Arkansas Tutorials are designed specifically for the Arkansas Standards found in the Curriculum Framework documents to prepare students in English, reading, writing, math and science tests.

Math Tutorials offer targeted instruction, practice and review designed to develop computational fluency, deepen conceptual understanding, and apply mathematical practices. They automatically identify and address learning gaps down to elementary-level content, using adaptive remediation to bring students to grade-level no matter where they start. Students engage with the content in an interactive, feedback-rich environment as they progress through standards-aligned modules. By constantly honing the ability to apply their knowledge in abstract and real world scenarios, students build the depth of knowledge and higher order skills required to demonstrate their mastery when put to the test.

In each module, the Learn It and Try It make complex ideas accessible to students through focused content, modeled logic and process, multi-modal representations, and personalized feedback as students reason through increasingly challenging problems. The Review It offers a high impact summary of key concepts and relates those concepts to students' lives. The Test It assesses students' mastery of the module's concepts, providing granular performance data to students and teachers after each attempt. To help students focus on the content most relevant to them, unit-level pretests and posttests can quickly identify where students are strong and where they're still learning.

Unit 1: Introduction to Geometry

- **POINTS, RAYS, LINE SEGMENTS, LINES, AND FIGURES**
  - HSG.CO.A.1: Congruence Investigate transformations in the plane 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.MG.A.1: Modeling with Geometry Apply geometric concepts in modeling situations Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).
- **PARALLEL AND PERPENDICULAR LINES**
  - HSG.CO.A.1: Congruence Investigate transformations in the plane 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.GPE.B.5: Expressing Geometric Properties with Equations Use coordinates to prove simple geometric theorems algebraically Prove the slope criteria for parallel and perpendicular lines. Use the slope criteria for parallel and perpendicular lines to solve geometric problems.

Unit 2: Lines and Angles

- **PARALLEL LINES AND ANGLE RELATIONSHIPS**

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- HSG.CO.C.9: Congruence Apply and prove geometric theorems Apply and prove theorems about lines and angles.
- HSG.CO.A.1: Congruence Investigate transformations in the plane 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.

- **PERPENDICULAR BISECTOR AND ANGLE BISECTOR THEOREMS**
  - HSG.CO.C.9: Congruence Apply and prove geometric theorems Apply and prove theorems about lines and angles.
  - HSG.CO.C.10: Congruence Apply and prove geometric theorems Apply and prove theorems about triangles.
  - HSG.CO.A.1: Congruence Investigate transformations in the plane 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.
- **SLOPE-INTERCEPT FORM OF A LINEAR EQUATION**
  - HSG.GPE.B.5: Expressing Geometric Properties with Equations Use coordinates to prove simple geometric theorems algebraically Prove the slope criteria for parallel and perpendicular lines. Use the slope criteria for parallel and perpendicular lines to solve geometric problems.

Unit 3: Coordinate Geometry

- **LENGTH AND THE DISTANCE FORMULA**
  - HSG.GPE.B.6: Expressing Geometric Properties with Equations Use coordinates to prove simple geometric theorems algebraically Find the midpoint between two given points; and find the endpoint of a line segment given the midpoint and one endpoint.
  - HSG.GPE.B.7: Expressing Geometric Properties with Equations Use coordinates to prove simple geometric theorems algebraically Use coordinates to compute perimeters of polygons and areas of triangles and rectangles.
  - HSG.MG.A.1: Modeling with Geometry Apply geometric concepts in modeling situations Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).
- **MIDPOINT FORMULA ON THE COORDINATE PLANE**
  - HSG.GPE.B.6: Expressing Geometric Properties with Equations Use coordinates to prove simple geometric theorems algebraically Find the midpoint between two given points; and find the endpoint of a line segment given the midpoint and one endpoint.
  - HSG.MG.A.1: Modeling with Geometry Apply geometric concepts in modeling situations 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.GPE.B.7: Expressing Geometric Properties with Equations Use coordinates to prove simple geometric theorems algebraically Use coordinates to compute perimeters of polygons and areas of

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triangles and rectangles.

