LCPS Algebra 1 Yearly Overview and Scope and Sequence 2021-22

Algebra 1 Yearly Overview

Quarter 1	Solving Algebraic Expressions & Equations Standards of Learning: A.1, A4.ace	Investigating Linear Functions Standards of Learning: A.4de, A.6, A.7
Quarter 2	**Investigating Linear Functions** (*Continued from Quarter 1*)	Investigating Linear Inequalities Standard of Learning: A.5
Quarter 3	Simplifying Expressions with Exponents and Radicals Standards of Learning: A.2a, A.3	Applying Polynomials Operations Standard of Learning: A.2bc
Quarter 4	Investigating Quadratic Functions Standards of Learning: A.4be A.7	Representing and Interpreting Bi-Variate Data Standards of Learning: A.8, A.9

VDOE Process Goals

- To build new mathematical knowledge through problem solving and to develop a repertoire of skills and strategies for solving a variety of problem types **(Problem Solving)**
- To communicate mathematical ideas coherently and clearly and to analyze and evaluate the mathematical thinking of others **(Communication)**
- To use logical reasoning in solving mathematical problems and to explain and justify mathematical ideas **(Reasoning)**
- To understand how mathematical ideas interconnect and build on one another and to use those connections to solve problems **(Connections)**
- To create and use a variety of representations in learning, doing, and communicating mathematics **(Representations)**

Scope and Sequence Documents will be added to this document by July 9, 2021.

Algebra 1 Scope and Sequence

The Loudoun County Public Schools Mathematics Scope and Sequence provides a broad overview of the content units, the quarter in which each unit is taught, and the sequence of the standards within each unit. Resources to support instruction are located in the Mathematics Curriculum Schoology Groups.

Curriculum Framework: The Curriculum Framework contains the 2016 *Mathematics Standards of Learning*, guidance for Understanding the Standard, and Essential Knowledge and Skills for students. Students are expected to continue to connect and apply knowledge and skills from Standards of Learning presented in previous grades as they deepen their mathematical understanding. Assessment items may not and should not be a verbatim reflection of the information presented in the Curriculum Framework.

Prerequisite Knowledge: These standards are the supporting concepts for the grade level concept. The hyperlinks are to the Just In Time Quick Check documentation which includes teacher notes, instructional plans, formative assessments, and activities to support student learning.

Mathematics Vertical Articulation Tool (MVAT): This tool provides support in identifying concepts aligned to the 2016 *Mathematics Standards of Learning* (SOL) that articulate across mathematics grade levels or courses.

Just In Time Quick Checks: Just in Time Mathematics Quick Checks are formative assessments that align to the 2016 Mathematics Standards of Learning (SOL). They are designed to help teachers identify students with unfinished learning and assist in planning instruction to fill potential gaps "just in time." As new content is introduced throughout the school year, teachers can use these Quick Checks to identify and diagnose unfinished learning at grade level and/or to assess understanding of prerequisite knowledge that may be needed to access grade level content. Student gaps in mathematics understanding exist for a variety of reasons and these resources can be used to help get student mathematical learning back on track.

Essential Skills and Knowledge: This section provides a detailed expansion of the mathematics knowledge and skills that each student should know and be able to demonstrate. This is not meant to be an exhaustive list of student expectations.

Quarter 1

Solving Algebraic Expressions & Equations

Curriculum Framework: A.1, A4.ace

Prerequisite Knowledge MVAT	Essential Skills and Knowledge (with links to VDOE Just In Time Quick Checks for details on how to support student understanding for each standard)
7.11, 8.14a, 8.14b	**A.1a Represent verbal quantitative situations algebraically** ● Translate between verbal quantitative situations and algebraic expressions and equations. ● Represent practical situations with algebraic expressions in a variety of representations (e.g., concrete, pictorial, symbolic, verbal).
	A.1b Evaluate algebraic expressions for given replacement values of the variables ● Evaluate algebraic expressions, using the order of operations, which include absolute value, square roots, and cube roots for given replacement values to include rational numbers, without rationalizing the denominator.
7.12, 8.14b, 8.17	**A.4e Solve practical problems involving equations**
	A.4a Solve multistep linear equations in one variable algebraically ● Determine whether a linear equation in one variable has one, an infinite number, or no solutions. ● Apply the properties of real numbers and properties of equality to simplify expressions and solve equations. ● Solve multistep linear equations in one variable algebraically.
	A.4c Solve literal equations for a specified variable ● Solve a literal equation for a specified variable

