

# Course Syllabus

## Mathematics, Algebra I

Morgan County Curriculum 4.1 Middle Sch., Final  
Morgan County School District

### Number Properties and Operations (20%)

- The learner will be able to compare real numbers using order relations (less than, greater than, equal to) and represent problems using real numbers.
- The learner will be able to demonstrate the relationships between different subsets of the real number system.
- The learner will be able to use scientific notation to express very large or very small quantities.
- The learner will be able to estimate solutions to problems with real numbers (including very large and very small quantities) in both real-world and mathematical problems, and USE the estimations to check for reasonable computational results.
- The learner will be able to solve real-world and mathematical problems to specified accuracy levels by simplifying expressions with real numbers involving addition, subtraction, multiplication, division, absolute value, integer exponents, roots (square, cube) and factorials.
- The learner will be able to apply ratios, percents and proportional reasoning to solve real-world problems (e.g., those involving slope and rate, percent of increase and decrease) and will EXPLAIN how slope determines a rate of change in linear functions representing real-world problems.
- The learner will be able to identify real number properties (commutative properties of additions and multiplication, associative properties of addition and multiplication, distributive property of multiplication over addition and subtraction, IDENTIFY properties of addition and multiplication and inverse properties of additions and multiplication) when used to justify a given step in simplifying an expression or solving an equation.
- The learner will be able to use equivalence relations (reflexive, symmetric, transitive).

### Measurement (12%)

- The learner will be able to continue to APPLY to both real-world and mathematical problems U.S. customary and metric systems of measurements.

### Geometry (18%)

- The learner will be able to identify and DESCRIBE properties of and APPLY geometric transformations within a plane to solve real-world and mathematical problems.
- The learner will be able to apply algebraic concepts and graphing in the coordinate plane to ANALYZE and SOLVE problems (e.g., finding the final coordinates for a specified polygon, midpoints, between-ness of points, parallel and perpendicular lines, the distance between two points, the slope of a segment).

### Data Analysis and Probability (15%)

- The learner will be able to analyze and MAKE INFERENCES from a set of data with no more than two variables, and will ANALYZE problems for the use and misuse of data representations.
- The learner will be able to construct data displays for data with no more than two variables.
- The learner will be able to represent real-world data USING matrices and will USE matrix addition, subtraction, multiplication (with matrices no larger than  $2 \times 2$ ) and scalar multiplication to solve real-world problems.
- The learner will be able to identify an appropriate curve of best fit (linear, quadratic, exponential) for a set of two-variable data; DETERMINE a line of best fit equation for a set of linear two-variable data and APPLY a line of best fit to make predictions within and beyond a given set of two-variable data.
- The learner will be able to determine theoretical and experimental (from given data) probabilities; MAKE PREDICTIONS and DRAW INFERENCES from probabilities; COMPARE theoretical and experimental probabilities and DETERMINE probabilities involving replacement and non-replacement.

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- The learner will be able to describe and COMPARE data distributions and make inferences from the data based on the shapes of graphs, measures of center (mean, median, mode) and measures of spread (range, standard deviation).
- The learner will be able to design simple experiments or investigations to collect data to answer questions of interest.
- The learner will be able to explain the differences between randomized experiments and observational studies.
- The learner will be able to represent probabilities in multiple ways, such as fractions, decimals, percentages and geometric area models.
- The learner will be able to apply order of operations, real number properties (identity, inverse, commutative, associative, distributive, closure) and rules of exponents (integer) to simplify algebraic expressions.
- The learner will be able to evaluate polynomial and rational expressions and expressions containing radicals and absolute values at specified values of their variables.
- The learner will be able to add, subtract and multiply polynomial expressions; factor polynomial expressions using the greatest common monomial factor and factor quadratic polynomials of the form  $ax^2 + bx + c$ , when  $a = 1$  and  $b$  and  $c$  are integers.
- The learner will be able to factor quadratic polynomials, such as perfect square trinomials and quadratic polynomials of the form  $ax^2 + bx + c$  when  $a = 1$  and  $b$  and  $c$  are integers.

### Algebraic Thinking (35%)

- The learner will be able to identify multiple representations (tables, graphs, equations) of functions (linear, quadratic, absolute value, exponential) in real-world or mathematical problems.
- The learner will be able to demonstrate how equations and graphs are models of the relationship between two real-world quantities (e.g., the relationship between degrees Celsius and degrees Fahrenheit.).
- The learner will be able to recognize and solve problems that can be modeled using an exponential function, such as compound interest problems.
- The learner will be able to determine if a relation is a function; DETERMINE the domain and range of a function (linear and quadratic); DETERMINE the slope and intercepts of a linear function; DETERMINE the maximum, minimum, and intercepts (roots/zeros) of a quadratic function and EVALUATE a function written in function notation for a specified rational number.
- The learner will be able to apply and USE direct and inverse variation to solve real-world and mathematical problems.
- The learner will be able to model, SOLVE and GRAPH first degree, single variable equations and inequalities, including value, based in real-world and mathematical problems and graph the solutions on a number line.
- The learner will be able to solve for a specified variable in a multivariable equation.
- The learner will be able to model, SOLVE and GRAPH first degree, two-variable equations and inequalities in real-world and mathematical problems.
- The learner will be able to model, SOLVE, and GRAPH systems of two linear equations in real-world and mathematical problems.
- The learner will be able to write, GRAPH, and SOLVE systems of two linear inequalities based on real-world or mathematical problems and interpret the solution.
- The learner will be able to model, SOLVE, and GRAPH quadratic equations in real-world and mathematical problems.