat' equations. These are given in the formula book and do not need to be memorised.</p>
7	<p>INTRODUCTION TO THE LARGE DATA SET)</p> <p>Prepare for Stats Pack Introduce sampling methods Introduce Large Data Set</p> <p>GCSE Statistics revision eg Box Plots, Measures of central tendency,</p> <p>Linear interpolation, Standard Deviation</p>	<p>LOGARITHMS & EXPONENTIALS</p> <p>The function a^x and its graph, for $a > 0$ Understand the difference in shape between $a < 1$ and $a > 1$ Solve equations of the form $a^x = b$</p> <p>Log rules $\log_a x + \log_a y = \log_a xy$ $\log_a x - \log_a y = \log_a \frac{x}{y}$ $k \log_a x = \log_a x^k$</p> <p>Know and use the definition of $\log_a x$ as the inverse of a^x, where a is positive and $x \geq 0$.</p> <p>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 $\log b$.</p>

HT	Oct Half Term	STATS PACK	
8	Inset Day Monday	<p>STATS PACK CONSOLIDATION/THE NORMAL DISTRIBUTION</p> <p>Consolidate issues arising from Stats Pack Understand and use key terminology (consensus, population, sample, statistics) Know the pros and cons of sampling vs consensus Be able to select and use different sampling techniques and know that they give differing results. Be able to clean data: dealing with missing data, errors, outliers.</p> <p>Understand and use the Normal distribution as a model The notation $X \sim N(\mu, \sigma^2)$ may be used. Knowledge of the shape and the symmetry of the distribution is required. Knowledge of the probability density function is not required. Derivation of the mean, variance and cumulative distribution function is not required. Select an appropriate probability distribution for a context, with appropriate reasoning, including recognising when the binomial or Normal model may not be appropriate.</p> <p>Find probabilities using the Normal distribution Questions may involve the solution of simultaneous equations. Students will be expected to use their calculator to find probabilities connected with the normal distribution.</p> <p>Link to histograms, mean, standard deviation, points of inflection, and the binomial distribution Students should know that the points of inflection on the normal curve are at $x = \mu \pm \sigma$. The derivation of this result is not expected. Students should know that when n is large and p is close to 0.5 the distribution $B(n, p)$ can be approximated by $N(np, np[1 - p])$ The application of a continuity correction is expected.</p> <p>Conduct a statistical hypothesis test for the mean of a Normal distribution Hypothesis should be stated in terms of the population mean μ. Variance will be known, given or assumed. Results to be interpreted in context.</p>	<p>DIFFERENTIATION II</p> <p>Derivatives of standard functions Differentiate a^{kx}, $\sin kx$, $\cos kx$, $\tan kx$ related sums, differences, and constant multiples.</p> <p>Chain, product and quotient rules Differentiation using the product rule, quotient rule and chain rule Use $\frac{dx}{dy}$ to differentiate inverse functions Differentiate $\operatorname{cosec} x$, $\cot x$, and $\sec x$, ($\arcsin x$, $\arccos x$, $\arctan x$)</p>
9	Open Evening Weds/Thurs, PR Day Thurs, Well-being Day Friday	<p>HYPOTHESIS TESTING I</p> <p>Understand the language of a statistical hypothesis test Null hypothesis, alternative hypothesis, significance level, test statistic, 1-tail test, 2-tail test, critical value, critical region, acceptance region, p-value</p>	<p>EXPONENTIAL GROWTH & DECAY</p> <p>Know and use the function e^x and its graph Know and use the function $\ln x$ and its graph Know and use $\ln x$ as the inverse function of e^x. Solutions of equations of the form $e^{ax+b} = p$ and $\ln(ax + b) = q$ Including $y = e^{ax+b} + c$ Know that the gradient of e^{kx} is equal to ke^{kx} and hence understand why the exponential model is suitable in many applications. Differentiate e^{kx}, $\ln kx$</p> <p>Modelling exponential growth E.g. use of e in continuous compound interest, radioactive decay, population growth Be able to find constants in models. Understand terms such as 'initial' meaning $t = 0$</p>

			<p>Consideration of the limitations of refinements of the models including considering a second improved model.</p> <p>Explore behaviour for large values of t or to consider whether the range of values predicted is appropriate</p>
