

Course Syllabus

Mathematics, ACT (Embedded)

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

The American College Test (ACT) is typically given to students in the later years of high school prior to applying to colleges.

Algebraic Concepts

The Algebraic Concepts Unit includes Competencies/Objectives which focus on algebraic equations and operations. Students explore the symbolic nature of algebraic concepts by identifying and extending patterns in algebra, by following algebraic procedures, and by proving theorems with properties.

- Objective 1
The learner will be able to identify and use properties of real numbers.
- Objective 2
The learner will be able to model and solve simple linear equations using concrete, informal and formal strategies.
- Objective 3
The learner will be able to solve for the value of a variable given in an inequality and as shown on a graph by manipulating the inequality correctly.
- Objective 4
The learner will be able to know the definition of square and cube roots, and how to determine and/or estimate them.
- Objective 5
The learner will be able to correctly manipulate fractional exponents, understanding their relationship to radicals raised to integral exponents.
- Objective 6
The learner will be able to determine and discuss what effect operations have on numbers.
- Objective 7
The learner will be able to understand how to substitute values for, find slope values using, and where, when, and why to apply the slope formula.
- Objective 8
The learner will be able to understand how to substitute values for, solve equations using, and where, when, and why to apply the distance formula.
- Objective 9
The learner will be able to understand how to substitute values for, what the standard form is, and where, when, and how to use the slope-intercept form for the equation of a line.
- Objective 10
The learner will be able to understand how to substitute values for, solve equations using, and where, when, and why to apply the midpoint formula.
- Objective 11
The learner will be able to calculate solutions to systems of linear equations.
- Objective 12
The learner will be able to determine the correct order of operations when addition, subtraction, multiplication, division, and parentheses are included.
- Objective 13
The learner will be able to determine the correct order of operations for an exponential equation.
- Objective 14
The learner will be able to apply the following properties: commutative, associative, distributive, identity, and reciprocal.
- Objective 15
The learner will be able to graph the solution set of a given one variable inequality.
- Objective 16
The learner will be able to understand the definition of absolute value of a number as the distance that number is from the origin.
- Objective 17
The learner will be able to evaluate an algebraic expression by substituting a given value for a variable.

Course Syllabus

Mathematics, ACT (Embedded)

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

- Objective 18
The learner will be able to demonstrate an understanding of the value of a number represented in exponential form.
- Objective 19
The learner will be able to multiply two whole numbers with different exponents.
- Objective 20
The learner will be able to correctly distribute an exterior exponent through an expression contained in parenthesis.
- Objective 21
The learner will be able to correctly manipulate numbers with negative exponents, understanding their reciprocal nature.
- Objective 22
The learner will be able to divide exponential numbers that have the same base and integer exponents.
- Objective 23
The learner will be able to use the rules of exponents that allow for the raising of a power to a power.
- Objective 24
The learner will be able to identify operation rules regarding the sum and product of odd and/or even numbers.
- Objective 25
The learner will be able to understand the basic concept of a variable as representing an unknown quantity.
- Objective 26
The learner will be able to factor a given algebraic expression.
- Objective 27
The learner will be able to factor the difference between two squares.
- Objective 28
The learner will be able to factor a quadratic trinomial.

- Objective 29
The learner will be able to factor trinomials, perfect square trinomials, or the difference between two squares.

Calculus and Pre-Calculus

The Calculus/Pre-Calculus Unit includes Competencies/Objectives which focus on calculus concepts. Students study limits, matrix algebra, functions, vectors, conic sections, mathematical induction, and sequence and series using graphical calculators, computers, and models.

- Objective 30
The learner will be able to use a given equation of an ellipse in standard form to find the center, foci, and vertices, and then graph the ellipse.
- Objective 31
The learner will be able to use a given equation of a parabola to find the vertex, focus, and direction and then graph the parabola.

Decimals

The Decimals Unit includes Competencies/Objectives which focus on number sense and operations with decimals. Students compare and compute decimals, study money, estimate decimals, problem solve using decimals, and reason using decimals.

