

ALGEBRA 1 CURRICULUM
Renewed 8/2006

LEARNING OUTCOME
Using Algebra to Work with Data
Collects, organizes and analyzes data 1- Frequency distribution a- mean b- median c- mode
Displays and describes data in a 1- bar graph 2- line graph 3- stem-and-leaf plot 4- line plot 5- scatter plot
Expressions
Constructs meaning for: 1- Term 2- Like Terms 3- Constant 4- Variable 5- Coefficient 6- Absolute Value
Performs operations with real numbers
Identifies and combines like terms
Creates, evaluates and simplifies variable expressions 1- Order of Operations (including parentheses, brackets and exponents) 2- Substitution of a number for a variable 3- Translation of a verbal phrase into an algebraic expression
Recognizes that a number to the zero power equals 1
Simplifies expressions with exponents 1- positive/negative/fractional exponents 2- negative base
Expresses a number in scientific and decimal notation
Applies properties of operations 1- Commutative property 2- Associative property 3- Distributive property 4- Property of the opposite of a sum
Equations and Inequalities
Translates a verbal sentence/word problem into an equation or inequality
Solves equations and inequalities involving ... and graphs solution set on a number line 1- one transformation

<ul style="list-style-type: none"> 2- two transformations 3- variables on one and both sides 4- real number coefficients 5- real number solutions 6- all real number solutions/no solution 7- absolute value
Recognizes inequality sign must be reversed when transformation involves multiplication/division with a negative number
<p>Solves combined inequalities and graphs solution set on a number line</p> <ul style="list-style-type: none"> 1- Conjunction—AND 2- Disjunction—OR
Transforms formulas by solving for a specific variable
<p>Uses charts and equations to solve ... problems</p> <ul style="list-style-type: none"> 1- Cost, income and value 2- Rate-time-distance 3- Area 4- Problems without solutions
Polynomials
<p>Constructs meaning for:</p> <ul style="list-style-type: none"> 1- monomial 2- binomial 3- trinomial 4- polynomial 5- term 6- like terms 7- degree of variable/monomial/polynomial 8- constant 9- linear term 10- quadratic term 11- quadratic polynomial 12- standard form of a quadratic function 13- double/multiple root
<p>Performs operations with polynomials</p> <ul style="list-style-type: none"> 1- Applies Rule of Exponents for Products of Powers: $a^m \cdot a^n = a^{m+n}$ 2- Applies Rule of Exponents for a Power of a Power: $(a^m)^n = a^{mn}$ 3- Applies Rule of Exponents for a Power of a Product: $(ab)^m = a^m b^m$ 4- Applies Rule of Exponents for Division: if $m > n$ then $a^m/a^n = a^{m-n}$, if $m < n$ then $a^m/a^n = a^{n-m}$, if $m = n$ then $a^m/a^n = 1$
<p>Applies properties of operations and numbers</p> <ul style="list-style-type: none"> 1- Property of Quotients : $ac/bd = a/b \times c/d$
Uses FOIL to multiply binomials mentally
<p>Identifies the greatest common factor of</p> <ul style="list-style-type: none"> 1- integers 2- monomials 3- polynomials

<p>Identifies special polynomials and factors accordingly</p> <ol style="list-style-type: none"> 1- Difference of two squares: $a^2 - b^2 = (a+b)(a-b)$ 2- Perfect square trinomials: $a^2 \pm 2ab + b^2 = (a \pm b)^2$
<p>Identifies characteristics of polynomials and factors accordingly</p> <ol style="list-style-type: none"> 1- Greatest common factor 2- Binomial—difference of two squares 3- Trinomial <ol style="list-style-type: none"> a- perfect square trinomial b- coefficient of quadratic term is 1 and constant positive/negative c- coefficient of quadratic term is >1 and constant positive/negative 4- Polynomial of 4 or more terms <ol style="list-style-type: none"> a- factor by grouping
Recognizes a prime polynomial
<p>Solves polynomial equations using factoring</p> <ol style="list-style-type: none"> 1- Zero product property
Solves word problems by writing and factoring quadratic equations
Rational Expressions
<p>Constructs meaning for:</p> <ol style="list-style-type: none"> 1- mixed expression 2- complex fraction
<p>Simplifies algebraic fractions using factoring</p> <ol style="list-style-type: none"> 1- Converts mixed expressions to fractions in simplest form
Solves rational equations
<p>Performs operations with algebraic fractions</p> <ol style="list-style-type: none"> 1- Applies rules for addition, subtraction, multiplication and division of fractions 2- Applies rule of exponents for a power of a quotient: $(a/b)^m = a^m/b^m$ 3- Performs polynomial long division; expresses answer as a mixed expression
Ratio, Proportion and Percent
<p>Solves problems using ratios and proportions</p> <ol style="list-style-type: none"> 1- Product of means equals the product of the extremes 2- Scale drawings
<p>Solves percent problems involving</p> <ol style="list-style-type: none"> 1- percent of increase/decrease 2- discount 3- sales tax 4- simple interest
Functions
<p>Constructs meaning for:</p> <ol style="list-style-type: none"> 1- coordinate plane 2- x- and y-axes 3- origin 4- quadrants 5- x- and y-coordinates/ordered pair 6- function 7- domain