- **CONJECTURES IN COORDINATE GEOMETRY**
  - HSG.CO.C.10: Congruence Apply and prove geometric theorems Apply and prove theorems about triangles.
  - HSG.GPE.B.4: Expressing Geometric Properties with Equations Use coordinates to prove simple geometric theorems algebraically Use coordinates to prove simple geometric theorems algebraically.

Unit 4: Perimeter and Area on the Coordinate Plane

- **PERIMETER ON THE COORDINATE PLANE**
  - HSG.GPE.B.7: Expressing Geometric Properties with Equations Use coordinates to prove simple geometric theorems algebraically Use coordinates to compute perimeters of polygons and areas of triangles and rectangles.
  - HSG.MG.A.1: Modeling with Geometry Apply geometric concepts in modeling situations 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.GPE.B.4: Expressing Geometric Properties with Equations Use coordinates to prove simple geometric theorems algebraically Use coordinates to prove simple geometric theorems algebraically.
- **AREA ON THE COORDINATE PLANE**
  - HSG.GPE.B.7: Expressing Geometric Properties with Equations Use coordinates to prove simple geometric theorems algebraically Use coordinates to compute perimeters of polygons and areas of triangles and rectangles.

Unit 5: Transformations on the Coordinate Plane

- **TRANSFORMATIONS ON THE COORDINATE PLANE**
  - HSG.CO.A.3: Congruence Investigate transformations in the plane Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and/or reflections that carry it onto itself.
  - HSG.CO.A.2: Congruence Investigate transformations in the plane Represent transformations in the plane (e.g. using transparencies, tracing paper, geometry software, etc.). 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).
  - HSG.CO.A.5: Congruence Investigate transformations in the plane Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure, (e.g., using graph paper, tracing paper, miras, geometry software, etc.). Specify a sequence of transformations that will carry a given figure onto another.
  - HSG.CO.B.6: Congruence Understand congruence in terms of rigid motions 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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- HSG.CO.A.4: Congruence Investigate transformations in the plane Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.
- HSG.SRT.A.1: Similarity, Right Triangles, and Trigonometry Understand similarity in terms of similarity transformations 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.A.2: Similarity, Right Triangles, and Trigonometry Understand similarity in terms of similarity transformations 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.

- **DILATIONS, TRANSLATIONS, ROTATIONS, AND REFLECTIONS**
  - HSG.CO.A.3: Congruence Investigate transformations in the plane Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and/or reflections that carry it onto itself.
  - HSG.CO.A.2: Congruence Investigate transformations in the plane Represent transformations in the plane (e.g. using transparencies, tracing paper, geometry software, etc.). 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).
  - HSG.CO.A.5: Congruence Investigate transformations in the plane Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure, (e.g., using graph paper, tracing paper, miras, geometry software, etc.). Specify a sequence of transformations that will carry a given figure onto another.
  - HSG.CO.B.6: Congruence Understand congruence in terms of rigid motions 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.
  - HSG.CO.A.4: Congruence Investigate transformations in the plane Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.
  - HSG.SRT.A.1: Similarity, Right Triangles, and Trigonometry Understand similarity in terms of similarity transformations 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.A.2: Similarity, Right Triangles, and Trigonometry Understand similarity in terms of similarity transformations Given two figures: Use the definition of similarity in terms of similarity

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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.

Unit 6: Congruence

- **TRIANGLES AND CONGRUENCE TRANSFORMATIONS**
  - HSG.CO.C.10: Congruence Apply and prove geometric theorems Apply and prove theorems about triangles.
  - HSG.CO.B.8: Congruence Understand congruence in terms of rigid motions 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).
  - HSG.CO.B.7: Congruence Understand congruence in terms of rigid motions 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.6: Congruence Understand congruence in terms of rigid motions 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.
  - HSG.SRT.B.5: Similarity, Right Triangles, and Trigonometry Apply and prove theorems involving similarity 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.A.2: Congruence Investigate transformations in the plane Represent transformations in the plane (e.g. using transparencies, tracing paper, geometry software, etc.). 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).
  - HSG.SRT.B.5: Similarity, Right Triangles, and Trigonometry Apply and prove theorems involving similarity 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.SRT.B.5: Similarity, Right Triangles, and Trigonometry Apply and prove theorems involving similarity 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.SRT.B.5: Similarity, Right Triangles, and Trigonometry Apply and prove theorems involving similarity 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.

