



## LCPS Geometry Yearly Overview and [Scope and Sequence](#) 2021-22

### Geometry Yearly Overview

<u>Quarter</u> <u>1</u>	<u>Logic and Reasoning</u> Standards of Learning: G.1	<u>Investigating Angle Relationships and Triangles</u> Standards of Learning: G.2, G.4g, G.5
<u>Quarter</u> <u>2</u>	<u>Exploring Similarity and Congruence</u> Standards of Learning: G.3abd, G.4abcdef, G.6, G.7	
<u>Quarter</u> <u>3</u>	<u>Applying Right Triangles</u> Standards of Learning: G.8	<u>Investigating Polygons</u> Standards of Learning: G.3ac, G.9, G.10
<u>Quarter</u> <u>4</u>	<u>Investigating Relationships within Circles</u> Standards of Learning: G.4h, G.11, G.12	<u>Applying Area, Perimeter, Surface Area, and Volume</u> Standards of Learning: G.13, G.14

#### 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**)



## Geometry Scope and Sequence

The Loudoun County Public Schools Mathematics Scope and Sequence provides a broad overview of the content units and the quarter in which each unit is taught.

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

## Logic and Reasoning

[Curriculum Framework: G.1](#)

<b>Prerequisite Knowledge</b> <a href="#">MVAT</a>	<b>Essential Skills and Knowledge</b> (with links to VDOE Just In Time Quick Checks for details on how to support student understanding for each standard)
	<p><a href="#">G.1a</a>, <a href="#">G.1b</a>, <a href="#">G.1c</a> Use deductive reasoning to construct and judge the validity of a logical argument consisting of a set of premises and a conclusion.</p> <ul style="list-style-type: none"><li>• Identify the converse, inverse, and contrapositive of a conditional statement. (a)</li><li>• Translate verbal arguments into symbolic form using the symbols of formal logic. (b)</li><li>• Determine the validity of a logical argument using valid forms of deductive reasoning. (c)</li><li>• Determine that an argument is false using a counterexample. (c)</li></ul>
<b>Investigating Angle Relationships &amp; Triangles</b>	
<a href="#">Curriculum Framework: G.2, G.4g, G.5</a>	
<b>Prerequisite Knowledge</b> <a href="#">MVAT</a>	<b>Essential Skills and Knowledge</b> (with links to VDOE Just In Time Quick Checks for details on how to support student understanding for each standard)
<a href="#">8.5</a>	<p><a href="#">G.2b</a> Solve problems, including practical problems, involving angles formed when parallel lines are intersected by a transversal.</p> <ul style="list-style-type: none"><li>• Solve problems by using the relationships between pairs of angles formed by the intersection of two parallel lines and a transversal including corresponding angles, alternate interior angles, alternate exterior angles, same-side (consecutive) interior angles, and same-side (consecutive) exterior angles.</li><li>• Solve problems, including practical problems, involving intersecting and parallel lines.</li></ul>



	<p><b><u>G.2a</u> Prove two or more lines are parallel</b></p> <ul style="list-style-type: none"><li>● Prove two or more lines are parallel given angle measurements expressed numerically or algebraically.</li><li>● Prove two lines are parallel using deductive proofs given relationships between and among angles.</li></ul>
	<p><b><u>G.4g</u> Construct a line parallel to a given line through a point not on the line.</b></p>
	<p><b><u>G.5a</u>, <u>G.5b</u>, <u>G.5c</u>, <u>G.5d</u> Solve problems, given information concerning the lengths of sides and/or measures of angles in triangles, including practical problems</b></p> <ul style="list-style-type: none"><li>● Order the sides of a triangle by their lengths when given information about the measures of the angles. (a)</li><li>● Order the angles of a triangle by their measures when given information about the lengths of the sides. (b)</li><li>● Given the lengths of three segments, determine whether a triangle could be formed. (c)</li><li>● Given the lengths of two sides of a triangle, determine the range in which the length of the third side must lie. (d)</li></ul>



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## Quarter 2

### Exploring Similarity and Congruence

**Curriculum Framework:** G.3abd\*, G.4abcdef, G.6, G.7

\* *G.3abd is included to support students' use of coordinate methods to prove similarity and congruence.*

