Course/Grade Level: Algebra I Curriculum (one year or two years)

Focus: Students will demonstrate algebraic skills evaluating, solving, and graphing algebraic expressions, equations, and inequalities as well as applying algebraic concepts to solve real-world problems. This can be accomplished in a one-year time frame or over two years in Algebra 1A and Algebra 1B.

M.A1.1 Students will demonstrate number sense for real numbers and algebraic expressions in a variety of situations. Students will...

M.A1.1.1 ▲ name, use and describe these properties with the real number system and demonstrate their meaning including the use of concrete objects:

a. commutative (a+ b = b + a and ab = ba), associative [a + (b + c) = (a + b) + c and a(bc) = (ab)c], distributive [a(b + c) = ab + ac], and substitution properties (if a =2, then 3a = 3 x 2 = 6)
b. identity properties for addition and multiplication and inverse properties of addition and multiplication (additive identity: a + 0 = a, multiplicative identity: a • 1 = a, additive inverse: +5 + -5 = 0, multiplicative inverse: 8 x 1/8 = 1)
c. symmetric property of equality (if a = b, then b = a)
d. addition and multiplication properties of equality (if a = b, then a + c = b + c and if a = b, then ac = bc) and inequalities (if a > b, then a + c > b + c and if a > b, and c > 0 then ac > bc)
e. zero product property (if ab = 0, then a = 0 and/or b = 0)

(HS 1.2.K3 a-e)

M.A1.1.2 ▲ adjust original rational number estimate of a real-world problem based on additional information (a frame of reference). e.g., Estimate how long it takes to walk from here to there; time how long it takes to take five steps and adjust your estimate. **(HS.1.3.A1)**

(continued…)

M.A1.1.3 ▲ generate and/or solve multi-step real-world problems with real numbers and algebraic expressions using computational procedures (addition, subtraction, multiplication, division, roots, and powers excluding logarithms), and mathematical concepts with:

a. applications from business, chemistry, and physics that involve addition, subtraction, multiplication, division, squares, and square roots when the formulae are given as part of the problem and variables are defined; e.g., Given F = ma, where F = force in newtons, m = mass in kilograms, a = acceleration in meters per second squared. Find the acceleration if a force of 20 newtons is applied to a mass of 3 kilograms.

b. volume and surface area give the measurement formulas of rectangular solids and cylinders. e.g., A silo has a diameter of 8 feet and a height of 20 feet. How many cubic feed of grain can it store?

d. application of percents. e.g., Given the formula $A = P(1 + \quad)^{nt}$, A = amount, P = principal, r = annual interest, n = number of compounding periods per year, t = number of years. If $1, 000 is placed in a savings account with a 6% annual interest rate and is compounded semiannually, how much money will be in the account at the end of 2 years?

(HS 1.4.A1a,b,d)

M.A1.2 Students will recognize, describe, extend, develop, and explain the general rule of a pattern in a variety of situations. Students will…

M.A1.2.1 solve arithmetic and geometric sequences using real numbers and/or exponents, patterns using algebraic patterns including consecutive number patterns or equations of functions, and special patterns. e.g., Radioactive half-lives; e.g., n, n + 1, n + 2, ... or f(n) = 2n - 1. (HS 2.1. A1a, c)

M.A1.2.2 solve real-world problems with arithmetic or geometric sequences by using the explicit equation of the sequence. e.g., An arithmetic sequence: a brick wall is three feet high and the owners want to build it higher. If the builders can lay two feet every hour, how long will it take to raise it to a height of 20 feet? Or a geometric sequence: A savings program can double your money every 12 years. If you place $100 in the program, how many years will it take to have over $1,000? (HS 2.1.A2)

M.A1.2.3 ▲ identify the slope and y-intercept in the equation and use this information to graph the line. e.g., If y = 4x - 3, the y-intercept would be -3 and the slope would be 4. **(HS 3.4.K6)**

M.A1.2.4 ▲ use and describe the multiplication property of equations and inequalities. **(HS 1.2.K3d)**

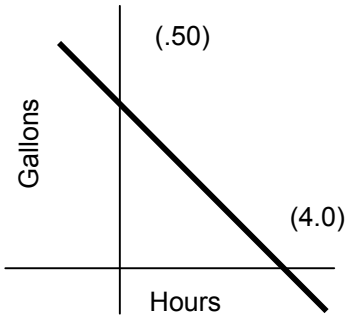
M.A1.3 **Students will use variables, symbols, real numbers, algebraic expressions, and graphs to solve equations and inequalities in a variety of situations.** Students will…