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- **CONGRUENCE OF OTHER POLYGONS**
  - HSG.MG.A.1: Modeling with Geometry Apply geometric concepts in modeling situations 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.CO.A.5: Congruence Investigate transformations in the plane Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure, (e.g., using graph paper, tracing paper, miras, geometry software, etc.). Specify a sequence of transformations that will carry a given figure onto another.
  - HSG.CO.B.6: Congruence Understand congruence in terms of rigid motions 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.
  - HSG.CO.A.2: Congruence Investigate transformations in the plane Represent transformations in the plane (e.g. using transparencies, tracing paper, geometry software, etc.). 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).
  - HSG.CO.A.3: Congruence Investigate transformations in the plane Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and/or reflections that carry it onto itself.

Unit 7: Similarity

- **TRIANGLES AND SIMILARITY TRANSFORMATIONS**
  - HSG.CO.C.10: Congruence Apply and prove geometric theorems Apply and prove theorems about triangles.
  - HSG.SRT.B.4: Similarity, Right Triangles, and Trigonometry Apply and prove theorems involving similarity Use triangle similarity to apply and prove theorems about triangles.
  - HSG.SRT.A.2: Similarity, Right Triangles, and Trigonometry Understand similarity in terms of similarity transformations 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: Similarity, Right Triangles, and Trigonometry Apply and prove theorems involving similarity 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.SRT.B.5: Similarity, Right Triangles, and Trigonometry Apply and prove theorems involving similarity 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.

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- HSG.SRT.A.3: Similarity, Right Triangles, and Trigonometry Understand similarity in terms of similarity transformations Use the properties of similarity transformations to establish the AA, SAS, SSS criteria for two triangles to be similar.
- HSG.SRT.B.5: Similarity, Right Triangles, and Trigonometry Apply and prove theorems involving similarity 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.SRT.B.5: Similarity, Right Triangles, and Trigonometry Apply and prove theorems involving similarity 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.

- **SIMILARITY OF OTHER POLYGONS**
  - HSG.SRT.A.2: Similarity, Right Triangles, and Trigonometry Understand similarity in terms of similarity transformations 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.

Unit 8: Triangles

- **TRIANGLE ANGLE THEOREMS**
  - HSG.CO.C.10: Congruence Apply and prove geometric theorems Apply and prove theorems about triangles.
- **TRIANGLE BISECTORS**
  - HSG.CO.C.9: Congruence Apply and prove geometric theorems Apply and prove theorems about lines and angles.
  - HSG.CO.C.10: Congruence Apply and prove geometric theorems Apply and prove theorems about triangles.
  - HSG.SRT.B.4: Similarity, Right Triangles, and Trigonometry Apply and prove theorems involving similarity Use triangle similarity to apply and prove theorems about triangles.
  - HSG.SRT.B.5: Similarity, Right Triangles, and Trigonometry Apply and prove theorems involving similarity 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.SRT.B.5: Similarity, Right Triangles, and Trigonometry Apply and prove theorems involving similarity 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.D.12: Congruence Make geometric constructions Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding,

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dynamic geometric software, etc.).

- HSG.CO.D.13: Congruence Make geometric constructions Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.
- HSG.C.A.3: Circles Understand and apply theorems about circles Construct the inscribed and circumscribed circles of a triangle. Prove properties of angles for a quadrilateral inscribed in a circle.

- **MEDIANS AND ALTITUDES OF TRIANGLES**
  - HSG.CO.C.10: Congruence Apply and prove geometric theorems Apply and prove theorems about triangles.

