ALEKS®

High School Geometry

Correlation of the ALEKS course High School Geometry to the Common Core State Standards for Geometry

- = ALEKS course topic that addresses the standard

G-CO: Congruence

G-CO.1: Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.

- Naming segments, rays, and lines
- Matching basic geometric terms with their definitions

G-CO.2: Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).

- Translating a point and giving its coordinates: One step
- Translating a point and giving its coordinates: Two steps
- Properties of translated figures
- Determining if figures are related by a translation
- Translating a polygon
- Using a translated point to find coordinates of other translated points
- Reflecting a point across an axis
- Reflecting a point across both coordinate axes
- Reflecting a point across an axis and giving its coordinates
- Finding the coordinates of a point reflected across an axis
- Finding the coordinates of a point reflected across both axes
- Reflecting a polygon across the x-axis or y-axis
- Properties of reflected figures
- Determining if figures are related by a reflection
- Reflecting a polygon over a vertical or horizontal line
- Finding the coordinates of three points reflected over an axis
- Rotating a point and giving its coordinates
- Properties of rotated figures
- Determining if figures are related by a rotation
- Rotating a figure about the origin
- Writing a rule to describe a translation
- Writing a rule to describe a reflection
- Writing a rule to describe a rotation
- Dilating a segment and giving the coordinates of its endpoints
- The effect of dilation on side length
- Determining if figures are related by a dilation
- Dilating a figure
- Writing a rule to describe a dilation

G-CO.3: Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.

- Drawing lines of symmetry
- Finding an angle of rotation
- Identifying rotational symmetry and angles of rotation
- Identifying transformations that map a quadrilateral onto itself
- Identifying transformations that map a regular polygon onto itself

G-CO.4: Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.

- Understanding the definition of a translation
- Understanding the definition of a reflection
- Understanding the definition of a rotation

G-CO.5: Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.

- Identifying transformations
- Translating a point and giving its coordinates: One step
- Translating a point and giving its coordinates: Two steps
- Translating a polygon
- Reflecting a point across an axis and giving its coordinates
- Reflecting a polygon across the x-axis or y-axis
- Reflecting a polygon over a vertical or horizontal line
- Rotating a point and giving its coordinates
- Rotating a figure about the origin
- Determining if figures are congruent and related by a transformation
- Determining if figures are congruent and related by a sequence of transformations

G-CO.6: Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.

- Identifying congruent shapes on a grid
- Determining if figures are related by rigid motions
- Properties of translated figures
- Determining if figures are related by a translation
- Properties of reflected figures
- Determining if figures are related by a reflection
- Properties of rotated figures
- Determining if figures are related by a rotation
- Determining if figures are congruent and related by a transformation
- Determining if figures are congruent and related by a sequence of transformations

G-CO.7: Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.

- Examining triangle congruence in terms of rigid motion

G-CO.8: Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.

- Exploring the triangle congruence theorems

G-CO.9: Prove theorems about lines and angles. Theorems include: vertical angles are congruent; when a

transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.

- Introduction to proofs: Justifying statements
- Proofs involving segment congruence
- Proofs involving angle congruence
- Establishing facts about the angles created when parallel lines are cut by a transversal
- Introduction to proofs involving parallel lines
- Proofs involving parallel lines
- Proof involving points on the perpendicular bisector of a line segment

G-CO.10: Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180?; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.

- Establishing facts about the interior angles of a triangle
- Establishing facts about the interior and exterior angles of a triangle
- Completing proofs involving congruent triangles using SSS or SAS
- Introduction to proving triangles congruent using SSS or SAS
- Completing proofs involving congruent triangles using ASA or AAS
- Introduction to proving triangles congruent using ASA or AAS
- Proofs involving congruent triangles and segment or angle bisectors
- Proofs involving congruent triangles that overlap: Basic
- Proofs involving congruent triangles with parallel or perpendicular segments
- Determining when to apply the HL congruence property
- Introduction to proving triangles congruent using the HL property
- Introduction to proofs involving congruent triangles and CPCTC
- Proofs involving congruent triangles, parallel or perpendicular segments, and CPCTC
- Proofs involving congruent triangles that overlap: Advanced
- Proofs of theorems involving isosceles triangles
- Proving the triangle midsegment theorem in the coordinate plane

G-CO.11: Prove theorems about parallelograms. Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.