- Objective 32
The learner will be able to convert decimals to fractions and fractions to decimals.
- Objective 33
The learner will be able to become proficient in the addition and subtraction of decimal numbers.
- Objective 34
The learner will be able to multiply 2 decimal numbers.
- Objective 35
The learner will be able to divide 2 decimal numbers out to a remainder of zero.

Course Syllabus

Mathematics, ACT (Embedded)

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

Fractions

The Fractions Unit includes Competencies/Objectives which focus on number sense and operations with fractions.

Students compare and order fractions, study fraction parts, estimate with fractions, reason using fractions, and problem solve using fractions.

- Objective 36
The learner will be able to add or subtract fractions and mixed fractions, including finding a lowest common denominator and reducing the answer to its lowest terms.
- Objective 37
The learner will be able to multiply fractions and/or reduce the answers to lowest terms.
- Objective 38
The learner will be able to divide two fractions.
- Objective 39
The learner will be able to reduce a given fraction to its lowest terms.
- Objective 40
The learner will be able to convert improper fractions to mixed fractions and vice versa.
- Objective 41
The learner will be able to compare fractions with the same or different denominators.

Geometry

The Geometry Unit includes Competencies/Objectives which focus on exploring geometric concepts from multiple perspectives. Students study properties and construction of figures, proofs and theorems, history of geometry, transformations, logic, and problem solving.

- Objective 42
The learner will be able to apply both the definition and properties of parallelograms to solve problems and write proofs.

- Objective 43
The learner will be able to recognize the radius and diameter of a circle and measure them.
- Objective 44
The learner will be able to identify, understand, and apply the following circle terms in both mathematical and geometric contexts: chord, sectors, secant, and tangent.
- Objective 45
The learner will be able to identify, understand, and apply the following circle terms in both mathematical and geometric contexts: center, diameter, radius, and semicircle.
- Objective 46
The learner will be able to determine properties of circles and their related parts such as arcs, chords, secants, tangents, and other angles, by inductively and deductively formulating and applying logical arguments.
- Objective 47
The learner will be able to classify quadrilaterals and solve problems by applying properties of quadrilateral shapes.
- Objective 48
The learner will be able to identify the properties of a square.
- Objective 49
The learner will be able to identify the properties of a rectangle.
- Objective 50
The learner will be able to identify a line segment.
- Objective 51
The learner will be able to identify and define angles which are supplementary.
- Objective 52
The learner will be able to identify and define vertical angles.

Course Syllabus

Mathematics, ACT (Embedded)

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

- Objective 53
The learner will be able to identify an isosceles triangle.
- Objective 54
The learner will be able to identify properties of a triangle which make it equilateral.
- Objective 55
The learner will be able to solve real world problems by applying the relationships found within 30-60-90 and 45-45-90 triangles.
- Objective 56
The learner will be able to analyze the properties of triangles.
- Objective 57
The learner will be able to use indirect measurement with similar triangles to make judgments about similar figures.
- Objective 58
The learner will be able to calculate arc length.
- Objective 59
The learner will be able to identify the correct definition and equation of a circle of a specific radius.
- Objective 60
The learner will be able to identify the Pythagorean Theorem.
- Objective 61
The learner will be able to identify Pythagorean triples, such as 3-4-5 and 5-12-13, in right triangles.
- Objective 62
The learner will be able to use the Pythagorean Theorem to determine an unknown side length of a right triangle.
- Objective 63
The learner will be able to describe how the side lengths of similar triangles are related.
- Objective 64
The learner will be able to identify parallel lines.

- Objective 65
The learner will be able to identify perpendicular lines.
- Objective 66
The learner will be able to identify right triangles and their properties.

Integers

The Integers Unit includes Competencies/Objectives which focus on number sense and operations with integers. Students compare integers, perform operations with integers, convert integers to other number forms, use manipulatives to demonstrate integers, and solve problems with integers in real world contexts.

- Objective 67
The learner will be able to identify what constitutes the set of integers.

Measurement

The Measurement Unit includes Competencies/Objectives which focus on measurement concepts, applications, and analysis. Students study length, area, circumference, perimeter, volume, weight, formulas, distance, calendar, money, tools, accuracy, units, constructions, patterns, and problem solving.