Unit 9: Quadrilaterals and Constructions

- **CONSTRUCTIONS**
  - HSG.CO.D.12: Congruence Make geometric constructions Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.).
- **PARALLELOGRAMS AND RECTANGLES**
  - HSG.CO.C.11: Congruence Apply and prove geometric theorems Apply and prove theorems about quadrilaterals.
  - HSG.MG.A.1: Modeling with Geometry Apply geometric concepts in modeling situations Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).
- **SQUARES AND RHOMBI**
  - HSG.CO.C.11: Congruence Apply and prove geometric theorems Apply and prove theorems about quadrilaterals.
  - HSG.MG.A.1: Modeling with Geometry Apply geometric concepts in modeling situations Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).

Unit 10: Right Triangles and Trigonometric Ratios

- **PYTHAGOREAN THEOREM**
  - HSG.SRT.C.8: Similarity, Right Triangles, and Trigonometry Define trigonometric ratios and solve problems involving right triangles Use trigonometric ratios, special right triangles, and/or the Pythagorean Theorem to find unknown measurements of right triangles in applied problems.
  - HSG.MG.A.1: Modeling with Geometry Apply geometric concepts in modeling situations 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.SRT.B.4: Similarity, Right Triangles, and Trigonometry Apply and prove theorems involving similarity Use triangle similarity to apply and prove theorems about triangles.

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- HSG.SRT.B.5: Similarity, Right Triangles, and Trigonometry Apply and prove theorems involving similarity 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: Congruence Apply and prove geometric theorems Apply and prove theorems about triangles.

- **TRIGONOMETRIC RATIOS**
  - HSG.SRT.C.6: Similarity, Right Triangles, and Trigonometry Define trigonometric ratios and solve problems involving right triangles 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.8: Similarity, Right Triangles, and Trigonometry Define trigonometric ratios and solve problems involving right triangles Use trigonometric ratios, special right triangles, and/or the Pythagorean Theorem to find unknown measurements of right triangles in applied problems.
  - HSG.SRT.C.7: Similarity, Right Triangles, and Trigonometry Define trigonometric ratios and solve problems involving right triangles Explain and use the relationship between the sine and cosine of complementary angles.
  - HSG.SRT.B.5: Similarity, Right Triangles, and Trigonometry Apply and prove theorems involving similarity 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.MG.A.1: Modeling with Geometry Apply geometric concepts in modeling situations Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).

Unit 11: Trigonometry

- **RADIANS AND THE UNIT CIRCLE**
  - HSG.SRT.C.8: Similarity, Right Triangles, and Trigonometry Define trigonometric ratios and solve problems involving right triangles Use trigonometric ratios, special right triangles, and/or the Pythagorean Theorem to find unknown measurements of right triangles in applied problems.
  - HSG.C.B.5: Circles Find arc lengths and areas of sectors of circles 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.
- **LAWS OF SINE AND COSINE**
  - HSG.SRT.C.8: Similarity, Right Triangles, and Trigonometry Define trigonometric ratios and solve problems involving right triangles Use trigonometric ratios, special right triangles, and/or the Pythagorean Theorem to find unknown measurements of right triangles in applied problems.
  - HSG.SRT.D.9: Similarity, Right Triangles, and Trigonometry Apply trigonometric to general triangles 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.

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- HSG.SRT.D.10: Similarity, Right Triangles, and Trigonometry Apply trigonometric to general triangles Prove the Laws of Sines and Cosines and use them to solve problems.
- HSG.SRT.D.11: Similarity, Right Triangles, and Trigonometry Apply trigonometric to general triangles Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles.

Unit 12: Circles 1

- **CIRCLE BASICS**
  - HSG.C.A.2: Circles Understand and apply theorems about circles Identify, describe, and use relationships among angles, radii, segments, lines, arcs, and chords as related to circles.
  - HSG.CO.A.1: Congruence Investigate transformations in the plane 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.
- **CIRCLES**
  - HSG.CO.A.1: Congruence Investigate transformations in the plane 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.GPE.A.1: Expressing Geometric Properties with Equations Translate between the geometric description and the equation of a conic section 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.

