



MATH DEPARTMENT

Year of 2026-2027

Lessons required for the Math Entrance Exam: (Grade 9Bac to 10Bac)

*Calculator is needed.

1) Real Numbers:

Students should be able to:

- Classify numbers as natural, integer, rational, or irrational.
- Compare real numbers.
- Perform operations and simplify numerical expressions involving real numbers by applying the properties of fractions, powers, and square roots.
- Apply the correct order of operations to simplify algebraic expressions.
- Rationalize denominators in expressions involving square roots.

2) Algebraic Expressions:

Students should be able to:

- Substitute given numerical values for a variable.
- Add, subtract and multiply polynomials.
- Expand, reduce and arrange a polynomial.
- Factorize a polynomial using greatest common factor, grouping, “ac” method and remarkable identities: $(a + b)^2$, $(a - b)^2$ and $(a - b)(a + b)$.
- Find the roots of a polynomial and solve linear equations.
- Find the domain of definition of rational algebraic expressions and simplify them.
- Solve equations in the form of $\frac{p(x)}{q(x)}$ where $p(x)$ and $q(x)$ are two polynomials.

3) **Proportionality:**

Students should be able to:

- Identify directly and inversely proportional quantities and the constant of proportionality.
- Calculate the fourth proportional of three numbers in proportional series.
- Express relationships between quantities using ratios.
- Calculate a percentage of a given quantity and the percentage of increase and decrease.
- Calculate quantities after raise/discount based on a percentage of increase/decrease.

4) **Inequalities:**

Students should be able to:

- Solve a linear inequality in one unknown and check its solution and represent it on a number line.
- Write solutions using interval notation.

5) **System Of Two Equations :**

Students should be able to:

- Solve a system of two equations in one unknown using different methods (comparison, elimination, substitution) and interpret the solution as the intersection point(s) of two lines.
- Distinguish between systems with one, two and infinite solutions and interpret each case algebraically and graphically.

6) **Trigonometry:**

Students should be able to:

- Find the trigonometric functions of a given acute angle.
- Find in degrees the measure of an acute angle using the slope of a line.
- Calculate missing sides/angles when given a cosine, sine, tangent or cotangent of an angle.

7) **Lines and circles:**

Students should be able to:

- Identify and justify the relative positions of lines and circles (tangent, secant, external, internal).
- Verify and construct tangents to a circle from a point on a circle and from external points.
- Apply circle theorems involving chords, arcs and angles, tangents, and secants to determine unknown measures and relationships.
- Use the Pythagorean and Midpoint Theorems to solve geometric problems, find unknown measures, and justify geometric relationships.
- Use the properties of triangles, perpendicular bisectors, bisectors, medians, altitudes, and parallel and perpendicular lines to construct figures and justify geometric relations.
- Prove that given points are concyclic using geometric properties and theorems and determine the circle passing through them.
- Find the locus of a variable point.

8) **Thales' properties:**

Students should be able to:

- Use Thales's theorem and its converse in a triangle.
- Find unknown lengths in geometric figures involving parallel lines.

9) **Lines in a coordinate system:**

Students should be able to:

- Plot a point, vector, and line in a coordinate system given their characteristics/equation.
- Find an equation of a line including vertical/horizontal line and line passing through the origin.
- Check whether a point, knowing its coordinates, belongs to a line of a given equation.
- Find the coordinates of a point that belongs to a given line.
- Prove two lines parallel/perpendicular by comparing their slopes.
- Find an equation of a line passing through a given point and parallel/perpendicular to a given line.
- Calculate the distance between two points knowing their coordinates.
- Solve geometry problems in a coordinate system.

10) Similar Triangles:

Students should be able to:

- Prove triangles similar, identify their corresponding angles and sides and establish proportional relationship between corresponding sides.

11) Vectors:

Students should be able to:

- Characterize a vector by its direction, sense and magnitude.
- Use Chasles' relation and parallelogram rule to add vectors.
- Identify equal and opposite vectors.
- Calculate the coordinates of a vector.
- Represent a vector geometrically and by using its coordinates.