

**Focus Statement:** Students will solve multi-step linear equations and inequalities using the algebraic properties of the real number system. They will also graph linear equations using slope and intercept on the coordinate plane.

**M.8.1 Students will create a diagram of the real number system and apply the basic properties of the real number system to simplify algebraic expressions.**

M.8.1.1 Define the real numbers which include the counting numbers, whole numbers, integers, rational numbers and irrational numbers.

M.8.1.2 Organize and create a model of the hierarchy of the real number system.

M.8.1.3 Apply the Opposite of Opposites property to simplify algebraic expressions

M.8.1.4 Apply the Opposite of a Sum and a Difference property to simplify algebraic expressions.

M.8.1.5 Apply the Additive Identity and Additive Inverse Properties to simplify algebraic expressions.

M.8.1.6 Apply the Multiplicative Identity and Multiplicative Inverse Properties to simplify algebraic expressions.

M.8.1.7 Apply the Add-Opp Property to simplify algebraic expressions.

**M.8.2 Students will solve multi-step linear equations and linear inequalities with the variable on one side of the equation only.**

M.8.2.1 Solve a linear equation of the form  $x + a = b$ ;  $x - a = b$ ;  $a - x = b$

M.8.2.2 Solve a linear equation of the form  $ax + b = c$ ;  $c$  negative or positive

M.8.2.3 Solve a linear equation of the form  $d(x + b) = c$

M.8.2.4 Solve inequalities of the above formats.

M.8.2.5 Graph on a real number line the solutions to the inequalities.

**M.8.3 Students will solve multi-step linear equations and inequalities with the variable on both sides of the equation.**

M.8.3.1 Solve a linear equation of the form  $ax + b = cx + d$

M.8.3.2 Solve a linear equation of the form  $a(x + b) = c(x + d)$

M.8.3.3 Solve linear inequalities of the above formats.

M.8.3.4 Solve literal equations and inequalities.

M.8.3.5 Interpret a percent problem-solving situation and write and solve an appropriate equation or inequality.

M.8.3.6 Interpret a geometric problem-solving situation and write and solve an appropriate equation or inequality.

**M.8.4 Students will solve proportions generated by various problem solving situations.**

M.8.4.1 Identify and simplify complex algebraic fractions

M.8.4.2 Define rate, ratio and proportions and compare and contrast the similarities and differences of each.

M.8.4.3 Apply the Means-Extremes Property to solve a given proportion.

M.8.4.4 Interpret a percent problem-solving situation and write and solve an appropriate proportion.

**M.8.5 Students will graph a linear equation of the form  $y = mx + b$  using the slope and y-intercept.**

M.8.5.1 Define the slope of a line as the rate in change of the dependent variable to the independent variable.

M.8.5.2 Calculate the slope of a line from a given graph of the line using the definition of slope.

M.8.5.3 Define the y-intercept of a line and identify the y-intercepts of the graphs of given lines.

M.8.5.4 Predict the effect that changing the value of slope in a given equation will have on the graph of the line.

M.8.5.5 Graph a linear function of the form  $y = mx + b$  by using the slope and y-intercept of the line without a graphing calculator.

M.8.5.6 Graph a linear function of the form  $y = mx + b$  using a graphing calculator.

**M.8.6 Students will graph a linear equation of the form  $y = c$  and  $x = c$ .**

M.8.6.1 Apply the definition of a “Well-defined operation” to explain why division by zero is undefined.

M.8.6.2 Compute the slope of a line of the form  $y = c$  and  $x = c$ .

M.8.6.3 Graph a line of the form  $y = c$  and  $x = c$ .

M.8.6.4 Graph a line which does not have a y-intercept through a given point and write the equation of the line.

**M.8.7 Students will identify and graph an exponential equation of the form  $y = x^2$**

M.8.7.1 Calculate  $x$  to a given power with and without a calculator.

M.8.7.2 Identify an exponential equation.

M.8.7.3 Identify the exponential growth and exponential decay curve.

M.8.7.4 Sketch an appropriate exponential growth or exponential decay curve from a problem solving situation.

M.8.7.5 Graph an exponential equation of the form  $y = x^2$  without and with a graphing calculator.

**M.8.8 Students will apply the power properties to simplify algebraic expressions.**

M.8.8.1 Apply the Product of Powers Property to simplify an algebraic expression with positive exponents

M.8.8.2 Apply the Power of Powers Property to simplify an algebraic expression with positive exponents.

M.8.8.3 Apply the Quotient of Powers Property to simplify an algebraic expression with positive exponents.

M.8.8.4 Apply the power properties to simplify an algebraic expression with negative exponents.

M.8.8.5 Add, subtract, multiply and divide algebraic fractions

**M.8.9 Students will apply the properties of radicals to simplify algebraic expressions.**

M.8.9.1 Calculate square roots and cubic roots of positive rational numbers with a calculator.

M.8.9.2 Apply the Pythagorean Theorem to find the leg of a right triangle and the diagonal of a rectangle.

M.8.9.3 Apply the rules of standard radical form to simplify an algebraic radical expression.

M.8.9.4 Apply the Properties of Radicals to add, subtract, multiply and divide radical expressions without a calculator.

**M.8.10 Students will graph and solve quadratic equations.**

M.8.10.1 Identify the characteristics of vertex, maximum or minimum, and axis of symmetry of a parabolic shaped graph.

M.8.10.2 Graph a quadratic equation of the form  $y = ax^2$  without a calculator.

M.8.10.3 Graph a quadratic equation of the form  $y = ax^2 + bx + c$  with a graphing calculator.

M.8.10.4 Apply the Quadratic Formula to solve a quadratic equation.

**M.8.11 Students will solve a system of linear equations.**

M.8.11.1 Apply the Graphing Method with/without a graphing calculator to solve a system of linear equations.

M.8.11.2 Apply the Substitution Method without a calculator to solve a system of linear equations.

M.8.11.3 Identify consistent independent, consistent dependent and inconsistent linear systems.

**M.8.12 Students will classify and perform operations on polynomials.**

M.8.12.1 Define a polynomial in standard form.

M.8.12.2 Classify polynomials by number of terms and degree of terms.

M.8.12.3 Add and subtract polynomials.

M.8.12.4 Multiply a polynomial by a monomial using the Distributive Property.

M.8.12.5 Multiply a binomial by a binomial using FOIL.

M.8.12.6 Factor polynomials with a greatest common monomial factor only.

M.8.12.7 Factor trinomials using reverse FOIL.

