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GEOMETRY SCOPE & SEQUENCE

UNIT 1: FOUNDATIONS & REASONING

5 Weeks

ESSENTIAL STANDARDS:

HSG.CO.A.1

Based on the undefined notions of point, line, plane, distance along a line, and distance around a circular arc, define:

- Angle
- Line segment
- Circle
- Perpendicular lines
- Parallel lines

HSG.CO.E.14

Apply inductive reasoning and deductive reasoning for making predictions based on real world situations using:

- ~~Conditional Statements (inverse, converse, and contrapositive)~~
- Venn Diagrams

HSG.GPE.B.6

Find the midpoint between two given points; and find the endpoint of a line segment given the midpoint and one endpoint

HSG.SRT.C.8

Use ~~trigonometric ratios, special right triangles, and the~~ Pythagorean Theorem to find unknown measurements of right triangles in applied problems

SUPPORTING STANDARDS:

HSG.CO.D.12

Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software)

UNIT 2: PARALLEL LINES & TRANSVERSALS

4 Weeks

ESSENTIAL STANDARDS:

HSG.CO.C.9

Apply and prove theorems about lines and angles

Note: Theorems include but are not limited to: 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.

HSG.GPE.B.5

- Prove the slope criteria for parallel and perpendicular lines
- Use the slope criteria for parallel and perpendicular lines to solve geometric problem**s**

SUPPORTING STANDARDS:

HSG.CO.D.12

Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software)

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UNIT 3: TRANSFORMATIONS

2 Weeks

ESSENTIAL STANDARDS:

HSG.CO.A.2

Represent transformations in the plane (e.g., using transparencies, tracing paper, 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 dilation)

SUPPORTING STANDARDS:

HSG.CO.A.3

Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself

HSG.CO.A.4

Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments

HSG.CO.A.5

Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure (e.g., using graph paper, tracing paper, miras, geometry software)

- Specify a sequence of transformations that will carry a given figure onto another

HSG.CO.B6

- 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

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UNIT 4: CONGRUENCE

4 Weeks

ESSENTIAL STANDARDS:

HSG.SRT.B.5

- Use congruence (SSS, SAS, ASA, AAS, and HL) and ~~similarity (AA~, SSS~, SAS~) criteria~~ for triangles to solve problems
- Use congruence and ~~similarity criteria~~ to prove relationships in geometric figures

HSG.CO.C.10

Apply and prove theorems about triangles

Note: Theorems include but are not limited to: 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.~~

SUPPORTING STANDARDS:

HSG.CO.B.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

HSG.CO.B.8

- Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions
- Investigate congruence in terms of rigid motion to develop the criteria for triangle congruence (ASA, SAS, AAS, SSS, and HL)

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UNIT 5: SIMILARITY

4-5 Weeks

ESSENTIAL STANDARDS:

HSG.SRT.A.2

Given two figures:

- Use the definition of similarity in terms of similarity transformations to determine 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

HSG.SRT.B.5

- Use ~~congruence (SSS, SAS, ASA, AAS, and HL)~~ and similarity (AA~, SSS~, SAS~) criteria for triangles to solve problems
- Use ~~congruence~~ and similarity criteria to prove relationships in geometric figures

SUPPORTING STANDARDS:

HSG.SRT.A.1

Verify experimentally the properties of dilations given by a center and a scale factor

- 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
- The dilation of a line segment is longer or shorter in the ratio given by the scale factor

HSG.SRT.B.4

Use triangle similarity to apply and prove theorems about triangles

Note: 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.

HSG.C.A.1

Prove that all circles are similar

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UNIT 6: TRIGONOMETRY

2 Weeks

ESSENTIAL STANDARDS:

HSG.SRT.C.8

Use trigonometric ratios, special right triangles, and the Pythagorean Theorem to find unknown measurements of right triangles in applied problems

SUPPORTING STANDARDS:

HSG.SRT.C.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

HSG.SRT.C.7

Explain and use the relationship between the sine and cosine of complementary angles

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UNIT 7: CIRCLES

2 Weeks

ESSENTIAL STANDARDS:

HSG.GPE.A.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~~

HSG.C.A.2

Identify, describe, and use relationships among angles, radii, segments, lines, arcs, and chords as related to circles

SUPPORTING STANDARDS:

HSG.C.B.5

- Derive using similarity that the length of the arc intercepted by an angle is proportional to the radius
- Derive and use the formula for the area of a sector
- Understand the radian measure of the angle as a unit of measure

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UNIT 8: 2D AND 3D

5 Weeks

ESSENTIAL STANDARDS:

HSG.GPE.B.7

Use coordinates to compute perimeters of polygons and areas of triangles and rectangles

HSG.GMD.A.3

- Use volume formulas for cylinders, pyramids, cones, spheres, and to solve problems which may involve composite figures
- Compute the effect on volume of changing one or more dimension(s)

SUPPORTING STANDARDS:

HSG.CO.C.11

Apply and prove theorems about quadrilaterals

HSG.CO.D.13

Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle

HSG.C.A.3

- Construct the inscribed and circumscribed circles of a triangle
- Prove properties of angles for a quadrilateral inscribed in a circle

HSG.GPE.B.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)

HSG.GMD.A.1

Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume and surface area of a cylinder, pyramid, and cone

HSG.GMD.B.4

- Identify the shapes of two-dimensional cross-sections of three- dimensional objects
- Identify three-dimensional objects generated by rotations of two-dimensional objects

HSG.MG.A.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)

HSG.MG.A.2

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

HSG.MG.A.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)