2005 Algebra I Standards

Number Sense and Operation Strand
Students will understand numbers, multiple ways of representing numbers, relationships among numbers, and number systems.

Number Theory
A.N.1   Identify and apply the properties of real numbers (closure, commutative, associative, distributive, identity, inverse).
                   Note: Students do not need to identify groups and fields, but students should be engaged in the ideas.

Students will understand meanings of operations and procedures, and how they relate to one another.

Operations
A.N.2.   Simplify radical terms (no variable in the radicand)
A.N.3.   Perform the four arithmetic operations using like and unlike radical terms and express the result in simplest form.
A.N.4.   Understand and use scientific notation to compute products and quotients of numbers greater than 100%.
A.N.5.   Solve algebraic problems arising from situations that involve fractions, decimals, percents (decrease/increase and discount),
                   and proportionality/direct variation.
A.N.6   Evaluate expressions involving factorial(s), absolute value(s), and exponential expression(s).
A.N.7   Determine the number of possible events, using counting techniques or the Fundamental Principle of Counting.
A.N.8   Determine the number of possible arrangements (permutations) of a list of items.

Algebra Strand
Students will represent and analyze algebraically a wide variety of problem solving situations.

Variables and Expressions
A.A.1   Translate a quantitative verbal phrase into an algebraic expression.
A.A.2   Write verbal expressions that match given mathematical expressions.

Equations and Inequalities
A.A.3   Distinguish the difference between an algebraic expression and an algebraic equation.
A.A.4   Translate verbal sentences into mathematical equations or inequalities.
A.A.5   Write algebraic equations or inequalities that represent a situation.
A.A.6   Analyze and solve verbal problems whose solution requires solving a linear equation in one variable or linear inequality in one variable.
A.A.7   Analyze and solve verbal problems whose solution requires solving systems of linear equations in two variables.
A.A.8   Analyze and solve verbal problems that involve quadratic equations.

A.A.9   Analyze and solve verbal problems that involve exponential growth and decay.

A.A.10   Solve systems of two linear equations in two variables algebraically (see A.G.7).

A.A.11   Solve a system of one linear and one quadratic equation in two variables, where only factoring is required.

           Note: the quadratic equations should represent a parabola and the solution(s) should be integers.

Students will perform algebraic procedures accurately.

Variables and Expressions

A.A.12   Multiply and divide monomial expressions with a common base, using the properties of exponents.

           Note: Use integral exponents only.

A.A.13   Add, subtract, and multiply monomials and polynomials.

A.A.14   Divide a polynomial by a monomial or binomial, where the quotient has no remainder.

A.A.15   Find values of a variable for which an algebraic fraction is undefined.

A.A.16   Simplify fractions with polynomials in the numerator and denominator by factoring both and renaming them to lowest terms.

A.A.17   Add or subtract fractional expressions with monomial or like binomial denominators.

A.A.18   Multiply and divide algebraic fractions and express the product or quotient in simplest form.

A.A.19   Identify and factor the difference of two perfect squares.

A.A.20   Factor algebraic expressions completely, including trinomials with a lead coefficient of one (after factoring a GCF).

Equations and Inequalities

A.A.21   Determine whether a given value is a solution to a given linear equation in one variable or linear inequality in one variable.

A.A.22   Solve all types of linear equations in one variable.

A.A.23   Solve literal equations for a given variable.

A.A.24   Solve linear inequalities in one variable.

A.A.25   Solve equations involving fractional expressions.

           Note: Expressions which result in linear equations in one variable.

A.A.26   Solve algebraic proportions in one variable which result in linear or quadratic equations.

A.A.27   Understand and apply the multiplication property of zero to solve quadratic equations with integral coefficients and integral roots.

A.A.28   Understand the difference and connection between roots of a quadratic equation and factors of a quadratic expression.

Students will recognize, use, and represent algebraically patterns, relations, and functions.

Patterns, Relations, and Functions

A.A.29   Use set-builder notation and/or interval notation to illustrate the elements of a set, given the elements in roster form.

A.A.30   Find the complement of a subset of a given set, within a given universe.

A.A.31   Find the intersection of sets (no more than three sets) and/or union of sets (no more than three sets).

Coordinate Geometry

A.A.32   Graph the Explain slope as a rate of change between dependent and independent variables.
A.A.33   Determine the slope of a line, given the coordinates of two points on the line.
A.A.34   Write the equation of a line, given its slope and the coordinates of a point on the line.
A.A.35   Write the equation of a line, given the coordinates of two points on the line.
A.A.36   Write the equation of a line parallel to the x- or y-axis.
A.A.37   Determine the slope of a line, given its equation in any form.
A.A.38   Determine if two lines are parallel, given their equations in any form.
A.A.39   Determine whether a given point is on a line, given the equation of the line.
A.A.40   Determine whether a given point is in the solution set of a system of linear inequalities.
A.A.41   Determine the vertex and axis of symmetry of a parabola, given its equation (See A.G.10).