Investigating Linear Functions

Curriculum Framework: A.4de, A.6, A.7

(*continued in Quarter 2*)

Prerequisite Knowledge MVAT	Essential Skills and Knowledge (with links to VDOE Just In Time Quick Checks for details on how to support student understanding for each standard)
8.15a, 8.15b	**A.7a, A.7b, A.7c, A.7d, A.7e, A.7f Investigate and analyze the linear function family and their characteristics both algebraically and graphically** • Investigate and analyze characteristics and multiple representations of functions with a graphing utility. (a, b, c, d, e, f) • Represent relations and functions using verbal descriptions, tables, equations, and graph. Given one representation, represent the relation in another form. (f) • Determine whether a relation, represented by a set of ordered pairs, a table, a mapping, or a graph is a function. (a) • Identify the domain, range, zeros, and intercepts of a function presented algebraically or graphically. (b, c, d) • For any value, x, in the domain of f, determine f(x). (e)
7.10a, 7.10b, 7.10c, 7.10d, 7.10e, 8.16a, 8.16b, 8.16c, 8.16d, 8.16e	**A.6a Determine the slope of a line when given an equation of the line, the graph of the line, or two points on the line** • Determine the slope of the line, given the equation of a linear function. • Determine the slope of a line, given the coordinates of two points on the line. • Determine the slope of a line, given the graph of a line. • Recognize and describe a line with a slope or rate of change that is positive, negative, zero, or undefined.
	A.6b Write the equation of a line when given the graph of the line, two points on the line, or the slope and a point on the line • Write the equation of a line when given the graph of a line. • Write the equation of a line when given two points on the line whose coordinates are integers. • Write the equation of a line when given the slope and a point on the line whose coordinates are integers. • Write the equation of a vertical line as x = a. • Write the equation of a horizontal line as y = c. • Write the equation of a line parallel or perpendicular to a given line through a given point.
	A.6c Graph linear equations in two variables. • Graph a linear equation in two variables, including those that arise from a variety of practical situations. • Use the parent function y = x and describe transformations defined by changes in the slope or y-intercept.

8.17	**A.4e Solve practical problems involving systems of equations** ● Write a system of two linear equations that models a practical situation. ● Interpret and determine the reasonableness of the algebraic or graphical solution of a system of two linear equations that models a practical situation. ● Solve practical problems involving systems of equations.
	A.4d Solve systems of two linear equations in two variables algebraically and graphically ● Given a system of two linear equations in two variables that has a unique solution, solve the system by substitution or elimination to identify the ordered pair which satisfies both equations. ● Given a system of two linear equations in two variables that has a unique solution, solve the system graphically by identifying the point of intersection. ● Solve and confirm algebraic solutions to a system of two linear equations using a graphing utility. ● Determine whether a system of two linear equations has one, an infinite number, or no solutions.

Quarter 2

Investigating Linear Functions

(*continued from Quarter 1*)

Investigating Linear Inequalities

Curriculum Framework: **A.5**

Prerequisite Knowledge MVAT	Essential Skills and Knowledge (with links to VDOE Just In Time Quick Checks for details on how to support student understanding for each standard)
7.13, 8.18	**A.5c Solve practical problems involving inequalities** ● Determine and verify algebraic solutions using a graphing utility. ● Solve practical problems involving linear inequalities. ● Determine whether a coordinate pair is a solution of a linear inequality or a system of linear inequalities.
	A.5a Solve multistep linear inequalities in one variable algebraically and represent the solution graphically ● Determine and verify algebraic solutions using a graphing utility. ● Solve multistep linear inequalities in one variable algebraically and represent the solution graphically. (a) ● Apply the properties of real numbers and properties of inequality to solve multistep linear inequalities in one variable algebraically.
	A.5b Represent the solution of linear inequalities in two variables graphically ● Determine and verify algebraic solutions using a graphing utility. ● Represent the solution of a linear inequality in two variables graphically.
	A.5d Represent the solution to a system of inequalities graphically ● Determine and verify algebraic solutions using a graphing utility.

	● Represent the solution of a system of two linear inequalities graphically. ● Determine and verify algebraic solutions using a graphing utility.

