



GIRLS' HIGH SCHOOL ADDITIONAL MATHEMATICS

Teacher: Ms. Ronnise Henry

WORK PLAN

Term 1 (12 weeks)		
Topic	Objectives	Duration
Algebra	<ol style="list-style-type: none">perform operations of addition, subtraction, multiplication and division of polynomial and rational expressionsfactorize polynomial expressions, of degree less than or equal to 4, leading to real linear factorsapply the Remainder Theoremuse the Factor Theorem to find factors and to evaluate unknown coefficients	2 weeks
Quadratics	<ol style="list-style-type: none">express the quadratic function $ax^2 + bx + c = 0$ in the form $a(x + h)^2 + k = 0$, where h and k are constants to be determineddetermine maximum or minimum values and range of quadratic functions by completion of the squaresketch the graph of the quadratic function, including maximum or minimum pointsdetermine the nature of the roots of a quadratic equationSolve equations in x reducible to a quadratic equation, for example, $x^4 - 6x^2 + 8 = 0$, etc.use the relationship between the sums and products of the roots and the coefficients of $ax^2 + bx + c = 0$solve two simultaneous equations in 2 unknowns in which one equation is linear and the other equation is quadratic	2 weeks
Surds, Indices and Logarithm	<ol style="list-style-type: none">perform operations involving surdsuse the laws of indices to solve exponential equations with one unknownuse the fact that $\log_a b = c$ implies that $a^c = b$ where a is any positive whole numbersimplify expressions by using the laws:<ol style="list-style-type: none">$\log_a(PQ) = \log_a P + \log_a Q$	3 weeks



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	<ul style="list-style-type: none"> ii. $\log_a \left(\frac{P}{Q}\right) = \log_a P - \log_a Q$ iii. $\log_a P^b = b \log_a P$ iv. $\log_a a = 1$ v. $\log_a 1 = 0$ <ul style="list-style-type: none"> 5. solve logarithmic equations 6. use logarithms to solve equations of the form $a^x = b$ 7. apply logarithms to problems involving the transformation of a given relationship to linear form 	
Sequences and Series	<ul style="list-style-type: none"> 1. define a sequence of terms $\{ a_n \}$ where n is a positive integer 2. write a specific term from the formula for the nth term of a sequence 3. use the summation (Σ) notation 4. define a series as the sum of the terms of a sequence 5. identify arithmetic and geometric series 6. obtain expressions for the general terms and sums of finite arithmetic and finite and infinite geometric series 7. show that all arithmetic series (except for zero common difference) are divergent, and that geometric series are convergent only if $-1 < r < 1$, where r is the common ratio 8. calculate the sum of arithmetic series to a given number of terms 9. calculate the sum of geometric series to a given number of terms 10. find the sum of a convergent geometric series 	2 weeks
Inequality	<ul style="list-style-type: none"> 1. find the solutions sets of quadratic inequalities using algebraic and graphical methods 2. find the solution sets of inequalities of the form $\frac{ax+b}{cx+d} > 0; \geq 0; < 0; \leq 0$ using algebraic and graphical methods 	2 sessions
Coordinate Geometry	<ul style="list-style-type: none"> 1. find the equation of a straight line 2. determine whether lines are parallel or mutually perpendicular using the gradients 	2 weeks



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	<ol style="list-style-type: none">3. find the point of intersection of two lines4. write the equation of a circle5. find the centre and radius of a given circle6. find equations of tangents and normals at given points on circles7. find the points of intersection of a curve with a straight line	
Circle Measurement	<ol style="list-style-type: none">1. define the radian2. convert degrees to radians and radians to degrees3. use the formulae for arc length $l = rq$ and sector area $A = \left(\frac{1}{2}\right)r^2q$	1 session
Data Representation and Analysis	<ol style="list-style-type: none">1. distinguish between types of data (qualitative and quantitative data, discrete and continuous data)2. represent numerical data diagrammatically (stem-and-leaf diagrams and box-and-whisker plots)3. outline the relative advantages and disadvantages of stem-and-leaf diagrams and box-and-whisker plots in data analyses4. interpret stem-and-leaf diagrams and box-and-whisker plots5. determine quartiles and percentiles from raw data, grouped data, stem-and-leaf diagrams, box-and-whisker plots6. calculate measures of central tendency and dispersion (mode, median, range, interquartile range, semi-interquartile range, variance and standard deviation of grouped and ungrouped data)7. explain how the standard deviation measures the spread of a set of data	Mid Term Break Work-book 1 session



