

# Geometry

## Reasoning, Lines and Transformations

**RLT.1** The student will translate logic statements, identify conditional statements, and use and interpret Venn diagrams. [G.RLT.1](#)

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**RLT.2** The student will analyze, prove, and justify the relationships of parallel lines cut by a transversal. [G.RLT.2](#)

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**RLT.3** The student will solve problems, including contextual problems, involving symmetry and transformation. [G.RLT.3](#)

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Translate propositional statements and compound statements into symbolic form, including negations ( $\sim p$ , read “not p”), conjunctions ( $p \wedge q$ , read “p and q”), disjunctions ( $p \vee q$ , read “p or q”), conditionals ( $p \rightarrow q$ , read “if p then q”), and biconditionals ( $p \leftrightarrow q$ , read “p if and only if q”), including statements representing geometric relationships. [G.RLT.1.A](#)

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**a** Translate propositional statements and compound statements into symbolic form, including negations ( $\sim p$ , read “not p”), conjunctions ( $p \wedge q$ , read “p and q”), disjunctions ( $p \vee q$ , read “p or q”), conditionals ( $p \rightarrow q$ , read “if p then q”), and biconditionals ( $p \leftrightarrow q$ , read “p if and only if q”), including statements representing geometric relationships. [G.RLT.1.A](#)

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Identify and determine the validity of the converse, inverse, and contrapositive of a conditional statement, and recognize the connection between a biconditional statement and a true conditional statement with a true converse, including statements representing geometric relationships. [G.RLT.1.B](#)

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**b** Identify and determine the validity of the converse, inverse, and contrapositive of a conditional statement, and recognize the connection between a biconditional statement and a true conditional statement with a true converse, including statements representing geometric relationships. [G.RLT.1.B](#)

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Use Venn diagrams to represent set relationships, including union, intersection, subset, and negation. [G.RLT.1.C](#)

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**c** Use Venn diagrams to represent set relationships, including union, intersection, subset, and negation. [G.RLT.1.C](#)

Interpret Venn diagrams, including those representing contextual situations. [G.RLT.1.D](#)

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**d** Interpret Venn diagrams, including those representing contextual situations. [G.RLT.1.D](#)

Prove and justify angle pair relationships formed by two parallel lines and a transversal, including: [G.RLT.2.A](#)

**i** corresponding angles; [G.RLT.2.A.I](#)

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**ii** alternate interior angles; [G.RLT.2.A.II](#)

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**iii** alternate exterior angles; [G.RLT.2.A.III](#)

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**iv** same-side (consecutive) interior angles; and [G.RLT.2.A.IV](#)

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**v** same-side (consecutive) exterior angles. [G.RLT.2.A.V](#)

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Prove two or more lines are parallel given angle measurements expressed numerically or algebraically. [G.RLT.2.B](#)

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**b** Prove two or more lines are parallel given angle measurements expressed numerically or algebraically. [G.RLT.2.B](#)

Solve problems by using the relationships between pairs of angles formed by the intersection of two parallel lines and a transversal. [G.RLT.2.C](#)

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**c** Solve problems by using the relationships between pairs of angles formed by the intersection of two parallel lines and a transversal. [G.RLT.2.C](#)

Locate, count, and draw lines of symmetry given a figure, including figures in context. [G.RLT.3.A](#)

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**a** Locate, count, and draw lines of symmetry given a figure, including figures in context. [G.RLT.3.A](#)

Determine whether a figure has point symmetry, line symmetry, both, or neither, including

**b** Determine whether a figure has point symmetry, line symmetry, both, or neither, including figures in context. [G.RLT.3.B](#)

figures in  
context. [G.RLT.3.B](#)

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Given an image or preimage, identify the transformation or combination of transformations that has/have occurred. Transformations include: [G.RLT.3.C](#)

- i** translations; [G.RLT.3.C.I](#)
  - ii** reflections over any horizontal or vertical line or the lines  $y = x$  or  $y = -x$ ; [G.RLT.3.C.II](#)
  - iii** clockwise or counterclockwise rotations of  $90^\circ$ ,  $180^\circ$ ,  $270^\circ$ , or  $360^\circ$  on a coordinate grid where the center of rotation is limited to the origin; and [G.RLT.3.C.III](#)
  - iv** dilations, from a fixed point on a coordinate grid. [G.RLT.3.C.IV](#)
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Triangles

