

Gr. 9 Algebra I Curriculum

Curriculum Standards	Student Learning Goals	Skills from FHS Rubric (Problem Solver)	Suggested Instructional Strategies	Suggested Assessment Techniques
<p>LS AI.N1 Identify and use the properties of operations on real numbers, including the associative, commutative, and distributive properties; the existence of the identity and inverse elements for addition and multiplication; the existence of n^{th} roots of positive real numbers for any positive integer n; the inverse relationship between taking the n^{th} root of and the n^{th} power of a positive real number; and the density of the set of rational numbers in the set of real numbers. (10.N.1)</p>	Identify and use real number properties	<p>Skill 5 Recognizes and analyzes unlikely or subtle similarities and differences.</p>	<ul style="list-style-type: none"> Extremely visual, relate to real life problems such as money, temperature, etc. Compare numerical sentences to algebraic sentences 	<ul style="list-style-type: none"> Test Quizzes Warm-Ups Jeopardy Check for understanding by random teacher-student questioning
<p>LS AI.N2 Simplify numerical expressions, including those involving positive integer exponents or the absolute value, e.g., $3(2^4 - 1) = 45$, $4 3 - 5 + 6 = 14$; apply such simplifications in the solution of problems. (10.N.2)</p>	Order of Operations and Absolute Value	<p>Skill 3 Independently creates and carries out to completion a complex multi-step task</p>	<ul style="list-style-type: none"> PEMDAS/PEDMSA “Please Excuse My Dear Aunt Sally” P-parenthesis, grouping symbols; E-exponents, M-multiply, D-divide, A-add, S-subtract *note: multiply or divide whichever comes first from left to right and add or subtract whichever comes first from left to right 	<ul style="list-style-type: none"> Warm-Ups Homework check Tests Quizzes MCAS questions Check for understanding by random teacher-student questioning
<p>AI.N3 Find the approximate value for solutions to</p>	Approximating square roots	<p>Skill 8 Test, analyzes, and adapts solutions</p>	<ul style="list-style-type: none"> Using the number line and perfect squares to 	<ul style="list-style-type: none"> Tests Quizzes

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problems involving square roots and cube roots without the use of a calculator, e.g., $\sqrt{3^2 - 1} \approx 2.8$. (10.N.3)			approximate roots without a calculator	<ul style="list-style-type: none"> • Warm-Ups • Check for understanding by random teacher-student questioning • MCAS questions
LS AI.N4 Use estimation to judge the reasonableness of results of computations and of solutions to problems involving real numbers. (10.N.4)	Estimations of computations	Skill 7 Selects, justifies, and evaluates a sophisticated solution Skill 8 Tests, analyzes, and adapts solutions	<ul style="list-style-type: none"> • Plugging answers back into the original equation to test validity 	<ul style="list-style-type: none"> • Students can self assess • MCAS questions
LS AI.P1 Describe, complete, extend, analyze, generalize, and create a wide variety of patterns, including iterative, recursive (e.g., Fibonacci Numbers), linear, quadratic, and exponential functional relationships. (10.P.1)	Identifying patterns	Skill 5 Recognizes and analyzes unlikely or subtle similarities and differences	<ul style="list-style-type: none"> • Show visual as well as numerical patterns 	<ul style="list-style-type: none"> • Tests • Quizzes • Warm-ups • Check for understanding by random teacher-student questioning • MCAS questions
LS AI.P2 Use properties of the real number system to judge the validity of equations and inequalities, to prove or disprove statements, and to justify every step in a sequential argument.	Use of properties of the real number system		<ul style="list-style-type: none"> • Real life examples • Site properties as you use it. • Use number sentences to demonstrate and validate the properties 	<ul style="list-style-type: none"> • Quizzes • Warm-Ups • Check for understanding by random teacher-student questioning • MCAS questions
LS AI.P3 Demonstrate an understanding of relations and functions. Identify the domain, range, dependent, and independent variables of	Relations of functions, domain and range,		<ul style="list-style-type: none"> • Pneumonic devices 	

