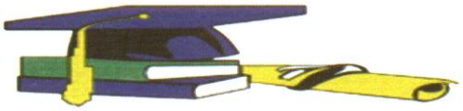
Thamer International School



ثامر مدرسة العالمية

A Community of Leaders and Learners

Entrance Exam Requirements "Going to Grade-12/ A level"

1. Quadratics	• carry out the process of completing the square for a quadratic polynomial $ax^2 + bx + c$, and use this form, e.g. to locate the vertex of the graph of $y = ax^2 + bx + c$ or to sketch the graph; • find the discriminant of a quadratic polynomial $ax^2 + bx + c$ and use the discriminant, e.g. to determine the number of real roots of the equation $ax^2 + bx + c = 0$; • solve quadratic equations, and linear and quadratic inequalities, in one unknown; • 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, e.g. $x^4 - 5x^2 + 4 = 0$.
2. 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; • determine whether or not a given function is one-one, and find the inverse of a one-one function in simple cases; • illustrate in graphical terms the relation between a one-one function and its inverse.
3. Coordinate geometry	• find the length, gradient and mid-point of a line segment, given the coordinates of the end-points; • find the equation of a straight line given sufficient information (e.g. the coordinates of two points on it, or one point on it and its gradient); • understand and use the relationships between the gradients of parallel and perpendicular lines; • interpret and use linear equations, particularly the forms $y = mx + c$ and $y - y_1 = m(x - x_1)$; • 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 (including, in simple cases, the correspondence between a line being tangent to a curve and a repeated root of an equation).
4. Circular Measure	• understand the definition of a radian, and use the relationship between radians and degrees; • use the formulae $s = r\theta$ and $A = \frac{1}{2}r^2\theta$ in solving problems concerning the arc length and sector area of a circle.

5. Trigonometry	• sketch and use graphs of the sine, cosine and tangent functions (for angles of any size, and using either degrees or radians); • use the exact values of the sine, cosine and tangent of 30°, 45°, 60°, and related angles, e.g. $\cos 150° = -\frac{1}{2}\sqrt{3}$; • use the notations $\sin^{-1}x$, $\cos^{-1}x$, $\tan^{-1}x$ to denote the principal values of the inverse trigonometric relations; • use the identities $\frac{\sin\theta}{\cos\theta} \equiv \tan\theta$ and $\sin^2\theta + \cos^2\theta \equiv 1$; • find all the solutions of simple trigonometrical equations lying in a specified interval (general forms of solution are not included).
6. Vectors	• use standard notations for vectors, i.e. $\begin{pmatrix} x \\ y \end{pmatrix}$, $x\mathbf{i} + y\mathbf{j}$, $\begin{pmatrix} x \\ y \\ z \end{pmatrix}$, $x\mathbf{i} + y\mathbf{j} + z\mathbf{k}$, $\overrightarrow{AB}$, $\mathbf{a}$; • carry out addition and subtraction of vectors and multiplication of a vector by a scalar, and interpret these operations in geometrical terms; • use unit vectors, displacement vectors and position vectors; • calculate the magnitude of a vector and the scalar product of two vectors; • use the scalar product to determine the angle between two directions and to solve problems concerning perpendicularity of vectors.
7. Series	• use the expansion of $(a + b)^n$, where n is a positive integer (knowledge of the greatest term and properties of the coefficients are not required, but the notations $\binom{n}{r}$ and $n!$ should be known); • recognise arithmetic and geometric progressions; • use the formulae for the nth term and for the sum of the first n terms to solve problems involving arithmetic or geometric progressions; • use the condition for the convergence of a geometric progression, and the formula for the sum to infinity of a convergent geometric progression.

8. Differentiation	• understand the idea of the gradient of a curve, and use the notations $f'(x)$, $f''(x)$, $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ (the technique of differentiation from first principles is not required); • use the derivative of x^n (for any rational n), together with constant multiples, sums, differences of functions, and of composite functions using the chain rule; • apply differentiation to gradients, tangents and normals, increasing and decreasing functions and rates of change (including connected rates of change); • locate stationary points, and use information about stationary points in sketching graphs (the ability to distinguish between maximum points and minimum points is required, but identification of points of inflexion is not included).
9. 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; • solve problems involving the evaluation of a constant of integration, e.g. to find the equation of the curve through $(1, -2)$ for which $\frac{dy}{dx} = 2x + 1$; • evaluate definite integrals (including simple cases of 'improper' integrals, such as $\int_0^1 x^{-\frac{1}{2}}dx$ and $\int_1^\infty x^{-2}dx$); • use definite integration to find the area of a region bounded by a curve and lines parallel to the axes, or between two curves, a volume of revolution about one of the axes.

Reading Comprehension:

Candidates will be assessed on their ability to comprehend and respond to information in a given text. They will be expected to use some or all of the following language conventions:

- focus on main idea
- observe the flow of ideas
- draw logical inferences
- make accurate predications
- recognize related information
- identify referents
- use effective strategies for vocabulary questions (use context clues)
- be able to: paraphrase, summarize, take notes, and list points

Structure and Written Expression:

- subject and verb
- verb agreement, tense, and form
- subordination
- verbal expressions
- pronoun form, agreement, and reference
- word order
- parallel & structure
- repetition
- correct usage

Writing:

Candidates should be able to write an appropriate 250-300 words essay (descriptive, personal narrative, persuasive, argumentative, or magazine article).
They will be assessed on their ability to:

- communicate accurately, clearly and appropriately
- convey information and express opinion effectively
- employ a variety of grammatical structures
- demonstrate knowledge of appropriate vocabulary
- observe conventions of paragraphing, punctuation and spelling
- employ appropriate style

Senior School

Administration