

Course/Grade Level: Algebra II Curriculum (year course)

Focus: Students will solve equations and inequalities including linear and quadratic functions with real numbers. They will analyze slope, transformations, minimums, maximums, intersections, and zeros of these equations.

M.A2.1 Students will demonstrate an understanding of data and linear representations. Students will...

M.A2.1.1 show domain and range of linear and constant functions given the graph or table.

M.A2.1.2 analyze:

- the effects of parameter changes (scale changes or restricted domains) on the appearance of a function's graph
- ▲ how changes in the constant and/or slope within a linear function affect the appearance of a graph **(HS 2.2.K6)**
- how changes in the constants and/or coefficients within a linear function in the form of $y = mx + b$ affect the appearance of a graph

M.A2.1.3 ▲ solve for, 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 $2x + 3y + 12$; or for multiple choice: which is an equation perpendicular to $2x + 3y = 12$? **(HS 3.4.K4)**

M.A2.1.4 translate between the written, numeric, algebraic, and geometric representations of a real-world problem. e.g., given a situation, write a function rule, make a T-table of the algebraic relationship, and graph the ordered pairs.

M.A2.2 Students will solve systems of equations with two variables. Students will...

M.A2.2.1 ▲ **N** solve systems of linear equations with two unknowns using integer coefficient and constants. **(HS 2.2.K3c)**

M.A2.2.2 represent and/or solve real-world problems with systems of linear equations with two unknowns.

M.A2.2.3 explain the relationship between the solution(s) to the system of equations and systems of inequalities in two unknowns and their corresponding graphs. e.g., for equations, the lines intersect in either one point, no points, or infinite points; and for inequalities, all points in double shaded areas are solutions for both inequalities.

M.A2.3 Students will solve quadratic functions by various methods. Students will...

- M.A2.3.1 solve quadratic equations with integer solutions (may be solved by trial and error, graphing, quadratic formula, or factoring).
- M.A2.3.2 represent and/or solve real-world problems with quadratic equations with integer solutions (may be solved by trial and error, graphing, quadratic formula, or factoring). e.g., a fence is to be built onto an existing fence. The three sides will be built with 2000 meters of fencing. To maximize the rectangular area, what should be the dimensions of the fence?
- M.A2.3.3 recognize the equation $y = ax^2 + bx + c$ as a parabola: represent and identify characteristics of the parabola including opens upward or downward, steepness (wide/narrow), the vertex, maximum and minimum values, and the line of symmetry; and sketches the graph of the parabola.
- M.A2.3.4 analyze how changes in the constants and/or leading coefficients within the equations of a line of parabola affect the appearance of the graph of the equations.

M.A2.4 Students will develop their knowledge of polynomial functions through using various methods of graphing and solving. Students will...

- M.A2.4.1 define what a polynomial is by understanding the criteria for a polynomial.
- M.A2.4.2 describe polynomial functions by their graph, including maximums, minimums, and where it is increasing or decreasing.
- M.A2.4.3 identify and perform various methods (sum or difference of cubes, synthetic division, and substitution) to factor polynomials.
- M.A2.4.4 solve for the zeros of polynomials by using factoring techniques or graphing.

M.A2.5 Students will demonstrate their knowledge of rational and radical functions through techniques for simplifying and solving functions. Students will ...

- M.A2.5.1 perform and explain these computational procedures:
 - a. simplification of radical expressions
 - b. simplification or evaluation of real numbers and algebraic monomial expressions raised to a whole number or rational power and algebraic binomial expressions squared or cubed
 - c. simplification of products and quotients of real number and algebraic monomial expressions using the properties of exponents.
- M.A2.5.2 solve radical and rational equations.
- M.A2.5.3 represent and/or solve real-world problems with rational and radical equations.

M.A2.6 Students will evaluate many different types of distributions and ideas for interpreting data through statistics. Students will ...

M.A2.6.1 ▲ explain the effects of outliers on the measure of central tendency (mean, median, mode), range, and interquartile range of a real number data set.
(HS 4.2.K4)

M.A2.6.2 illustrate different types of visual representation of data:

- a. stem and leaf plots
- b. histograms
- c. circle graphs
- d. box-and-whisker plot

M.A2.7 Students will demonstrate an understanding of exponential and log functions by implementing the rules of the functions. Students will ...

M.A2.7.1 solve exponent equations with the same base without the aid of a calculator.

M.A2.7.2 implement the properties of logs and exponential functions of any base.

M.A2.7.3 solve real-world problems by applying the properties of logs.