

Course Syllabus

Mathematics, Math- Grade 8

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

Number Properties and Operations (22%)

- The learner will be able to provide examples of and identify rational numbers and irrational numbers (Square roots and π only).
- The learner will be able to describe and provide examples of representations of numbers (rational, square roots, and π) and operations in a variety of equivalent forms using models, diagrams, and symbols (e.g., number lines, 10 by 10 grids, rectangular arrays, number sentences), based on real world and mathematical problems.
- The learner will be able to convert, compare, and order multiple numerical representations (e.g., fractions, decimals, percentages) of rational numbers and irrational numbers (square roots and π).
- The learner will be able to estimate to solve real-world and mathematical problems with rational numbers, checking for reasonable and appropriate computational results.
- The learner will be able to add, subtract, multiply, and divide rational numbers to solve real-world problems and to apply order of operations (including positive whole number exponents) to simplify numerical expressions.
- The learner will be able to explain how operations (addition and subtraction; multiplication and division; squaring and taking the square root of a number) are inversely related.
- The learner will be able to apply ratios and proportional reasoning to solve real-world problems (e.g., percents, constant rate of change, unit pricing, percent of increase or decrease).
- The learner will be able to identify the use of properties (commutative properties of addition and multiplication, the associative properties of addition and multiplication, the identity properties for addition and multiplication, inverse properties and the distributive property of multiplication over addition and subtraction) to justify a given step in problems.

Measurement (15%)

- The learner will be able to measure lengths (to the nearest sixteenth of an inch or the nearest millimeter) and will determine and use in real-world and mathematical problems:
 - *Area and perimeter of triangles and quadrilaterals;
 - *Area and circumference of circles;
 - *Area and perimeter of compound figures composed of triangles, quadrilaterals, and circles;
 - *Area from circumference or perimeter; and
 - *Circumference or perimeter from area.
- The learner will be able to estimate measurements in standard units in real world and mathematical problems.
- The learner will be able to evaluate the measures of angles by estimation, measurement with a protractor or angle ruler and determine angle measures in mathematical and real-world situations (e.g., supplementary, external, vertical).
- The learner will be able to convert units within the same measurement system and use these units to solve real-world problems.
- The learner will be able to apply formulas to determine that volume of rectangular prisms in real world and mathematical problems.
- The learner will be able to use formulas to find surface area of right rectangular prisms in real world and mathematical problems.
- The learner will be able to apply the Pythagorean theorem to determine the length of a hypotenuse.

Geometry (20%)

- The learner will be able to describe and provide examples of the basic geometric elements that include points, rays, lines, segments, angles, planes, and will use these elements in real-world and mathematical problems.

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The learner will be able to identify and compare properties of two-dimensional figures (circles, triangles [acute, right, obtuse, scalene, isosceles, equilateral]), quadrilaterals (square, rectangle, rhombus, parallelogram, trapezoid], regular/irregular polygons), and will apply these elements and figures to solve real-world and mathematical problems.

- The learner will be able to compare properties of three-dimensional figures (spheres, cones, cylinders, prisms, pyramids), and will apply these properties and figures to solve real-world and mathematical problems.
- The learner will be able to provide examples of congruent and similar figures, apply congruent and similar figures to solve real-world and mathematical problems, and apply proportional reasoning to solve problems involving scale drawings and proportional figures.
- The learner will be able to describe, provide examples of, and apply to real-world and mathematical problems rotational symmetry (90 degrees, 180 degrees, 360 degrees).
- The learner will be able to transform (translations, reflections, and dilations with the center of dilation at the origin) figures in a coordinate plane and determine the new coordinates of the image after the transformation.
- The learner will be able to identify rotation (clockwise or counterclockwise) of figures about the origin, in a coordinate plane.
- The learner will be able to identify and graph ordered pairs on a coordinate system, correctly identifying the origin, axes, and ordered pairs; and will apply graphing the coordinate system to solve real-world and mathematical problems.

Data Analysis and Probability (15%)

- The learner will be able to analyze and make inferences from data displays (drawings, tables/charts, pictographs, bar graphs, circle graphs, line plots, Venn diagrams, line graphs, stem-and- leaf plots, scatter plots, histograms, box-and-whiskers plots).

- The learner will be able to explain how different representations of data (e.g., tables, graphs, diagrams, pots) are related.
- The learner will be able to *construct data displays (Venn diagrams, tables, line graphs, stem-and-leaf plots, circle graphs, scatter plots);
*Explain why the type of display is appropriate for the data; and *Explain how misleading representations affect interpretations and conclusions about data (e.g., changing the scale on a graph).
- The learner will be able to determine and apply the mean, median, mode, and range of a set of data;
*Identify clusters, gaps, and outliers; and *Apply these concepts to compare sets of data.
- The learner will be able to apply counting techniques to determine the size of a sample space for a real-world or mathematical situation.
- The learner will be able to *Determine theoretical probabilities of simple events;
*Determine probabilities based on the results of an experiment; and *Make inferences from probability data.
- The learner will be able to tabulate experimental results from simulations and explain how theoretical and experimental probabilities are related.
- The learner will be able to construct box-and-whiskers plots.
- The learner will be able to explain how data gathering, bias issues, and faulty data analysis, can affect the results of data collection.
- The learner will be able to determine theoretical probabilities and represent them using area models.

Algebraic Thinking (28%)

- The learner will be able to use variables to describe numerical patterns based on arithmetic sequences in real world and mathematical situations (e.g., $f(N)=2N+3$).

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- The learner will be able to represent, analyze, and generalize functions using tables, graphs, words, and algebraic notations, and will apply the relationships to solve real-world and mathematical problems.
- The learner will be able to explain how the change in one variable affects the change in another variable (e.g., if rate remains constant, an increase in time results in an increase in distance).
- The learner will be able to evaluate and simplify algebraic expressions applying the order of operations.
- The learner will be able to describe, define, and provide examples of variables and expressions with a missing value based on real-world and mathematical situations.
- The learner will be able to model and solve single-variable, first-degree real-world and mathematical problems (e.g., $4x+2=22$, $x-4<60$).