MARINA INTERNATIONAL SCHOOL

ADDITIONAL MATHS SCHEME OF WORK

FORM 4 - TERM 1

WEEK	TOPIC	TOPIC DETAILS
1.1	Indices	Perform simple operations with indices and with surds, including rationalizing the denominator.
1.2	Indices	Learners will no doubt need to revise their knowledge of indices and then develop skills in manipulating surds. Convince learners using examples that can be shown to be true using the index laws .
2.1	Surds	Learners will need to appreciate that $\sqrt{ab}=\sqrt{a}$ X $\sqrt{b}$ and vice versa and also $\sqrt{a}/\sqrt{b}=\sqrt{(a/b)}$ and vice versa, algebraically as well as numerically.
2.2	Surds	Rationalizing the denominator is a new skill dictated purely by mathematical convention. It will be useful to revise the difference of two squares to show why. Make sure that learners appreciate that multiplying both the numerator and the denominator by the "same" number with opposite sign (the square root conjugate) means that the original expression is being multiplied by a strategic form of 1 and therefore identity is maintained.
3.1	Factors of Polynomials	Know and use the remainder and factor theorems
3.2	Factors of Polynomials	Find factors of polynomials
3.3	Factors of Polynomials	Solve cubic equations
4.1	Factors of Polynomials	If a polynomial expression, f(x), is such that f(a) = 0, then (x – a) is a factor and vice versa.

WEEK	TOPIC	TOPIC DETAILS
4.2	Factors of Polynomials	We have seen with the factor theorem that, if (x – a) is a factor of f(x) ,a cubic equation or expression, then f(x) = (x – a)(some quadratic) If, however, (x – a) is NOT a factor of f(x), then f(x) = (x – a)(some quadratic) + some remainder Calling the remainder R: f(x) = (x – a)(some quadratic) + R However, if we now put x = a we have f(x) = (a – a)(some quadratic) + R
5.1	Simultaneous equations	Solve simultaneous equations in two unknowns with at least one linear equation
6.1	Simultaneous equations	Find the points of intersection between the line y = –3x and the circle x2 + y2 = 3 graphically, learners will be able to see that it is possible for there to be varying numbers of solutions, depending on the number of intersections of the line and curve under consideration.
7.1	Solve simultaneous equations in two unknowns with at least one linear equation	Learners should be able to solve simultaneous equations in which one is linear and one quadratic
8.1	Straight line graphs	Line that passes through a given point
8.2	Straight line graphs	Learners should be able to find the equation of a line parallel to a given line that passes through a given point
9.1	Straight line graphs	Interpret the equation of a straight line graph in the form y = mx + c.
9.2	Straight line graphs	Solve questions involving mid-point and length of a line
10.1	Straight line graphs	Know and use the condition for two lines to be parallel or perpendicular
10.2	Straight line graphs	Slopes of parallel lines are equal slopes of perpendicular lines are negative reciprocals of each other (i.e., the slopes of perpendicular lines have a product of -1)

WEEK	TOPIC	TOPIC DETAILS
11.1	Straight line graphs	The equation of a line perpendicular to a given line that passes through a given point

ADDITIONAL MATHS SCHEME OF WORK

FORM 4 - TERM 2

WEEK	TOPIC	TOPIC DETAILS
1.1	Circular Measure	Solve problems involving involving the arc length
1.2	Circular Measure	Solve problems involving involving sector area of a circle, including knowledge and use of radian measure
2.1	Circular Measure	Conversion from radians to degrees
2.2	Circular Measure	Conversion from degrees to radians
3.1	FUNCTIONS	Understand the terms: function, domain, range (image set), one-one function, inverse function and composition of functions
3.2	FUNCTIONS	Understand the relationship between y = f(x) and y = |f(x)|, where f(x) may be linear, quadratic, or trigonometric.
3.3	FUNCTIONS	Find the inverse of a one-one function and form composite functions
4.1	FUNCTIONS	understand the terms: function, domain, range (image set), one-one function, inverse function and composition of functions
4.2	FUNCTIONS	Use the notation f(x) = sin x, f: x ↦ lg x, (x > 0), f –1(x) and f 2(x) [= f(f(x))]
4.3	FUNCTIONS	Understand the relationship between y = f(x) and y = |f(x)|, where f(x) may be linear, quadratic
5.1	FUNCTIONS	Explain in words why a given function is a function or why it does not have an inverse
5.2	FUNCTIONS	Find the inverse of a one-one function and form composite functions

