



Geometry Level 1 - Unit C - Lines in a Plane

Unit Focus

In this unit students develop proofs to fairly complex problems. Along with two column proofs students are encouraged to give verbal and/or paragraph arguments always with the idea of a clear, logical argument with mathematical justification as a priority.

A major focus in this unit is on quadrilaterals. Properties of quadrilaterals are introduced through various discovery activities in order to build a quadrilateral tree and to be able to classify the special quadrilaterals. Parallelograms are explored in further detail as students learn about sufficient conditions for parallelograms. Coordinate plane geometry is used to classify quadrilaterals.

Finally, the students move beyond two dimensional shapes and study lines and planes in three dimensional space.

Stage 1: Desired Results - Key Understandings

Standard(s)	Transfer	
Common Core Mathematics: 9-12 - 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.HSG.CO.A.1) - Prove theorems about lines and angles. (CCSS.MATH.CONTENT.HSG.CO.C.9) - Prove theorems about parallelograms. (CCSS.MATH.CONTENT.HSG.CO.C.11) - Use coordinates to prove simple geometric theorems algebraically. (CCSS.MATH.CONTENT.HSG.GPE.B.4) - 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). (CCSS.MATH.CONTENT.HSG.GPE.B.5) - Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula. (CCSS.MATH.CONTENT.HSG.GPE.B.7) - Make sense of problems and persevere in solving them. (CCSS.MATH.MP.1)	<i>Students will be able to independently use their learning to...</i> T1 draw conclusions about graphs, shapes, equations, or objects. T2 make sense of a problem, initiate a plan, execute it, and evaluate the reasonableness of the solution. T3 justify reasoning using clear and appropriate mathematical language.	
	Meaning	
	Understanding(s)	Essential Question(s)
	<i>Students will understand that...</i> U1 Effective problem solvers work to make sense of the problem before trying to solve it. U2 Mathematicians compare the effectiveness of various arguments, by analyzing and critiquing solution pathways U3 Mathematicians analyze characteristics and properties of geometric shapes to develop mathematical arguments about geometric relationships.	<i>Students will keep considering...</i> Q1 What strategies can I use to solve the problem? Q2 What do I need to support my answer? Q3 How does classifying bring clarity? Q4 What makes these shapes similar? Different?
	Acquisition of Knowledge and Skill	
	Knowledge	Skill(s)
	<i>Students will know...</i> K1 if two angles are both supp and comp, then they are both right angles K2 the perpendicular bisector theorem and its converse	<i>Students will be skilled at...</i> S1 applying the midpoint formula S2 creating a diagram for a proof when none is given S3 using indirect proofs

Stage 1: Desired Results - Key Understandings

- Construct viable arguments and critique the reasoning of others. (CCSS.MATH.MP.3)

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- Analyzing: Examining information/data/ evidence from multiple sources to identify possible underlying assumptions, patterns, and relationships in order to make inferences. (POG.1.2)

K3 the formula for slope
K4 horizontal lines have zero slope while vertical lines have no slope
K5 parallel lines have equal slope
K6 the slope of perpendicular lines are negative reciprocals
K7 the exterior angle inequality theorem
K8 alt. int (alt, ext. or corr) angles congruent $\Rightarrow \parallel$ lines
K9 if 2 int (ext) angles are supplementary $\Rightarrow \parallel$ lines
K10 if two coplanar lines are perp. to a third line, they are parallel
K11 five ways to prove a quadrilateral is a parallelogram
K12 the definition of each quadrilateral
K13 properties of special quadrilaterals and applications of those props
K14 the properties of parallelograms in depth
K15 a trapezoid is a quadrilateral with exactly one pair of parallel sides
K16 four ways to determine a plane
K17 Vocabulary: midpoint, distance, equidistance, plane, coplanar, noncoplanar, interior, exterior, alternate, corresponding, transversal, polygon, convex polygon, diagonals, base angles of a trapezoid, foot of a line, skew

S4 recognizing special angles pairs formed by transversals
S5 identifying visually whether a slope is positive, negative, zero or if there is no slope
S6 use the relationships of the slopes of parallel and perpendicular lines to solve problems and proofs
S7 identifying the exterior angle, adjacent interior angle and remote interior angles of a triangle
S8 using various methods to prove lines parallel
S9 applying parallel lines and the angles formed by the transversal to solve problems and proofs
S10 identifying polygons and non polygons
S11 naming polygons via their vertices
S12 identifying properties of specific quadrilaterals relating to their diagonals, sides and angles
S13 prove that a quadrilateral is a parallelogram.
S14 classifying quadrilaterals based on definitions and properties
S15 applying the properties of parallelograms and of special quadrilaterals to solve problems and proofs
S16 proving info about special quadrilaterals on the coordinate plane