

Chariho Regional School District
MATH CURRICULUM
GEOMETRY

Unit 1: *Tools of Geometry*

OVERVIEW

Number of 90-minute Instructional Days: 5

LESSON #	LESSON TITLE	# of Days
Lesson 1-1	The Geometric System	.5
Lesson 1-2	Points, Lines, and Planes	.5
Lesson 1-3	Line Segments	.5
Lesson 1-4	Distance	.5
Lesson 1-5	Locating Points on a Number Line	.5
Lesson 1-6	Locating Points on a Coordinate Plane	.5
Lesson 1-7	Midpoints and Bisectors	.5

ESSENTIAL CONTENT & SKILLS

The major themes of this unit are:

- Students understand the basic elements of geometry, including points, lines, segments, planes, and angles.
- Students measure distances and compute midpoints on number lines and the coordinate plane.

Content to be learned:

- Analyze axiomatic systems and identify types of geometry.
- Analyze figures to identify points, lines, planes, and intersections of lines and planes.
- Find measures of line segments.
- Apply the Distance Formula to find lengths of line segments.
- Find points that partition directed line segments on number lines.
- Find points that partition directed line segments on the coordinate plane.
- Find midpoints and bisect line segments.

Essential Questions:

- How are points, lines, and segments used to model the real world?

WRITTEN CURRICULUM		
Lesson 1.1	FOCUS STANDARDS: Click on the standard to view the progression of standards.	No grade level standards covered in this lesson.
	STANDARDS FOR MATHEMATICAL PRACTICES:	3 - Construct viable arguments and critique the reasoning of others. 6 - Attend to precision.
Lesson 1.2	FOCUS STANDARDS: Click on the standard to view the progression of standards.	CCSS.MATH.CONTENT. G.CO.1 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. CCSS.MATH.CONTENT. G.MG.1 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).
	STANDARDS FOR MATHEMATICAL PRACTICES:	1 - Make sense of problems and persevere in solving them. 3 - Construct viable arguments and critique the reasoning of others. 6 - Attend to precision.
Lesson 1.3	FOCUS STANDARDS:	CCSS.MATH.CONTENT. G.CO.1 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. CCSS.MATH.CONTENT. G.CO.12 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.). Constructions include: 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.
	STANDARDS FOR MATHEMATICAL PRACTICES:	5 - Use appropriate tools strategically. 6 - Attend to precision. 7 - Look for and make use of structure.
Lesson 1.4	FOCUS STANDARDS: Click on the standard to view the progression of standards.	CCSS.MATH.CONTENT. G.CO.1 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.
	STANDARDS FOR MATHEMATICAL PRACTICES:	1 - Make sense of problems and persevere in solving them. 2 - Reason abstractly and quantitatively. 6 - Attend to precision.
Lesson 1.5	FOCUS STANDARDS: Click on the standard to view the progression of standards.	CCSS.MATH.CONTENT. G.GPE.6 B. Use coordinates to prove simple geometric theorems algebraically. 6. Find the point on a directed line segment between two given points that partitions the segment in a given ratio.
	STANDARDS FOR MATHEMATICAL PRACTICES:	3 - Construct viable arguments and critique the reasoning of others. 4 - Model with mathematics. 5 - Use appropriate tools strategically. 7 - Look for and make use of structure.
Lesson 1.6	FOCUS STANDARDS: Click on the standard to view the progression of standards.	CCSS.MATH.CONTENT. G.GPE.6 B. Use coordinates to prove simple geometric theorems algebraically. 6. Find the point on a directed line segment between two given points that partitions the segment in a given ratio.
	STANDARDS FOR MATHEMATICAL PRACTICES:	1 - Make sense of problems and persevere in solving them. 4 - Model with mathematics. 5 - Use appropriate tools strategically. 6 - Attend to precision. 7 - Look for and make use of structure.