Unit 13: Circles 2

- **CENTRAL ANGLES, INSCRIBED ANGLES, AND CHORDS**
  - HSG.C.A.2: Circles Understand and apply theorems about circles Identify, describe, and use relationships among angles, radii, segments, lines, arcs, and chords as related to circles.
  - HSG.CO.A.1: Congruence Investigate transformations in the plane 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.C.9: Congruence Apply and prove geometric theorems Apply and prove theorems about lines and angles.
  - HSG.C.A.3: Circles Understand and apply theorems about circles Construct the inscribed and circumscribed circles of a triangle. Prove properties of angles for a quadrilateral inscribed in a circle.
  - HSG.C.B.5: Circles Find arc lengths and areas of sectors of circles 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.
- **SECANTS, ANGLES, AND INTERCEPTED ARCS**
  - HSG.CO.A.1: Congruence Investigate transformations in the plane Based on the undefined notions of point, line, plane, distance along a line, and distance around a circular arc, define: angle, line

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segment, circle, perpendicular lines, parallel lines.

- HSG.CO.C.9: Congruence Apply and prove geometric theorems Apply and prove theorems about lines and angles.
- HSG.C.A.2: Circles Understand and apply theorems about circles Identify, describe, and use relationships among angles, radii, segments, lines, arcs, and chords as related to circles.

- **TANGENTS, ANGLES, AND INTERCEPTED ARCS**
  - HSG.CO.A.1: Congruence Investigate transformations in the plane 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.C.9: Congruence Apply and prove geometric theorems Apply and prove theorems about lines and angles.
  - HSG.C.A.2: Circles Understand and apply theorems about circles Identify, describe, and use relationships among angles, radii, segments, lines, arcs, and chords as related to circles.

Unit 14: Properties of Circles

- **CONGRUENT AND SIMILAR CIRCLES**
  - HSG.CO.A.1: Congruence Investigate transformations in the plane 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.C.A.1: Circles Understand and apply theorems about circles Prove that all circles are similar.
  - HSG.CO.A.4: Congruence Investigate transformations in the plane Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.
  - HSG.CO.B.6: Congruence Understand congruence in terms of rigid motions 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.
  - HSG.SRT.A.2: Similarity, Right Triangles, and Trigonometry Understand similarity in terms of similarity transformations 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.
- **CIRCUMFERENCE AND ARC LENGTH**
  - HSG.GMD.A.1: Geometric measurement and dimension Explain volume formulas and use them to solve problems Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone.
  - HSG.CO.A.1: Congruence Investigate transformations in the plane Based on the undefined notions of point, line, plane, distance along a line, and distance around a circular arc, define: angle, line

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segment, circle, perpendicular lines, parallel lines.

- HSG.MG.A.1: Modeling with Geometry Apply geometric concepts in modeling situations Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).

- **AREA OF CIRCLES AND SECTORS**
  - HSG.GMD.A.1: Geometric measurement and dimension Explain volume formulas and use them to solve problems Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone.
  - HSG.MG.A.1: Modeling with Geometry Apply geometric concepts in modeling situations 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.CO.A.1: Congruence Investigate transformations in the plane 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.C.B.5: Circles Find arc lengths and areas of sectors of circles 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.

Unit 15: Surface Area

- **SURFACE AREA AND VOLUME OF SPHERES**
  - HSG.GMD.A.2: Geometric measurement and dimension Explain volume formulas and use them to solve problems Give an informal argument using Cavalieris principle for the formulas for the volume of a sphere and other solid figures.
  - HSG.GMD.A.3: Geometric measurement and dimension Explain volume formulas and use them to solve problems 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).
  - HSG.GMD.B.4: Geometric measurement and dimension Visualize relationships between two-dimensional and three-dimensional objects 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: Modeling with Geometry Apply geometric concepts in modeling situations Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).
- **SURFACE AREA OF COMPOSITE SOLIDS**
  - HSG.MG.A.1: Modeling with Geometry Apply geometric concepts in modeling situations Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).
- **SURFACE AREA OF SIMILAR SOLIDS**

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- HSG.MG.A.1: Modeling with Geometry Apply geometric concepts in modeling situations Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).