M.A1.3.1 ▲**N** represent and or/solve real-world problems with linear equations and inequalities both analytically and graphically. e.g., Tickets for a school play are $5 for adults and $3 for students. You need to sell at least $65 in tickets. Give an inequality and a graph that represents this situation and three possible solutions. **(HS 2.2.A2a)**

M.A1.3.2 ▲ recognize how changes in the constant and/or slope within a linear function changes the appearance of a graph. **(HS 2.3.K6)**

M.A1.3.3 ▲**N** solve systems of linear equations with two unknowns using integer coefficients and constants. **(HS 2.2.K3c)**

M.A1.3.4 ▲ interpret the meaning of the x- and y-intercepts, slope, and/or points on and off the line on a graph in the context of a real-world situation. e.g., The graph below represents a tank full of water being emptied. What does the y-intercept represent? What does the x-intercept represent? What is the rate at which it is emptying? What does the point (2, 25) represent in this situation? What does the point (2, 30) represent in this situation? **(HS 2.3.A2)**



M.A1.3.5 know and explain the use of variables as parameters for a specific variable situation. e.g., The m and b in y = mx + b. (HS 2.2.K1)

M.A1.3.6 manipulate variable quantities within an equation or inequality. e.g., 5x - 3y = 20 could be written as 5x - 20 = 3y or 5x(2x + 3) = 8 could be written as 8/(5x) = 2x + 3. (HS 2.2.K2)

M.A1.3.7 determine x- and y-intercepts and maximum and minimum values of the portion of the graph that is shown on a coordinate plane. (HS 2.2.K4)

M.A1.4 Students will use geometric concepts and procedures in a variety of situations. Students will...

M.A1.4.1 ▲ find and explain the relationship between the slopes of parallel and perpendicular lines. e.g., The equation of a line 2x + 3y = 12. The slope of this line is -2/3. What is the slope of a line perpendicular to this line? Write an equation for a line perpendicular to 2x + 3y = 12. **(HS 3.4.K4)**

M.A1.4.2 ▲ recognize the equation of a line and transform the equation into slope-intercept form in order to identify the slope and y-intercept and use this information to graph the line. e.g., 3x + 2y = 6 is transformed into y = -(3/2)x + 3, with the y-intercept being 3 and the slope being -(3/2). **(HS 3.4.K6)**

M.A1.4.3 ▲ solve real-world problems by applying the Pythagorean Theorem. e.g., When checking for square corners on concrete forms for a foundation, determine if a right angle is formed by using the Pythagorean Theorem. **(HS 3.1.A1b)**

M.A1.4.4 ▲ analyze the impact of transformations on the perimeter and area of circles, rectangles and triangles and volume of rectangular prisms and cylinders. e.g., Reducing by a factor of 1/2 multiples an area by a factor of 1/4 and multiplies the volume by a factor of 1/8, where as, rotating a geometric figures does not change perimeter or area. **(HS 3.3.A1)**

M.A1.5 Students will use concepts and procedures of data analysis in a variety of situations. Students will …

M.A1.5.1 ▲ explain the relationship between probability and odds and compute one given the other. e.g., The **odds** that an event will occur are 8:3. The **probability** that the same event will occur in 8:11. **(HS 4.1.K3)**

M.A1.5.2 ▲ explain the effects of outlies on the measures of central tendency (mean, median, mode) and range and interquartile range of a real number data set. e.g., Have the students figure a mean, median, mode, and range on a set of data for the price of used cars that cost $6,000, $7,500, $6,250, $8,000, $7,700, $6,500 and $7,500. Then have the students recompute them when a used car costing $800 is added. Have them explain how this car affected the mean, media, mode, and range; which were affected; and which were not? **(HS 4.2.K4)**

M.A1.5.3 ▲ approximate a line of best fit given a scatter plot and make predictions using the equation of that line. e.g., Have students compare electricity costs for several months by using kilowatt hours used and price of electric bill as the coordinates. For example, in one month, 1,100 kilowatt hours were used and the electric bill was $105, in another month 1,500 kilowatt hours were used and the bill was $143, and in another month 800 kilowatt hours were used and the bill was $76. Have students plot the points and make predictions about how much the electric bill would cost if 2,200 kilowatt were used. **(HS 4.2.K5)**

M.A1.5.4 ▲ use data analysis (mean, median, mode, range, quartile, interquartile range) in real-world problems with rational number data sets to compare and contrast two sets of data, to make accurate inferences and predictions, to analyze decisions, and to develop convincing arguments from these data

a. frequency tables and line plots
b. bar, line, and circle graphs
c. Venn diagrams or other pictorial displays
d. charts and tables
e. stem-and-leaf plots (single and double)
f. scatter plots
g. box-and-whiskers plots
h. histograms

(HS 4.2.A1 a-h)