Lesson 1.7	FOCUS STANDARDS: Click on the standard to view the progression of standards.	<p>CCSS.MATH.CONTENT.G.GPE.6 B. Use coordinates to prove simple geometric theorems algebraically. 6. Find the point on a directed line segment between two given points that partitions the segment in a given ratio.</p> <p>CCSS.MATH.CONTENT.G.CO.12 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.). Constructions include: 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.</p>
	STANDARDS FOR MATHEMATICAL PRACTICES:	<p>1 - Make sense of problems and persevere in solving them. 3 - Construct viable arguments and critique the reasoning of others. 4 - Model with mathematics. 8 - Look for and express regularity in repeated reasoning.</p>

Unit 2: *Angles and Geometric Figures*

OVERVIEW		
Number of 90-minute Instructional Days: 8		
LESSON #	LESSON TITLE	# of Days
Lesson 2.1	Angles and Congruence	1
Lesson 2.2	Angle Relationships	1
Lesson 2.3	Two-Dimensional Figures	.5
Lesson 2.4	Transformations in the Plane	1.5
Lesson 2.5	Three-Dimensional Figures	.5
Lesson 2.6	Two-Dimensional Representations of Three-Dimensional Figures	.5

Lesson 2.7	Precision and Accuracy	1
Lesson 2.8	Representing Measurements	.5

ESSENTIAL CONTENT & SKILLS

The major themes of this unit are:

- Students find measures of angles.
- Students find measures of two- and three-dimensional figures.
- Students use precision and accuracy when reporting measurements.

Content to be learned:

- Apply the definitions of angles, parts of angles, congruent angles, and angle bisectors to calculate angle measures.
- Apply the characteristics of complementary and supplementary angles and parallel and perpendicular lines to calculate angle measures.
- Apply the characteristics of perpendicular lines to calculate angle measures.
- Find perimeters, circumferences, and areas of two-dimensional geometric shapes.
- Reflect, translate, and rotate figures.
- Solve for unknown measures of three-dimensional figures by calculating surface areas and volumes.
- Model three-dimensional geometric figures with orthographic drawings.
- Determine levels of precision and accuracy.
- Determine the correct numbers of significant figures in recorded measurements.

Essential Questions:

- How are angles and two-dimensional figures used to model the real world?

WRITTEN CURRICULUM

Lesson 2.1	<p>FOCUS STANDARDS:</p> <p>Click on the standard to view the progression of standards.</p>	<p>CCSS.MATH.CONTENT.G.CO.1</p> <p>A. Experiment with transformations in the plane.</p> <p>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.</p> <p>CCSS.MATH.CONTENT.G.CO.12</p> <p>D. Make geometric constructions.</p> <p>12. Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Constructions include: copying a segment; copying an angle; bisecting a</p>
-------------------	---	--

		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.
	STANDARDS FOR MATHEMATICAL PRACTICES:	3 - Construct viable arguments and critique the reasoning of others. 4 - Model with mathematics. 6 - Attend to precision.
Lesson 2.2	FOCUS STANDARDS:	CCSS.MATH.CONTENT. G.CO.1 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. CCSS.MATH.CONTENT. G.CO.12 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.). Constructions include: 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.
	STANDARDS FOR MATHEMATICAL PRACTICES:	3 - Construct viable arguments and critique the reasoning of others. 8 - Look for and express regularity in repeated reasoning.
Lesson 2.3	FOCUS STANDARDS: Click on the standard to view the progression of standards.	CCSS.MATH.CONTENT. G-GPE.7 B. Use coordinates to prove simple geometric theorems algebraically. 7. Use coordinates to compute perimeters of polygons and areas of triangles and rectangles (e.g., using the distance formula). CCSS.MATH.CONTENT. G-MG.1 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).
	STANDARDS FOR MATHEMATICAL PRACTICES:	1 - Make sense of problems and persevere in solving them. 2 - Reason abstractly and quantitatively.
Lesson	FOCUS	CCSS.MATH.CONTENT. G.CO.2