<b>Prerequisite Knowledge</b> <a href="#">MVAT</a>	<b>Essential Skills and Knowledge</b> (with links to VDOE Just In Time Quick Checks for details on how to support student understanding for each standard)
<a href="#">7.7</a> , <a href="#">8.7a</a> , <a href="#">8.7b</a>	<b><a href="#">G.3d</a> Determine whether a figure has been translated, reflected, rotated, or dilated, using coordinate methods.</b> <ul style="list-style-type: none"><li>Given an image and preimage, identify the transformation or combination of transformations that has/have occurred. Transformations include:<ul style="list-style-type: none"><li>a translation;</li><li>a reflection over any horizontal or vertical line or the lines <math>y = x</math> or <math>y = -x</math>;</li><li>a clockwise or counter clockwise rotation of <math>90^\circ</math>, <math>180^\circ</math>, <math>270^\circ</math>, or <math>360^\circ</math> on a coordinate grid where the center of rotation is limited to the origin; and</li><li>a dilation from a fixed point on a coordinate grid.</li></ul></li></ul>
<a href="#">8.9a</a> , <a href="#">8.9b</a> , <a href="#">A.3a</a> , <a href="#">A.6a</a>	<b><a href="#">G.3a</a> Investigate and use formulas for determining distance and slope;</b> <ul style="list-style-type: none"><li>Determine the coordinates of the midpoint or endpoint of a segment, using the midpoint formula.</li><li>Use a formula to determine the slope of a line.</li><li>Apply the distance formula to determine the length of a line segment when given the coordinates of the endpoints.</li></ul>
<a href="#">A.6a</a>	<b><a href="#">G.3b</a> Apply slope to verify and determine whether lines are parallel or perpendicular.</b> <ul style="list-style-type: none"><li>Compare the slopes to determine whether two lines are parallel, perpendicular, or neither.</li></ul>



<p><b><u>7.5</u></b></p>	<p><b><u>G.7</u> Prove two triangles are similar</b></p> <ul style="list-style-type: none"><li>● Prove two triangles similar given relationships among angles and sides of triangles expressed numerically or algebraically.</li><li>● Prove two triangles similar given representations in the coordinate plane and using coordinate methods (distance formula and slope formula).</li><li>● Use direct proofs to prove triangles similar.</li></ul>
<p><b><u>7.7, 8.7a, 8.7b</u></b></p>	<p><b><u>G.3d</u> Determine whether a figure has been translated, reflected, rotated, or dilated, using coordinate methods.</b></p> <ul style="list-style-type: none"><li>● Given an image and preimage, identify the transformation or combination of transformations that has/have occurred. Transformations include:<ul style="list-style-type: none"><li>○ a translation;</li><li>○ a reflection over any horizontal or vertical line or the lines <math>y = x</math> or <math>y = -x</math>;</li><li>○ a clockwise or counter clockwise rotation of <math>90^\circ</math>, <math>180^\circ</math>, <math>270^\circ</math>, or <math>360^\circ</math> on a coordinate grid where the center of rotation is limited to the origin; and</li><li>○ a dilation from a fixed point on a coordinate grid.</li></ul></li></ul>
<p><b><u>6.9</u></b></p>	<p><b><u>G.6</u> Prove two triangles are congruent</b></p> <ul style="list-style-type: none"><li>● Prove two triangles congruent given relationships among angles and sides of triangles expressed numerically or algebraically.</li><li>● Prove two triangles congruent given representations in the coordinate plane and using coordinate methods (distance formula and slope formula).</li><li>● Use direct proofs to prove two triangles congruent.</li></ul>
	<p><b>G.4 a-f The student will construct and justify the constructions of</b></p> <ul style="list-style-type: none"><li><b><u>G.4a</u> _____ a line segment congruent to a given line segment;</b></li><li><b><u>G.4b</u> _____ the perpendicular bisector of a line segment;</b></li><li><b><u>G.4c</u> _____ a perpendicular to a given line from a point not on the line;</b></li><li><b><u>G.4d</u> _____ a perpendicular to a given line at a given point on the line;</b></li><li><b><u>G.4e</u> _____ the bisector of a given angle;</b></li><li><b><u>G.4f</u> _____ an angle congruent to a given angle;</b></li></ul>