- Completing proofs of theorems involving sides of a parallelogram
- Completing proofs of theorems involving angles of a parallelogram

G-CO.12: Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.

- Constructing congruent line segments
- Constructing an angle bisector
- Constructing congruent angles
- Constructing the perpendicular bisector of a line segment
- Constructing a pair of perpendicular lines
- Constructing a pair of parallel lines

G-CO.13: Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.

- Inscribing an equilateral triangle or a regular hexagon in a circle

- Inscribing a square in a circle

G-SRT: Similarity, Right Triangles, and Trigonometry

G-SRT.1: Verify experimentally the properties of dilations given by a center and a scale factor:

G-SRT.1.a: A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged.

- Dilating a segment and giving the coordinates of its endpoints
- Dilating a figure
- Exploring the effect of dilation on lines

G-SRT.1.b: The dilation of a line segment is longer or shorter in the ratio given by the scale factor.

- The effect of dilation on side length

G-SRT.2: Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.

- Identifying similar or congruent shapes on a grid
- Examining triangle similarity in terms of similarity transformations
- Determining if figures are similar and related by a sequence of transformations

G-SRT.3: Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.

- Examining triangle similarity in terms of similarity transformations

G-SRT.4: Prove theorems about triangles. Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity.

- Proofs involving similar triangles
- Completing proofs involving the triangle proportionality theorem
- Proving the Pythagorean Theorem using similar triangles
- Informal proof of the Pythagorean Theorem

G-SRT.5: Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.

- Identifying and naming congruent triangles
- Finding angle measures of a triangle given two angles of a similar triangle
- Finding angle measures and side ratios to determine if two triangles are similar
- Similar polygons
- Similar right triangles
- Indirect measurement
- Triangles and parallel lines
- Identifying and naming similar triangles
- Identifying similar right triangles that overlap
- Right triangles and geometric mean
- Understanding trigonometric ratios through similar right triangles
- Using similar right triangles to find trigonometric ratios

G-SRT.6: Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.

- Understanding trigonometric ratios through similar right triangles

- Using similar right triangles to find trigonometric ratios

G-SRT.7: Explain and use the relationship between the sine and cosine of complementary angles.

- Relationship between the sines and cosines of complementary angles

G-SRT.8: Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.*

- Introduction to the Pythagorean Theorem
- Pythagorean Theorem
- Using the Pythagorean Theorem to find distance on a grid
- Word problem involving the Pythagorean Theorem
- Using the Pythagorean Theorem and a quadratic equation to find side lengths of a right triangle
- Using the Pythagorean Theorem repeatedly
- Identifying side lengths that give right triangles
- Using the Pythagorean Theorem to find a trigonometric ratio
- Finding trigonometric ratios given a right triangle
- Using a trigonometric ratio to find a side length in a right triangle
- Solving a right triangle
- Using trigonometry to find a length in a word problem with one right triangle
- Using a trigonometric ratio to find an angle measure in a right triangle
- Using trigonometry to find angles of elevation or depression in a word problem
- Finding the area of a right triangle using the Pythagorean Theorem
- Computing an area using the Pythagorean Theorem
- Using trigonometry to find the area of a right triangle

G-SRT.9: (+) Derive the formula A = 1/2 ab sin(C) for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.

- Expressing the area of a triangle in terms of the sine of one of its angles

G-SRT.10: (+) Prove the Laws of Sines and Cosines and use them to solve problems.

- Solving a triangle with the law of sines: Problem type 1
- Solving a triangle with the law of sines: Problem type 2
- Solving a word problem using the law of sines
- Proving the law of sines
- Solving a triangle with the law of cosines
- Solving a word problem using the law of cosines
- Proving the law of cosines

G-SRT.11: (+) Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).

- Solving a triangle with the law of sines: Problem type 1
- Solving a triangle with the law of sines: Problem type 2
- Solving a word problem using the law of sines
- Solving a triangle with the law of cosines
- Solving a word problem using the law of cosines

G-C: Circles

G-C.1: Prove that all circles are similar.

- Exploring similarity of circles

G-C.2: Identify and describe relationships among inscribed angles, radii, and chords. Include the

relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.