10	Targeted Parents Evening Thurs	<p>BINOMIAL EXPANSION</p> <p>Understand and use the binomial expansion of $(a + bx)^n$ for any value of n $(a + bx)^n$ for positive integer n. $(1+ax)^n$ for negative or fractional n including writing in the correct form</p> <p>Be able to manipulate and use notations $n!$ and nC_r Use in problems where n is unknown Understand nC_r and $n!$ as linked to binomial probabilities.</p> <p>Understand and use validity Be aware that the expansion is valid for $\left \frac{bx}{a}\right < 1$. Proof not required. Understand how validities may combine. May be asked to comment on the range of validity</p> <p>Approximations?</p>	<p>VECTORS</p> <p>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.</p> <p>Calculate the magnitude and direction of a vector and convert between component form and magnitude/direction form. Students should be able to find a unit vector in the direction of a, and be familiar with the notation a.</p> <p>Add vectors diagrammatically and perform the algebraic operations of vector addition and multiplication by scalars, and understand their geometrical interpretations. The triangle and parallelogram laws of addition. Parallel vectors.</p> <p>Understand and use position vectors; calculate the distance between two points represented by position vectors. $\vec{OB} - \vec{OA} = \vec{AB} = b - a$ The distance d between two points (x_1, y_1) and (x_2, y_2) is given by $d^2 = (x_1 - x_2)^2 + (y_1 - y_2)^2$</p> <p>Use vectors to solve problems in pure mathematics For example, finding position vector of the fourth corner of a shape (e.g. parallelogram) ABCD with three given position vectors for the corners A, B and C. Or use of ratio theorem to find position vector of a point C dividing AB in a given ratio.</p>
11		<p>BINOMIAL DISTRIBUTION and DRVs</p> <p>Understand and use simple, discrete probability distributions Calculation of mean and variance of discrete random variables is excluded Should be able to identify the discrete uniform distribution</p> <p>The binomial distribution Use distribution to model a real-world situation and comment critically on the appropriateness. Use the notation $X \sim B(n, p)$ Use of calculator to find individual or cumulative binomial probabilities. Calculate probabilities using the binomial distribution.</p>	<p>VECTORS IN MECHANICS</p> <p>Understand and use the <i>suvat</i> formula with 2-dimensional vectors Vectors can be given in i-j or column vector form.</p> <p>Problems of motion in a straight line with constant acceleration in vector form.</p>
12		<p>HYPOTHESIS TESTING II</p> <p>Appreciate the expected value of a binomial distribution is given by np for a 2-tail test</p> <p>Conduct a statistical hypothesis test for the proportion in the binomial distribution Interpret the results in context. Understand that a sample is being used to make an inference about the population Hypotheses should be expressed in terms of the population parameter p. Appreciate the significance level is the probability of incorrectly rejecting the null hypothesis.</p>	<p>IMPLICIT DIFFERENTIATION</p> <p>Differentiate simple functions implicitly. Find equations of tangents and normals Use implicit differentiation to prove the derivative of e^x, a^{kx}, the product and quotient rules</p>
13		<p>INTEGRATION I</p> <p>Know and use the Fundamental Theorem of Calculus</p>	<p>CONNECTED PARTICLES AND FRICTION</p> <p>Understand and use fundamental quantities and units in the S.I. system: mass</p>

		<p>Integration is the reverse of differentiation Constant of integration (+c) is required</p> <p>Understand and use integration as the limit of a sum $\int_a^b f(x) dx = \lim_{\delta x \rightarrow 0} \sum_{x=a}^b f(x) dx$</p> <p>Integrate polynomials Integrate x^n excluding $n=-1$, related sums, differences and constant multiples Integrate e^{kx}, $\frac{1}{x}$, $\sin kx$, $\cos kx$ and related sums and differences Students should recognise integrals of the form $\int \frac{f'(x)}{f(x)} = \ln f(x) + c$.</p> <p>Evaluate definite integrals: find the area under a curve and between two curves Understand and use numerical integration of functions, including the use of the trapezium rule and estimating the approximate area under a curve and limits that it must lie between.</p>	<p>Understand and use derived quantities and units: acceleration, force, weight, Newton's second and Newton's third laws may be extended to problems involving smooth pulleys and connected problems. Further problems could involve contact problems (e.g. lift problems). All cases could include where forces need to be resolved (e.g. at least one of the particles is moving on an inclined plane).</p> <p>Understand and use addition of forces; resultant forces; dynamics for motion in a plane. May be required to resolve a vector into two components or use a vector diagram May be required to use triangles (and sine/cosine rules) Problems may involve two or more forces. Forces may be given in magnitude – direction form.</p>
