NFC ACADEMY

PRE-ALGEBRA (MATH 800)
COURSE OVERVIEW

Mathematics 800 is an introductory algebra course designed to prepare junior-high school students for Algebra I. The course focuses on strengthening needed skills in problem solving, integers, equations, and graphing. Students will begin to see the "big picture" of mathematics and learn how numeric, algebraic, and geometric concepts are woven together to build a foundation for higher mathematical thinking.

OBJECTIVES

- **THE REAL NUMBER SYSTEM**: Student will explore different properties of numbers, and how to use them to simplify expressions and formulas to make computations easier.
- **MODELING PROBLEMS IN INTEGERS**: Student will translate and solve one-step equations, or two-step equations in context, and check solutions for reasonableness, using the order of operations, and by substituting values for variables.
- **MODELING PROBLEMS WITH RATIONAL NUMBERS**: Student will add, subtract, multiply, and divide decimals, fractions, and mixed numbers with variables, likes, and unlike denominators to solve one and two-step word problems.

- **PROPORTIONAL REASONING**: Student will convert between fractions, decimals, and percent, and compare them, and identify similar and congruent figures and their corresponding parts and solve for missing measures.
- **MORE WITH FUNCTIONS**: Student will identify the parts of a line or quadratic equation and be able to graph it, and explore arithmetic and geometric sequences, as well as exponential growth and decay.
- **MEASUREMENT**: Student will explore relationships between sets of lines and the angles they create, understand and use the Pythagorean theorem, and identify characteristics of polygons.
- **PLANE GEOMETRY**: Student will determine how to calculate areas of common polygons, identify different transformations and how to determine the type and original image location.
- **MEASURES OF SOLID FIGURES**: Student will calculate surface area and volume of different objects and solve for missing measures of 3 dimensional figures when given surface area or volume and explain the relationship between surface area and volume.
- **DATA ANALYSIS**: Student will identify the mean, median, mode, range, lower quartile, and upper quartile of different data sets and construct the best display of the information.
- **PROBABILITY**: Student will identify all the possible outcomes of a given situation using combinations, permutations, and probability, and determine if events are dependent or independent.

CURRICULUM CONTENT AND SKILL FOCUS

UNIT 1: THE REAL NUMBER SYSTEM

- Identify rational, irrational numbers, variables, terms, or expressions.
- Use substitution, and order of operations to simplify expressions and formulas.
- Evaluate numerical expressions containing absolute value symbols, positive bases and positive or negative exponents.

- Write numbers given in standard form in scientific notation and given in scientific notation in standard form.
- Evaluate perfect square roots, determine if a square root is a rational or irrational number, and simplify square roots that are not perfect squares.
- Convert a rational number with a terminating or repeating decimal to a fraction, and a fraction into a terminating or repeating decimal.
- Perform multiplication and division with numbers written in scientific notation.
- Estimate large quantities or small quantities, using numbers written in scientific notation and understand that larger positive powers of ten represent large numbers, and that larger negative powers of ten represent extremely small numbers.

UNIT 2: MODELING PROBLEMS IN INTEGERS

- Translate written statements into math symbols, expressions, and equations.
- Translate and solve one-step equations, or two-step equations in context, and check solutions for reasonableness.
- Identify the inverse operation, or property of equality needed to solve a one-step equation.
- Recognize a function represented in various ways: rule, table, mapping, etc. and complete a t-chart for a function rule and graph the function
- Use ordered pairs to graph a function, and answer questions based on a graph by reading and interpreting the graph.
- Add, subtract, multiply, and divide integers within the context of a word problem.
- Evaluate expressions using the order of operations, and by substituting values for variables.
- Solve one- and two- step equations using the square root or cube root of numbers with exponential value.

UNIT 3: MODELING PROBLEMS WITH RATIONAL NUMBERS

- Express the prime factorization of composite numbers and terms in exponential form.
- Determine the greatest common factor using prime factorization and use it to solve problems.
- Reduce positive and negative fractions, with and without variables.
- Find the least common multiple (LCM), and the least common denominator (LCD) of two or more terms.
- Convert between improper fractions and mixed numbers.
- Add, subtract, multiply, and divide decimals, fractions, and mixed numbers with variables, likes, and unlike denominators to solve one and two-step word problems.
- Check solutions in equations and determine their reasonableness by estimating.
- Write and solve one-step and two-step inequalities and graph the solution set on a number line.

UNIT 4: PROPORTIONAL REASONING

- Use proportional reasoning to solve problems and determine unit rate or unit price.
- Recognize a relationship as a direct variation, calculate the constant of variation, and use the constant of variation to determine the equation of a direct variation.
- Calculate a missing value in a direct variation problem, and a percent problem.
- Convert between fractions, decimals, and percent, and compare them.
- Write and solve a multi-step word problem involving percent.
- Solve problems that require unit conversions of measurements.
- Identify similar and congruent figures and their corresponding parts and solve for missing measures.

