



MATH DEPARTMENT

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

*Calculator is needed.

1- Sets:

Students should be able to:

- Write a set in comprehension/extension.
- 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:

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

3- 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.

4- Trigonometric lines

Students should be able to:

- Find the trigonometric lines of some remarkable angles (sine, cosine, tangent and cotangent).
- Use the fundamental relation $\cos^2 \alpha + \sin^2 \alpha = 1$ and other formulas derived from it to calculate missing trigonometric lines.
- Apply the rules for associated arcs: *opposite arcs* (α and $-\alpha$), *supplementary arcs* (α and $\pi - \alpha$), *arcs differing by π* (α and $\pi + \alpha$), *complementary arcs* (α and $\frac{\pi}{2} - \alpha$), *arcs differing by $\frac{\pi}{2}$* (α and $\frac{\pi}{2} + \alpha$, and *arcs differing by $2k\pi$* (α and $\alpha + 2k\pi$))

5- Vectors:

Students should be able to:

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

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 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.

7- 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.