LCPS Pre-Algebra Yearly Overview and Scope and Sequence 2022-23

Pre-Algebra Yearly Overview

Quarter 1	**Applying Real Numbers** 8.1, 8.2, 8.3, 8.4 Unit 1 Resources	**Solving Algebraic Expressions and Equations** 8.14, 8.17, 8.18 Unit 2 Resources
Quarter 2	**Solving Algebraic Expressions and Equations** (*Continued from Quarter 1*)	**Investigating Linear Functions** 8.15, 8.16 Unit 3 Resources
Quarter 3	**Exploring Angle Relationships and the Pythagorean Theorem** 8.5, 8.9 Unit 4 Resources	**Investigating Area, Perimeter, Volume, Surface Area and Transformations** 8.6, 8.7, 8.8, 8.10 Unit 5 Resources
Quarter 4	**Finding Probability of Independent and Dependent Events** 8.11 Unit 6 Resources	**Representing and Interpreting Data with Boxplots and Scatterplots** 8.12, 8.13 Unit 7 Resources

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)**

Pre-Algebra 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.

VDOE Bridging Document: This document identifies bridging standards in the 2016 *Mathematics Standards of Learning.* Bridging standards allow for the identification of content that can be connected when planning instruction and promote deeper student understanding.

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.

Return to Yearly Overview Quarter 2 Quarter 3 Quarter 4

Quarter 1

Applying Real Numbers

Curriculum Framework: 8.3a, 8.3b, 8.1, 8.2, 8.4

VDOE Bridging Document

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)
6.3a, 6.3b, 6.4, 7.1d,	**8.3a Estimate and determine the two consecutive integers between which a square root lies** • Estimate and identify the two consecutive integers between which the positive or negative square root of a given number lies. Numbers are limited to natural numbers from 1 to 400.
	8.3b Determine both the positive and negative square roots of a given perfect square • Determine the positive or negative square root of a given perfect square from 1 to 400.
6.2a, 6.2b, 6.3b, 6.4, 7.1b, 7.1c, 7.1d	**8.1 Compare and order real numbers** • Use rational approximations (to the nearest hundredth) of irrational numbers to compare and order, locating values on a number line. Radicals may include both positive and negative square roots of values from 0 to 400 yielding an irrational number. • Compare and order no more than five real numbers expressed as integers, fractions (proper or improper), decimals, mixed numbers, percents, numbers written in scientific notation, radicals, and π. Radicals may include both positive and negative square roots of values from 0 to 400. Ordering may be in ascending or descending order.
6.2a, 6.3a, 6.3c, 6.4, 7.1d, 7.1e	**8.2 Describe the relationships between the subsets of the real number system** • Describe and illustrate the relationships among the subsets of the real number system by using representations (graphic organizers, number lines, etc.). Subsets include rational numbers, irrational numbers, integers, whole numbers, and natural numbers.

	• Classify a given number as a member of a particular subset or subsets of the real number system, and explain why. • Describe each subset of the set of real numbers and include examples and non-examples. • Recognize that the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.
6.2a, 6.5b, 6.5c, 6.6a, 6.6b, 6.13, 7.2, 7.3	**8.4 Solve practical problems involving consumer applications** • Solve practical problems involving consumer applications by using proportional reasoning and computation procedures for rational numbers. • Compute a discount or markup and the resulting sale price for one discount or markup. • Compute the sales tax or tip and resulting total. • Compute the simple interest and new balance earned in an investment or on a loan given the principal amount, interest rate, and time period in years. • Compute the percent increase or decrease found in a practical situation. • Reconcile an account balance given a statement with five or fewer transactions.
Solving Algebraic Expressions and Equations (***continued in Quarter 2***) **Curriculum Framework: 8.14a, 8.14b, 8.17, 8.18** **VDOE Bridging Document**	
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)
6.3c, 6.5a, 6.6a, 6.6c, 7.1d, 7.1e, 7.11	**8.14a Evaluate an algebraic expression for given replacement values of the variables** • Use the order of operations and apply the properties of real numbers to evaluate algebraic expressions for the given replacement values of the variables. Exponents are limited to whole numbers and bases are limited to integers. Square roots are limited to perfect squares. Limit the number of replacements to no more than three per expression.