<ul style="list-style-type: none"> 8- range 9- values of a function 10- parabola
Solves equations in two variables over given domain
Defines a function by using a <ul style="list-style-type: none"> 1- table 2- graph 3- equation
Identifies the domain and range of a function
Classifies a relation to be a function by recognizing that each member of the domain is assigned exactly one member of the range <ul style="list-style-type: none"> 1- Mapping diagram 2- Vertical line test
Calculates the values of a function (linear and quadratic) over given domain
Represents a linear equation in ... form: <ul style="list-style-type: none"> 1- standard: $ax + by = c$ 2- slope-intercept: $y = mx + b$
Recognizes a linear equation
Graphs points in the coordinate plane <ul style="list-style-type: none"> 1- Identifies coordinates and quadrant of a given point
Graphs a linear function in the coordinate plane using: <ul style="list-style-type: none"> 1- table of values 2- slope and y-intercept
Calculates slope of a line given <ul style="list-style-type: none"> 1- a graph: rise over run 2- two points: $\frac{y_2 - y_1}{x_2 - x_1}$ 3- an equation
Recognizes the slope of a horizontal line is 0 and a vertical line has no slope
Recognizes parallel lines have the same slope and different y-intercepts
Recognizes perpendicular lines have slopes whose product is -1
Writes an equation of a line given ... in slope-intercept and standard forms <ul style="list-style-type: none"> 1- a graph 2- slope and one point 3- two points
Represents a quadratic function as $f(x) = ax^2 + bx + c$
Graphs a quadratic function in the coordinate plane using: <ul style="list-style-type: none"> 1- vertex and a table of values
Identifies the ... of a parabola <ul style="list-style-type: none"> 1- maximum/minimum point 2- greatest/least value 3- axis of symmetry 4- vertex
Systems of Linear Equations and Inequalities
Solves systems of linear equations by

<ol style="list-style-type: none"> 1- graphing 2- substitution 3- elimination: addition/subtraction and multiplication w/ addition/subtraction
<p>Solves word problems using a system of linear equations</p> <ol style="list-style-type: none"> 1- Wind and water current problems 2- Puzzle problems (e.g. digit, age, fraction problems)
<p>Solves a system of linear inequalities by graphing</p> <ol style="list-style-type: none"> 1- Solution is the area of overlap
<p>Working with Radicals</p>
<p>Simplifies radicals</p>
<p>Recognizes an expression having a square root radical is in simplest form when</p> <ol style="list-style-type: none"> 1- no integral radicand has a perfect square factor other than 1 2- no fractions are under a radical sign 3- no radicals are in a denominator (e.g. rationalizing the denominator)
<p>Performs operations with radicals</p> <ol style="list-style-type: none"> 1- add 2- subtract 3- multiply 4- divide
<p>Applies the Pythagorean theorem and its converse to solve geometric problems</p>
<p>Multiplies binomials containing square root radicals and rationalizes binomial denominators that contain square root radicals</p>
<p>Solves radical equations</p>
<p>Solves quadratic equations by the quadratic formula</p>
<p>Mathematics Process:</p>
<p>Learns algebra through</p> <ol style="list-style-type: none"> 1- problem solving 2- inquiry 3- discovery
<p>Solves problems of various types and difficulty level</p> <ol style="list-style-type: none"> 1- open-ended 2- non-routine 3- multiple solutions 4- multiple problem solving strategies
<p>Selects and applies a variety of problem-solving strategies:</p> <ol style="list-style-type: none"> 1- try a simpler problem 2- make a diagram 3- work backwards 4- use a chart 5- write an equation
<p>Reflects on their problem solving process</p>
<p>Organizes, clarifies and clearly communicates mathematical thinking through</p> <ol style="list-style-type: none"> 1- reading and writing 2- discussion 3- listening

4- questioning
Analyzes and evaluates the mathematical thinking and strategies of others
Uses the language of mathematics to express mathematical ideas
Recognizes recurring themes across mathematical domains (e.g. patterns in number, algebra and geometry)
Uses connections among mathematical ideas to explain concepts (e.g. 2 linear equations have a unique solution because the lines they represent intersect at a single point)
Recognizes the larger context of mathematics and applies mathematics accordingly
Makes connections between mathematical ideas and builds on one another
Traces the development of mathematical concepts over time and across cultures (world languages and social studies standards)
Recognizes that mathematical facts, procedures and claims must be justified
Uses various types of reasoning and methods of proof to support their mathematical conclusions and problem solutions
Uses reasoning, rather than answer keys, teachers or peers, to check the correctness of their solutions
Evaluates mathematical reasoning and determines validity
Makes and investigates mathematical conjectures
<ul style="list-style-type: none"> 1- Counterexamples as a means of disproving conjectures 2- Verifying conjectures using informal reasoning or proofs
Uses representations to organize, record and communicate mathematical ideas
<ul style="list-style-type: none"> 1- Concrete representations (e.g. base-ten blocks or algebra tiles) 2- Pictorial representations (e.g. diagrams, charts or tables) 3- Symbolic representations (e.g. a formula) 4- Graphical representations (e.g. a line graph)
Selects, applies and translates among mathematical representations to solve problems and to model and interpret physical, social and mathematical phenomena
Uses technology to gather, analyze and communicate mathematical information
Uses computer spreadsheets, software and graphing utilities to organize and display quantitative information
Uses graphing calculators and computer software to investigate properties of functions and their graphs
Uses calculators as problem-solving tools (e.g. to explore patterns, to validate solutions)
Uses computer software to make and verify conjectures about geometric objects
Uses computer-based laboratory technology for mathematical applications in the sciences