MATH DEPARTMENT

Year of 2026-2027

Lessons required for the Math Entrance Exam: (Grade 10Bac to 11L)

* *Calculator is needed.*

1- Sets:

Students should be able to:

- Write a set in comprehension/extension.
- Represent sets in a Venn Diagram.
- Find the subset of a set, the complement of a subset as well as the intersection and union of two sets.

2- Absolute value

Students should be able to:

- Apply the properties of absolute value.
- Express expressions without the absolute value sign.
- Solve equations and inequalities with absolute value.

3- Powers and Radicals:

Students should be able to:

- Evaluate powers with natural, rational and irrational exponents.
- Apply the properties of powers.
- Find the n^{th} root of a real number.

4- Coordinate System:

Students should be able to:

- Prove 2 vectors $\vec{u}$ *and* $\vec{v}$ collinear using det $(\vec{u}, \vec{v})$=0.
- Prove 3 points collinear.
- Find the coordinates of the midpoint of a segment, the centroid of a triangle and of equal vectors.
- Use the formulas of the translation of a system.
- Find the coordinates of points in a given system formed of an origin and 2 non-collinear vectors.

5- Scalar Product in a Plane:

Students should be able to:

- Find the algebraic and the geometric expression of the scalar product of 2 vectors.
- Apply the property that the scalar product of 2 orthogonal non-zero vectors is equal to zero.
- Apply the properties of dot product.
- Find the scalar product of two non-collinear vectors using orthogonal projection.

6- Equations of straight lines:

Students should be able to:

- Find a Cartesian equation of a straight line given 2 points or 1 point and a directing vector.
- Find a set of parametric equations of a straight line given 2 points or 1 point and a directing vector.
- Write an equation of a line parallel / perpendicular to a given line and passing through a given point.
- Study the relative positions of 2 straight lines with given equation and find the intersection point of 2 lines.
- Find the distance between a point and a line

7- Counting:

Students should be able to:

- Count possibilities using the product principle/sum principle.
- Solve counting problems of sampling with replacement (r-list).
- Solve counting problems of sampling without replacement (permutation).

8- Polynomials:

Students should be able to:

- Factorize and divide a polynomial by $(x - \alpha)$. (Identification method and Euclidean division method).

9- First Degree Equations and Inequalities in One Unknown:

Students should be able to:

- Study the sign of $ax + b$, a product of first-degree factors and a quotient of first-degree factors.
- Solve inequalities with the above mentioned expressions.
- Solve system of first-degree inequalities.

10- Functions:

Students should be able to:

- Find the domain of definition of a function.
- Study the parity of a function.
- Study the sense of variation of a function over its domain of definition.
- Find the local/absolute extrema of a function.
- Plot the graph of a function.
- Solve equations and inequalities graphically.
- Read and analyze the graph of a function.