- TR.1** The student will determine the relationships between the measures of angles and lengths of sides in triangles, including problems in context. [G.TR.1](#)
  - TR.2** The student will, given information in the form of a figure or statement, prove and justify two triangles are congruent using direct and indirect proofs, and solve problems involving measured attributes of congruent triangles. [G.TR.2](#)
  - TR.3** The student will, given information in the form of a figure or statement, prove and justify two triangles are similar using direct and indirect proofs, and solve problems, including those in context, involving measured attributes of similar triangles. [G.TR.3](#)
  - TR.4** The student will model and solve problems, including those in context, involving trigonometry in right triangles and applications of the Pythagorean Theorem. [G.TR.4](#)
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Given the lengths of three segments, determine whether a triangle could be formed. [G.TR.1.A](#)

- a** Given the lengths of three segments, determine whether a triangle could be formed. [G.TR.1.A](#)
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Given the lengths of two sides of a triangle, determine the range in which the length of the third side must lie. [G.TR.1.B](#)

- b** Given the lengths of two sides of a triangle, determine the range in which the length of the third side must lie. [G.TR.1.B](#)
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Order the sides of a triangle by their lengths when given information about the measures of the angles. [G.TR.1.C](#)

- c** Order the sides of a triangle by their lengths when given information about the measures of the angles. [G.TR.1.C](#)
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Order the angles of a triangle by their measures when given information about the lengths of the sides. [G.TR.1.D](#)

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**d** Order the angles of a triangle by their measures when given information about the lengths of the sides. [G.TR.1.D](#)

Solve for interior and exterior angles of a triangle, when given two angles. [G.TR.1.E](#)

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**e** Solve for interior and exterior angles of a triangle, when given two angles. [G.TR.1.E](#)

Use definitions, postulates, and theorems (including Side-Side-Side (SSS); Side-Angle-Side (SAS); Angle-Side-Angle (ASA); Angle-Angle-Side (AAS); and Hypotenuse-Leg (HL)) to prove and justify two triangles are congruent. [G.TR.2.A](#)

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**a** Use definitions, postulates, and theorems (including Side-Side-Side (SSS); Side-Angle-Side (SAS); Angle-Side-Angle (ASA); Angle-Angle-Side (AAS); and Hypotenuse-Leg (HL)) to prove and justify two triangles are congruent. [G.TR.2.A](#)

Use algebraic methods to prove that two triangles are congruent. [G.TR.2.B](#)

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**b** Use algebraic methods to prove that two triangles are congruent. [G.TR.2.B](#)

Use coordinate methods, such as the slope formula and the distance formula, to prove two triangles are congruent. [G.TR.2.C](#)

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**c** Use coordinate methods, such as the slope formula and the distance formula, to prove two triangles are congruent. [G.TR.2.C](#)

Given a triangle, use congruent segment, congruent angle, and/or perpendicular line constructions to create a congruent triangle (SSS, SAS, ASA, AAS, and HL). [G.TR.2.D](#)

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**d** Given a triangle, use congruent segment, congruent angle, and/or perpendicular line constructions to create a congruent triangle (SSS, SAS, ASA, AAS, and HL). [G.TR.2.D](#)

Use definitions, postulates, and theorems (including Side-Angle-Side (SAS);

**a** Use definitions, postulates, and theorems (including Side-Angle-Side (SAS); Side-Side-Side (SSS); and Angle-Angle (AA)) to prove and justify that triangles are similar. [G.TR.3.A](#)

Side-Side-Side (SSS); and Angle-Angle (AA)) to prove and justify that triangles are similar. [G.TR.3.A](#)

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Use algebraic methods to prove that triangles are similar. [G.TR.3.B](#)

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**b** Use algebraic methods to prove that triangles are similar. [G.TR.3.B](#)

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Use coordinate methods, such as the slope formula and the distance formula, to prove two triangles are similar. [G.TR.3.C](#)

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**c** Use coordinate methods, such as the slope formula and the distance formula, to prove two triangles are similar. [G.TR.3.C](#)

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Describe a sequence of transformations that can be used to verify similarity of triangles located in the same plane. [G.TR.3.D](#)

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**d** Describe a sequence of transformations that can be used to verify similarity of triangles located in the same plane. [G.TR.3.D](#)

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Solve problems, including those in context involving attributes of similar triangles. [G.TR.3.E](#)

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**e** Solve problems, including those in context involving attributes of similar triangles. [G.TR.3.E](#)

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Determine whether a triangle formed with three given lengths is a right triangle. [G.TR.4.A](#)

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**a** Determine whether a triangle formed with three given lengths is a right triangle. [G.TR.4.A](#)

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Find and verify trigonometric ratios using right triangles. [G.TR.4.B](#)

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**b** Find and verify trigonometric ratios using right triangles. [G.TR.4.B](#)

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Model and solve problems, including those in context, involving right triangle trigonometry (sine, cosine, and tangent ratios). [G.TR.4.C](#)

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**c** Model and solve problems, including those in context, involving right triangle trigonometry (sine, cosine, and tangent ratios). [G.TR.4.C](#)