	• Represent algebraic expressions using concrete materials and pictorial representations. Concrete materials may include colored chips or algebra tiles.
6.6a, 6.6c, 6.13, 7.12	**8.14b Simplify algebraic expressions in one variable** • Simplify algebraic expressions in one variable. Expressions may need to be expanded (using the distributive property) or require combining like terms to simplify. Expressions will include only linear and numeric terms. Coefficients and numeric terms may be rational.
6.5a, 6.6a, 6.6c, 6.13, 7.12	**8.17 Solve multistep linear equations in one variable with the variable on one or both sides of the equation, including practical problems that require the solution of a multistep linear equation in one variable** • Represent and solve multistep linear equations in one variable with the variable on one or both sides of the equation (up to four steps) using a variety of concrete materials and pictorial representations. • Apply properties of real numbers and properties of equality to solve multistep linear equations in one variable (up to four steps). Coefficients and numeric terms will be rational. Equations may contain expressions that need to be expanded (using the distributive property) or require collecting like terms to solve. • Write verbal expressions and sentences as algebraic expressions and equations. • Write algebraic expressions and equations as verbal expressions and sentences. • Solve practical problems that require the solution of a multistep linear equation. • Confirm algebraic solutions to linear equations in one variable.
6.14a, 6.14b, 7.13	**8.18 Solve multi step linear inequalities in one variable with the variable on one or both sides of the inequality symbol, including practical problems, and graph the solution on a number line** • Apply properties of real numbers and properties of inequality to solve multi step linear inequalities (up to four steps) in one variable with the variable on one or both sides of the inequality. Coefficients and numeric terms will be rational. Inequalities may contain expressions that need to be expanded (using the distributive property) or require collecting like terms to solve. • Graph solutions to multi step linear inequalities on a number line. • Write verbal expressions and sentences as algebraic expressions and inequalities. • Write algebraic expressions and inequalities as verbal expressions and sentences. • Solve practical problems that require the solution of a multistep linear inequality in one variable. • Identify a numerical value(s) that is part of the solution set of a given inequality.

Quarter 2

Solving Algebraic Expressions and Equations

(*continued from Quarter 1*)

Investigating Linear Functions

Curriculum Framework: **8.16a, 8.16b, 8.16c, 8.16d, 8.16e, 8.15a, 8.15b**

VDOE Bridging Document

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)
6.1, 6.8b, 6.12a, 6.12b, 7.10a	**8.16a Recognize and describe the graph of a linear function with a slope that is positive, negative, or zero** ● Recognize and describe a line with a slope that is positive, negative, or zero (0).
	8.16b Identify the slope and *y*-intercept of a linear function, given a table of values, a graph, or an equation in *y = mx + b* ● Given a table of values for a linear function, identify the slope and y-intercept. The table will include the coordinate of the y-intercept. ● Given a linear function in the form y = mx + b, identify the slope and y-intercept. ● Given the graph of a linear function, identify the slope and y-intercept. The value of the y-intercept will be limited to integers. The coordinates of the ordered pairs shown in the graph will be limited to integers.
6.1, 6.8b, 6.12a, 6.12b, 7.10a, 7.10c	**8.16c Determine the independent and dependent variable, given a practical situation modeled by a linear function** ● Identify the dependent and independent variable, given a practical situation modeled by a linear function.

6.1, 6.8b, 6.12a, 6.12c, 7.10a, 7.10b, 7.10c, 7.10d	**8.16d Graph a linear function given the equation in *y* = *mx* + *b* form** ● Given the equation of a linear function in the form y = mx + b, graph the function. The value of the y-intercept will be limited to integers.
6.12a, 6.12b, 6.12c, 6.12d, 7.10a, 7.10b, 7.10c, 7.10d, 7.10e	**8.16e Make connections between and among representations of a linear function using verbal descriptions, tables, equations, and graphs** ● Write the equation of a linear function in the form y = mx + b given values for the slope, m, and the y-intercept or given a practical situation in which the slope, m, and y-intercept are described verbally. ● Make connections between and among representations of a linear function using verbal descriptions, tables, equations, and graphs.
6.8b	**8.15a Determine whether a given relation is a function** ● Determine whether a relation, represented by a set of ordered pairs, a table, or a graph of discrete points is a function. Sets are limited to no more than 10 ordered pairs.
6.8b, 7.10b, 7.10d, 7.10e	**8.15b Determine the domain and range of a function** ● Identify the domain and range of a function represented as a set of ordered pairs, a table, or a graph of discrete points.

Quarter 3

Exploring Angle Relationships and the Pythagorean Theorem

Curriculum Framework: 8.5, 8.9a, 8.9b

VDOE Bridging Document

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)
6.9, 7.5	**8.5 Use relationships among pairs of angles that are vertical angles, adjacent angles, supplementary angles, and complementary angles to determine the measure of unknown angles** ● Identify and describe the relationship between pairs of angles that are vertical, adjacent, supplementary, and complementary. ● Use the relationships among supplementary, complementary, vertical, and adjacent angles to solve problems, including practical problems, involving the measure of unknown angles.
6.4, 7.1d	**8.9a Verify the Pythagorean Theorem** ● Verify the Pythagorean Theorem, using diagrams, concrete materials, and measurement.
	8.9b Apply the Pythagorean Theorem ● Determine whether a triangle is a right triangle given the measures of its three sides. ● Determine the measure of a side of a right triangle, given the measures of the other two sides. ● Solve practical problems involving right triangles by using the Pythagorean Theorem.