14	Finish on Weds this week	Consolidation/Extension of Integration	Mechanics Consolidation/Exam Questions
	XMAS		
	XMAS		
(15)		<p>INTEGRATION II: SUBSTITUTION & INSPECTION</p> <p>Carry out simple cases of integration by substitution Integration by substitution includes finding a suitable substitution and is limited to cases where one substitution will lead to a function which can be integrated Understand this method as the inverse of the chain rule Include cases where students having to pick the substitution</p> <p>Applications from partial fractions Understand that fractions reached from partial fractions can be integrated using (generally) standard techniques</p>	<p>TRIGONOMETRY IV</p> <p>Harmonic form Use of compound angle formula ($\sin(A \pm B)$, $\cos(A \pm B)$, $\tan(A \pm B)$) Understand and use the double angle formula Understand geometric proofs of these formula Include applications to half angles. (Not $\tan(\frac{1}{2}\theta)$) Understand and use expressions for $a \cos \theta + b \sin \theta$ in the equivalent forms of $r \cos(\theta \pm \alpha)$ or $r \sin(\theta \pm \alpha)$</p> <p>Use trigonometric functions and identities to construct proofs involving trigonometry. Students need to prove identities such as $\cos x \cos 2x + \sin x \sin 2x \equiv \cos x$</p> <p>Use trigonometric functions to solve problems in content Problems involving vectors, kinematics, forces, wave motion, harmonic motion.</p> <p>Understand and use the standard small angle approximations of sine, cosine and tangent $\sin \theta \approx \theta$ $\cos \theta \approx 1 - \frac{\theta^2}{2}$ $\neq \tan \theta \approx \theta$ for θ in radians</p>
16	Progress Review Day Weds/Parents Evening Thurs	<p>INTEGRATION IV: PARTS & VOLUMES OF REVOLUTION</p> <p>Carry out simple cases of integration by parts Integration by parts includes more than one application of the method but excludes reduction formulae. Understand this method as the inverse of the product rule</p> <p>Consolidate integration using Volumes of Revolution</p> <p>Trapezium Rule</p>	<p>FUNCTIONS</p> <p>Definition of a function Finding domain and range Composition of functions (including graphs) Inverse functions (and their graphs) including e and ln Inverse trig functions The modulus function</p>
17	Parents Evening Tues	<p>CORRELATION & REGRESSION</p> <p>Interpret scatter diagrams and regression lines for bivariate data Need to know terms 'exploratory (independent) and response (dependent) variables.</p>	<p>NON-CONSTANT ACCELERATION</p> <p>Use calculus in kinematics for motion in a straight line:</p>

		<p>Informal interpretation of correlation (positive, negative, zero, weak, strong) Interpret scatter diagrams which include distinct sections of the population. Make predictions within range of the explanatory variable, and the dangers of extrapolation. Understand that correlation does not imply causation. Calculate a regression line. Change of variable may be required (logs to linear relationships)</p>	<p>Know that velocity is the rate of change of displacement over time ($v = \frac{ds}{dt}$) and acceleration is the rate of change of velocity over time ($a = \frac{dv}{dt} = \frac{d^2s}{dt^2}$) Use the above facts and calculus to respond to problems in the variable of time. This may be linked to velocity-time graphs. Calculus using vectors Differentiation and integration of a vector with respect to time.</p>
18		<p>HYPOTHESIS TESTING III PMCC hypothesis testing including using a p-value</p>	<p>PARAMETRICS Convert parametric equations to Cartesian form Using trigonometry or algebra Recognise parametric functions as describing familiar curves Domain of parameter t Implications on the domain/range of Cartesian function Parametric equations in modelling Parametric equations from modelling (links to paper 3) Differentiate parametric equations Understand this as a consequence of the chain rule. Integrate parametric equations</p>