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Term 2 (11 weeks)		
Topic	Objectives	Duration
Trigonometry	<ol style="list-style-type: none"> 1. evaluate sine, cosine and tangent for angles of any size given either in degrees or radians 2. evaluate the exact values of sine, cosine and tangent for $q = 0, \pi/6, \pi/4, \pi/3, \pi/2$, and integral multiples of each of these angles for values of q such that $0 \leq q \leq 2\pi$ 3. graph the functions $\sin kx, \cos kx, \tan kx$ where k is 1 or 2 and $0 \leq x \leq 2\pi$ 4. derive the identity $\cos^2 x + \sin^2 x = 1$ 5. use the formulae for $\sin(A \pm B), \cos(A \pm B), \tan(A \pm B)$ 6. derive the multiple angle identities for $\sin 2x, \cos 2x, \tan 2x$ 7. use Specific Objectives 7, 8, and 9 above to prove simple identities 8. find solutions of simple trigonometric equations for a given range, including those involving the use of $\cos^2 q + \sin^2 q = 1$ 	3 weeks
Differentiation	<ol style="list-style-type: none"> 1. use the concept of the derivative at a point $x = c$ as the gradient of the tangent to the graph at $x = c$ 2. define the derivative at a point as a limit 3. use the $f'(x)$ and dy/dx notation for the first derivative of $f(x)$ 4. use $(d/dx)x^n = nx^{n-1}$ where n is any real number 5. use $(d/dx)\sin x = \cos x$ and $(d/dx)\cos x = -\sin x$ 6. use simple rules of derivatives to find derivatives of sums and multiples of functions 7. use Specific Objectives 4, 5 and 6 above to calculate derivatives of polynomials and trigonometric functions 8. apply the chain rule in the differentiation of composite functions 9. differentiate products and quotients of simple polynomials and trigonometric functions 10. use the concept of the derivative as a rate of change 	3 weeks



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	<ol style="list-style-type: none">11. use the concept of stationary points12. determine the nature of stationary points13. locate stationary points, maxima and minima, by considering sign changes of the derivative14. calculate the second derivative, $f''(x)$15. interpret the significance of the sign of the second derivative16. use the sign of the second derivative to determine the nature of stationary points17. obtain equations of tangents and normals to curves	
Integration	<ol style="list-style-type: none">1. recognize integration as the reverse process of differentiation2. use the notation $\int f(x)dx$3. show that the indefinite integral represents a family of functions which differ by constants4. use simple rules of integration5. Integrate functions of the form $(ax + b)^n$ where a, b, n are real and n is not -1.6. find indefinite integrals using formulae and integration theorems7. integrate simple trigonometric functions8. compute definite integrals9. formulate the equation of a curve given its gradient function and a point on the curve10. apply integration to:<ol style="list-style-type: none">(i) find the area of the region in the first quadrant bounded by a curve and the lines parallel to the y-axis(ii) find volumes of revolution about the x-axis, for polynomials up to and including degree 2	3 weeks
Kinematics of motion	<ol style="list-style-type: none">1. distinguish between distance and displacement, and speed and velocity2. draw and use displacement-time and velocity-time graphs3. calculate and use displacement, velocity, acceleration and time in simple equations representing the motion of a particle in a straight line	2 weeks



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	<p>4. apply where appropriate the following rates of change:</p> $v = \frac{dx}{dt} = \dot{x}$ $a = \frac{d^2x}{dt^2} = \frac{dv}{dt} = \ddot{x}$ <p>Where x, \dot{x}, \ddot{x} represent displacement, velocity and acceleration respectively (restricted to calculus from Section 3)</p>	
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Easter Holidays and Part of Term 3		
Topic	Objectives	Duration
Vectors	<ol style="list-style-type: none"> 1. express a vector in the form $\begin{pmatrix} x \\ y \end{pmatrix}$ or $xi + yj$; $x, y \in P$; 2. define equal vectors 3. add and subtract vectors 4. multiply a vector by a scalar quantity 5. derive and use unit vectors 6. find displacement vectors 7. find the magnitude and direction of a vector 8. define the scalar product of two vectors: <ol style="list-style-type: none"> i. in terms of their components; ii. in terms of their magnitudes and the angle between them 9. find the angle between two given vectors 10. apply properties of parallel and perpendicular vectors 	
Probability	<ol style="list-style-type: none"> 1. distinguish among the terms experiment, outcome, sample space and event 2. calculate the probability of event A, $P(A)$, as the number of outcomes of A divided by the total number of possible outcomes, when all outcomes are equally likely and the sample space is finite 3. use the basic laws of probability: <ol style="list-style-type: none"> i. the sum of the probabilities of all the outcomes in a sample space is equal to one; 	



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	<p>ii. $0 \leq P(A) \leq 1$ for any event A</p> <p>iii. $P(A') = 1 - P(A)$, where $P(A')$ is the probability that event A does not occur;</p> <p>4. Use $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ to calculate probabilities.</p> <p>5. identify mutually exclusive events A and B such that $P(A \cap B) = 0$</p> <p>6. calculate the conditional probability $P(A B)$ where $P(A B) = \frac{P(A \cap B)}{P(B)}$</p> <p>7. identify independent events</p> <p>8. use the property $P(A \cap B) = P(A) \times P(B)$ or $P(A B) = P(A)$ where A and B are independent events</p> <p>construct and use possibility space diagrams, tree diagrams and Venn diagrams to solve problems involving probability</p>	
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