MARINA INTERNATIONAL SCHOOL

MATHEMATICS SCHEME OF WORK

FORM 6 - TERM 1

WEEK	TOPIC	TOPIC DETAILS
1.1	Quadratics	Carry out the process of completing the square for a quadratic polynomial ax2 + bx + c and use a completed square form
1.2	Quadratics	Find the discriminant of a quadratic polynomial ax2 + bx + c and use the discriminant
1.3	Quadratics	Solve quadratic equations, and quadratic inequalities, in one unknown
1.4	Quadratics	Solve by substitution a pair of simultaneous equations of which one is linear and one is quadratic. Recognise and solve equations in x which are quadratic in some function of x.
2.1	FUNCTIONS	□ Understand the terms function, domain, range, one-one function, inverse function and composition of functions □ Identify the range of a given function in simple cases, and find the composition of two given functions, e.g. range of and range of ; including the condition that a composite function gf can only be formed when the range of f is within the domain of g
2.2	FUNCTIONS	□ Determine whether or not a given function is one-one, and find the inverse of a one-one function in simple cases, e.g. finding the inverse of □ Illustrate in graphical terms the relation between a one-one function and its inverse; sketches should include an indication of the mirror line y = x

WEEK	TOPIC	TOPIC DETAILS
2.3	FUNCTIONS	□ Understand and use the transformations of the graph of y = f(x) given by y = f(x) + a, y = f(x + a), y = af(x), y = f(ax) and simple combinations of these; including use of the terms 'translation', 'reflection' and 'stretch' in describing transformations; questions may involve algebraic or trigonometric functions, or other graphs with given features
3.1	COORDINATE GEOMETRY	Find the equation of a straight line given sufficient information e.g. given two points, or one point and the gradient
3.2	COORDINATE GEOMETRY	Interpret and use any of the forms y = mx + c, y – y1 = m(x – x1), in solving problems; including calculations of distances, gradients, midpoints, points of intersection and use of the relationship between the gradients of parallel and perpendicular lines
3.3	COORDINATE GEOMETRY	Understand that the equation(x – a)2 + (y – b)2 = r2 represents the circle with centre (a, b) and radius r ; including use of the expanded form
4.1	COORDINATE GEOMETRY	Use algebraic methods to solve problems involving lines and circles; including use of elementary geometrical properties of circles, e.g. tangent perpendicular to radius, angle in a semicircle, symmetry; implicit differentiation is not included
4.2	COORDINATE GEOMETRY	Understand the relationship between a graph and its associated algebraic equation, and use the relationship between points of intersection of graphs and solutions of equations, e.g. to determine the set of values of k for which the line y = x + k intersects, touches or does not meet a quadratic curve
5.1	CIRCULAR MEASURE	Understand the definition of a radian, and use the relationship between radians and degrees
6.1	CIRCULAR MEASURE	Use the formulae s = r θ and in solving problems concerning the arc length and sector area of a circle; including calculation of lengths and angles in triangles and areas of triangles
7.1	TRGONOMETRY	Sketch and use graphs of the sine, cosine and tangent functions (for angles of any size, and using either degrees or radians); including e.g. y = 3sinx , y = 1 - 2cosx, y = tan(x +1/4 π)
7.2	TRGONOMETRY	Use the exact values of the sine, cosine and tangent of 30°, 45°, 60°, and related angles

WEEK	TOPIC	TOPIC DETAILS
7.3	TRGONOMETRY	Use the notations sin^(-1)x, cos^(-1)x, tan^(-1)x to denote the principal values of the inverse trigonometric relations; no specialized knowledge of these functions is required, but understanding of them as examples of inverse functions is expected
8.1	TRGONOMETRY	Use the identities Sinθ/(Cos θ)≡tanθ and Sin^2θ+Cos^2θ=1
8.2	TRGONOMETRY	Find all the solutions of simple trigonometrical equations lying in a specified interval (general forms of solution are not included),
9.1	SERIES	Use the expansion of (a + b)^n , where n is a positive integer; including the notations(n/r) and n!; knowledge of the greatest term and properties of the coefficients are not required
9.2	SERIES	Recognise arithmetic and geometric progressions
10.1	SERIES	Use the formulae for the nth term and for the sum of the first n terms to solve problems involving arithmetic or geometric progressions; including knowledge that numbers a, b, c are 'in arithmetic progression' if 2b = a + c (or equivalent) and are 'in geometric progression' if b^2 = ac (or equivalent); questions may involve more than one progressi
10.2	SERIES	Use the condition for the convergence of a geometric progression, and the formula for the sum to infinity of a convergent geometric progression
11.1	DIFFERENTIATION	Understand the gradient of a curve at a point as the limit of the gradients of a suitable sequence of chords, and use the notations f'(x), f''(x), and(d^2 y)/(dy^2) for first and second derivatives; only an informal understanding of the idea of a limit is expected; e.g. includes consideration of the gradient of the chord joining the points with x coordinates 2 and (2 + h) on the curve y = x^3;Formal use of the general method of differentiation from first principles is not required
11.2	DIFFERENTIATION	Use the derivative of x^n (for any rational n), together with constant multiples, sums and differences of functions, and of composite functions using the chain rule,
12.1	DIFFERENTIATION	Apply differentiation to gradients, tangents and normals, increasing and decreasing functions and rates of change; including connected rates of change, e.g. given the rate of increase of the radius of a circle, find the rate of increase of the area for a specific value of one of the variables