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functions.				
<p>LS AI.P4 Translate between different representations of functions and relations: graphs, equations, point sets, and tabular.</p>	<p>Translate between different representations of functions and relations</p>	<p>Skill 7 Selects, justifies, and evaluates a sophisticated solution</p>	<ul style="list-style-type: none"> • Present material in a variety of ways • Make a table, mapping, graph, etc. of same function • Use the handheld whiteboards for demonstration and practice 	<ul style="list-style-type: none"> • Tests • Quizzes • Warm-Ups • Check for understanding by random teacher-student questioning • MCAS questions • Whiteboards
<p>LS AI.P5 Demonstrate an understanding of the relationship between various representations of a line. Determine a line’s slope and x- and y-intercepts from its graph or from a linear equation that represents the line. Find a linear equation describing a line from a graph or a geometric description of the line, e.g., by using the “point-slope” or “slope y-intercept” formulas. Explain the significance of a positive, negative, zero, or undefined slope. (10.P.2)</p>	<p>Writing and graphing linear equations.</p>	<p>Skill 3 Independently creates and carries out to completion a complex multi-step task</p> <p>Skill 5 Recognizes and analyzes unlikely or subtle similarities and differences</p>	<ul style="list-style-type: none"> • Small white boards for graphing. B=beginning, m=movement • Explain meaning of slope in terms of rise/run. • Relate to real life scenarios • Explain the significance of a positive, negative, zero or undefined slope 	<ul style="list-style-type: none"> • Worksheets • Whiteboards • Quizzes • Tests.
<p>LS AI.P6 Find linear equations that represent lines either perpendicular or parallel to a given line and through a point, e.g., by using the</p>	<p>Explore concepts of parallel and perpendicular lines using point slope formulas and slope intercept formulas</p>	<p>Skill 5 Recognizes and analyzes unlikely or subtle similarities and differences</p>	<ul style="list-style-type: none"> • Introduce the meaning of parallel and perpendicular lines as they relate to slope and y-intercept 	<ul style="list-style-type: none"> • Graphing calculator activities • Whiteboard activities • Write equations that are parallel and perpen-

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<p>“point-slope” form of the equation. (10.G.8)</p>			<ul style="list-style-type: none"> • Show that the product of slopes of perpendicular lines is -1 • Show that parallel lines have equal slopes. • Visually show what parallel lines and perpendicular lines look like 	<p>dicular.</p> <ul style="list-style-type: none"> • Test/Quizzes • ORQ questions
<p>LS A1.P7 Add, subtract, and multiply polynomials. Divide polynomials by monomials. (10.P.3)</p>	<p>Explore and demonstrate understanding through the transformation of polynomials expressions by addition, subtraction, multiplication, and division by monomials</p>	<p>Skill 3 Independently creates and carries out to completion a complex multi-step task</p> <p>Skill 5 Recognizes and analyzes unlikely or subtle similarities and differences</p>	<ul style="list-style-type: none"> • Use algebra tiles to demonstrate meaning of like terms and how to combine • Multiply using variety of method, i.e. foiling, boxing; distribution 	<ul style="list-style-type: none"> • Tests • Quizzes • Warm-Ups • Check for understanding by random teacher-student questioning • MCAS questions
<p>LS A1.P8 Demonstrate facility in symbolic manipulation of polynomial and rational expressions by rearranging and collecting terms, factoring (e.g., $a^2 - b^2 = (a + b)(a - b)$, $x^2 + 10x + 21 = (x + 3)(x + 7)$, $5x^4 + 10x^3 - 5x^2 = 5x^2(x^2 + 2x - 1)$), identifying and canceling common factors in rational expressions, and applying the properties of positive integer exponents. (10.P.4)</p>	<p>Explore and demonstrate understanding through the transformation of polynomial expressions by factoring to solve problems.</p>	<p>Skill 3 Independently creates and carries out to completion a complex multi-step task</p>	<ul style="list-style-type: none"> • Use of factoring checklist • Help them identify the special products such as difference of squares and cubes • Review GCF and prime factorization • Use factor by grouping 	<ul style="list-style-type: none"> • Tests • Quizzes • Warm-Ups • Check for understanding by random teacher-student questioning • MCAS questions