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## Quarter 3

### Applying Right Triangles

[Curriculum Framework: G.8](#)

<b>Prerequisite Knowledge</b> <a href="#">MVAT</a>	<b>Essential Skills and Knowledge</b> (with links to VDOE Just In Time Quick Checks for details on how to support student understanding for each standard)
<a href="#">8.9a</a> , <a href="#">8.9b</a> , <a href="#">A.3a</a>	<b><a href="#">G.8a</a>, <a href="#">G.8b</a>, <a href="#">G.8c</a> Solve problems, including practical problems, involving right triangles.</b> <ul style="list-style-type: none"><li>● Determine whether a triangle formed with three given lengths is a right triangle. (a)</li><li>● Solve for missing lengths in geometric figures, using properties of <math>45^\circ</math>-<math>45^\circ</math>-<math>90^\circ</math> triangles where rationalizing denominators may be necessary. (b)</li><li>● Solve for missing lengths in geometric figures, using properties of <math>30^\circ</math>-<math>60^\circ</math>-<math>90^\circ</math> triangles where rationalizing denominators may be necessary. (b).</li><li>● Solve problems, including practical problems, involving right triangles with missing side lengths or angle measurements, using sine, cosine, and tangent ratios. (c)</li><li>● Solve problems, including practical problems, using right triangle trigonometry and properties of special right triangles. (a,b,c)</li></ul>



# Investigating Polygons

Curriculum Framework: G.3c, G.9, G.10

<b>Prerequisite Knowledge</b> <u>MVAT</u>	<b>Essential Skills and Knowledge</b> (with links to VDOE Just In Time Quick Checks for details on how to support student understanding for each standard)
<a href="#">7.6a</a> , <a href="#">7.6b</a>	<b><a href="#">G.9</a> Verify and use properties of quadrilaterals to solve problems, including practical problems.</b> <ul style="list-style-type: none"><li>● Solve problems, including practical problems, using the properties specific to parallelograms, rectangles, rhombi, squares, isosceles trapezoids, and trapezoids.</li><li>● Prove that quadrilaterals have specific properties, using coordinate and algebraic methods, such as the distance formula, slope, and midpoint formula.</li><li>● Prove the properties of quadrilaterals, using direct proofs.</li></ul>
<a href="#">8.9a</a> , <a href="#">8.9b</a> , <a href="#">A.3a</a> , <a href="#">A.6a</a>	<b><a href="#">G.3a</a> Investigate and use formulas for determining distance, midpoint, and slope;</b> <ul style="list-style-type: none"><li>● Determine the coordinates of the midpoint or endpoint of a segment, using the midpoint formula.</li><li>● Use a formula to determine the slope of a line.</li><li>● Apply the distance formula to determine the length of a line segment when given the coordinates of the endpoints.</li></ul>
<a href="#">A.6a</a>	<b><a href="#">G.3b</a> Apply slope to verify and determine whether lines are parallel or perpendicular.</b> <ul style="list-style-type: none"><li>● Compare the slopes to determine whether two lines are parallel, perpendicular, or neither.</li></ul>
	<b><a href="#">G.3c</a> Investigate symmetry and determine whether a figure is symmetric with respect to a line or a point</b> <ul style="list-style-type: none"><li>● Determine whether a figure has point symmetry, line symmetry, both, or neither.</li></ul>
	<b><a href="#">G.10a</a>, <a href="#">G.10b</a>, <a href="#">G.10c</a> Solve problems, including practical problems, involving angles of convex polygons.</b> <ul style="list-style-type: none"><li>● Determine the sum of the measures of the interior and exterior angles of a convex polygon. (a)</li><li>● Determine the measure of each interior and exterior angle of a regular polygon. (b)</li><li>● Determine angle measures of a regular polygon in a tessellation. (b)</li><li>● Determine the number of sides of a regular polygon, given the measures of interior or exterior angles of the polygon. (c)</li></ul>





