Geometry – Crosswalk (Summary of Revisions): 2016 *Mathematics Standards of Learning and Curriculum Framework*

Additions (2016 SOL)	Deletions from Geometry (2009 SOL)
• G.1c EKS – Determine that an argument is false using a counterexample • G.2b EKS – Added same-side exterior angles to the required relationships between pairs of angles • G.3a EKS – Use the midpoint formula to determine the endpoint of a segment in addition to the midpoint • G.10b EKS – Determine angle measures of a regular polygon in a tessellation • G.13 EKS – Determine surface area and volume of hemispheres • G.13 EKS – Solve problems involving lateral area of cylinders, prisms, and regular pyramids	• G.1c – Use Venn diagrams to represent set relationships; interpret Venn diagrams [Moved to DM.12] • G.4 EKS – Construct the inscribed and circumscribed circles of a triangle; and a tangent line from a point outside a given circle to the circle
Parameter Changes/Clarifications (2016 SOL)	**Moves within Geometry (2009 SOL to 2016 SOL)**
• G.6, G.7, and G.9 – proofs are referred to as "direct proofs" and the following statement was added to the US: "Deductive or inductive reasoning is used in mathematical proofs. In this course, deductive reasoning and logic are used in direct proofs. Direct proofs are presented in different formats (typically two-column or paragraph) and employ definitions, postulates, theorems, and algebraic justifications including coordinate methods" • G.2a – Verifying parallelism (formerly G.2b) included under "prove" • G.3d EKS –Clarified that transformations may be a combination of transformations, and includes a list of possible transformations; reflections limited to reflections over any horizontal line, vertical line, the line $y = x$, or the line $y = -x$; rotations limited to 90°, 180°, 270°, or 360° on a coordinate grid where the center of rotation at the origin; dilations limited to those from a fixed point on the coordinate grid • G.8b EKS – Clarified that solving problems for missing lengths in right triangles may include situations where rationalizing denominators may be necessary • G.8c EKS – Clarified that solving problems involving right triangles may include determining missing side lengths or angle measurements • G.10a,b,c – Clarified that solving problems involves angles of convex polygons • G.12 EKS – Clarified expectations for solving problems involving equations of circles • G.13 US – Clarified types of cylinders, cones, prisms, and pyramids used in solving practical problems involving volume and surface area	• G.1d – [Moved to standard stem] • G.1 – Determine the validity of a logical argument [Moved from standard stem to G.1c] • G.2c – [Moved to G.2b] • G.4h – [Moved from EKS] • G.11a – [Moved to standard stem] • G.11b – [Moved to standard stem] • G.11c – Area of a sector [Moved to G.11d]

EKS = Essential Knowledge and Skills, referring to the column on the right side of the Curriculum Framework
US = Understanding the Standard, referring to the column on the left side of the Curriculum Framework

Comparison of Mathematics Standards of Learning – 2009 to 2016

2009 SOL	2016 SOL
Reasoning, Lines, and Transformations	
G.1 The student will construct and judge the validity of a logical argument consisting of a set of premises and a conclusion. This will include a) identifying the converse, inverse, and contrapositive of a conditional statement; b) translating a short verbal argument into symbolic form; c) using Venn diagrams to represent set relationships; [Moved to DM.12] and d) using deductive reasoning.	G.1 The student will use deductive reasoning to construct and judge the validity of a logical argument consisting of a set of premises and a conclusion. This will include a) identifying the converse, inverse, and contrapositive of a conditional statement; b) translating a short verbal argument into symbolic form; and c) determining the validity of a logical argument.
G.2 The student will use the relationships between angles formed by two lines cut by a transversal to a) determine whether two lines are parallel; b) verify the parallelism, using algebraic and coordinate methods as well as deductive proofs; and c) solve real-world problems involving angles formed when parallel lines are cut by a transversal.	G.2 The student will use the relationships between angles formed by two lines intersected by a transversal to a) prove two or more lines are parallel; and b) solve problems, including practical problems, involving angles formed when parallel lines are intersected by a transversal.
G.3 The student will use pictorial representations, including computer software, constructions, and coordinate methods, to solve problems involving symmetry and transformation. This will include a) investigating and using formulas for finding distance, midpoint, and slope; b) applying slope to verify and determine whether lines are parallel or perpendicular; c) investigating symmetry and determining whether a figure is symmetric with respect to a line or a point; and d) determining whether a figure has been translated, reflected, rotated, or dilated, using coordinate methods.	G.3 The student will solve problems involving symmetry and transformation. This will include a) investigating and using formulas for determining distance, midpoint, and slope; b) applying slope to verify and determine whether lines are parallel or perpendicular; c) investigating symmetry and determining whether a figure is symmetric with respect to a line or a point; and d) determining whether a figure has been translated, reflected, rotated, or dilated, using coordinate methods.
G.4 The student will construct and justify the constructions of a) a line segment congruent to a given line segment; b) the perpendicular bisector of a line segment; c) a perpendicular to a given line from a point not on the line; d) a perpendicular to a given line at a given point on the line; e) the bisector of a given angle; f) an angle congruent to a given angle; and g) a line parallel to a given line through a point not on the given line.	G.4 The student will construct and justify the constructions of a) a line segment congruent to a given line segment; b) the perpendicular bisector of a line segment; c) a perpendicular to a given line from a point not on the line; d) a perpendicular to a given line at a given point on the line; e) the bisector of a given angle; f) an angle congruent to a given angle; g) a line parallel to a given line through a point not on the line; and h) an equilateral triangle, a square, and a regular hexagon inscribed in a circle.