19		<p>SEQUENCES & SUMMING SERIES Work with sequences Formula for the nth term, Recurrence relations Increasing, decreasing and periodic sequences Understand and use sigma notation for sums of series Students are expected to know that $\sum_1^n 1 = n$ Understand and work with arithmetic sequences and series Formula for the nth term Formula for sum to n terms Proof of the arithmetic sum formula should be known Formula for the sum of the first n natural numbers should be known. Understand and work with geometric sequences and series Formula for the nth term Formula for sum to n terms (finite sum) Use logs to identify n if given the value of a sum Formula for the sum to infinity of a convergent series Understand and use $r < 1$ condition, including understanding the modulus notation Proof of the sum formula should be known Modelling in sequences and series Money examples (amounts paid into saving schemes) Any series defined by a formula or relation.</p>	<p>MOMENTS Understand and use moments in simple static contexts Respond to problems in the context of rigid bodies. Respond to problems involving parallel and non-parallel coplanar forces (e.g. ladder problems)</p>
20		<p>CONNECTED RATES OF CHANGE Connected rates of change Extend the chain rule to connected rates of change Construct simple differential equations in pure maths & context. May include direct/inverse proportion.</p>	<p>PROJECTIONS Model motion under gravity in a vertical plane using vectors Projectiles Derivation of formulae for time of flight, range and greatest height and the derivation of the equation of the path of a projectile may be required.</p>
	Feb Half Term		
21		DIFFERENTIAL EQUATIONS	VECTORS IN MECHANICS II

		<p>Evaluate the analytical solution of simple first order differential equations with separable variables Including finding particular solutions Separation of variables may require factorisation involving a common factor. Sketch members of the family of solution curves</p> <p>Interpret the solution of a differential equation in the context of solving a problem Including identifying limitations of the solution The validity of the solution for large values</p> <p>Consolidate integration using Volumes of Revolution if not covered yet</p>	<p>Revisit calculus in kinematics Interpret the solution of a differential equation in the context of a kinematics problem.</p>
22		<p>NUMERICAL METHODS</p> <p>Locate roots of $f(x) = 0$ by considering changes of sign of $f(x)$ in an interval of x on which $f(x)$ is sufficiently well behaved. Understand how change of sign methods can fail. Students should know that sign change is appropriate for continuous functions in a small interval. When the interval is too large sign may not change as there may be an even number of roots. If the function is not continuous, sign may change but there may be an asymptote (not a root).</p> <p>Solve equations approximately using simple iterative methods; be able to draw associated cobweb and staircase diagrams. Understand that many mathematical problems cannot be solved analytically, but numerical methods permit solution to a required level of accuracy. Use an iteration of the form $x_{n+1} = f(x_n)$ to find a root of the equation $x = f(x)$ and show understanding of the convergence in geometrical terms by drawing cobweb and staircase diagrams.</p> <p>Solve equations using the Newton-Raphson method and other recurrence relations of the form $x_{n+1} = g(x_n)$ Understand how such methods can fail. For the Newton-Raphson method, students should understand its working in geometrical terms, so that they understand its failure near to points where the gradient is small.</p>	<p>PROOF AND REASONING</p> <p>Understand and use the structure of mathematical proof, proceeding from given assumptions through a series of logical steps to a conclusion Proof by deduction: Proof that a function is always positive (including using completing the square), Differentiation from first principles Proof by exhaustion: Number theory (given integers x and y such that $x, y < 7$, prove their sum is divisible by 2) Proof by contradiction: Irrationality of $\sqrt{2}$, infinity of primes Disproof by counter-example</p>
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	Easter		
	Easter		
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	Bank Holiday Monday		
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30	1A Study Leave from Tues	Transfer Exams	
(31)		Transfer Exams	
	MAY Half Term		
(31)			
(32)			