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LS AI.P.9 Find solutions to quadratic equations (with real roots) by factoring, completing the square, or using the quadratic formula. Demonstrate an understanding of the equivalence of the methods. (10.P.5)	Solving quadratic equations using factoring, the quadratic formula and completing the square.	Skill 2 Identifies a variety of possible important information ; gathers sophisticated, apt, or valid information in novel ways Skill 3 Independently creates and carries out to completion a complex multi-step task	<ul style="list-style-type: none"> • Song to remember quadratic formula. • Relate factoring to real life • Plot a quadratic to show it is a formula 	<ul style="list-style-type: none"> • Test • Quizzes • Warm-ups • Max/Min problems
LS AI.P.10 Solve equations and inequalities including those involving absolute value of linear expressions (e.g., $ x - 2 > 5$) and apply to the solution of problems. (10.P.6)	Solving equations with inequalities and absolute values	Skill 3 Independently creates and carries out to completion a complex multi-step task Skill 5 Recognizes and analyzes unlikely or subtle similarities and differences	<ul style="list-style-type: none"> • Treat equation as equal sign until the end • Show visual relation between inequality sign and arrow 	<ul style="list-style-type: none"> • Test • Quizzes • Warm-ups.
LS AI.P.11 Solve everyday problems that can be modeled using linear, reciprocal, quadratic, or exponential functions. Apply appropriate tabular, graphical, or symbolic methods to the solution. Include compound interest, and direct and inverse variation problems. Use technology when appropriate. (10.P.7)	Explore everyday problems using a variety of functions and direct and inverse variations.	Skill 3 Independently creates and carries out to completion a complex multi-step task	<ul style="list-style-type: none"> • Use of I=PRT. • Use of proportions in direct/inverse variations • Use of graphing calculator where appropriate 	<ul style="list-style-type: none"> • Test • Quizzes • Word problems • MCAS questions
LS AI.P.12 Solve everyday problems that can be modeled using systems of linear equations or	Solve everyday problems that can be modeled using systems of linear equations or inequalities.	Skill 3 Independently creates and carries out to completion a complex multi-step task Skill 8 Test, analyzes, and	<ul style="list-style-type: none"> • Teach solving systems by graphing to show visual • Teach substitution before elimination 	<ul style="list-style-type: none"> • Test • Quizzes • Use of whiteboards • Word problems

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inequalities. Apply algebraic and graphical methods to the solution. Use technology when appropriate. Include mixture, rate, and work problems. (10.P.8)		adapts solutions	<ul style="list-style-type: none"> Show how to test solutions Show how companies determine price setting through supply/demand lines i.e. Solving systems. 	<ul style="list-style-type: none"> MCAS ORQ questions.
LS AI.D.1 Select, create, and interpret an appropriate graphical representation (e.g., scatterplot, table, stem-and-leaf plots, circle graph, line graph, and line plot) for a set of data and use appropriate statistics (e.g., mean, median, range, and mode) to communicate information about the data. Use these notions to compare different sets of data. (10.D.1)	Statistics and Data Analysis	<p>Skill 2 Identifies a variety of possible important information ; gathers sophisticated, apt, or valid information in novel ways</p> <p>Skill 5 Recognizes and analyzes unlikely or subtle similarities and differences</p>	Sets of data to arrange and analyze class data (height, hand span). Survey project w/ use of Excel apply data to different graphs. Show how to use data tables and stem and leaf to find mean, median, mode and range.	Test/Quizzes, MCAS ORQ/Short Answer/Multiple Choice questions.
AI.D.2 Approximate a line of best fit (trend line) given a set of data (e.g., scatterplot). Use technology when appropriate. (10.D.2)	Line of best fit and scatter plot.	Skill 3 Independently creates and carries out to completion a complex multi-step task	Relate positive/negative correlation with slope. Apply to real life problems. Best use with word problems. White boards are helpful also. Use of TI calculator.	Test/Quizzes/Warm-ups. MCAS questions
AI.D.3 Describe and explain how the relative sizes of a sample and the population affect the validity of predictions from a set of data. (10.D.3)	Sample and Population affect the validity of predictions from a set of data.	Skill 2 Identifies a variety of possible important information ; gathers sophisticated, apt, or valid information in novel ways	Demonstrate different outcomes by limiting sample size and population size.	Survey project. Break class into groups have each group use same survey question with different population and or number of participants and compare results.