UNIT 5: MORE WITH FUNCTIONS

- Rewrite formulas to solve for a specific variable and solve for a missing value.

- Identify and combine like terms in an algebraic expression and use the distributive property to simplify algebraic expressions and solve equations.
- Find the slope of a line on a graph, identify the x-intercept and the y-intercept of a line, graph a line from its intercepts and identify the type of slope from a graph.
- Identify equations in slope-intercept form, identify the slope and the y-intercept, and graph the line.
- Identify a quadratic equation, an absolute value equation, exponential growth and decay from graphs, and graph quadratic, absolute value, and exponential functions from t-charts.
- Determine if a sequence is arithmetic, or geometric, find the common difference in an arithmetic sequence, or the common ratio in a geometric sequence, extend the sequence, and use a formula to calculate the nth term of the sequence.
- Identify specific characteristics and solve single variable linear equations using inverse operations and differentiate between the three possible solutions: one solution, no solution, and infinitely many solutions.
- Solve a system of linear equations graphically, by substitution, by addition, and classify the equations as dependent, independent, or inconsistent.
- Identify systems of linear equations with no solution, and with an infinite number of solutions.
- Use algebraic operations, or substitution to determine whether an ordered pair is a solution to a system of linear equations.

UNIT 6: MEASUREMENT

- Identify angles by their measure, classify pairs of angles, and find the measure of an angle.
- Identify a transversal, the angles it creates, and find the measure of those angles.
- Identify the relationships between, and find the measures of, angles created by a transversal across parallel lines.
- Classify and find the measures of angles and arcs of circles.

- Identify which figures are polygons, classify them as regular, irregular, concave or convex, and name them based on their properties.
- Identify the different parts of polygons (sides, vertexes, diagonals, interior angles, and exterior angles), and the name of the quadrilateral by its properties.
- Find the interior and exterior angle measures of polygons and recognize the relationship that exists between the number of sides of a polygon and the sum of the measures of its interior angles.
- Classify a triangle by its sides or by its angles, and solve a contextual problem using the Pythagorean theorem.

UNIT 7: PLANE GEOMETRY

- Find the circumference or perimeter of a figure and find unknown dimensions of a figure by solving algebraic equations.
- Calculate the area of a parallelogram, triangle, or trapezoid, and find a missing measure in a parallelogram, triangle, trapezoid, or circle.
- Recognize the common shapes that make up a composite figure and determine the area of a composite figure using common area formulas.
- Identify lines of symmetry in shapes and write equations of lines of symmetry for shapes in a coordinate plane.
- Find the distance, and midpoint between two points, and solve word problems using distance and midpoint.
- Identify a transformation as a reflection, translation, or rotation, and determine the coordinates of an image or pre-image.
- Identify a tessellation and know which regular polygons will tessellate.
- Identify the scale factor for a dilation, determine whether a dilation is an enlargement or a reduction, and find the coordinates of an image or pre-image point in a dilation.

UNIT 8: MEASURES OF SOLID FIGURES

- Classify a three-dimensional figure by its characteristics.
- Identify the relationship that exists among the number of faces, edges, and vertices of a solid figure.

- Calculate the surface area and volume of rectangular prisms, triangular prisms, pyramid, cone, sphere, and cylinder using a net, and its formula.
- Solve for a missing measure when given the surface area or volume and other dimensions of 3-dimensional objects.
- Calculate the surface area and volume of a composite figure.
- Define the relationship that exists between the volume of a cone and the volume of a cylinder with the same dimensions.

UNIT 9: DATA ANALYSIS

- Interpret a tally chart to identify trends and make predictions about the general population.
- Identify the mean, median, mode, and range for a set of data.
- Construct and interpret a bar graph, circle graph or line graph from a set of data.
- Construct and interpret box-and-whisker plots, stem-and-leaf plots, scatter plots, frequency tables, and histograms from sets of data.
- Identify the lower quartile, upper quartile, and the median from sets of data.
- Identify a line of best fit for a scatter plot.
- Identify how a graph is misleading and changes needed to correct a misleading graph.
- Choose the correct graph to display information.

UNIT 10: PROBABILITY

- Identify all the possible outcomes for a given situation.
- Use tree diagrams, permutations, combinations to identify probabilities.
- Define theoretical probability, fairness, and odds.
- Use the theoretical probability to predict experimental probability.
- Find the probability of a disjointed or an overlapping event.
- Identify if events are independent or dependent and find the probability of dependent and independent events.

REQUIRED RESOURCES

Some assignments in this course require the use of resources that must be supplied by the user. These outside resources are listed by assignment.

PRE-ALGEBRA - MATHEMATICS 800		
Unit	Assignment Title	Supply List
All	All Assignments	Scratch Paper

GRADING INFORMATION

GRADING COMPONENTS

Lessons	40%
Quizzes	30%
Tests	30%

GRADING SCALE

100-90	A
89-80	B
79-70	C
69-60	D
Below 60	F