WEEK	TOPIC	TOPIC DETAILS
5.3	FUNCTIONS	Use sketch graphs to show the relationship between a function and its inverse
6.1	Logarithms	Meaning of logarithm
6.2	Logarithms	Logarithms to base 10
6.3	Logarithms	Logarithms to base a
6.4	Logarithms	Laws of logarithms
7.1	Logarithms	Use of the laws will involve simplifying expressions and solving simple equations involving logarithms.
7.2	Logarithms	Solving logarithmic equations
7.3	Logarithms	Change of base
7.4	Logarithms	Solve equations of the form a^x = b
8.1	SERIES	The arithmetic progression
8.2	SERIES	Finding terms
8.3	SERIES	Finding sum of A.P
9.1	SERIES	Geometric Progression
9.2	SERIES	Finding terms
9.3	SERIES	Finding sum of G.P
10.1	SERIES	Sum to infinity
10.2	SERIES	Use the condition for the convergence of a geometric progression, and the formula for the sum to infinity of

ADDITIONAL MATHS SCHEME OF WORK

FORM 4 - TERM 3

WEEK	TOPIC	TOPIC DETAILS
1.1	Binomial Theorem	Pascal triangle
1.2	Binomial Theorem	Use of the Binomial theorem
2.1	Binomial Theorem	Use the Binomial Theorem for expansion of $(a + b)^n$ for positive integer n
3.1	Trigonometry	Angles between 0 *and 90*
3.2	Trigonometry	Trigonometric ratios of general angles
3.3	Trigonometry	Trigonometric identities
3.4	Trigonometry	Basic proofs
4.1	Trigonometry	Solving simple trigonometric equations
4.2	Trigonometry	Know and use the six trigonometric functions of angles of any magnitude (sine, cosine, tangent, secant, cosecant, cotangent).
5.1	Trigonometry	The minor ratios sec, cosec (often csc in textbooks) and cot will be new to learners. The relationships with cos, sin and tan are important and various methods of recall exist – one of which is the 3rd letter rule: $\sec A = 1/\cos A$, $\operatorname{cosec} A = 1/(\sin A)$, $\cot A = 1/\tan A$
5.2	Trigonometry	$(\sin A)/\cos A = \tan A$ $(\cos A)/\sin A = \cot A$ $\sin^2 A + \cos^2 A = 1$, $\sec^2 A = 1 + \tan^2 A$, $\operatorname{cosec}^2 A = 1 + \cot^2 A$

WEEK	TOPIC	TOPIC DETAILS
6.1	Differentiation	Differentiation of algebraic functions Techniques of differentiation
6.2	Differentiation	Product rule
6.3	Differentiation	Quotient rule
6.4	Differentiation	Function of a function
7.1	Differentiation	Differentiation of trigonometric functions i)sin ii)cos, iii)tan iv)ex, v)linx together constant
7.2	Differentiation	Multiples, sum and composite functions of i)sin ii)cos, iii)tan iv)ex, v)linx together constant
8.1	Differentiation	B) Application of differentiation i)Gradients ii) tangents and normal, iii) Stationary points
8.2	Differentiation	iv) Connected rates of change, v)Small increments
8.3	Differentiation	vi)Practical maxima and minima problems
8.4	Differentiation	vii)The first and second derivative test to discriminate between maxima and minima
9.1	Quadratic functions	Find the maximum or minimum value of the quadratic function $f : x \mapsto ax^2 + bx + c$ by any method
9.2	Quadratic functions	Use the maximum or minimum value of $f(x)$ to sketch the graph or determine the range for a given domain
9.3	Quadratic functions	Know the conditions for $f(x) = 0$ to have: (i) two real roots, (ii) two equal roots, (iii) no real roots and the related conditions for a given line to (i) intersect a given curve, (ii) be a tangent to a given curve, (iii) not intersect a given curve
9.4	Quadratic functions	Solve quadratic equations for real roots and find the solution set for quadratic inequalities
10.1	Equations, inequalities and graphs	Solve graphically or algebraically equations of the type $|ax + b| = c$ $(c \geqslant 0)$ and $|ax + b| = |cx + d|$. Solve graphically or algebraically inequalities of the type $|ax + b| > c$ $(c \geqslant 0)$, $|ax + b| \leqslant c$ $(c > 0)$ and $|ax + b| \leqslant |cx + d|$

WEEK	TOPIC	TOPIC DETAILS
10.2	Equations, inequalities and graphs	Use substitution to form and solve a quadratic equation in order to solve a related equation. Sketch the graphs of cubic polynomials and their moduli, when given in factorized form $y = k(x - a)(x - b)(x - c)$
10.3	Equations, inequalities and graphs	Solve cubic inequalities in the form $k(x - a)(x - b)(x - c) \leqslant d$ graphically
11.1	Logarithm	Conversion to linear form
11.2	Logarithm	Transform given relationships, including $y = ax^n$ and $y = Ab^x$, to straight line form
12.1	Logarithm	Determine unknown constants by calculating the gradient or intercept of the transformed graph