Investigating Area, Perimeter, Volume, Surface Area, and Transformations

Curriculum Framework: 8.10, 8.7a, 8.7b, 8.6a, 8.6b, 8.8

VDOE Bridging Document

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)
6.7a, 6.7b, 6.7c	**8.10 Solve area and perimeter problems, including practical problems, involving composite plane figures** ● Subdivide a plane figure into triangles, rectangles, squares, trapezoids, parallelograms, and semicircles. Determine the area of subdivisions and combine to determine the area of the composite plane figure. ● Subdivide a plane figure into triangles, rectangles, squares, trapezoids, parallelograms, and semicircles. Use the attributes of the subdivisions to determine the perimeter of the composite plane figure. ● Apply perimeter, circumference, and area formulas to solve practical problems involving composite plane figures.
6.8a, 6.8b, 6.9, 7.7	**8.7a Given a polygon, apply transformations, to include translations, reflections, and dilations, in the coordinate plane** ● Sketch the image of a polygon that has been translated vertically, horizontally, or a combination of both. ● Sketch the image of a polygon that has been reflected over the x- or y-axis. ● Sketch the image of a dilation of a right triangle or a rectangle limited to a scale factor of 1/4 , 1/2 , 2, 3, or 4. The center of the dilation will be the origin. ● Sketch the image of a polygon that has been translated and reflected over the x- or y-axis, or reflected over the x- or y-axis and then translated. ● Identify the type of translation in a given example. ● Given a preimage in the coordinate plane, identify the coordinate of the image of a polygon that has been translated vertically, horizontally, or a combination of both. ● Given a preimage in the coordinate plane, identify the coordinates of the image of a polygon that has been reflected over the x- or y-axis. ● Given a preimage in the coordinate plane, identify the coordinates of the image of a right triangle or a rectangle that has been dilated. Scale factors are limited to 1/4 , 1/2 , 2, 3, or 4. The center of the dilation will be the origin. ● Given a preimage in the coordinate plane, identify the coordinates of the image of a polygon that has been

	translated and reflected over the x-or y-axis, or reflected over the x- or y-axis and then translated.
	8.7b Identify practical applications of transformations ● Identify practical applications of transformations including, but not limited to, tiling, fabric, wallpaper designs, art, and scale drawings. ● Identify the type of translation in a given example.
6.7b, 6.7c, 7.4a, 7.4b	**8.6a Solve problems, including practical problems, involving volume and surface area of cones and square-based pyramids** ● Distinguish between situations that are applications of surface area and those that are applications of volume. ● Determine the surface area of cones and square-based pyramids by using concrete objects, nets, diagrams and formulas. ● Determine the volume of cones and square-based pyramids, using concrete objects, diagrams, and formulas. ● Solve practical problems involving volume and surface area of cones and square-based pyramids.
	8.6b Describe how changing one measured attribute of a rectangular prism affects the volume and surface area ● Describe how the volume of a rectangular prism is affected when one measured attribute is multiplied by a factor of ¼ , ⅓ , ½ , 2, 3, or 4. ● Describe how the surface area of a rectangular prism is affected when one measured attribute is multiplied by a factor of ½ or 2.
	8.8 Construct a three-dimensional model, given the top or bottom, side, and front views ● Identify three-dimensional models given a two-dimensional perspective. ● Identify the two-dimensional perspective from the top or bottom, side, and front view, given a three-dimensional model. ● Construct three-dimensional models, given the top or bottom, side, and front views.

Quarter 4

Finding Probability of Independent and Dependent Events

Curriculum Framework: 8.11a, 8.11b

VDOE Bridging Document

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)
6.1, 6.2a, 6.2b, 7.1c, 7.8a, 7.8b	**8.11a Compare and contrast the probability of independent and dependent event** ● Determine whether two events are independent or dependent. ● Compare and contrast the probability of independent and dependent events.
	8.11b Determine the probabilities for independent and dependent events ● Determine the probability of two independent events. ● Determine the probability of two dependent events.

Representing and Interpreting Data with Boxplots and Scatterplots

Curriculum Framework: 8.12a, 8.12b, 8.12c, 8.13a, 8.13b, 8.13c

VDOE Bridging Document

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)

6.3b, 6.10a, 7.9a	**8.12a Represent numerical data in boxplots** ● Collect and display a numeric data set of no more than 20 items, using boxplots.
6.6a, 6.10b, 6.11b, 7.9b	**8.12b Make observations and inference about data represented in boxplots** ● Make observations and inferences about data represented in a boxplot. ● Given a data set represented in a boxplot, identify and describe the lower extreme (minimum), upper extreme (maximum), median, upper quartile, lower quartile, range, and interquartile range.
6.6a, 6.10c, 7.9c	**8.12c Compare and analyze two data sets using boxplots** ● Compare and analyze two data sets represented in boxplots.
6.8b, 6.10a, 7.9a	**8.13a Represent data in scatterplots** ● Collect, organize, and represent a data set of no more than 20 items using scatterplots.
6.8b, 6.10b, 7.9b	**8.13b Make observations about data represented in scatterplots** ● Make observations about a set of data points in a scatterplot as having a positive linear relationship, a negative linear relationship, or no relationship.
6.8b, 6.10c, 7.9c, 7.10b, 7.10d	**8.13c Use a drawing to estimate the line of best fit for data represented in a scatterplot** ● Estimate the line of best fit with a drawing for data represented in a scatterplot.