

Course Syllabus

Mathematics, Pre-Calculus

Morgan County Curriculum 4.1 High School, Final
Morgan County School District

Students are assessed in Mathematics through the Commonwealth Assessment Testing System (CATS).

The Kentucky Core Content Test (KCCT) in mathematics is given in grade 11 and consists of 38 Multiple-Choice and five (5) Open Response items.

Eleventh grade students will also take the American College Test (ACT). The ACT assesses students' general educational development and their ability to complete college-level work. The Mathematics section of the ACT contains 60 Multiple-Choice questions: 24 questions dealing with pre-algebra and elementary algebra; 18 questions dealing with intermediate algebra and coordinate geometry; 14 questions dealing with geometry; and four questions dealing with trigonometry.

Tenth grade students will take the PLAN, a curriculum-based assessment program developed by the American College Testing Program (ACT) to help students plan their academic careers and prepare for entry into college or the world of work. The test consists of 40 Multiple-Choice Questions dealing with pre-algebra, elementary algebra, coordinate geometry and plane geometry content.

Upon reviewing assessment results, the Morgan County High School will help the student and parent to determine what courses their child needs to take during their high school career, utilizing the Individual Learning Plan (ILP)

Number Properties and Operations (20%)

■ 1.1.1 (Supporting)

The learner will be able to compare real numbers using order relations (less than, greater than, equal to) and represent problems using real numbers.

■ 1.1.2 (Supporting)

The learner will be able to demonstrate the relationships between different subsets of the real number system.

1.2.1 (Supporting)

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.

■ 1.3.1 (DOK 2) ASSESSED

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.

■ 1.3.2 (DOK 3) ASSESSED

The learner will be able to describe and extend arithmetic and geometric sequences; DETERMINE a specific term of a sequence given in explicit formula; DETERMINE an explicit rule for the n th term of an arithmetic sequence and APPLY sequences to solve real-world problems.

■ 1.3.3 (Supporting)

The learner will be able to write an explicit rule for the n th term of a geometric sequence.

■ 1.4.1 (DOK 2) ASSESSED

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.

■ 1.5.1 (Supporting)

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.

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Measurement (12%)

- 2.1.2 (DOK3) ASSESSED
The learner will be able to describe how a change in one or more dimensions of a geometric figure affects the perimeter, area and volume of the figure.
- 2.1.3 (DOK 3) ASSESSED
The learner will be able to apply definitions and properties of right triangle relationships (right triangle trigonometry and the Pythagorean theorem) to determine length and angle measures to solve real-world and mathematical problems.
- 2.1.4 (Supporting)
The learner will be able to apply special right triangles and converse of the Pythagorean theorem to solve real-world problems.

Geometry (18%)

- 3.1.1 (DOK 2) ASSESSED
The learner will be able to analyze and APPLY spatial relationships (not using Cartesian coordinates) among points, lines and planes (e.g., betweenness of points, midpoint, segment length, collinear, coplanar, parallel, perpendicular, skew).
- 3.1.3 (DOK 2) ASSESSED
The learner will be able to analyze and APPLY angle relationships (e.g., linear pairs, relationships, complementary, supplementary, corresponding and alternate interior angles) in real-world and mathematical problems.
- 3.1.5 (DOK 2) ASSESSED
The learner will be able to classify and APPLY properties of two-dimensional geometric figures (e.g., number of sides, vertices, length of sides, sum of interior and exterior angle measures).
- 3.1.6 (ADP, Supporting)
The learner will be able to know the definitions and basic properties of a circle and will USE them to provide basic theorems and solve problems.

3.3.1 (DOK 2) ASSESSED

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%)

- 4.1.1 (DOK 3) ASSESSED
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.
- 4.1.2 (DOK 2) ASSESSED
The learner will be able to construct data displays for data with no more than two variables.
- 4.1.3 (Supporting)
The learner will be able to represent real-world data USING matrices and will USE matrix addition, subtraction, multiplication (with matrices no larger than 2×2) and scalar multiplication to solve real-world problems.
- 4.2.1 (DOK 2) ASSESSED
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).
- 4.2.3 (DOK 3) ASSESSED
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.
- 4.2.4 (Supporting)
The learner will be able to recognize when arguments based on data confuse correlation and causation.

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■ 4.4.1 (DOK 3) ASSESSED

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.

■ 4.4.2 (Supporting)

The learner will be able to recognize and identify the differences between combinations and permutations and use them to count discrete quantities.

■ 4.4.3 (Supporting)

The learner will be able to represent probabilities in multiple ways, such as fractions, decimals, percentages and geometric area models.

Algebraic Thinking (35%)

■ 5.1.1 (DOK 2) ASSESSED

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.

■ 5.1.2 (Supporting)

The learner will be able to identify, RELATE and APPLY representations (graphs, equations, tables) of a piecewise function (such as long distance telephone rates) from mathematical or real-world information.

■ 5.1.3 (Supporting)

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.).

■ 5.1.4 (Supporting)

The learner will be able to recognize and solve problems that can be modeled using an exponential function, such as compound interest problems.

■ 5.1.5 (DOK 2) ASSESSED

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.

■ 5.1.6 (Supporting)

The learner will be able to find the domain and range for absolute value functions.

■ 5.1.8 (DOK 2) ASSESSED

The learner will be able to identify the changes and explain how changes in parameters affect graphs of functions (linear, quadratic, absolute value, exponential) (e.g., compare $y = x$, $y = 2x$, $y = (x - 4)$, and $y = x + 3$).

■ 5.2.1 (DOK 1) ASSESSED

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.

■ 5.2.2 (Supporting)

The learner will be able to evaluate polynomial and rational expressions and expressions containing radicals and absolute values at specified values of their variables.

■ 5.2.3 (DOK 2) ASSESSED

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.

■ 5.2.4 (Supporting)

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.

■ 5.2.5 (DOK 1) ASSESSED

The learner will be able to add, subtract, multiply and divide simple rational expressions with monomial first-degree denominators and integer numerators (e.g. $3/5x + 4/3y$; $9/2a - -7/4b$; $3/-5x - 4/7y$; $5/2c - 9/-11d$), and will express the results in simplified form.

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- 5.3.1 (DOK 2) ASSESSED
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.
- 5.3.2 (Supporting)
The learner will be able to solve for a specified variable in a multivariable equation.
- 5.3.3 (DOK 2) ASSESSED
The learner will be able to model, SOLVE and GRAPH first degree, two-variable equations and inequalities in real-world and mathematical problems.
- 5.3.4 (DOK 3) ASSESSED
The learner will be able to model, SOLVE, and GRAPH systems of two linear equations in real-world and mathematical problems.
- 5.3.5 (Supporting)
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.
- 5.3.6 (DOK 2) ASSESSED
The learner will be able to model, SOLVE, and GRAPH quadratic equations in real-world and mathematical problems.