Entrance Exam Requirements "Going to Grade-11/AS"

1. ***Number, set notation and language***: Use language, notation and Venn diagrams to describe sets and represent relationships between sets.

2. Squares and cubes

3. Directed numbers

4. Vulgar and decimal fractions and percentages

5. Ordering

6. Standard form

7. The four rules

8. Estimation

9. ***Limits of accuracy***: Obtain appropriate upper and lower bounds to solutions of simple problems.

10. ***Ratio, proportion and rate***: Express direct and inverse variation in algebraic terms and use this form of expression to find unknown quantities; increase and decrease a quantity by a given ratio.

11. ***Percentages***: Carry out calculations involving reverse percentages, e.g. finding the cost price given the selling price and the percentage profit.

12. Use of an electronic calculator

13. Measures

14. Time

15. Money

16. Personal and household finance

17. ***Graphs in practical situations***: Apply the idea of rate of change to easy kinematics involving distance-time and speed- time graphs, acceleration and deceleration; calculate distance travelled as area under a linear speed-time graph.

18. ***Graphs of functions***: Construct tables of values and draw graphs for functions of the form ax^n where a is a rational constant and $n = -2, -1, 0, 1, 2, 3$ and simple sums of not more than three of these and for functions of the form a^x where a is a positive integer; estimate gradients of curves by drawing tangents; solve associated equations approximately by graphical methods.

19. ***Straight line graphs***: Calculate the gradient of a straight line from the coordinates of two points on it; calculate the length and the coordinates of the midpoint of a straight line segment from the coordinates of its end points.

20. ***Algebraic representation and formulae***: Construct and transform more complicated formulae and equations.

21. ***Algebraic manipulation***: Expand products of algebraic expressions; factorize where possible expressions of the form $ax + bx + kay + kby$, $a^2x^2 - b^2y2$; $a2 + 2ab + b^2$, $ax^2 + bx + c$; manipulate algebraic fractions, factorize and simplify expressions

22. ***Functions***: Use function notation, to describe simple functions, and the notation $f^{1}(x)$ to describe their inverses; form composite functions as defined by $gf(x) = g(f(x))$.

23. ***Indices***: Use and interpret fractional indices.

24. ***Solutions of equations and inequalities***: Solve quadratic equations by factorization, completing the square or by use of the formula; solve simple linear inequalities.

25. ***Linear programming***: Represent inequalities graphically and use this representation in the solution of simple linear programming problems (the conventions of using broken lines for strict inequalities and shading unwanted regions will be expected).

26. Geometrical terms and relationships

27. Use the relationships between areas of similar triangles, with corresponding results for similar figures and extension to volumes and surface areas of similar solids.

28. Geometrical constructions

29. *Symmetry*: Recognize symmetry properties of the prism (including cylinder) and the pyramid (including cone); use the following symmetry properties of circles:
   - Equal chords are equidistant from the centre.
   - The perpendicular bisector of a chord passes through the centre.
   - Tangents from an external point are equal in length.

30. *Angle properties*: Use in addition the following geometrical properties:
   - Angle properties of irregular polygons
   - Angle at the centre of a circle is twice the angle at the circumference
   - Angles in the same segment are equal
   - Angles in opposite segments are supplementary; cyclic quadrilaterals.

31. Locus

32. *Mensuration*: Solve problems involving the arc length and sector area as fractions of the circumference and area of a circle, the surface area and volume of a sphere, pyramid and cone (given formulae for the sphere, pyramid and cone).

33. *Trigonometry*: Solve trigonometrical problems in two dimensions involving angles of elevation and depression; extend sine and cosine values to angles between 90° and 180°; solve problems using the sine and cosine rules for any triangle and the formula area of triangle = $\frac{1}{2}$ *ab sin C*, solve simple trigonometrical problems in three dimensions including angle between a line and a plane.

34. *Statistics*: Construct and read histograms with equal and unequal intervals (areas proportional to frequencies and vertical axis labeled 'frequency density'); construct and use cumulative frequency diagrams; estimate and interpret the median, percentiles, quartiles and inter-quartile range; calculate an estimate of the mean for grouped and continuous data; identify the modal class from a grouped frequency distribution.

35. *Probability*: Calculate the probability of simple combined events, using possibility diagrams and tree diagrams where appropriate (in possibility diagrams outcomes will be represented by points on a grid and in tree diagrams outcomes will be written at the end of branches and probabilities by the side of the branches).

36. *Vectors in two dimensions*: Calculate the magnitude of a vector $\begin{pmatrix} x \\ y \end{pmatrix}$ *as* $\sqrt{x^2 + y^2}$. Victors will be printed $\overrightarrow{AB}$ or **a** and their magnitudes denoted by modulus signs, e.g. **IABI** or **Ial**. In their answers to questions candidates are expected to indicate **a** in some definite way, e.g. by an arrow or by underlining, thus $\overrightarrow{AB}$ or a̲)
   Represent vectors by directed line segments; use the sum and difference of two vectors to express given vectors in terms of two coplanar vectors; use position vectors.

37. *Matrices*: Display information in the form of a matrix of any order; calculate the sum and product (where appropriate) of two matrices; calculate the product of a matrix and a scalar quantity; use the algebra of 2 × 2 matrices including the zero and identity 2 × 2 matrices; calculate the determinant and inverse A^{-1} of a non-singular matrix **A.**

38. *Transformations*: Use the following transformations of the plane: reflection (M); rotation (R); translation (T); vertices or midpoints of edges of the figures, through enlargement (E); shear (H); stretch (S) and their combinations (if M(a) = b and R(b) = c the notation RM(a) = c will be used; invariants under these transformations may be assumed.) Identify and give precise descriptions of transformations connecting given figures; describe transformations using co-ordinates and matrices (singular matrices are excluded).

Critical Reading and Grammar:

A reading comprehension passage and questions on correct usage will require candidate to do some or all of the following:
- draw conclusions
- evaluate information
- recognize and interpret facts, assumptions, and inferences
- know overall theme or meaning of the passage
- determine the purpose, attitude and tone of the writer
- determine the main idea and follow the logic of the passage
- understand a specific idea or relationship by identifying a parallel or analogous idea
- know vocabulary from context
- understand the logic of a rather complicated sentence
- know correct grammatical structures and 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

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