



Alignment Document
State of Indiana and Aventa Learning Geometry

Geometry
2005-2007 Benchmark Blueprint

| Standards | Benchmarks | Unit Name | Course Topic Description |
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| G.1 Students find lengths and midpoints of line segments. They describe and use parallel and perpendicular lines. They find slopes and equations of lines. | G.1.1 Find the lengths and midpoints of line segments in one- or two-dimensional coordinate systems. | Connections From Algebra | Measuring Segments |
| | | Connections From Algebra | Measuring a the Length of a Segment Using a Number Line |
| | | Parallel Lines and Coordinate Plane | Length of a Segment on a Coordinate Plane |
| | | Parallel Lines and Coordinate Plane | Midpoint of a Segment |
| | G.1.2 Construct congruent segments and angles, angle bisectors, and parallel and perpendicular lines using a straight edge and compass, explaining and justifying the process used. | Connections From Algebra | Bisecting a Segment |
| | | Connections From Algebra | Bisector of an Angle |
| | | Connections From Algebra | Perpendicular-Bisector of a Segment |
| | | Parallel Lines and Coordinate Plane | Construction of a Line Parallel to an Axis Through a Point |
| | Parallel Lines and Coordinate Plane | Relationships Between Two Lines on a Plane | |



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| | <p>G.1.3 Understand and use the relationships between special pairs of angles formed by parallel lines and transversals.</p> | <p>Connections From Algebra</p> <p>Connections From Algebra</p> <p>Connections From Algebra</p> <p>Connections From Algebra</p> <p>Connections From Algebra</p> <p>Parallel Lines and the Coordinate Plane</p> <p>Parallel Lines and the Coordinate Plane</p> | <p>Vertical Angles</p> <p>Adjacent Angles</p> <p>Supplementary Angles</p> <p>Complementary Angles</p> <p>Right Angles and Perpendicular Lines</p> <p>Postulates about Parallel Lines</p> <p>Angles Formed by Parallel Lines and their Transversals</p> |
| | <p>G.1.4 Use coordinate geometry to find slopes, parallel lines, perpendicular lines, and equations of lines.</p> | <p>Parallel Lines and the Coordinate Plane</p> <p>Parallel Lines and the Coordinate Plane</p> <p>Parallel Lines and the Coordinate Plane</p> <p>Parallel Lines and the Coordinate Plane</p> <p>Parallel Lines and the Coordinate Plane</p> | <p>Important Theorems About Parallel and Transversal Lines</p> <p>How to Write the Equation of a Line</p> <p>How to Display a Line on the Coordinate Plane</p> <p>Slope-Intercept Form</p> <p>Point-Slope Form</p> |
| <p>G.2 Students identify and describe polygons and measure interior and exterior angles. They use congruence, similarity, symmetry,</p> | <p>G.2.1 Identify and describe convex, concave, and regular polygons.</p> | <p>Quadrilaterals and Polygons</p> | <p>What are Polygons?</p> |

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| tessellations, and transformations. They find measures of sides, perimeters, and areas. | | Quadrilaterals and Polygons | Types of Polygons |
| | G.2.2 Find measures of interior and exterior angles of polygons, justifying the method used. | Quadrilaterals and Polygons | Angle Measures in Polygons |
| | G.2.3 Use properties of congruent and similar polygons to solve problems. | Triangles: Basic Closed Figures in Geometry | Congruence of Geometric Figures |
| | | Quadrilaterals and Polygons | Parallelograms |
| | | Similarity | What are Similar Figures? |
| | | Similarity | Similar Polygons |
| | G.2.4 Apply transformations (slides, flips, turns, expansions, and contractions) to polygons in order to determine congruence, similarity, symmetry, and tessellations. Know that images formed by slides, flips and turns are congruent to the original shape. | | |
| G.2.5 Find and use measures of sides, perimeters, and areas of polygons, and relate these measures to each other using formulas. | Quadrilaterals and Polygons | Application of Pythagorean Theorem in Squares | |
| | Quadrilaterals and Polygons | Properties of Diagonals in Squares and Rectangles | |
| G.2.6 Use coordinate geometry to prove properties of polygons such as regularity, congruence, and similarity. | | | |
| G.3 Students identify and describe simple quadrilaterals. They use congruence and similarity. They find measures of sides, perimeters, and areas. | G.3.1 Describe, classify, and understand relationships among the quadrilaterals square, rectangle, rhombus, parallelogram, trapezoid, and kite. | Quadrilaterals and Polygons | What are Quadrilaterals? |
| | | Quadrilaterals and Polygons | Main Classes of Quadrilaterals |
| | | Quadrilaterals and Polygons | A Square and Its Properties |