2009 SOL	2016 SOL
Triangles	
G.5 The student, given information concerning the lengths of sides and/or measures of angles in triangles, will a) order the sides by length, given the angle measures; b) order the angles by degree measure, given the side lengths; c) determine whether a triangle exists; and d) determine the range in which the length of the third side must lie. These concepts will be considered in the context of real-world situations.	G.5 The student, given information concerning the lengths of sides and/or measures of angles in triangles, will solve problems, including practical problems. This will include a) ordering the sides by length, given angle measures; b) ordering the angles by degree measure, given side lengths; c) determining whether a triangle exists; and d) determining the range in which the length of the third side must lie.
G.6 The student, given information in the form of a figure or statement, will prove two triangles are congruent, using algebraic and coordinate methods as well as deductive proofs.	G.6 The student, given information in the form of a figure or statement, will prove two triangles are congruent.
G.7 The student, given information in the form of a figure or statement, will prove two triangles are similar, using algebraic and coordinate methods as well as deductive proofs.	G.7 The student, given information in the form of a figure or statement, will prove two triangles are similar.
G.8 The student will solve real-world problems involving right triangles by using the Pythagorean Theorem and its converse, properties of special right triangles, and right triangle trigonometry.	G.8 The student will solve problems, including practical problems, involving right triangles. This will include applying a) the Pythagorean Theorem and its converse; b) properties of special right triangles; and c) trigonometric ratios.
Polygons and Circles	
G.9 The student will verify characteristics of quadrilaterals and use properties of quadrilaterals to solve real-world problems.	G.9 The student will verify and use properties of quadrilaterals to solve problems, including practical problems.
G.10 The student will solve real-world problems involving angles of polygons.	G.10 The student will solve problems, including practical problems, involving angles of convex polygons. This will include determining the a) sum of the interior and/or exterior angles; b) measure of an interior and/or exterior angle; and c) number of sides of a regular polygon.
G.11 The student will use angles, arcs, chords, tangents, and secants to a) investigate, verify, and apply properties of circles; b) solve real-world problems involving properties of circles; and c) find arc lengths and areas of sectors in circles.	G.11 The student will solve problems, including practical problems, by applying properties of circles. This will include determining a) angle measures formed by intersecting chords, secants, and/or tangents; b) lengths of segments formed by intersecting chords, secants, and/or tangents; c) arc length; and d) area of a sector.

2009 SOL	2016 SOL
G.12 The student, given the coordinates of the center of a circle and a point on the circle, will write the equation of the circle.	G.12 The student will solve problems involving equations of circles.
Three-Dimensional Figures	
G.13 The student will use formulas for surface area and volume of three-dimensional objects to solve real-world problems.	G.13 The student will use surface area and volume of three-dimensional objects to solve practical problems.
G.14 The student will use similar geometric objects in two- or three-dimensions to a) compare ratios between side lengths, perimeters, areas, and volumes; b) determine how changes in one or more dimensions of an object affect area and/or volume of the object; c) determine how changes in area and/or volume of an object affect one or more dimensions of the object; and d) solve real-world problems about similar geometric objects.	G.14 The student will apply the concepts of similarity to two- or three-dimensional geometric figures. This will include a) comparing ratios between lengths, perimeters, areas, and volumes of similar figures; b) determining how changes in one or more dimensions of a figure affect area and/or volume of the figure; c) determining how changes in area and/or volume of a figure affect one or more dimensions of the figure; and d) solving problems, including practical problems, about similar geometric figures.