

**ALGEBRA I**

Make note of added standards and inclusion of technology

Prior to entering Algebra I as an eighth grader, the student will have mastered all Diocesan Mathematics Curriculum for students in grades kindergarten through pre-algebra.

Use of a graphing calculator is not part of the Algebra I Diocesan Mathematics Curriculum; however, T-180 calculator or Desmos may be used when noted, after all curriculum has been mastered.

- The student will perform all computational skills with and without a calculator (noted in the curriculum when to use technology).

ALGEBRA I CORE

- ____ A.I.C.1 The student will evaluate algebraic expressions, including numeric expressions, and those with absolute values and exponents by replacing variables with numbers including rational numbers and integers.
- ____ A.I.C.2 The student will understand and correctly apply the distributive property.
- ____ A.I.C.3 The student will derive and apply the laws of exponents.
- The student will define base and exponent.
 - The student will derive the laws of exponents through explorations of patterns, to include products, quotients, powers of bases, and the zero power rule.
 - The student will simplify multivariable expressions and ratios of monomial expressions in which the exponents are integers, using the laws of exponents.
- ____ A.I.C.4 The student will understand, correctly interpret and apply scientific notation.
- ____ A.I.C.5 The student will solve all types of one variable equations and problems, including those with the variable on both sides and absolute value equations.
- The student will determine if a linear equation in one variable has one solution, no solution, or an infinite number of solutions.
- ____ A.I.C.6 The student will solve literal equations for any variable.
- ____ A.I.C.7 The student will solve application problems.
- Translate verbal statement into equations
 - Consecutive integer problems
 - Age problems
 - Coin problems
- ____ A.I.C.8 The student will define and use vocabulary:
- Monomial, binomial, trinomial, polynomial
 - Constant, coefficient, similar or like terms
 - Degree of a monomial
 - Degree of a polynomial.
- ____ A.I.C.9 The student will perform operations with polynomials.
- Add and subtract polynomials.
 - Multiply polynomials by monomials and polynomials.
 - Find powers of monomials using rule of exponents for a power of a power and rule of exponents for power of a product.
 - Divide polynomials by monomials and divide polynomials by polynomials using long division (Remainder Theorem).



- ____ A.I.C.10 The student will solve application problems involving polynomials:
- Rate-time-distance problems
 - Area problems.
- ____ A.I.C.11 The student will find quotients and factors, as follows:
- Simplify quotients of monomials and find the greatest common factor of several monomials.
 - Find monomial factors of polynomials.
- ____ A.I.C.12 The student will find products and factor as follows:
- Find products of two binomials mentally (using FOIL or similar method).
 - Simplify products of the form $(a+b)(a-b)$ and factor difference of two squares.
 - Find the squares of binomials and factor perfect square trinomials.
- ____ A.I.C.13 The student will apply basic factoring techniques to second and simple third degree polynomials. These techniques include finding a common factor for all terms in a polynomial, recognizing the difference of two squares, recognizing perfect square trinomials, factoring general trinomials and factoring by grouping.
- ____ A.I.C.14 The student will solve polynomial equations by factoring and using the zero (0) product property.
- ____ A.I.C.15 The student will simplify rational expressions.
- ____ A.I.C.16 The student will multiply and divide rational expressions.
- ____ A.I.C.17 The student will add and subtract rational expressions with like and unlike denominators.
- ____ A.I.C.18 The student will solve problems involving ratios and proportions.
- ____ A.I.C.19 The student will solve equations with rational expressions and corresponding application problems.
- Mixture
 - Work
 - Percent
 - Change in percent
 - Finding original or new amount
 - Investment problems
- ____ A.I.C.20 The student will graph ordered pairs and linear equations in two variables:
- Identify coordinate axes, origin, and quadrants.
- ____ A.I.C.21 The student will find the slope of a line as a rate of change and as rise over run.
- ____ A.I.C.22 The student will use the slope-intercept form of a linear equation and standard form to find the x and y intercepts.
- ____ A.I.C.23 The student will find an equation of a line given the slope and one point on the line, or given two points on the line using point-slope form.
- ____ A.I.C.24 The student will find equations of lines through a given point with a zero or undefined slope.
- ____ A.I.C.25 The student will find an equation of a line that is parallel or perpendicular to a given line through a given point.
- ____ A.I.C.26 The student will solve linear equations by graphing.