Trigonometric Functions

A.A.42   Find the sine, cosine, and tangent ratios of an angle of a right triangle, given the lengths of the sides.
A.A.43   Determine the measure of an angle of a right triangle, given the length of any two sides of the triangle.
A.A.44   Find the measure of a side of a right triangle, given an acute angle and the length of another side.
A.A.45   Determine the measure of a third side of a right triangle using the Pythagorean Theorem, given the lengths of any two sides.

Geometry Strand

Students will use visualization and spatial reasoning to analyze characteristics and properties of geometric shapes.

Shapes

A.G.1   Find the area and/or perimeter of figures composed of polygons and circles or sectors of a circle.
     Note: Figures may include triangles, rectangles, squares, parallelograms, rhombuses, trapezoids, circles, semi-circles, and regular
       polygons (perimeter only).
A.G.2   Use formulas to calculate volume and surface area of rectangular solids and cylinders.

Students will apply coordinate geometry to analyze problem solving situations.

Coordinate Geometry

A.G.3   Determine when a relation is a function, by examining ordered pairs and inspecting graphs of relations.
A.G.4   Identify and graph linear, quadratic (parabolic), absolute value, and exponential functions.
A.G.5   Investigate and generalize how changing the coefficients of a function affects its graph.
A.G.6   Graph linear inequalities.
A.G.7   Graph and solve systems of linear equations and inequalities with rational coefficients in two variables (See A.A.10).

A.G.8	Find the roots of a parabolic function graphically.
	Note: Only quadratic equations with integral solutions.
A.G.9	Solve systems of linear and quadratic equations graphically.
	Note: Only use systems of linear and quadratic equations that lead to solutions where coordinates are integers.
A.G.10	Determine the vertex and axis of symmetry of a parabola, given its graph (see A.A.41).
	Note: The vertex will have an ordered pair of integers and the axis of symmetry will have an integral value.

Measurement Strand
Students will determine what can be measured and how, using appropriate methods and formulas.

Unit of Measurement
| A.M.1 | Calculate rates using appropriate units (e.g., rate of a spaceship versus the rate of a snail). |
| A.M.2 | Solve problems involving conversions within measurement systems, given the relationship between the units. |

Students will understand that all measurement contains error and be able to determine its significance.

Error and Magnitude
| A.M.3 | Calculate the relative error in measuring square and cubic units, when there is an error in the linear measure. |
| A.M.2 | Solve problems involving conversions within measurement systems, given the relationship between the units. |

Statistics and Probability Strand
Students will collect, organize, display, and analyze data.

Organization and Display of Data
A.S.1	Categorize data as qualitative or quantitative.
A.S.2	Determine whether the data to be analyzed is univariate or bivariate.
A.S.3	Determine when collected data or display of data may be biased.
A.S.4	Compare and contrast the appropriateness of different measures of central tendency for a given data set.
A.S.5	Construct a histogram, cumulative frequency histogram, and a box-and-whisker plot, given a set of data.
A.S.6	Understand how the five statistical summary (minimum, maximum, and the three quartiles) is used to construct a box-a-whisker plot.
A.S.7	Create a scatter plot of bivariate data.
A.S.8	Construct manually a reasonable line of best fit for a scatter plot and determine the equation of that line.

Analysis of Data

A.S.9   Analyze and interpret a frequency distribution table or histogram, a cumulative frequency distribution table or histogram, or a box-and-whisker plot.

A.S.10   Evaluate published reports and graphs that are based on data by considering: experimental design, appropriateness of the data analysis, and the soundness of the conclusions.

A.S.11   Find the percentile rank of an item in a data set and identify the point values for first, second, and third quartiles.

A.S.12   Identify the relationship between the independent and dependent variables from a scatter plot (positive, negative, or none).

A.S.13   Understand the difference between correlation and causation.

A.S.14   Identify variables that might have a correlation but not a causal relationship.

Students will make predictions that are based upon data analysis.

Predictions from Data

A.S.15   Identify and describe sources of bias and its effect, drawing conclusions from data.

A.S.16   Recognize how linear transformations of one-variable data affect the data's mean, median, mode, and range.

A.S.17   Use a reasonable line of best fit to make a prediction involving interpolation or extrapolation.

Students will understand and apply concepts of probability.

Probability

A.S.18   Know the definition of conditional probability and use it to solve for probabilities in finite sample spaces.

A.S.19   Determine the number of elements in a sample space and the number of favorable events.

A.S.20   Calculate the probability of an event and its complement.

A.S.21   Determine empirical probabilities based on specific sample data.

A.S.22   Determine, based on calculated probability of a set of events, if:
some or all are equally likely to occur.
one is more likely to occur than another.
whether or not an event is certain to happen or not to happen.

A.S.23   Calculate the probability of:
a series of independent events.
two mutually exclusive events.
two events that are not mutually exclusive.