2.4	STANDARDS: Click on the standard to view the progression of standards.	A. Experiment with transformations in the plane. 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).
	STANDARDS FOR MATHEMATICAL PRACTICES:	4 - Model with mathematics. 5 - Use appropriate tools strategically.
Lesson 2.5	FOCUS STANDARDS: Click on the standard to view the progression of standards.	CCSS.MATH.CONTENT. G.MG.1 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). CCSS.MATH.CONTENT. G.GMD.3 A. Explain volume formulas and use them to solve problems. 3. Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.
	STANDARDS FOR MATHEMATICAL PRACTICES:	4 - Model with mathematics. 7 - Look for and make use of structure.
Lesson 2.6	FOCUS STANDARDS: Click on the standard to view the progression of standards.	CCSS.MATH.CONTENT. G.MG.1 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).
	STANDARDS FOR MATHEMATICAL PRACTICES:	2 - Reason abstractly and quantitatively. 4 - Model with mathematics. 6 - Attend to precision.
Lesson 2.7	FOCUS STANDARDS: Click on the standard to view the progression of standards.	CCSS.MATH.CONTENT. N.Q.3 A. Reason quantitatively and use units to solve problems. 3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. a. Describe the effects of approximate error in measurement and rounding on measurements and on computed values from measurements. Identify significant figures in recorded measures and computed values based on the context given and the precision

		of the tools used to measure.
	STANDARDS FOR MATHEMATICAL PRACTICES:	2 - Reason abstractly and quantitatively. 6 - Attend to precision.
Lesson 2.8	FOCUS STANDARDS: Click on the standard to view the progression of standards.	CCSS.MATH.CONTENT. N.Q.3 A. Reason quantitatively and use units to solve problems. 3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
	STANDARDS FOR MATHEMATICAL PRACTICES:	3 - Construct viable arguments and critique the reasoning of others. 5 - Use appropriate tools strategically. 6 - Attend to precision.

Unit 3: Logical Arguments and Line Relationships

OVERVIEW		
Number of 90-minute Instructional Days: 9.5		
LESSON #	LESSON TITLE	# of Days
Lesson 3.1	Conjectures and Counterexample	.5
Lesson 3.2	Statements, Conditionals, and Biconditionals	.5
Lesson 3.3	Deductive Reasoning	.5
Lesson 3.4	Writing Proofs	1.5
Lesson 3.5	Proving Segment Relationships	.5
Lesson 3.6	Proving Angle Relationships	1
Lesson 3.7	Parallel Lines and Transversals	.5

Lesson 3.8	Slope and Equations of Lines	1
Lesson 3.9	Proving Lines Parallel	.5
Lesson 3.10	Perpendiculars and Distance	1

ESSENTIAL CONTENT & SKILLS

The major themes of this unit are:

- Students look for patterns and write conjectures based on those patterns.
- Students prove conjectures using logical arguments or disprove conjectures using counterexamples.
- Students apply logical arguments to basic line and angle relationships.

Content to be learned:

- Make and analyze conjectures based on inductive reasoning.
- Disprove conjectures by using counterexamples.
- Determine truth values of statements, negations, conjunctions, and disjunctions.
- Write and analyze conditionals and biconditionals using logic.
- Distinguish correct logic or reasoning from that which is flawed using the Laws of Detachment and Syllogism.
- Construct viable arguments by writing paragraph proofs.
- Construct viable arguments by writing flow proofs.
- Prove statements about segments and angles by writing two-column proofs.
- Identify and use relationships between pairs of angles.
- Identify and use parallel and perpendicular lines using the slope criteria.
- Solve problems using distances and parallel and perpendicular lines.

Essential Questions:

- What makes a logical argument, and how are logical arguments used in geometry?

WRITTEN CURRICULUM

Lesson 3.1	FOCUS STANDARDS: Click on the standard to view the progression of standards.	No grade level standards covered in this lesson.
	STANDARDS FOR	1 - Make sense of problems and persevere in solving them.