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Solve problems using the properties of special right triangles. **G.TR.4.D**

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**d** Solve problems using the properties of special right triangles. **G.TR.4.D**

Solve for missing lengths in geometric figures, using properties of  $45^\circ$ - $45^\circ$ - $90^\circ$  triangles, where rationalizing denominators may be necessary. **G.TR.4.E**

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**e** Solve for missing lengths in geometric figures, using properties of  $45^\circ$ - $45^\circ$ - $90^\circ$  triangles, where rationalizing denominators may be necessary. **G.TR.4.E**

Solve for missing lengths in geometric figures, using properties of  $30^\circ$ - $60^\circ$ - $90^\circ$  triangles, where rationalizing denominators may be necessary. **G.TR.4.F**

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**f** Solve for missing lengths in geometric figures, using properties of  $30^\circ$ - $60^\circ$ - $90^\circ$  triangles, where rationalizing denominators may be necessary. **G.TR.4.F**

Solve problems, including those in context, involving right triangles using the Pythagorean Theorem and its converse, including recognizing Pythagorean Triples. **G.TR.4.G**

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**g** Solve problems, including those in context, involving right triangles using the Pythagorean Theorem and its converse, including recognizing Pythagorean Triples. **G.TR.4.G**

**Polygons and Circles**

**PC.1** The student will prove and justify theorems and properties of quadrilaterals, and verify and use properties of quadrilaterals to solve problems, including the relationships between the sides, angles, and diagonals **G.PC.1**

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**PC.2** The student will verify relationships and solve problems involving the number of sides and measures of angles of convex polygons. **G.PC.2**

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**PC.3** The student will solve problems, including those in context, by applying properties of circles. **G.PC.3**

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**PC.4** The student will solve problems in the coordinate plane involving equations of circles. **G.PC.4**

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Solve problems, using the properties specific to parallelograms, rectangles, rhombi, squares, isosceles

**a** Solve problems, using the properties specific to parallelograms, rectangles, rhombi, squares, isosceles trapezoids, and trapezoids. **G.PC.1.A**

trapezoids, and  
trapezoids. [G.PC.1.A](#)

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Prove and justify that quadrilaterals have specific properties, using coordinate and algebraic methods, such as the slope formula, the distance formula, and the midpoint formula. [G.PC.1.B](#)

**b** Prove and justify that quadrilaterals have specific properties, using coordinate and algebraic methods, such as the slope formula, the distance formula, and the midpoint formula. [G.PC.1.B](#)

Prove and justify theorems and properties of quadrilaterals using deductive reasoning. [G.PC.1.C](#)

**c** Prove and justify theorems and properties of quadrilaterals using deductive reasoning. [G.PC.1.C](#)

Use congruent segment, congruent angle, angle bisector, perpendicular line, and/or parallel line constructions to verify properties of quadrilaterals. [G.PC.1.D](#)

**d** Use congruent segment, congruent angle, angle bisector, perpendicular line, and/or parallel line constructions to verify properties of quadrilaterals. [G.PC.1.D](#)

Solve problems involving the number of sides of a regular polygon given the measures of the interior and exterior angles of the polygon. [G.PC.2.A](#)

**a** Solve problems involving the number of sides of a regular polygon given the measures of the interior and exterior angles of the polygon. [G.PC.2.A](#)

Justify the relationship between the sum of the measures of the interior and exterior angles of a convex polygon and solve problems involving the sum of the measures of the angles. [G.PC.2.B](#)

**b** Justify the relationship between the sum of the measures of the interior and exterior angles of a convex polygon and solve problems involving the sum of the measures of the angles. [G.PC.2.B](#)

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**Justify the relationship between the measure of each interior and exterior angle of a regular polygon and solve problems involving the measures of the angles.** G.PC.2.C

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**c Justify the relationship between the measure of each interior and exterior angle of a regular polygon and solve problems involving the measures of the angles.** G.PC.2.C

**Determine the proportional relationship between the arc length or area of a sector and other parts of a circle.** G.PC.3.A

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**a Determine the proportional relationship between the arc length or area of a sector and other parts of a circle.** G.PC.3.A

**Solve for arc measures and angles in a circle formed by central angles.** G.PC.3.B

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**b Solve for arc measures and angles in a circle formed by central angles.** G.PC.3.B

**Solve for arc measures and angles in a circle involving inscribed angles.** G.PC.3.C

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**c Solve for arc measures and angles in a circle involving inscribed angles.** G.PC.3.C

**Calculate the length of an arc of a circle.** G.PC.3.D

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**d Calculate the length of an arc of a circle.** G.PC.3.D