- Identifying chords, secants, and tangents of a circle
- Tangents of a circle: Problem type 1
- Tangents of a circle: Problem type 2
- Naming and finding measures of central angles, inscribed angles, and arcs of a circle
- Applying properties of radii, diameters, and chords
- Central angles and inscribed angles of a circle
- Central angles and angles involving chords and tangents of a circle
- Inscribed angles in relation to a diameter or a polygon inscribed in a circle
- Inscribed angles and angles involving chords and tangents of a circle
- Angles of intersecting secants and tangents
- Lengths of chords, secants, and tangents

G-C.3: Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.

- Establishing facts about a quadrilateral inscribed in a circle
- Inscribing a circle in a triangle
- Circumscribing a circle about a triangle

G-C.4: (+) Construct a tangent line from a point outside a given circle to the circle.

- Constructing a tangent of a circle

G-C.5: Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.

- Area of a sector of a circle: Exact answer in terms of pi
- Informal argument for the formula of the area of a sector
- Arc length
- Arc length and area of a sector of a circle
- Computing ratios of arc lengths to radii and describing the result

G-GPE: Expressing Geometric Properties with Equations

G-GPE.1: Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.

- Identifying the center and radius to graph a circle given its equation in general form: Basic
- Identifying the center and radius to graph a circle given its equation in general form: Advanced
- Deriving the equation of a circle using the Pythagorean Theorem

G-GPE.2: Derive the equation of a parabola given a focus and directrix.

- Deriving the equation of a parabola given its focus and directrix

G-GPE.4: Use coordinates to prove simple geometric theorems algebraically. For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point $(1, \sqrt{3})$ lies on the circle centered at the origin and containing the point (0, 2).

- Identifying coordinates that give right triangles
- Identifying scalene, isosceles, and equilateral triangles given coordinates of their vertices
- Proving the triangle midsegment theorem in the coordinate plane

- Proving that a quadrilateral with given vertices is a parallelogram
- Classifying parallelograms in the coordinate plane
- Writing an equation of a circle and identifying points that lie on the circle

G-GPE.5: Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).

- Finding slopes of lines parallel and perpendicular to a line given in the form $Ax + By = C$
- Identifying parallel and perpendicular lines from equations
- Writing equations of lines parallel and perpendicular to a given line through a point
- Identifying parallel and perpendicular lines from coordinates
- Proving the slope criterion for parallel or perpendicular lines

G-GPE.6: Find the point on a directed line segment between two given points that partitions the segment in a given ratio.

- Finding a point that partitions a number line segment in a given ratio
- Finding a point that partitions a segment in the plane in a given ratio

G-GPE.7: Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.*

- Finding the perimeter or area of a rectangle in the coordinate plane
- Finding the perimeter of a triangle, trapezoid, or parallelogram in the coordinate plane
- Finding the area of a triangle or parallelogram in the coordinate plane

G-GMD: Geometric Measurement and Dimension

G-GMD.1: Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri's principle, and informal limit arguments.

- Informal argument for the formula of the circumference of a circle
- Informal argument for the formula of the area of a circle
- Informal argument for the formula of the volume of a cylinder
- Using cross sections to identify solids with the same volume
- Relating the volumes of a rectangular prism and a rectangular pyramid
- Relating the volumes of a triangular prism and a triangular pyramid
- Informal argument for the formula of the volume of a cone
- Relating the volumes of a cylinder and a cone

G-GMD.3: Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.*

- Volume of a cylinder
- Volume of an oblique cylinder
- Word problem involving the volume of a cylinder
- Word problem involving the rate of filling or emptying a cylinder
- Volume of a pyramid
- Volume of a cone
- Volume of a cone: Exact answers in terms of pi
- Word problem involving the volume of a cone
- Volume of a sphere
- Word problem involving the volume of a sphere

G-GMD.4: Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.

- Identifying horizontal and vertical cross sections of solids

- Identifying solids generated by rotations of two-dimensional regions

G-MG: Modeling with Geometry

G-MG.1: Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).*

- Identifying geometric shapes that model real-world objects

G-MG.2: Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).*

- Word problem on population density
- Computations involving density, mass, and volume
- Word problem on density involving the volume of a rectangular solid
- Word problem on density involving the volume of a cylindrical solid

G-MG.3: Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).*

- Word problem on optimizing an area or perimeter

Statistics and Probability

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S-CP: Conditional Probability and the Rules of Probability

S-CP.1: Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not").