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| | | <p>Quadrilaterals and Polygons</p> <p>Quadrilaterals and Polygons</p> <p>Quadrilaterals and Polygons</p> <p>Quadrilaterals and Polygons</p> <p>Similarity</p> | <p>Rectangles and Their Properties</p> <p>What are Parallelograms?</p> <p>The Rhombus</p> <p>Trapezoids</p> <p>Similar Quadrilaterals</p> |
| | G.3.2 Use properties of congruent and similar quadrilaterals to solve problems involving lengths and areas. | | |
| | G.3.3 Find and use measures of sides, perimeters, and areas of quadrilaterals, and relate these measures to each other using formulas. | <p>Perimeters and Areas</p> <p>Perimeters and Areas</p> <p>Perimeters and Areas</p> <p>Perimeters and Areas</p> <p>Perimeters and Areas</p> <p>Perimeters and Areas</p> <p>Perimeters and Areas</p> | <p>Area of Polygon</p> <p>Perimeter of Regular Polygon</p> <p>Area and Perimeter of a Square</p> <p>Area and Perimeter of Rectangle</p> <p>Area and Perimeter of Parallelogram</p> <p>Area and Perimeter of Rhombus</p> <p>Area and Perimeter of Trapezoid</p> |
| | G.3.4 Use coordinate geometry to prove properties of quadrilaterals such as regularity, congruence, and similarity. | | |
| G.4 Students identify and describe types of triangles. They identify and draw altitudes, medians, and angle bisectors. They use | G.4.1 Identify and describe triangles that are right, acute, obtuse, scalene, isosceles, equilateral, and equiangular. | Connections From Algebra | How to Classify Angles |



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| <p>congruence and similarity. They find measures of sides, perimeters, and areas. They apply inequality theorems.</p> | | <p>Triangles: Basic Closed Figures in Geometry</p> <p>Triangles: Basic Closed Figures in Geometry</p> <p>Special Triangles and Special Relationships in Triangles</p> <p>Special Triangles and Special Relationships in Triangles</p> <p>Special Triangles and Special Relationships in Triangles</p> <p>Special Triangles and Special Relationships in Triangles</p> <p>Special Triangles and Special Relationships in Triangles</p> | <p>Classification of Triangles</p> <p>Angle Based Classification of Triangles</p> <p>Isosceles Triangle and its Parts</p> <p>Equilateral or Equiangular Triangle</p> <p>Right Triangles</p> <p>Special Right Triangles</p> <p>45-45-90 Triangle (Isosceles Right Triangle)</p> |
| | <p>G.4.2 Define, identify, and construct altitudes, medians, angle bisectors, and perpendicular bisectors.</p> | <p>Triangles: Basic Closed Figures in Geometry</p> <p>Triangles: Basic Closed Figures in Geometry</p> <p>Triangles: Basic Closed Figures in Geometry</p> <p>Triangles: Basic Closed Figures in Geometry</p> | <p>Special Segments in Triangles</p> <p>Altitude</p> <p>Median</p> <p>Angle Bisector</p> <p>Perpendicular Bisectors</p> |

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| | <p>Special Triangles and Special Relationships in Triangles</p> <p>Special Triangles and Special Relationships in Triangles</p> <p>Special Triangles and Special Relationships in Triangles</p> <p>Special Triangles and Special Relationships in Triangles</p> | <p>Properties of Medians of Isosceles Triangle</p> <p>Properties of Altitudes of Isosceles Triangle</p> <p>Properties of Angle Bisectors of Isosceles Triangle</p> <p>Properties of Perpendicular Bisectors of Isosceles Triangle</p> |
| G.4.3 Construct triangles congruent to given triangles. | | |
| G.4.4 Use properties of congruent and similar triangles to solve problems involving lengths and areas. | Similarity | What are Similar Triangles? |
| G.4.5 Prove and apply theorems involving segments divided proportionally. | | |
| G.4.6 Prove that triangles are congruent or similar and use the concept of corresponding parts of congruent triangles. | <p>Triangles: Basic Closed Figures in Geometry</p> <p>Triangles: Basic Closed Figures in Geometry</p> <p>Triangles: Basic Closed Figures in Geometry</p> <p>Triangles: Basic Closed Figures in Geometry</p> <p>Triangles: Basic Closed Figures in Geometry</p> | <p>Congruent Postulate 1 (SAS Postulate)</p> <p>Postulate 2 (ASA Postulate)</p> <p>Postulate 3 (SSS Postulate)</p> <p>Postulate 4 (AAS Postulate)</p> <p>Postulate 5 (HL Postulate)</p> |