**Calculate the area of a sector of a circle.** G.PC.3.E

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**e Calculate the area of a sector of a circle.** G.PC.3.E

**Apply arc length or sector area to solve for an unknown measurement of the circle including the radius, diameter, arc measure, central angle, arc length, or sector area.** G.PC.3.F

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**f Apply arc length or sector area to solve for an unknown measurement of the circle including the radius, diameter, arc measure, central angle, arc length, or sector area.** G.PC.3.F

**Derive the equation of a circle of given the center and radius using the**

**a Derive the equation of a circle of given the center and radius using the Pythagorean Theorem.** G.PC.4.A

**Pythagorean Theorem.** [G.PC.4.A](#)

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**Solve problems in the coordinate plane involving equations of circles:** [G.PC.4.B](#)

- i** given a graph or the equation of a circle in standard form, identify the coordinates of the center of the circle; [G.PC.4.B.I](#)
  - ii** given the coordinates of the endpoints of a diameter of a circle, determine the coordinates of the center of the circle. [G.PC.4.B.II](#)
  - iii** given a graph or the equation of a circle in standard form, identify the length of the radius or diameter of the circle. [G.PC.4.B.III](#)
  - iv** given the coordinates of the endpoints of the diameter of a circle, determine the length of the radius or diameter of the circle. [G.PC.4.B.IV](#)
  - v** 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; and [G.PC.4.B.V](#)
  - vi** given the coordinates of the center and length of the radius of a circle, identify the coordinates of a point(s) on the circle. [G.PC.4.B.VI](#)
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**Determine the equation of a circle given:** [G.PC.4.C](#)

- i** a graph of a circle with a center with coordinates that are integers; [G.PC.4.C.I](#)
  - ii** coordinates of the center and a point on the circle; [G.PC.4.C.II](#)
  - iii** coordinates of the center and the length of the radius or diameter; and [G.PC.4.C.III](#)
  - iv** coordinates of the endpoints of a diameter. [G.PC.4.C.IV](#)
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**Two- and Three-Dimensional Figures**

- DF.1** The student will create models and solve problems, including those in context, involving surface area and volume of rectangular and triangular prisms, cylinders, cones, pyramids, and spheres. [G.DF.1](#)
  - DF.2** The student will determine the effect of changing one or more dimensions of a three-dimensional geometric figure and describe the relationship between the original and changed figure. [G.DF.2](#)
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**Identify the shape of a two-dimensional cross section of a three-dimensional figure.** [G.DF.1.A](#)

- a** Identify the shape of a two-dimensional cross section of a three-dimensional figure. [G.DF.1.A](#)
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**Create models and solve problems, including those in context, involving surface area of three-dimensional**

- b** Create models and solve problems, including those in context, involving surface area of three-dimensional figures, as well as composite three-dimensional figures. [G.DF.1.B](#)

figures, as well as composite three-dimensional figures. [G.DF.1.B](#)

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Solve multistep problems, including those in context, involving volume of three-dimensional figures, as well as composite three-dimensional figures. [G.DF.1.C](#)

**c** Solve multistep problems, including those in context, involving volume of three-dimensional figures, as well as composite three-dimensional figures. [G.DF.1.C](#)

Determine unknown measurements of three-dimensional figures using information such as length of a side, area of a face, or volume. [G.DF.1.D](#)

**d** Determine unknown measurements of three-dimensional figures using information such as length of a side, area of a face, or volume. [G.DF.1.D](#)

Describe how changes in one or more dimensions of a figure affect other derived measures (perimeter, area, total surface area, and volume) of the figure. [G.DF.2.A](#)

**a** Describe how changes in one or more dimensions of a figure affect other derived measures (perimeter, area, total surface area, and volume) of the figure. [G.DF.2.A](#)

Describe how changes in surface area and/or volume of a figure affect the measures of one or more dimensions of the figure. [G.DF.2.B](#)

**b** Describe how changes in surface area and/or volume of a figure affect the measures of one or more dimensions of the figure. [G.DF.2.B](#)

Solve problems, including those in context, involving changing the dimensions or derived measures of a three-dimensional figure. [G.DF.2.C](#)

**c** Solve problems, including those in context, involving changing the dimensions or derived measures of a three-dimensional figure. [G.DF.2.C](#)

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**Compare ratios between side lengths, perimeters, areas, and volumes of similar figures.** G.DF.2.D

**d Compare ratios between side lengths, perimeters, areas, and volumes of similar figures.** G.DF.2.D

**Recognize when two- and three-dimensional figures are similar and solve problems, including those in context, involving attributes of similar geometric figures.** G.DF.2.E

**e Recognize when two- and three-dimensional figures are similar and solve problems, including those in context, involving attributes of similar geometric figures.** G.DF.2.E