Geometry Pacing Guide

Neshoba Central High School

#OneNeshoba

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|  | **Geometry Mississippi College- and Career-Readiness Standards for Mathematics** |
| **NCHS**  **1st Nine Weeks** | **Unit 1 – Rigid Motions**  I can identify and define transformations and composite transformations.  I can perform transformations and composite transformations.  I can determine the congruence of two figures using rigid motions.  I can apply transformations and composite transformations to figures in the coordinate plane.  I can map a figure onto itself using transformations.  I can explain triangle criteria for congruence.  **Congruence G-CO**  **A. Experiment with transformations in the plane.**  3. Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.1  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).  4. Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.  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.  **B. Understand congruence in terms of rigid motions.**  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.  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.  1A trapezoid is defined as “A quadrilateral with at least one pair of parallel sides.”  **Unit 2 – Tools of Geometry**  I can use basic terms in geometry: angle, perpendicular line, parallel line, and line segment.  I can create basic geometric objects based on their definitions: median, angle bisector, altitude, perpendicular bisector, midsegment.  I can use tools and methods to perform formal constructions.  I can solve problems using points of concurrency.  **Congruence G-CO**  **A. Experiment with transformations in the plane.**  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.  **C. Prove geometric theorems.**  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.  **D. Make geometric constructions.**  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.  G-CO 13. Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.  **Circles G-C**  **A. Understand and apply theorems about circles**.  3. Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle. |
| **NCHS**  **2nd Nine Weeks** | **Unit 3 – Geometric Relationships and Properties – Angles**  I can use inductive and deductive reasoning to make conclusions about statements, converses, inverses, and contrapositives.  I can use and prove theorems about special pairs of angles.  I can solve problems using parallel lines.  I can prove theorems about parallel lines.  **Congruence G-CO**  **C. Prove geometric theorems.**  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.  **Unit 4 – Geometric Relationships and Properties – Triangles**  I can solve problems using triangles.  I can prove theorems about angles in triangles.  I can solve problems using congruent triangles.  I can explain criteria for triangle congruence.  **Congruence G-CO**  **C. Prove geometric theorems**.  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.  **B. Understand congruence in terms of rigid motions.**  8. Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.  **Unit 5 – Geometric Relationships and Properties – Polygons**  I can recognize properties of special quadrilaterals.  I can use properties of special quadrilaterals to solve problems.  I can prove theorems about special quadrilaterals.  I can determine sufficient conditions for naming special quadrilaterals.  **Congruence G-CO**  **C. Prove geometric theorems.**  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. |

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| **NCHS**  **3rd Nine Weeks** | **Unit 6 – Similarity**  I can identify, define, and perform dilations.  I can determine the similarity of two figures using similarity transformations.  I can prove theorems about triangles.  I can solve for and prove relationships in geometric figures using similarity criteria.  **Similarity G-SRT**  **A. Understand similarity in terms of similarity transformations**  1. Verify experimentally the properties of dilations given by a center and a scale factor:  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.  b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor.  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.  3. Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.  Prove theorems involving similarity  **B. Prove theorems using similarity.**  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.  5. Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.  **Circles G-C**  **A. Understand and apply theorems about circles**  1. Prove that all circles are similar.  **Unit 7 – Right Triangles**  I can use the Pythagorean Theorem to solve right triangles in applied problems.  I can solve special right triangles.  I can use trigonometric ratios to solve right triangles.  I can use trigonometric ratios and special right triangle ratios to solve right triangles in applied problems.  **Similarity G-SRT**  **C. Define trigonometric ratios and solve problems involving right triangles**  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.2  7. Explain and use the relationship between the sine and cosine of complementary angles.  8. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.3★  ★Modeling is best interpreted not as a collection of isolated topics but rather in relation to other standards. Making mathematical models is a Standard for Mathematical Practice, and specific modeling standards appear throughout the high school standards indicated by a star symbol.  2Trigonometric ratios include sine, cosine, tangent, cotangent, secant, and cosecant.  3Tasks have multiple steps. Tasks have a context.  **Unit 8 – Circles**  I can use relationships between angles and arcs in circles to solve for missing measures.  I can use relationships between secants, chords, and tangents in circles to solve for missing measures.  I can use similarity to calculate arc length and area of a sector.  I can prove relationships between secants, chords, and tangent in circles.  **Circles: G-C**  **A. Understand and apply theorems about circles**  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.  4. (+) Construct a tangent line from a point outside a given circle to the circle.  **B. Find arc lengths and areas of sectors of circles**  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. |

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| **NCHS**  **4th Nine Weeks** | **Unit 9 – Coordinate Geometry**  I can represent and use vertices of a geometric figure in the coordinate plane. G-GPE 4  I can use the equation of a circle in the coordinate plane to solve problems. G-GPE 1  I can use slope, distance, and midpoint along with properties of geometric objects to verify claims about the objects. G-GPE 4, G-GPE 5, G-GPE 7  I can partition a segment in a given ratio. G-GPE 6  **Expressing Geometric Properties with Equations G-GPE**  **A. Translate between the geometric description and the equation for a conic section**  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.  **B. Use coordinates to prove simple geometric theorems algebraically**  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, √3) lies on the circle centered at the origin and containing the point (0, 2).  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).  6. Find the point on a directed line segment between two given points that partitions the segment in a given ratio.  7. Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.★  ★Modeling is best interpreted not as a collection of isolated topics but rather in relation to other standards. Making mathematical models is a Standard for Mathematical Practice, and specific modeling standards appear throughout the high school standards indicated by a star symbol.  **Unit 10 – Geometric Measure and Dimension**  I can use formulas to calculate area and volume.  I can identify cross-sections of 3-D objects, and I can identify the 3-D objects formed by rotating 2-D objects.  I can explain the formulas for area and volume.  I can calculate the area and volume of geometric objects to solve problems.  **Geometric Measurement and Dimension G-GMD**  **A. Explain volume formulas and use them to solve problems**  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.  2. (+) Give an informal argument using Cavalieri’s principle for the formulas for the volume of a sphere and other solid figures.  3. Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.★  **B. Visualize relationships between two-dimensional and three-dimensional objects**  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.  ★Modeling is best interpreted not as a collection of isolated topics but rather in relation to other standards. Making mathematical models is a Standard for Mathematical Practice, and specific modeling standards appear throughout the high school standards indicated by a star symbol.  **Unit 11 – Modeling with Geometry**  I can use geometry to solve a design problem and make valid conclusions.  I can estimate and calculate measures as needed to solve problems.  I can decompose geometric shapes into manageable parts.  I can create a visual representation of a design problem.  **Modeling with Geometry G-MG**  **A. Apply geometric concepts in modeling situations**  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).★  2. Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).★  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).★  ★Modeling is best interpreted not as a collection of isolated topics but rather in relation to other standards. Making mathematical models is a Standard for Mathematical Practice, and specific modeling standards appear throughout the high school standards indicated by a star symbol. |