- Determining a sample space and outcomes for a simple event
- Determining a sample space and outcomes for a compound event
- Outcomes and event probability
- Probabilities involving two dice
- Determining outcomes for compound events and complements of events

S-CP.2: Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent.

- Identifying independent events given values of probabilities

S-CP.3: Understand the conditional probability of A given B as P(A and B)/P(B), and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B.

- Identifying independent events given values of probabilities
- Conditional probability: Basic

S-CP.4: Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the

results.

- Constructing a two-way frequency table: Basic
- Constructing a two-way frequency table: Advanced
- Making an inference using a two-way frequency table
- Computing conditional probability using a two-way frequency table
- Computing conditional probability to make an inference using a two-way frequency table

S-CP.5: Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.

- Identifying independent events given descriptions of experiments

S-CP.6: Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model.

- Probability of dependent events
- Outcomes and event probability: Conditional probability

S-CP.7: Apply the Addition Rule, P(A or B) = P(A) + P(B) - P(A and B), and interpret the answer in terms of the model.

- Using a Venn diagram to understand the addition rule for probability
- Outcomes and event probability: Addition rule
- Probability of the union of two events
- Probability of intersection or union: Word problems

S-CP.8: (+) Apply the general Multiplication Rule in a uniform probability model, P(A and B) = P(A)P(B|A) = P(B)P(A|B), and interpret the answer in terms of the model.

- Probability of dependent events
- Probabilities of draws with replacement
- Using a Venn diagram to understand the multiplication rule for probability

S-CP.9: (+) Use permutations and combinations to compute probabilities of compound events and solve problems.

- Introduction to permutations and combinations
- Permutations and combinations: Problem type 1
- Permutations and combinations: Problem type 2
- Permutations and combinations: Problem type 3
- Probabilities of a permutation and a combination
- Probabilities of draws without replacement

S-MD: Using Probability to Make Decisions

S-MD.6: (+) Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).

- Using a random number table to make a fair decision

S-MD.7: (+) Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).

- Computing conditional probability to make an inference using a two-way frequency table

Standards for Mathematical Practices

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1: Make sense of problems and persevere in solving them.

- Word problem on optimizing an area or perimeter
- Pythagorean Theorem
- Using the Pythagorean Theorem to find distance on a grid
- Finding angle measures of a triangle given two angles of a similar triangle
- Finding angle measures and side ratios to determine if two triangles are similar
- Similar polygons
- Similar right triangles
- Indirect measurement
- Word problem involving the Pythagorean Theorem
- Using the Pythagorean Theorem and a quadratic equation to find side lengths of a right triangle
- Using a trigonometric ratio to find a side length in a right triangle
- Solving a right triangle
- Using trigonometry to find a length in a word problem with one right triangle
- Using a trigonometric ratio to find an angle measure in a right triangle
- Using trigonometry to find angles of elevation or depression in a word problem
- Solving a word problem using the law of sines
- Solving a word problem using the law of cosines
- Finding the perimeter or area of a rectangle in the coordinate plane
- Word problem on population density
- Finding the perimeter of a triangle, trapezoid, or parallelogram in the coordinate plane
- Finding the area of a triangle or parallelogram in the coordinate plane
- Finding the area of a right triangle using the Pythagorean Theorem
- Computing an area using the Pythagorean Theorem
- Finding the area of a triangle using trigonometry
- Computations involving density, mass, and volume
- Word problem on density involving the volume of a rectangular solid
- Word problem involving the rate of filling or emptying a cylinder
- Introduction to permutations and combinations
- Permutations and combinations: Problem type 1
- Permutations and combinations: Problem type 2
- Permutations and combinations: Problem type 3
- Computing a percentage from a table of values
- Outcomes and event probability
- Probabilities involving two dice
- Probabilities of a permutation and a combination
- Probability of dependent events
- Probabilities of draws with replacement
- Probabilities of draws without replacement
- Using a Venn diagram to understand the multiplication rule for probability
- Computing conditional probability using a two-way frequency table
- Computing conditional probability to make an inference using a two-way frequency table
- Conditional probability: Basic
- Using a Venn diagram to understand the addition rule for probability
- Probability of intersection or union: Word problems
- Using a random number table to make a fair decision

2: Reason abstractly and quantitatively.