Unit 16: Volume 1

- **RELATING TWO-DIMENSIONAL FIGURES TO THREE-DIMENSIONAL SOLIDS**
  - HSG.GMD.B.4: Geometric measurement and dimension Visualize relationships between two-dimensional and three-dimensional objects Identify the shapes of two-dimensional cross-sections of three- dimensional objects. Identify three-dimensional objects generated by rotations of two-dimensional objects.
- **VOLUME OF PRISMS AND PYRAMIDS**
  - HSG.GMD.A.2: Geometric measurement and dimension Explain volume formulas and use them to solve problems Give an informal argument using Cavalieris principle for the formulas for the volume of a sphere and other solid figures.
  - HSG.GMD.B.4: Geometric measurement and dimension Visualize relationships between two-dimensional and three-dimensional objects Identify the shapes of two-dimensional cross-sections of three- dimensional objects. Identify three-dimensional objects generated by rotations of two-dimensional objects.
  - HSG.GMD.A.1: Geometric measurement and dimension Explain volume formulas and use them to solve problems Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone.
  - HSG.GMD.A.2: Geometric measurement and dimension Explain volume formulas and use them to solve problems Give an informal argument using Cavalieris principle for the formulas for the volume of a sphere and other solid figures.
  - HSG.GMD.A.3: Geometric measurement and dimension Explain volume formulas and use them to solve problems 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).
  - HSG.MG.A.1: Modeling with Geometry Apply geometric concepts in modeling situations 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.GMD.A.2: Geometric measurement and dimension Explain volume formulas and use them to solve problems Give an informal argument using Cavalieris principle for the formulas for the volume of a sphere and other solid figures.
- **VOLUME OF CYLINDERS AND CONES**
  - HSG.GMD.A.1: Geometric measurement and dimension Explain volume formulas and use them to solve problems Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone.

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- HSG.GMD.A.2: Geometric measurement and dimension Explain volume formulas and use them to solve problems Give an informal argument using Cavalieris principle for the formulas for the volume of a sphere and other solid figures.
- HSG.GMD.A.3: Geometric measurement and dimension Explain volume formulas and use them to solve problems 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).
- HSG.GMD.A.2: Geometric measurement and dimension Explain volume formulas and use them to solve problems Give an informal argument using Cavalieris principle for the formulas for the volume of a sphere and other solid figures.
- HSG.MG.A.1: Modeling with Geometry Apply geometric concepts in modeling situations 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.GMD.A.2: Geometric measurement and dimension Explain volume formulas and use them to solve problems Give an informal argument using Cavalieris principle for the formulas for the volume of a sphere and other solid figures.
- HSG.GMD.B.4: Geometric measurement and dimension Visualize relationships between two-dimensional and three-dimensional objects Identify the shapes of two-dimensional cross-sections of three- dimensional objects. Identify three-dimensional objects generated by rotations of two-dimensional objects.

Unit 17: Volume 2

- **MODELING SITUATIONS WITH GEOMETRY**
  - HSG.MG.A.2: Modeling with Geometry Apply geometric concepts in modeling situations 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: Modeling with Geometry Apply geometric concepts in modeling situations 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).
- **VOLUME OF COMPOSITE SOLIDS**
  - HSG.MG.A.1: Modeling with Geometry Apply geometric concepts in modeling situations 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.GMD.A.3: Geometric measurement and dimension Explain volume formulas and use them to solve problems 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).
  - HSG.GMD.A.2: Geometric measurement and dimension Explain volume formulas and use them to solve problems Give an informal argument using Cavalieris principle for the formulas for the volume

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of a sphere and other solid figures.

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