- Objective 68
The learner will be able to use the appropriate formula to calculate the area of a trapezoid.
- Objective 69
The learner will be able to calculate the circumference of a circle using the correct formula.
- Objective 70
The learner will be able to use the appropriate formula to calculate the area of a circle.
- Objective 71
The learner will be able to calculate the area of a triangle using the correct formula.

Number Theory

Course Syllabus

Mathematics, ACT (Embedded)

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

The Number Theory Unit includes Competencies/Objectives which focus on manipulating number forms and classifications. Students make connections between number forms and their real world applications.

- Objective 72
The learner will be able to recognize all the digits in the base-ten number system, and understand the concept of place value for these digits in any number.
- Objective 73
The learner will be able to identify and describe ways to determine odd or even numbers and construct models for these numbers.
- Objective 74
The learner will be able to identify and calculate numbers expressed in scientific notation.
- Objective 75
The learner will be able to apply an understanding of ratios and ratio comparisons to solve problems.
- Objective 76
The learner will be able to identify prime and composite numbers.
- Objective 77
The learner will be able to demonstrate an understanding of multiples.
- Objective 78
The learner will be able to demonstrate an understanding of factors.
- Objective 79
The learner will be able to apply the rules of divisibility.
- Objective 80
The learner will be able to identify the value of any number written to the power of zero.

Numeration

The Numeration Unit includes Competencies/Objectives which focus on exploring ordinality, identifying and extending number patterns, comparing numbers, and demonstrating number relationships.

- Objective 81
The learner will be able to understand the meaning of the equal to ($=$), greater than ($>$), and less than ($<$) symbols.

Percents

The Percent Unit includes Competencies/Objectives which focus on the concepts of percent. Students perform operations with percents, convert percents to other number forms, use manipulatives to demonstrate percents, and solve problems with percents in real world contexts.

- Objective 82
The learner will be able to apply percent concepts in problem solving situations.

Probability/Statistics

The Probability/Statistics Unit includes Competencies/Objectives which focus on data analysis and probability concepts. Students collect, analyze, and make sense of real world data (including overlapping data, inconclusive data, etc.).

- Objective 83
The learner will be able to determine within the context of a real world problem the average of a set of given numbers.
- Objective 84
The learner will be able to solve problems that involve the calculation of a weighted average.

Problem Solving

The Problem Solving Unit includes Competencies/Objectives which focus on analyzing problems, evaluating solutions, exploring problems, and developing strategies for solving problems.

- Objective 85
The learner will be able to demonstrate an understanding that a problem can be solved by beginning with the final conditions and working backwards to determine the initial conditions.

Course Syllabus

Mathematics, ACT (Embedded)

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

■ Objective 86

The learner will be able to obtain problem solutions that are actually algebraic expressions constructed from information in the problem.

Rational and Irrational Numbers

The Rational and Irrational Numbers Unit includes Competencies/Objectives which focus on number concepts. Students manipulate, compare, and perform operations with rational and irrational numbers.

■ Objective 87

The learner will be able to identify rational and irrational numbers.

Real Numbers and the Coordinate Plane

The Real Numbers and the Coordinate Plane Unit includes Competencies/Objectives which focus on graphing concepts. Students graph equations and make connections between algebraic concepts and their geometric correspondences.

● Objective 88

The learner will be able to explain the relationship between coordinate points, written in $(4, 5)$ form, and where coordinate points lie on the coordinate plane.

● Objective 89

The learner will be able to understand the properties of positive and negative numbers, know their relative positions on a number line, and correctly perform all four operations involving positive and negative numbers.

● Objective 90

The learner will be able to develop an intuitive sense of all real numbers.

■ Objective 91

The learner will be able to draw the graph of a line on a coordinate plane using only its slope and y-intercept.

Trigonometry

The Trigonometry Unit includes Competencies/Objectives which focus on trigonometric concepts. Students study triangles, trigonometric ratios, and triangle measurements; apply triangle properties; and solve right triangle problems.

■ Objective 92

The learner will be able to define the trigonometric terms sine, cosine, tangent, secant, cosecant, and cotangent.

■ Objective 93

The learner will be able to derive the Pythagorean trigonometric identities (sine squared of an angle + cosine squared of that angle = 1, etc.).