- Word problem on optimizing an area or perimeter
- Pythagorean Theorem
- Using the Pythagorean Theorem to find distance on a grid
- Finding a point that partitions a number line segment in a given ratio
- Finding a point that partitions a segment in the plane in a given ratio
- Finding angle measures and side ratios to determine if two triangles are similar
- Word problem involving the Pythagorean Theorem
- Using the Pythagorean Theorem and a quadratic equation to find side lengths of a right triangle
- Using a trigonometric ratio to find a side length in a right triangle
- Solving a right triangle
- Using trigonometry to find a length in a word problem with one right triangle
- Using a trigonometric ratio to find an angle measure in a right triangle
- Using trigonometry to find angles of elevation or depression in a word problem
- Solving a word problem using the law of sines
- Solving a word problem using the law of cosines
- Finding the perimeter or area of a rectangle in the coordinate plane
- Word problem on population density
- Finding the perimeter of a triangle, trapezoid, or parallelogram in the coordinate plane
- Finding the area of a triangle or parallelogram in the coordinate plane
- Finding the area of a right triangle using the Pythagorean Theorem
- Computing an area using the Pythagorean Theorem
- Finding the area of a triangle using trigonometry
- Computations involving density, mass, and volume
- Word problem on density involving the volume of a rectangular solid
- Introduction to permutations and combinations
- Permutations and combinations: Problem type 1
- Permutations and combinations: Problem type 2
- Permutations and combinations: Problem type 3
- Computing a percentage from a table of values
- Outcomes and event probability
- Probabilities involving two dice
- Probabilities of a permutation and a combination
- Probability of dependent events
- Probabilities of draws with replacement
- Probabilities of draws without replacement
- Using a Venn diagram to understand the multiplication rule for probability
- Computing conditional probability using a two-way frequency table
- Computing conditional probability to make an inference using a two-way frequency table
- Conditional probability: Basic
- Using a Venn diagram to understand the addition rule for probability
- Probability of intersection or union: Word problems
- Using a random number table to make a fair decision

3: Construct viable arguments and critique the reasoning of others.

- Introduction to proofs: Justifying statements
- Proofs involving segment congruence
- Proofs involving angle congruence
- Establishing facts about the angles created when parallel lines are cut by a transversal
- Introduction to proofs involving parallel lines
- Proofs involving parallel lines

- Establishing facts about the interior angles of a triangle
- Establishing facts about the interior and exterior angles of a triangle
- Completing proofs involving congruent triangles using SSS or SAS
- Introduction to proving triangles congruent using SSS or SAS
- Completing proofs involving congruent triangles using ASA or AAS
- Introduction to proving triangles congruent using ASA or AAS
- Proofs involving congruent triangles and segment or angle bisectors
- Proofs involving congruent triangles that overlap: Basic
- Proofs involving congruent triangles with parallel or perpendicular segments
- Determining when to apply the HL congruence property
- Introduction to proving triangles congruent using the HL property
- Introduction to proofs involving congruent triangles and CPCTC
- Proofs involving congruent triangles, parallel or perpendicular segments, and CPCTC
- Proofs involving congruent triangles that overlap: Advanced
- Proofs of theorems involving isosceles triangles
- Proving the triangle midsegment theorem in the coordinate plane
- Proof involving points on the perpendicular bisector of a line segment
- Completing proofs of theorems involving sides of a parallelogram
- Completing proofs of theorems involving angles of a parallelogram
- Proving that a quadrilateral with given vertices is a parallelogram
- Proofs involving similar triangles
- Completing proofs involving the triangle proportionality theorem
- Proving the slope criterion for parallel or perpendicular lines
- Proving the Pythagorean Theorem using similar triangles
- Proving the law of sines
- Proving the law of cosines
- Informal proof of the Pythagorean Theorem
- Expressing the area of a triangle in terms of the sine of one of its angles
- Informal argument for the formula of the circumference of a circle
- Informal argument for the formula of the area of a circle
- Informal argument for the formula of the area of a sector
- Informal argument for the formula of the volume of a cylinder
- Using cross sections to identify solids with the same volume
- Informal argument for the formula of the volume of a cone
- Establishing facts about a quadrilateral inscribed in a circle
- Writing an equation of a circle and identifying points that lie on the circle
- Deriving the equation of a circle using the Pythagorean Theorem
- Deriving the equation of a parabola given its focus and directrix
- Computing conditional probability to make an inference using a two-way frequency table

4: Model with mathematics.

