Math Department

Year of 2025-2026

Lessons required for the Math Entrance Exam:(Grade 10ADP to 11ADP) (Algebra 2)

*Calculator is needed.

1. **Relations and Functions**

   Students should be able to:

   - Analyze functions graphically (domains, codomains, and ranges).
   - Write the domain and range of a function in set builder and interval notations.
   - Identify one-to-one and onto functions from graphs and tables.
   - Determine the continuity of a function.
   - Identify linear and non-linear functions from equations, graphs and tables.
   - Identify and interpret the intercepts of a function.
   - Identify types of symmetry that the graph of a function has.
   - Identify even and odd functions.
   - Identify extrema of functions.
   - Identify end-behaviors of graphs.
   - Graph linear, non-linear, piecewise-defined, step and absolute value functions.
   - Apply transformations and composite of transformations (translation, vertical/horizontal dilation and reflection) to the graphs of functions.
   - Use transformations to write equations from graphs.

2. **Linear Equations, Inequalities and Systems**

Students should be able to:

- Solve for a variable.
- Write and solve a linear equation/inequality.
- Solve a linear equation/inequality by graphing.
- Solve absolute value equations and inequalities algebraically and by graphing.
- Write and interpret linear equations in standard, slope-intercept and point-slope forms.
- Write and solve a system of two equations in two variables algebraically (substitution and elimination methods) and by graphing.
- Solve systems of inequalities in two variables graphically.

3. **Quadratic Functions**

Students should be able to:

- Graph quadratic functions.
- Find and interpret the average rate of change from an equation, a table and a graph.
- Solve quadratic equations by graphing.
- Perform operations with pure imaginary numbers (find square roots of negative numbers and product of pure imaginary numbers; solve equation with pure imaginary solutions).
- Perform operations (equate, add, subtract, multiply and divide) with complex numbers.
- Use the discriminant to identify real and complex roots of a quadratic equation.
- Solve a quadratic equation by factoring, completing the square and by using the quadratic formula (real and complex roots).
- Complete the square in a quadratic function to interpret key features of its graph.
- Solve quadratic inequalities algebraically and graphically.

4. **Polynomials and Polynomial Functions**

Students should be able to:

- Graph and analyze (end-behavior and degree) a power function.
- Graph and analyze (degree and leading coefficients, zeros, extrema and end-behavior) a polynomial function.
- Perform operations on polynomials.

5. **Polynomial Equations**

Students should be able to:

- Solve a polynomial equation algebraically (Factoring) and by graphing.

6. **Inverses and Radical Functions**

   Students should be able to:
   - Perform operations on functions (add, subtract, multiply, divide and compose).
   - Find inverses of relations.
   - Verify that two relations are inverses using compositions.
   - Simplify expressions involving radicals and rational exponents.
   - Simplify expressions in exponential or radical form.
   - Simplify radical expressions.
   - Perform operations on radical expressions.
   - Rationalize the denominator using the conjugate.
   - Solve radical equations in one variable algebraically and identify extraneous solutions.

7. **Rational Functions**

   Students should be able to:
   - Simplify rational expressions.
   - Perform operations on rational expressions.
   - Solve rational equations in one variable.