

DOBBS FERRY MIDDLE SCHOOL

Dobbs Ferry, New York 10522

COURSE OUTLINE

SUBJECT: Algebra I

GRADE: 8

This is a full-year course in Algebra I that focuses on the concepts outlined in the New York State Next Generation Learning Standards. Topics include relationships between quantities, linear relationships, exponential and quadratic relationships, advanced functions and equations, and data analysis. **Students will be exposed to more rigor at a faster pace than they are used to and will be expected to meet those expectations.** This high school level course is appropriate for students who **excel in math** and are **highly academically motivated**.

ANTICIPATED OUTCOMES:

By June of this year, students in this class will be able to:

- Work with variables, expressions, and formulas to represent quantities and relationships.
- Use the order of operations, properties of real numbers, and equivalent forms to simplify and interpret expressions.
- Use properties of exponents (including rational exponents) to rewrite expressions, and connect radicals and rational exponents.
- Perform operations on polynomials and use factoring to rewrite expressions and reveal structure.
- Create linear, quadratic, and exponential equations to represent real-world situations.
- Rearrange formulas to highlight a quantity of interest (solve literal equations).
- Solve linear equations in one variable, including multi-step cases and variables on both sides.
- Solve linear inequalities in one variable and interpret solution sets in context.
- Graph linear inequalities in two variables and interpret the shaded solution region.
- Solve systems of linear inequalities in two variables and interpret solutions as constraints.
- Understand functions as rules that assign each input exactly one output; use function notation and evaluate functions.
- Interpret and sketch graphs of functions, identifying key features such as intercepts, zeros, increasing/decreasing behavior, and maximum/minimum values when applicable.

- Determine appropriate domains for functions from graphs and from real-world contexts.
- Graph and interpret linear functions, including slope and intercept as rate of change and initial value.
- Write equations of lines in slope-intercept, point-slope, and standard form.
- Analyze relationships between lines, including parallel and perpendicular lines, using slopes and equations.
- Work with absolute value, step, and other piecewise-defined functions, including graphing and interpreting them in context.
- Interpret and graph quadratic functions, including identifying zeros, vertex, and symmetry.
- Solve quadratic equations using factoring, completing the square, the quadratic formula, and/or graphing, and interpret the number of real solutions.
- Solve systems of equations that include linear equations, and interpret intersection points as solutions.
- Solve systems consisting of a linear equation and a quadratic equation and interpret solutions graphically and/or algebraically.
- Compare linear and exponential models by recognizing situations with equal differences versus equal factors.
- Construct linear and exponential functions from graphs, descriptions, and input-output information, and interpret parameters in context.
- Model exponential growth and decay situations and interpret key features of exponential graphs.
- Understand sequences as functions with integer domains; work with arithmetic and geometric sequences using explicit and recursive descriptions.
- Represent data distributions using appropriate plots and describe center and spread in context.
- Compare data sets by analyzing and interpreting differences in center, spread, and overall distribution.
- Create and interpret scatter plots, describing patterns, clusters, outliers, and direction/strength of association.
- Fit a linear function to data, use the model to make predictions, and interpret slope and intercept in context.
- Use correlation (with technology when appropriate) to describe the strength of a linear association and distinguish correlation from causation.
- Represent and summarize categorical data in ways that support meaningful comparison and interpretation.

KEY CONCEPTS

- Relationships
- Logic

MATERIALS NEEDED

- TI-84 Plus CE Graphing Calculator
- 3-Ring Binder
- Loose Leaf Paper/Graph Paper
- One Folder
- One Ruler
- Pencil Case
- Highlighters
- Pens (blue or black only)
- Pencils

CRITERIA FOR GRADING

Grades will be based on the following:

- Practice Problem Sets
- Assessments

Outline developed by: Math Department

Date: January 2026