WEEK	TOPIC	TOPIC DETAILS
12.2	DIFFERENTIATION	Locate stationary points and determine their nature, and use information about stationary points in sketching graphs; including use of the second derivative for identifying maxima and minima; alternatives may be used in questions where no method is specified; knowledge of points of inflexion is not included
13.1	INTEGRATION	Understand integration as the reverse process of differentiation, and integrate (ax + b)^n (for any rational n except –1), together with constant multiples, sums and differences
13.2	INTEGRATION	Solve problems involving the evaluation of a constant of integration
14.1	INTEGRATION	Evaluate definite integrals; including simple cases of 'improper' integrals
14.2	INTEGRATION	Use definite integration to find: - the area of a region bounded by a curve and lines parallel to the axes, or between a curve and a line or between two curves; - a volume of revolution about one of the axes; a volume of revolution may involve a region not bounded by the axis of rotation

MATHEMATICS SCHEME OF WORK

FORM 6 - TERM 2

WEEK	TOPIC	TOPIC DETAILS
1.1	ALGEBRA	Uderstand the meaning of |x| , sketch the graph of y = |ax + b| and use relations such as |a| = |b| ↔ a2 = b2 and |x- a| < b ↔ a – b < x < a + b when solving equations and inequalities; graphs of y = |f(x)| and y = f(|x|) for non-linear functions f are not included
1.2	ALGEBRA	Divide a polynomial, of degree not exceeding 4, by a linear or quadratic polynomial, and identify the quotient and remainder (which may be zero)
2.1	ALGEBRA	Use the factor theorem and the remainder theorem, e.g. to find factors and remainders, solve polynomial equations or evaluate unknown coefficients; includes factors of the form (ax + b) in which the coefficient of x is not unity, and including calculation of remainders
3.1	LOGARITHMIC AND EXPONENTIAL FUNCTIONS	Understand the relationship between logarithms and indices, and use the laws of logarithms (excluding change of base)
3.2	LOGARITHMIC AND EXPONENTIAL FUNCTIONS	Understand the definition and properties of e^x and ln x, including their relationship as inverse functions and their graphs; including knowledge of the graph y = e^(kx) for both positive and negative values of k
3.3	LOGARITHMIC AND EXPONENTIAL FUNCTIONS	Use logarithms to solve equations and inequalities in which the unknown appears in indices, e.g. 2^x < 5, 3 × 2^(3x–1) < 5, 3^(x+1) = 4^(2x–1)
4.1	LOGARITHMIC AND EXPONENTIAL FUNCTIONS	Use logarithms to transform a given relationship to linear form, and hence determine unknown constants by considering the gradient and/or intercept, e.g. y = kx^n gives ln y = ln k + nln x which is linear in ln x and ln y y = k (a^x) gives ln y = ln k + x lna which is linear in x and ln y.

WEEK	TOPIC	TOPIC DETAILS
5.1	TRIGONOMETRY	Understand the relationship of the secant, cosecant and cotangent functions to cosine, sine and tangent, and use properties and graphs of all six trigonometric functions for angles of any magnitude
5.2	TRIGONOMETRY	Use trigonometrical identities for the simplification and exact evaluation of expressions e.g. simplifying cos(x – 30°) – 3sin(x – 60°), and in the course of solving equations e.g tan θ + cot θ = 4, 2sec^2θ – tan θ = 5, 3cos θ + 2sin θ = 1, and select an identity or identities appropriate to the context, showing familiarity in particular with the use of - sec^2θ=1+tan^2θ and Cosec^2θ=1+Cot^2θ - the expansions of sin(A ± B), cos(A ± B) and tan(A ± B) - the formulae for sin 2A, cos 2A and tan 2A
6.1	DIFFERENTIATION	Use the derivatives of ex, In x, sin x, cos x, tan x, together with constant multiples, sums, differences and composites
6.2	DIFFERENTIATION	Differentiate products and quotients
7.1	DIFFERENTIATION	Find and use the first derivative of a function which is defined parametrically or implicitly; Including use in problems involving tangents and normals
8.1	INTEGRATION	Extend the idea of 'reverse differentiation' to include the integration of e^(ax+b), 1/(ax+b), sin(ax+b), cos(ax+b) and sec^2(ax+b); knowledge of the general method of integration by substitution is not required
8.2	INTEGRATION	Use trigonometrical relationships in carrying out integration, e.g. use of double-angle formulae to integrate sin^2x or cos^2(2x)
9.1	INTEGRATION	Understand and use the trapezium rule to estimate the value of a definite integral; including use of sketch graphs in simple cases to determine whether the trapezium rule gives an over-estimate or an under-estimate
10.1	NUMERICAL SOLUTIONS PFEQUATIONS	Locate approximately a root of an equation, by means of graphical considerations and/or searching for a sign change, e.g. finding a pair of consecutive integers between which a root lies
10.2	NUMERICAL SOLUTIONS PFEQUATIONS	Understand the idea of, and use the notation for, a sequence of approximations which converges to a root of an equation

WEEK	TOPIC	TOPIC DETAILS
10.3	NUMERICAL SOLUTIONS PFEQUATIONS	Understand how a given simple iterative formula of the form xn + 1 = F(xn) relates to the equation being solved, and use a given iteration, or an iteration based on a given rearrangement of an equation, to determine a root to a prescribed degree of accuracy; knowledge of the condition for convergence is not included, but an understanding that an iteration may fail to converge is expected

MATHEMATICS SCHEME OF WORK

FORM 6 - TERM 3

WEEK	TOPIC	TOPIC DETAILS