	MATHEMATICAL PRACTICES:	3 - Construct viable arguments and critique the reasoning of others. 5 - Use appropriate tools strategically. 6 - Attend to precision. 7 - Look for and make use of structure. 8 - Look for and express regularity in repeated reasoning.
Lesson 3.2	FOCUS STANDARDS:	No grade level standards covered in this lesson.
	STANDARDS FOR MATHEMATICAL PRACTICES:	1 - Make sense of problems and persevere in solving them. 3 - Construct viable arguments and critique the reasoning of others. 4 - Model with mathematics. 5 - Use appropriate tools strategically. 6 - Attend to precision.
Lesson 3.3	FOCUS STANDARDS: Click on the standard to view the progression of standards.	No grade level standards covered in this lesson.
	STANDARDS FOR MATHEMATICAL PRACTICES:	1 - Make sense of problems and persevere in solving them. 3 - Construct viable arguments and critique the reasoning of others. 4 - Model with mathematics. 5 - Use appropriate tools strategically. 6 - Attend to precision. 7 - Look for and make use of structure. 8 - Look for and express regularity in repeated reasoning.
Lesson 3.4	FOCUS STANDARDS: Click on the standard to view the progression of standards.	No grade level standards covered in this lesson.
	STANDARDS FOR MATHEMATICAL PRACTICES:	1 - Make sense of problems and persevere in solving them. 3 - Construct viable arguments and critique the reasoning of others.
Lesson 3.5	FOCUS STANDARDS:	CCSS.MATH.CONTENT. G.CO.9 C. Prove geometric theorems and, when appropriate, the converse of theorems 9. Prove theorems about lines and angles. Theorems include:

	<p>Click on the standard to view the progression of standards.</p>	<p>vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent, and conversely prove lines are parallel; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.</p> <p>CCSS.MATH.CONTENT.G.CO.12 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.). Constructions include: 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.</p>
	<p>STANDARDS FOR MATHEMATICAL PRACTICES:</p>	<p>3 - Construct viable arguments and critique the reasoning of others. 6 - Attend to precision.</p>
Lesson 3.6	<p>FOCUS STANDARDS:</p> <p>Click on the standard to view the progression of standards.</p>	<p>CCSS.MATH.CONTENT.G.CO.9 C. Prove geometric theorems and, when appropriate, the converse of 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, and conversely prove lines are parallel; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.</p>
	<p>STANDARDS FOR MATHEMATICAL PRACTICES:</p>	<p>3 - Construct viable arguments and critique the reasoning of others. 4 - Model with mathematics. 6 - Attend to precision.</p>
Lesson 3.7	<p>FOCUS STANDARDS:</p> <p>Click on the standard to view the progression of standards.</p>	<p>CCSS.MATH.CONTENT.G.CO.1 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. CCSS.MATH.CONTENT.G.CO.9 C. Prove geometric theorems and, when appropriate, the converse of 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</p>

		angles are congruent, and conversely prove lines are parallel; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.
	STANDARDS FOR MATHEMATICAL PRACTICES:	1 - Make sense of problems and persevere in solving them. 3 - Construct viable arguments and critique the reasoning of others. 6 - Attend to precision.
Lesson 3.8	FOCUS STANDARDS: Click on the standard to view the progression of standards.	CCSS.MATH.CONTENT. G.GPE.5 B. Use coordinates to prove simple geometric theorems algebraically. 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).
	STANDARDS FOR MATHEMATICAL PRACTICES:	1 - Make sense of problems and persevere in solving them. 3 - Construct viable arguments and critique the reasoning of others. 8 - Look for and express regularity in repeated reasoning.
Lesson 3.9	FOCUS STANDARDS: Click on the standard to view the progression of standards.	CCSS.MATH.CONTENT. G.CO.9 C. Prove geometric theorems and, when appropriate, the converse of 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, and conversely prove lines are parallel; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints. CCSS.MATH.CONTENT. G.CO.12 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.). Constructions include: 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.
	STANDARDS FOR MATHEMATICAL PRACTICES:	1 - Make sense of problems and persevere in solving them. 3 - Construct viable arguments and critique the reasoning of others. 4 - Model with mathematics.
Lesson	FOCUS	CCSS.MATH.CONTENT. G.CO.12

3.10	STANDARDS: Click on the standard to view the progression of standards.	<p>D. Make geometric constructions.</p> <p>12. Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Constructions include: 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.</p> <p>CCSS.MATH.CONTENT.G.MG.3</p> <p>A. Apply geometric concepts in modeling situations.</p> <p>3. Apply geometric methods to solve design problems (<i>e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios</i>).</p>
	STANDARDS FOR MATHEMATICAL PRACTICES:	<p>1 - Make sense of problems and persevere in solving them.</p> <p>4 - Model with mathematics.</p> <p>5 - Use appropriate tools strategically.</p> <p>6 - Attend to precision.</p>