- Word problem on optimizing an area or perimeter
- Similar polygons
- Similar right triangles
- Indirect measurement
- Word problem on density involving the volume of a rectangular solid
- Word problem involving the rate of filling or emptying a cylinder

5: Use appropriate tools strategically.

- Constructing congruent line segments
- Constructing an angle bisector

- Constructing congruent angles
- Constructing the perpendicular bisector of a line segment
- Constructing a pair of perpendicular lines
- Constructing a pair of parallel lines
- Finding a point that partitions a number line segment in a given ratio
- Finding a point that partitions a segment in the plane in a given ratio
- Constructing a tangent of a circle
- Inscribing an equilateral triangle or a regular hexagon in a circle
- Inscribing a square in a circle
- Inscribing a circle in a triangle
- Circumscribing a circle about a triangle

6: Attend to precision.

- Finding the perimeter of a triangle, trapezoid, or parallelogram in the coordinate plane
- Area of a sector of a circle: Exact answer in terms of pi
- Volume of an oblique cylinder
- Word problem involving the volume of a cylinder
- Volume of a cone
- Volume of a cone: Exact answers in terms of pi
- Word problem involving the volume of a cone
- Word problem involving the volume of a sphere
- Arc length and area of a sector of a circle

7: Look for and make use of structure.

- Order of operations with whole numbers
- Order of operations with whole numbers and grouping symbols
- Order of operations with whole numbers and exponents: Basic
- Order of operations with integers
- Combining like terms: Whole number coefficients
- Combining like terms: Integer coefficients
- Distributive property: Whole number coefficients
- Distributive property: Integer coefficients
- Combining like terms in a quadratic expression
- Factoring out a monomial from a polynomial: Univariate
- Factoring a quadratic with leading coefficient 1
- Factoring out a constant before factoring a quadratic
- Factoring a perfect square trinomial with leading coefficient 1
- Completing proofs involving congruent triangles using SSS or SAS
- Introduction to proving triangles congruent using SSS or SAS
- Proofs involving congruent triangles and segment or angle bisectors
- Proofs involving congruent triangles that overlap: Basic
- Proof involving points on the perpendicular bisector of a line segment
- Completing proofs of theorems involving sides of a parallelogram
- Triangles and parallel lines
- Proofs involving similar triangles
- Using the Pythagorean Theorem repeatedly
- Identifying similar right triangles that overlap
- Right triangles and geometric mean
- Proving the law of sines
- Area of a triangle
- Informal proof of the Pythagorean Theorem

- Expressing the area of a triangle in terms of the sine of one of its angles
- Informal argument for the formula of the area of a circle
- Identifying horizontal and vertical cross sections of solids
- Identifying solids generated by rotations of two-dimensional regions
- Informal argument for the formula of the volume of a cylinder
- Volume of an oblique cylinder
- Using cross sections to identify solids with the same volume
- Volume of a pyramid
- Relating the volumes of a rectangular prism and a rectangular pyramid
- Relating the volumes of a triangular prism and a triangular pyramid
- Volume of a cone
- Volume of a cone: Exact answers in terms of pi
- Informal argument for the formula of the volume of a cone
- Relating the volumes of a cylinder and a cone
- Identifying chords, secants, and tangents of a circle
- Tangents of a circle: Problem type 1
- Tangents of a circle: Problem type 2
- Central angles and inscribed angles of a circle
- Central angles and angles involving chords and tangents of a circle
- Inscribed angles in relation to a diameter or a polygon inscribed in a circle
- Inscribed angles and angles involving chords and tangents of a circle
- Establishing facts about a quadrilateral inscribed in a circle
- Angles of intersecting secants and tangents
- Lengths of chords, secants, and tangents
- Identifying the center and radius to graph a circle given its equation in general form: Basic
- Deriving the equation of a circle using the Pythagorean Theorem
- Deriving the equation of a parabola given its focus and directrix
- Using a Venn diagram to understand the multiplication rule for probability

8: Look for and express regularity in repeated reasoning.

- Using the Pythagorean Theorem repeatedly
- Identifying similar right triangles that overlap
- Using a translated point to find coordinates of other translated points
- Identifying rotational symmetry and angles of rotation