- _____ A.I.C.27 R The student will understand what a function is and define a function by using tables, graphs, mapping and ordered pairs.
- _____ A.I.C.28 The student will define a function using functional notation and identifying domain and range of the function.
- _____ A.I.C.29 The student will graph linear and quadratic functions.
- a. The student will investigate and explain how transformations to the parent function $y = x$ affects the rate of change (slope) and the y-intercept of a linear function.
 - b. The student will write equivalent algebraic forms of linear functions, including slope-intercept form, standard form, and point-slope form and analyze and interpret the information revealed by each form.
 - b. Graph a linear function in two variables, with and without the use of technology, including those that can represent contextual situations.
 - E d. The student will, given an equation or graph, determine key characteristics of a quadratic function including x-intercepts (zeros), y-intercept, vertex (maximum or minimum), and domain and range (including when restricted by context); interpret key characteristics as related to contextual situations, where applicable.
 - E e. The student will graph a quadratic function, $f(x)$, in two variables using a variety of strategies, including transformations $f(x) + k$ and $kf(x)$, where k is limited to rational values.
 - E f. The student will make connections between the algebraic (standard, factored and vertex forms) and graphical representation of a quadratic function.
- _____ A.I.C.30 The student will solve systems of linear equations in two variables by:
- a. Graphing
 - b. Substitution
 - c. Addition-or-subtraction method with and without multiplication.
- _____ A.I.C.31 The student will solve application problems using systems of linear equations:
- a. Wind and water current problems
 - b. Age, digit and fraction problems
 - E c. Other types of applicable problems
 - i. Area
 - ii. Perimeter
 - iii. See Examples
 - Len is ten years older than Marie. In six years, their ages total 62. How old is each now?
 - A purse contains 21 coins, consisting of nickels and dimes. How many coins of each kind does it contain if their total value is \$1.65?
 - The difference between two numbers is 16. Five times the smaller is the same as 8 less than twice the larger. Find the numbers.
- _____ A.I.C.32 R The student will express the square roots and cube roots of whole numbers.
- _____ A.I.C.33 R The student will find the square roots of variable expressions and use them to solve equations and application problems.
- _____ A.I.C.34 The student will simplify and determine equivalent radical expressions involving square roots of whole numbers and (E) cube roots of integers.



- _____ A.I.C.35 The student will work with square-root radical expressions:
- Simplify products and quotients of radicals
 - Simplify sums and differences of radicals
 - Multiply binomials containing square-root radicals and rationalize binomial denominators that contain square-root radicals
 - Rationalize the denominator of expressions with a radical in the denominator
- E
- Generate equivalent numerical expressions and justify their equivalency for radicals using rational exponents, limited to rational exponents of $\frac{1}{2}$ and $\frac{1}{3}$ (e.g., $\sqrt{5} = 5^{\frac{1}{2}}$; $\sqrt[3]{8} = 8^{\frac{1}{3}} = (2^3)^{\frac{1}{3}} = 2$).
- _____ A.I.C.36 The student will solve simple square-root radical equations and corresponding application problems.
- _____ A.I.C.37 R The student will solve application problems that involve inequalities.
- The student will solve all types of one variable inequalities, including those with parenthesis and the variable on both sides.
 - The student will identify the inequality given a graph.
 - The student will verify possible solutions to multistep linear inequalities in one variable algebraically, graphically, and with technology, if necessary, to justify the reasonableness of the answer.
 - The student will solve application problems that involve inequalities.
- _____ A.I.C.38 The student will combine open sentences:
- Find union and intersection of sets, using set notation.
 - Find solution sets of combined inequalities and graph them on a number line.
 - Solve equations and inequalities involving absolute value and graph the solution on a number line.
- _____ A.I.C.39 The student will solve and graph linear inequalities in two variables on a coordinate plane.
- The student will identify the inequality given a graph.
 - The student will verify possible solutions algebraically, graphically, and with technology to justify the reasonableness of the answer.
- _____ A.I.C.40 The student will graph the solution set of a system of two linear inequalities in two variables on a coordinate plane.
- The student will identify the inequality given a graph.
 - The student will verify possible solutions algebraically, graphically, and with technology to justify the reasonableness of the answer.
- _____ A.I.C.41 The student will solve quadratic equations involving perfect squares.
- _____ A.I.C.42 The student will solve quadratic equations by completing the square.
- _____ A.I.C.43 The student will learn the quadratic formula and use it to solve quadratic equations such as motion of an object under the force of gravity.
- Verify possible solution(s) to a quadratic equation with technology to justify the reasonableness of the answer(s).
- _____ A.I.C.44 The student, given a situation in a real-world context, will analyze a relation to determine whether a direct or inverse variation exists, and represent a direct variation algebraically and graphically and an inverse variation algebraically.



**Please note skills below do not need to be mastered (not on the exemption exam). Exposure is to help students succeed in high school mathematics. Graphing calculators can be used here.*

- _____ A.I.C.45 The student will explain the importance of random sampling and be familiar with stratified sampling, cluster sampling, systematic sampling, multistage sampling and convenience sampling.
- _____ A.I.C.46 The student will be able to take a univariable set of data (ages, heights, incomes, etc) and use a calculator to find the mean, median, and standard deviation. The student need not construct but will be able to interpret the same data as presented in a frequency table, bar graph, pie chart, stem-and-leaf display and box and whisker plot.
- _____ A.I.C.47 The student will be able to take a univariable set of data (e.g. soup temperatures) and explain the importance of a smaller versus larger standard deviation as it pertains to the data (e.g. customer's experience). The student will not need to calculate the z-score but be able to interpret a z-score given a standard deviation and particular application.
- _____ A.I.C.48 The student will be able to find the overall average using a frequency table and using weighted averages. Specifically, the student will be able to calculate a final grade given weighted test grades.
- _____ A.I.C.49 Using a calculator, the student will be able to display bivariate data as a scatter plot and:
- Find and graph the equation for the line of best fit, calculate an r and r^2 -value for the line of best fit and describe the quality of fit and the type of relationship between the variables: direct or inverse.
 - Interpret the slope of the line of best fit as it relates to the variables.
 - Use the line of best fit to predict another data point.
 - Calculate a best fit quadratic and use it to predict another data point.