

Algebra I/Data Analysis Essential Curriculum

UNIT I: Patterns and Functional Relationships

Goal. The student will demonstrate the ability to summarize patterns by examining the relationship between variables using various methods. This unit will provide a foundation for the student as they study specific models of change such as linear, quadratic, and exponential models in later units.

Objectives – The students will be able to:

- a. Recognize, describe, represent, and/or extend patterns and functional relationships that are expressed numerically, algebraically, and/or geometrically.
- b. Represent and interpret relations and functions in a real-world context using numbers, graphs, tables, oral/written descriptions, equations, and technology.

UNIT II: Solving Linear Equations and Inequalities

Goal. The student will demonstrate the ability to solve one variable linear equations and inequalities and apply these concepts to solve real-world problems.

Objectives – The students will be able to:

- a. Simplify and evaluate numerical and algebraic expressions.
- b. Apply addition, subtraction, multiplication, and/or division of algebraic expressions to mathematical and real-life problems.
- c. Solve a one-variable equation for the unknown.
- d. Solve a literal equation for a specific variable.
- e. Solve and graph a one-variable inequality for the unknown, interpret it in the context of the problem, and apply the solution to a real-world application.
- f. Solve and interpret absolute value expressions and equations.

UNIT III: Linear and Non-Linear Functions, Inequalities, and Graphs

Goal. The student will demonstrate the ability to graph and write linear equations and inequalities and apply these concepts to solve real-world problems.

Objectives - The students will be able to:

- a. Describe the graph of a non-linear function and discuss its appearance in terms of the basic concepts of maxima and minima, zeros (roots), rate of change, domain and range, and continuity.

- b. Describe how the graphical model of a non-linear equation represents a given problem and estimate the solution.
- c. Recognize and describe linear functions that are expressed numerically, algebraically, and/or graphically.
- d. Represent linear functions numerically, algebraically, and/or graphically.
- e. Determine the equation for a line, solve linear equations, and/or describe the solutions using numbers, symbols, and/or graphs.
- f. Determine and interpret properties of linear functions, including slope, intercepts, dependent and independent variables, and continuity, in the context of a real-world situation.
- g. Interpret data and/or make predictions by finding and using a line of best fit and by using a given curve of best fit.
- h. Identify, describe, and apply properties of a direct variation.
- i. Solve linear inequalities and describe the solutions using numbers, symbols, and/or graphs.
- j. Write, solve, graph, and/or interpret an inequality in the context of a real-world problem.
- k. Interpret and solve absolute value equations and inequalities.

UNIT IV: Statistics, Probability, and Proportional Reasoning

Goal. The student will demonstrate the ability to apply probability and statistical methods for representing data, interpreting data, and communicating results.

Objectives - The students will be able to:

- a. Use the concepts of ratio, rate, percent, and proportion to solve problems.
- b. Determine the experimental probability of an event using real-world data.
- c. Calculate theoretical probability and use simulations or statistical inference from data to estimate the probability of an event.
- d. Represent, interpret, and manipulate data in matrices to solve real-world problems.
- e. Use measures of central tendency and/or variability to draw informed conclusions.
- f. Organize and analyze data using a histogram, stem-and-leaf plot or box-and-whisker plot.
- g. Make informed decisions and predictions based upon the results of simulations and data from research.
- h. Design and/or conduct an investigation that uses statistical methods to analyze data and communicate results.
- i. Investigate and communicate the use and misuse of statistics.

UNIT V: Systems of Equations and Inequalities

Goal. The student will demonstrate the ability to develop systems of linear equations and inequalities to model real-world situations. Systems of linear equations will be solved using a variety of methods and the solutions will be interpreted in the context of the problem.

Objectives – The students will be able to:

- a. Organize and interpret graphs of systems of linear equations with two unknowns.
- b. Solve and describe using numbers, symbols, and/or graphs if and where two straight lines intersect.
- c. Write a system of equations for a real-world situation that is expressed verbally, numerically, algebraically, and graphically.
- d. Write, solve, and/or interpret a system of linear inequalities in the context of a real-world problem.

UNIT VI: Exponents and Exponential Functions

Goal. The student will demonstrate the ability to perform operations involving exponents. They will explore exponential growth and decay through real-world models.

Objectives – The students will be able to:

- a. Apply addition, subtraction, multiplication, and/or division of algebraic expressions to mathematical and real-world problems.
- b. Simplify expressions using laws of exponents.
- c. Read and write numbers in scientific notation.
- d. Recognize and describe exponential functions that are expressed numerically, algebraically, and/or graphically.
- e. Represent exponential functions numerically, graphically, and/or algebraically.
- f. Solve a real-world problem involving an exponential function.

UNIT VII: Polynomials and Quadratics

Goal. The student will demonstrate the ability to perform operations with polynomial expressions and to solve and interpret quadratic functions and apply these concepts to real-world problems.

Objective – The students will be able to:

- a. Write polynomials in standard form.
- b. Add and subtract polynomials.
- c. Multiply polynomials.
- d. Represent a polynomial as a product of a monomial and a polynomial.

- e. Represent a quadratic polynomial as a product of two linear factors.
- f. Recognize and describe quadratic functions that are expressed numerically, algebraically, and/or graphically.
- g. Identify the properties of a quadratic function represented numerically, algebraically, and/or graphically.
- h. Represent quadratic functions numerically, algebraically, and/or graphically.
- i. Solve a quadratic equation using a graph, factors, and the quadratic formula.
- j. Evaluate expressions by adding, subtracting, multiplying, dividing, and simplifying radicals.
- k. Solve a quadratic equation using the quadratic formula.
- l. Solve a real-world problem involving a quadratic function.