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| | | Special Triangles and Special Relationships in Triangles | When Two Equilateral Triangles Are Congruent? |
| | G.4.7 Find and use measures of sides, perimeters, and areas of triangles, and relate these measures to each other using formulas. | Perimeters and Areas | The Area of a Triangle |
| | G.4.8 Prove, understand, and apply the inequality theorems: triangle inequality, inequality in one triangle, and hinge theorem. | Special Triangles and Special Relationships in Triangles | Triangle Inequalities: Side-Angle Inequality in a Triangle |
| | | Special Triangles and Special Relationships in Triangles | Exterior Angle Inequality |
| | | Special Triangles and Special Relationships in Triangles | Shortest Distance Between a Point and a Line |
| | G.4.9 Use coordinate geometry to prove properties of triangles such as regularity, congruence, and similarity. | | |
| G.5 Students prove the Pythagorean Theorem and use it to solve problems. They define and apply the trigonometric relations sine, cosine, and tangent. | G.5.1 Prove and use the Pythagorean Theorem | Special Triangles and Special Relationships in Triangles | Pythagorean Theorem |
| | | The Right Triangle and Trigonometry | Review of Pythagorean Theorem |
| | G.5.2 State and apply the relationships that exist when the altitude is drawn to the hypotenuse of a right triangle. | Triangles: Basic Closed Figures in Geometry | Postulate 5 (HL Postulate) |
| | G.5.3 Use special right triangles ($30^\circ - 60^\circ$ and $45^\circ - 45^\circ$) to solve problems. | Special Triangles and Special Relationships in Triangles | Isosceles Triangle and its Parts |
| Special Triangles and Special Relationships in Triangles | | Equilateral or Equiangular Triangle | |

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| | | Triangles Special Triangles and Special Relationships in Triangles Special Triangles and Special Relationships in Triangles Special Triangles and Special Relationships in Triangles The Right Triangle and Trigonometry | Right Triangles Special Right Triangles 45-45-90 Triangle (Isosceles Right Triangle) Indirect Measurement |
| | G.5.4 Define and use the trigonometric functions (sine, cosine, tangent, cosecant, secant, cotangent) in terms of angles of right triangles. | The Right Triangle and Trigonometry The Right Triangle and Trigonometry The Right Triangle and Trigonometry The Right Triangle and Trigonometry | Special Ratios in a Right Triangle Relationships Between Trigonometric Ratios Special Segments in Triangles Law of Cosines |
| | G.5.5 Know and use the relationship $\sin^2x + \cos^2x = 1$. | The Right Triangle and Trigonometry | Relationships Between Trigonometric Ratios |
| | G.5.6 Solve word problems involving right triangles. | | |
| G.6 Students define ideas related to circles: e.g., radius, tangent. They find measures of angles, lengths, and areas. They prove theorems about circles. They find equations of circles. | G.6.1 Find the center of a given circle. Construct the circle that passes through three given points not on a line. | Circles Circles | Standard Equation of a Circle Equation of a Circle with Radius R units and Center at (a, b) |
| | G.6.2 Define and identify relationships among: | Circles | Arcs and Special segments |

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| | radius, diameter, arc, measure of an arc, chord, secant, and tangent. | Circles Perimeters and Areas Perimeters and Areas Perimeters and Areas | Theorems About Chords and Tangents Circumference of a Circle Area of a Circle Sector of a Circle and Its Area |
| | G.6.3 Prove theorems related to circles. | Circles | Theorems About Chords and Tangents |
| | G.6.4 Construct tangents to circles, and circumscribe and inscribe circles. | Circles Circles | Central Angles Inscribed Angles |
| | G.6.5 Define, find, and use measures of arcs and related angles (central, inscribed, and intersections of secants and tangents). | Circles Circles Circles Circles | Special Angles in Circles: Central Angles Inscribed Angles Tangent-Chord Angles Arcs and Special segments |
| | G.6.6 Define and identify congruent and concentric circles. | | |
| | G.6.7 Define, find, and use measures of circumference, arc length, and areas of circles and sectors. Use these measures to solve problems. | Perimeters and Areas Perimeters and Areas Perimeters and Areas | Circumference of a Circle Area of a Circle Sector of a Circle and Its Area |
| | G.6.8 Find the equation of a circle in the coordinate plane in terms of its center and radius. | Circles Circles | Standard Equation of a Circle Equation of a Circle with Radius R units and Center at (a, b) |
| G.7 Students describe and make polyhedra and other solids. They describe relationships and symmetries, and use congruence and similarity. | G.7.1 Describe and make regular and nonregular polyhedra. G.7.2 Describe the polyhedron that can be | | |