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Quarter 3

Simplifying Expressions with Exponents and Radicals

Curriculum Framework: **A.2a, A.3**

Prerequisite Knowledge MVAT	Essential Skills and Knowledge (with links to VDOE Just In Time Quick Checks for details on how to support student understanding for each standard)
7.1a	**A.2a Applying the laws of exponents to perform operations on expressions** ● Simplify monomial expressions and ratios of monomial expressions in which the exponents are integers, using the laws of exponents.
8.3a, 8.3b	**A.3a Simplify square roots of whole numbers and monomial algebraic expressions** ● Express the square root of a whole number in simplest form. ● Express the principal square root of a monomial algebraic expression in simplest form where variables are assumed to have positive values.
	A.3b Simplify cube roots of integers ● Express the cube root of an integer in simplest form.
	A.3c Simplify numerical expressions containing square or cube roots ● Simplify a numerical expression containing square or cube roots. ● Add, subtract, and multiply two monomial radical expressions limited to a numerical radicand.

Applying Polynomial Operations

Curriculum Framework: **A.2bc**

Prerequisite Knowledge MVAT	**Essential Skills and Knowledge** (with links to VDOE Just In Time Quick Checks for details on how to support student understanding for each standard)
8.14b	**A.2b Add, subtract, multiply, and divide polynomials** ● Model sums, differences, products, and quotients of polynomials with concrete objects and their related pictorial and symbolic representations. ● Determine sums and differences of polynomials. ● Determine products of polynomials. The factors should be limited to five or fewer terms (i.e., $(4x + 2)(3x + 5)$ represents four terms and $(x + 1)(2x^2 + x + 3)$ represents five terms). ● Determine the quotient of polynomials, using a monomial or binomial divisor, or a completely factored divisor.
	A.2c Factor completely first- and second-degree binomials and trinomials in one variable. ● Factor completely first- and second-degree polynomials in one variable with integral coefficients. After factoring out the greatest common factor (GCF), leading coefficients should have no more than four factors. ● Factor and verify algebraic factorizations of polynomials with a graphing utility.

Quarter 4

Investigating Quadratic Functions

Curriculum Framework: A.4be, A.7

Prerequisite Knowledge MVAT	**Essential Skills and Knowledge** (with links to VDOE Just In Time Quick Checks for details on how to support student understanding for each standard)
8.15a, 8.15b	**A.7a, A.7b, A.7c, A.7d, A.7e, A.7f Investigate and analyze the quadratic function family and their characteristics both algebraically and graphically** ● Investigate and analyze characteristics and multiple representations of functions with a graphing utility. (a, b, c, d, e, f) ● Represent relations and functions using verbal descriptions, tables, equations, and graph. Given one representation, represent the relation in another form. (f) ● Determine whether a relation, represented by a set of ordered pairs, a table, a mapping, or a graph is a function. (a) ● Identify the domain, range, zeros, and intercepts of a function presented algebraically or graphically. (b, c, d) ● Use the x-intercepts from the graphical representation of a quadratic function to determine and confirm its factors. (c, d) ● For any value, x, in the domain of f, determine f(x). (e)
	A.4e Solve practical problems involving equations
	A.4b Solve quadratic equations in one variable algebraically ● Apply the properties of real numbers and properties of equality to simplify expressions and solve equations. ● Solve quadratic equations in one variable algebraically. Solutions may be rational or irrational.

Representing and Interpreting Bi-Variate Data

Curriculum Framework: A.8, A.9	
Prerequisite Knowledge **MVAT**	**Essential Skills and Knowledge** (with links to VDOE Just In Time Quick Checks for details on how to support student understanding for each standard)
7.10a, 7.10b	**A.8 The student, given a data set or practical situation, 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.** ● Given a data set or practical situation, determine whether a direct variation exists. ● Given a data set or practical situation, determine whether an inverse variation exists. ● Given a data set or practical situation, write an equation for a direct variation. ● Given a data set or practical situation, write an equation for an inverse variation. ● Given a data set or practical situation, graph an equation representing a direct variation.
8.13a, 8.13b, 8.13c	**A.9 The student will collect and analyze data, determine the equation of the curve of best fit in order to make predictions, and solve practical problems, using mathematical models of linear and quadratic functions.** ● Determine an equation of a curve of best fit, using a graphing utility, given a set of no more than twenty data points in a table, a graph, or a practical situation. ● Make predictions, using data, scatterplots, or the equation of the curve of best fit. ● Solve practical problems involving an equation of the curve of best fit. ● Evaluate the reasonableness of a mathematical model of a practical situation.