

CURRICULUM

GUIDE

Geometry

Providence
Schools

QUARTER I

Content students have to learn

Processes students will learn and use

Unit 1.1 – Points, Lines, and Planes (11 days)

- Make and verify conjectures about relationships among points, lines, and planes, including intersecting lines and planes.
- Determine segment lengths, including appropriate measurement with a ruler and interpreting diagrams.
- Use appropriate units of measure to explain and justify classifications of angles.
- Understand and apply angle measures and relationships, including congruent angles, angle bisectors, and perpendicular lines, to solve meaningful problems.
- Extend the notion of segment length to one and two-dimensional coordinate systems.
- Extend the Pythagorean theorem to develop the distance formula for a two-dimensional coordinate plane, and then apply the distance formula to solve real-world problems.
- Develop midpoint formulas for one- and two-dimensional coordinate systems and apply those formulas to solve real-world problems.

- » Make and verify conjectures about segment and angle relationships.
- » Use problem-solving strategies to solve problems involving angle relationships, segment length, distance, and midpoint.
- » Explore situations involving segment and angle relationships using multiple methods, including appropriate technology.
- » Use constructions (such as compass/straight edge, patty paper, or dynamic geometry software) to investigate angle relationships.
- » Use computation strategies, estimation, and measurement in justifying conclusions and results regarding distance and midpoint problems.

Unit 1.2 – Reasoning and Proof (7 days)

- Understand and explain inductive and deductive reasoning.
- Investigate the use of postulates, axioms, and theorems in formal and informal proofs.
- Use algebraic proofs within geometric contexts.
- Develop logical thinking and formal proof through relationships among segments and angles.

- » Use informal and formal reasoning and proof to explain and justify conclusions.
- » Draw logical conclusions and make generalizations using deductive and inductive reasoning.
- » Use reasoning and proof to formulate, test, and justify mathematical conjectures and arguments.
- » Explain and justify thinking and develop a problem-solving model that incorporates understanding the problem.
- » Evaluate the effectiveness of different representations to communicate ideas: formulate questions, conjectures, definitions, and generalizations about data, information, and problem situations.

Unit 1.3 – Perpendicular and Parallel Lines (7 days)

- Use concrete models to explore and explain the angle relationships created by parallel lines and a transversal.
- Understand and explain the relationships among angles that are created by parallel lines and a transversal, such as congruent angles and supplementary angles.
- Apply the relationships among the measures of angles that are created by parallel lines and a transversal, including congruent and supplementary angle relationships.

- » Make and verify conjectures about parallel and perpendicular lines.
- » Use a variety of methods of proof, both informal and formal, to justify conclusions about parallel and perpendicular lines.
- » Use problem-solving strategies to solve problems involving parallel and perpendicular lines.

QUARTER I

Content students have to learn

Processes students will learn and use

- Make and verify conjectures about patterns of slopes of parallel and perpendicular lines using multiple methods, including technology such as graphing calculators or dynamic geometry software.

Unit 1.4 – Triangle Congruence (15 days)

- Use geometric properties to solve problems involving side and angle relationships within and among triangles, including real-world applications.
- Prove triangles to be congruent using a variety of methods of proof, both formal and informal.
- Develop properties of isosceles and equilateral triangles using concrete models and technology as appropriate, and then apply those properties to solve real-world problems.
- Construct and investigate special segments of triangles, including angle bisectors, perpendicular bisectors, medians, and altitudes.
- Investigate and apply triangle inequalities, including the triangle inequality theorem.

- » Explore situations involving parallel and perpendicular lines using multiple methods including appropriate technology.

- » Make and verify conjectures about properties of triangles such as the angle sum theorem, exterior angle theorem, or triangle congruence postulates, using inductive reasoning.
- » Use a variety of methods of proof, both informal and formal, to justify conclusions about congruent triangles.
- » Use problem-solving strategies to solve problems involving triangles and congruent triangles.
- » Explore situations involving triangles and congruent triangles using multiple methods including appropriate technology.
- » Use computation strategies, estimation, and measurement in justifying conclusions and results in solving problems about triangles and congruent triangles.

QUARTER 2

Content students have to learn

Processes students will learn and use

Unit 2.1 – Polygons (15 days)

- Understand and apply interior and exterior angle relationships in polygons in order to construct geometric arguments and solve problems.
- Develop and use properties and relationships of quadrilaterals to justify conclusions and solve problems.

- » Select or develop an appropriate problem-solving strategy from a variety of different types.
- » Use informal and formal reasoning and proof to explain and justify conclusions.
- » Use appropriate representations, including appropriate measures and units, concrete models, and technology, to solve problems involving quadrilaterals.