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| | made from a given net (or pattern). Describe the net for a given polyhedron. | | |
| | G.7.3 Describe relationships between the faces, edges, and vertices of polyhedra. | | |
| | G.7.4 Describe symmetries of geometric solids. | | |
| | G.7.5 Describe sets of points on spheres: chords, tangents, and great circles. | | |
| | G.7.6 Identify and know properties of congruent and similar solids. | | |
| | G.7.7 Find and use measures of sides, volumes of solids, and surface areas of solids, and relate these measures to each other using formulas. | | |
| G.8 Mathematical Reasoning and Problem Solving | G.8.1 Use a variety of problem-solving strategies, such as drawing a diagram, making a chart, guess-and-check, solving a simpler problem, writing an equation, and working backwards. | Covered throughout the course | |
| | G.8.2 Decide whether a solution is reasonable in the context of the original situation. | Covered throughout the course | |
| | G.8.3 Make conjectures about geometric ideas. Distinguish between information that supports a conjecture and proof of a conjecture. | Reasoning and Introduction to Proof! | Conjecture |
| | | Reasoning and Introduction to Proof! | Counterexamples |
| | | Reasoning and Introduction to Proof! | Geometric Induction |
| G.8.4 Write and interpret statements of the form "if - then" and "if and only if." | Reasoning and Introduction to Proof! | If-Then Statements, Converses, and Postulates | |
| | Reasoning and Introduction to Proof! | Compound Statements | |
| G.8.5 State, use, and examine the validity of the converse, inverse, and contrapositive of "if - then" statements. | Reasoning and Introduction to Proof! | If-Then Statements, Converses, and Postulates | |
| | Reasoning and | Compound Statements | |

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| | | Introduction to Proof! | |
| | | Reasoning and Introduction to Proof! | Postulates and Converses |
| G.8.6 Identify and give examples of undefined terms, axioms, and theorems, and inductive and deductive proof. | | Reasoning and Introduction to Proof! | Inductive Reasoning |
| | | Reasoning and Introduction to Proof! | Recognizing Number Patterns By Inductive Method |
| | | Reasoning and Introduction to Proof! | Geometric Induction |
| | | Reasoning and Introduction to Proof! | Deductive Reasoning |
| | | Reasoning and Introduction to Proof! | Law of Detachment |
| G.8.7 Construct logical arguments, judge their validity, and give counterexamples to disprove statements. | | Reasoning and Introduction to Proof! | Using Algebraic Properties in Geometric Proofs |
| | | Reasoning and Introduction to Proof! | A Sample Geometric Proof Using Algebraic Postulates |
| | | Reasoning and Introduction to Proof! | Two Column Proof With Segments and Angles |
| | | Reasoning and Introduction to Proof! | Developing a Two Column Proof |
| G.8.8 Write geometric proofs, including proofs by contradiction and proofs involving coordinate geometry. Use and compare a variety of ways to present deductive proofs, such as flow charts, paragraphs, and two-column and indirect proofs. | | Reasoning and Introduction to Proof! | Using Algebraic Properties in Geometric Proofs |
| | | Reasoning and Introduction to Proof! | A Sample Geometric Proof Using Algebraic Postulates |
| | | Reasoning and Introduction to Proof! | Two Column Proof With Segments and Angles |



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| | | Reasoning and Introduction to Proof! | Developing a Two Column Proof |
| | | Special Triangles and Special Relationships in Triangles | Triangle Inequalities: Indirect Proof |
| | <p>G.8.9 Perform basic constructions, describing and justifying the procedures used. Distinguish between constructing and drawing geometric figures.</p> | Connections From Algebra | Bisecting a Segment |
| | | Connections From Algebra | Bisector of an Angle |
| | | Parallel Lines and Coordinate Plane | Construction of a Line Parallel to an Axis Through a Point |