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Algebra I/Data Analysis
Essential Curriculum

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UNIT I: Patterns and Functional Relationships

Goal: The students will demonstrate the ability to summarize patterns by examining the relationship between variables using various methods. This unit will provide a foundation for studying 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 One Variable Equations and Inequalities

Goal: The students will demonstrate the ability to solve one variable linear equations and inequalities and to 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, equations, and inequalities.

UNIT III: Non-Linear Functions and Graphs

Goal: The students will demonstrate the ability to graph and write non-linear equations 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. Interpret data and/or make predictions using a given curve of best fit.
d. Recognize and describe non-linear functions that are expressed numerically, algebraically, and/or graphically.

UNIT IV: Linear Functions, Inequalities, and Graphs

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

Objectives - The students will be able to:
a. Represent linear functions numerically, algebraically, and/or graphically.
b. Determine the equation for a line, solve linear equations, and/or describe the solutions using numbers, symbols, and/or graphs.
c. Determine and interpret properties of linear functions, including slope, intercepts, dependent and independent variables, and continuity, in the context of a real-world situation.
d. Interpret data and/or make predictions by finding and using a line of best fit.
e. Identify, describe, and apply properties of a direct variation.
f. Solve linear inequalities and describe the solutions using numbers, symbols, and/or graphs.
g. Write, solve, graph, and/or interpret an inequality in the context of a real-world problem.

UNIT V: Statistics, Probability, and Proportional Reasoning

Goal: The students 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. Represent, interpret, and manipulate data in matrices to solve real-world problems.
b. Use the concepts of ratio, rate, percent, and proportion to solve problems.

c. Determine the experimental probability of an event using real-world data.
d. Calculate theoretical probability and use simulations or statistical inference from data to estimate the probability of an event.
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 VI: Systems of Equations and Inequalities

Goal: The students will demonstrate the ability to develop systems of linear equations and inequalities to model real-world situations. Systems of linear equations and inequalities 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, graph and/or interpret a system of linear inequalities in the context of a real-world problem.

UNIT VII: Exponents and Exponential Functions

Goal: The students will demonstrate the ability to perform operations involving exponents by exploring 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, algebraically, and/or graphically.
f. Solve a real-world problem involving an exponential function.

UNIT VIII: Polynomials and Quadratics

Goal: The students 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 by graphing and/or factoring.
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.