

Congruence:

HS.G-CO.A Experiment With Transformations In The Plane (located in GM1T1 and T2)

- **HS.G-CO.A.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.
- **HS.G-CO.A.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).
- **HS.G-CO.A.3:** Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.
- **HS.G-CO.A.4:** Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.
- **HS.G-CO.A.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.

HS.G-CO.B Understand congruence in terms of rigid motions. (Located in GM1T3)

- 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. (CCSS: HS.G-CO.B.6)
- 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. (CCSS: HS.G-CO.B.7)
- Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions. (CCSS: HS.G-CO.B.8)

HS.G-CO.C Prove geometric theorems. (Located in GM2T1-3)

- 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. (CCSS: HS.G-CO.C.9)
- 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. (CCSS: HS.G-CO.C.10)
- 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. (CCSS: HS.G-CO.C.11)

Similarity, Right Triangles, and Trigonometry:

HS.G-SRT.A Understand similarity in terms of similarity transformations. (GM3T1-2)

- Verify experimentally the properties of dilations given by a center and a scale factor. (CCSS: HS.G-SRT.A.1)
- 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. (CCSS: HS.G-SRT.A.2)
- Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar. (CCSS: HS.G-SRT.A.3)

HS.G-SRT.B Prove theorems involving similarity. (GM3T1-2)

- 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. (CCSS: HS.G-SRT.B.4)
- Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. (CCSS: HS.G-SRT.B.5)

HS.G-SRT.C Define trigonometric ratios and solve problems involving right triangles. (GM3T1-2)

- Explain 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. (CCSS: HS.G-SRT.C.6)
- Explain and use the relationship between the sine and cosine of complementary angles. (CCSS: HS.G-SRT.C.7)
- Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems (CCSS: HS.G-SRT.C.8)

Circles

HS.G-C.A. Circles: Understand and apply theorems about circles. (GM2T1-2 and GM4T1)

- 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.* (CCSS: HS.G-C.A.2)
- Construct the inscribed and circumscribed circles of a triangle and prove the properties of angles for a quadrilateral inscribed in a circle. (CCSS: HS.G-C.A.3)

Expressing Geometric Properties with Equations:

HS.G-GPE.B Use coordinates to prove simple geometric theorems algebraically (GM1T1)

- 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 $(0,2)$. (CCSS:HS.G-GPE.B.4)
- 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). (CCSS:HS.G-GPE.B.5)
- Find the point on a directed line segment between two given points that partitions the segment in a given ratio. (CCSS: HS.G-GPE.B.6)
- Use coordinates and the distance formula to compute perimeters of polygons and areas of triangles and rectangles (CCSS: HS.G-GPE.B.7)

Modeling with Geometry:

HS.G-MG.A Apply geometric concepts in modeling situations. (GM4T1-2)

- Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder) (CCSS:HS.G-MG.A.1)
- Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). (CCSS: HS.G-MG.A.2)
- 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) (CCSS: HS.G-MG.A.3)