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|  | <ul style="list-style-type: none"><li>• Solve problems, including practical problems, involving angles of convex polygons.</li></ul> |
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## Quarter 4

### Investigating Relationships within Circles

[Curriculum Framework](#): G.4h, G.11, G.12

<b>Prerequisite Knowledge</b> <a href="#">MVAT</a>	<b>Essential Skills and Knowledge</b> (with links to VDOE Just In Time Quick Checks for details on how to support student understanding for each standard)
<a href="#">8.9a</a> , <a href="#">8.9b</a> ,	<p><a href="#">G.12</a> <b>The student will solve problems involving equations of circles.</b></p> <ul style="list-style-type: none"><li>● Given a graph or the equation of a circle in standard form, identify the coordinates of the center of the circle.</li><li>● Given the coordinates of the endpoints of a diameter of a circle, determine the coordinates of the center of the circle.</li><li>● Given a graph or the equation of a circle in standard form, identify the length of the radius or diameter of the circle.</li><li>● Given the coordinates of the endpoints of the diameter of a circle, determine the length of the radius or diameter of the circle.</li><li>● Given the coordinates of the center and the coordinates of a point on the circle, determine the length of the radius or diameter of the circle.</li><li>● Given the coordinates of the center and length of the radius of a circle, identify the coordinates of a point(s) on the circle.</li><li>● Determine the equation of a circle given:<ul style="list-style-type: none"><li>○ a graph of a circle with a center with coordinates that are integers;</li><li>○ coordinates of the center and a point on the circle;</li><li>○ coordinates of the center and the length of the radius or diameter; or</li><li>○ coordinates of the endpoints of a diameter.</li></ul></li></ul>
	<p><a href="#">G.4h</a> <b>Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.</b></p>



**A.2c, A.4b**

**G.11a, G.11b, G.11c, G.11d Solve problems, including practical problems, by applying properties of circles.**

- Determine angle measures and arc measures associated with
  - two intersecting chords;
  - two intersecting secants;
  - an intersecting secant and tangent;
  - two intersecting tangents; and
  - central and inscribed angles. (a)
- Determine segment lengths associated with:
  - two intersecting chords;
  - two intersecting secants;
  - an intersecting secant and tangent; and
  - two intersecting tangents. (b)
- Calculate the length of an arc of a circle. (c)
- Calculate the area of a sector. (d)
- Solve problems, including practical problems, by applying properties of circles.



# Applying Area, Perimeter, Surface Area, and Volume

Curriculum Framework: G.13, G.14

<b>Prerequisite Knowledge</b> <u>MVAT</u>	<b>Essential Skills and Knowledge</b> (with links to VDOE Just In Time Quick Checks for details on how to support student understanding for each standard)
<a href="#">7.4a</a> , <a href="#">7.4b</a> , <a href="#">8.6a</a> , <a href="#">8.6b</a> , <a href="#">8.8</a>	<b><u>G.13</u> The student will use surface area and volume of three-dimensional objects to solve practical problems</b> <ul style="list-style-type: none"><li>● Determine the surface area of cylinders, prisms, pyramids, cones, hemispheres, and spheres, using the appropriate formulas.</li><li>● Determine the volume of cylinders, prisms, pyramids, cones, hemispheres, and spheres, using the appropriate formulas.</li><li>● Solve problems including practical problems, involving surface area and volume of cylinders, prisms, pyramids, cones, hemispheres, and spheres, as well as composite three-dimensional figures.</li><li>● Solve problems, including practical problems, involving the lateral area of circular cylinders, prisms, and regular pyramids.</li><li>● Given information about a three-dimensional figure such as length of a side, area of a face, or volume, determine missing information.</li></ul>
	<b><u>G.14d</u> Solve problems, including practical problems, about similar geometric figures</b>
	<b><u>G.14a</u> Compare ratios between lengths, perimeters, areas, and volumes of similar figures</b>
	<b><u>G.14b</u> Determine how changes in one or more dimensions of a figure affect area and/or volume of the figure</b>
	<b><u>G.14c</u> Determine how changes in area and/or volume of a figure affect one or more dimensions of the figure</b>