Unit 2.2 – Similarity (20 days)

- Apply properties of similar geometric figures to solve problems and justify conclusions.
- Prove that two triangles are similar.
- Apply properties of figures with proportional parts to solve meaningful problems and justify conclusions.
- Investigate and apply dilations.

- » Use computation strategies, estimation, and measurement in justifying conclusions and results.
- » Select or develop an appropriate problem-solving strategy from a variety of different types.
- » Reflect on solutions and the problem-solving process for a given situation and refine strategies as needed.
- » Use a variety of methods of proof, both formal and informal, to show that two triangles are similar.

Unit 2.3 – Transformations on the Coordinate Plane (11 days)

- Make and verify conjectures about transformations, including reflections, translations, rotations, and dilations.
- Apply concepts and procedures of congruence to solve problems involving reflections, translations, and rotations.
- Apply concepts and procedures of similarity to solve problems involving dilations.

- » Use computation strategies, estimation, and measurement in justifying conclusions and results.
- » Use a variety of tools, including concrete models and technology, to make predictions and justify conclusions.
- » Choose from a variety of representations and mathematical language to describe congruence and similarity transformations.

QUARTER 3

Content students have to learn

Processes students will learn and use

Unit 3.1 – Pythagorean Theorem (10 days)

- Connect the Pythagorean theorem's algebraic representation to a variety of geometric representations.
- Use the Pythagorean theorem to solve realworld problems in a variety of contexts.
- Make and defend conjectures in order to generalize Pythagorean relationships, including Pythagorean triples and Pythagorean inequalities from tables of data and number patterns.
- Explore and describe properties of special right triangles as extensions of similar triangles.

- » Use computation strategies, estimation, and measurement, including estimation of square roots, in justifying conclusions and results.
- » Use a variety of tools, including concrete models and technology, to make predictions and justify conclusions.
- » Examine multiple methods for solving a problem and arriving at the correct solution.

Unit 3.2 – Trigonometry (11 days)

- Use concrete models or technology to develop the concept of trigonometric ratios (sine, cosine, and tangent) using similar right triangles.
- Apply trigonometric ratios to determine missing angle measures and side lengths of right triangles.
- Use trigonometric ratios to solve real-world indirect measurement problems, including the use of angles of elevation and angles of depression.

- » Use appropriate representations, such as geometric models or algebraic symbols, to communicate the mathematics in a real-world situation.
- » Use inductive reasoning to develop important ideas.
- » Use technology to solve real-world problems.
- » Examine multiple methods for solving a problem and arriving at the correct solution.

Unit 3.3 – Area and Perimeter (20 days)

- Identify, classify, and describe polygons and circles by their component parts.
- Develop and apply area formulas for circles, polygons, and composite figures to solve theoretical and real-world problems.
- Make visual geometric connections to the algebraic representations of area formulas.

- » Use computation strategies, estimation, and measurement in justifying conclusions and results.
- » Use a variety of tools, including concrete models and technology, to make predictions and justify conclusions.
- » Examine multiple methods for solving problems and arriving at the correct solution.

QUARTER 4

Content students have to learn

Processes students will learn and use

Unit 4.1 – Spatial Visualization and Surface Area and Volume (20 days)

- Use appropriate tools and visualizations to represent three-dimensional objects using twodimensional sketches.
- Determine and apply surface area and volume of prisms, cylinders, pyramids, cones, spheres, and composite solids in order to solve realworld problems.
- Use ratios and scale factors to identify and describe similar solids and then use similar solids to solve real-world problems.

- » Use appropriate representations to communicate geometric ideas (i.e., comparing three-dimensional figures with their twodimensional representations).
- » Use a variety of tools, including concrete models and technology, to make predictions and justify conclusions.
- » Examine multiple methods for solving a problem and arriving at the correct solution.

Unit 4.2 – Circles (18 days)

- Determine the angular measure and length of a variety of types of arcs.
- Use a variety of methods, including technology, to develop and apply relationships between arcs and chords, inscribed angles and polygons, tangent segments and circumscribed polygons, angle measures created by intersecting secants and tangent segments, and segment lengths created by intersecting secants and tangent segments.
- Use a variety of methods of proof, both formal and informal, to justify conjectures about properties and attributes of circles and their component parts.

- » Use appropriate representations to communicate geometric and algebraic ideas.
- » Use a variety of tools, including concrete models and technology, to make and defend conjectures.
- » Use technology to solve real-world problems.
- » Examine multiple methods for solving a problem and arriving at the correct solution.

Unit 4.3 – Geometric Probability (5 days)

- Understand the use of geometric models (length and area only) and technology to solve problems involving theoretical and experimental probability.

- » Use a variety of tools, including concrete models and technology, to make predictions and justify conclusions.
- » Choose appropriate mathematical language (including probability notation) to describe real-world situations.

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