ROBERTSON COUNTY SCHOOLS

CURRICULUM GUIDE

GATEWAY ALGEBRA

Gateway Algebra is a research-based pre- or post-intervention option for preparing students to meet requirements of the Gateway Algebra exam. A credit in the course may serve as an elective, but shall not serve as one of the units in mathematics required for graduation.

The concepts emphasized in the course include functions, solving equations, slope as rates of change, and proportionality.

Gateway Algebra is individualized to meet the specific deficiencies or needs of the students enrolled in the course.

Specific Course Standards and the associated Learning Expectations taught are:

1.0 Numbers and Operations

The student will:

1.1 demonstrate an understanding of the subsets, properties, and operations of the real number system;
1.2 demonstrate an understanding of the relative size of rational and irrational numbers;
1.3 articulate, model, and apply the concept of inverse (e.g., opposites, reciprocals, and powers and roots);
1.4 describe, model, and apply inverse operations;
1.5 apply number theory concepts (e.g., primes, factors, divisibility and multiples) in mathematical problem solving;
1.6 connect graphical and symbolic representations of absolute value;
1.7 use real numbers to represent real-world applications (e.g., slope, rate of change, probability, and proportionality);
1.8 use a variety of notations appropriately (e.g. exponential, functional, square root);
1.9 select and apply an appropriate method (i.e., mental mathematics, paper and pencil, or technology) for computing with real numbers, and evaluate the reasonableness of results;
1.10 perform operations on algebraic expressions and informally justify the procedures chosen;
1.11 perform operations on matrices in real-world problem solving (i.e., addition, subtraction, and scalar multiplication).

2.0 Algebra

The student will:

2.1 recognize, analyze, extend, and create a variety of patterns;
2.2 use algebraic thinking to generalize a pattern by expressing the pattern in functional notation;
2.3 solve linear systems using a variety of techniques;
2.4 communicate the meaning of variables in algebraic expressions, equations, and inequalities;
2.5 identify and represent a variety of functions;
2.6 apply and interpret rates of change from graphical and numerical data;
2.7 analyze graphs to describe the behavior of functions;
2.8 interpret results of algebraic procedures;
2.9 apply the concept of variable in simplifying algebraic expressions, solving equations, and solving inequalities;
2.10 interpret graphs that depict real-world phenomena;
2.11 model real-world phenomena using functions and graphs;
2.12 articulate and apply algebraic properties in symbolic manipulation;
2.13 analyze relationships which can and which cannot be represented by a function;
2.14 graph inequalities and interpret graphs of inequalities;
2.15 describe the domain and range of functions and articulate restrictions imposed either by the operations or by the real-life situations which the functions represent;
2.16 describe the transformation of the graph that occurs when coefficients and/or constants of the corresponding linear equations are changed.
2.17 find and represent solutions of quadratic equations.

3.0 Geometry

The student will:

3.1 apply geometric properties, formulas, and relationships to solve real-world problems;
3.2 solve problems using the midpoint formula;
3.3 apply right triangle relationships including the Pythagorean Theorem and the distance formula.

4.0 Measurement

The student will:

4.1 use concepts of length, area, and volume to estimate and solve real-world problems;
4.2 apply and communicate measurement concepts and relationships in algebraic and geometric problem-solving situations;

4.3 demonstrate an understanding of rates and other derived and indirect measurements (e.g., velocity, miles per hour, revolutions per minute, cost per unit);
4.4 make decisions about units, scales, and measurement tools that are appropriate for problem situations involving measurement;
4.5 analyze precision, accuracy, tolerance, and approximate error in measurement situations.

5.0 Data Analysis and Probability

The student will:

5.1 collect, represent, and describe linear and nonlinear data sets developed from the real world;
5.2 make predictions from a linear data set using a line of best fit;
5.3 interpret a set of data using the appropriate measure of central tendency;
5.4 choose, construct, and analyze appropriate graphical representations for a data set;
5.5 demonstrate an understanding of the concept of random sampling;
5.6 apply counting principles of permutations and combinations using appropriate technology;
5.7 model situations to determine theoretical and experimental probabilities.

Correlation With the Blueprint for Learning

Assessed items indicated with an "A".

Gateway Mathematics		
Standard Number:		**1.0 Number and Operations**
Performance Indicators	**Reporting**	**As documented through state assessment -**
State:	**Category**	
		At Level 1, the student is able to
A	**NS**	• select the best estimate for the coordinate of a given point on a number line (only rational);
A	**NS**	• identify the opposite of a rational number;
A	**NS**	• determine the square root of a perfect square less than 169;
A	**AE**	• use exponents to simplify a monomial written in expanded form;
A	**NS**	• apply order of operations when computing with integers using no more than two sets of grouping symbols and exponents 1 and 2;
A	**NS**	• select a reasonable solution for a real-world division problem in which the remainder must be considered.
		At Level 2, the student is able to

A **A** **A** **A** **A** **A**	**NS** **NS** **AE** **NS** **NS** **NS**	• order a given set of rational numbers (both fraction and decimal notations); • identify the reciprocal of a rational number; • add and subtract algebraic expressions; • multiply two polynomials with each factor having no more than two terms; • use estimation to determine a reasonable solution for a tedious arithmetic computation; • select ratios and proportions to represent real-world problems (e.g., scale drawings, sampling, etc.).
A	**RW**	**At Level 3, the student is able to** • apply the concept of slope to represent rate of change in a real-world situation.
Performance Indicators		**As documented through teacher observation -**
Teacher:		
		At Level 1, the student is able to • connect a variety of real-world situations to integers; • use manipulatives to represent commutative and associative properties of addition and multiplication; • investigate alternate algorithms that show the relationship of division to subtraction and multiplication to addition; • analyze prime and composite numbers; • compare and contrast the GCF and LCM of a set of numbers; • refine strategies for estimating whole numbers, fractions, and percentages.
		At Level 2, the student is able to • probe the relationships among various subsets of the real number system; • compare and contrast the GCF and LCM of a set of algebraic expressions; • construct a number line to describe the absolute value of a number as distance from zero; • model operations using real-world situations and physical representations; • perform operations on matrices using appropriate technology (addition, subtraction, and scalar multiplication); • explore various representations of absolute value.
		At Level 3, the student is able to • research the history of prime numbers and their uses; • scrutinize approximate values of real numbers such as pi and the square root of two.