

Unit C - Lines in a Plane

Overview

In this unit we de-emphasize two column proofs and concentrate more heavily on diagram type problems and the notion that there are other ways to make a mathematical proof including verbal and paragraph arguments but the idea of a clear, logical argument with mathematical justification for each step remains constant. .

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 incorporated frequently to bridge Algebra and Geometry concepts.

21st Century Capacities: Analyzing

Stage 1 - Desired Results

<p>ESTABLISHED GOALS/ STANDARDS</p> <p>MP1 Make sense of problems and persevere in solving them</p> <p>MP3 Construct viable arguments and critique the reasoning of others</p> <p>CCSS.MATH.CONTENT.HSG.CO.A.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.HSG.CO.C.9 Prove theorems about lines and angles.</p>	<table style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2" style="text-align: center; background-color: #D3D3D3;">Transfer:</td> </tr> <tr> <td colspan="2"><i>Students will be able to independently use their learning in new situations to...</i></td> </tr> <tr> <td colspan="2"> <ol style="list-style-type: none"> 1. Draw conclusions about graphs, shapes, equations, or objects. (Analyzing) 2. Make sense of a problem, initiate a plan, execute it, and evaluate the reasonableness of the solution. (Analyzing) 3. Justify reasoning using clear and appropriate mathematical language. </td> </tr> <tr> <td colspan="2" style="text-align: center; background-color: #D3D3D3;">Meaning:</td> </tr> <tr> <td style="width: 50%; vertical-align: top; padding: 5px;"> <p>UNDERSTANDINGS: <i>Students will understand that:</i></p> <ol style="list-style-type: none"> 1. Effective problem solvers work to make sense of the problem before trying to solve it 2. Mathematicians compare the effectiveness of various arguments, by analyzing and critiquing solution pathways. </td> <td style="width: 50%; vertical-align: top; padding: 5px;"> <p>ESSENTIAL QUESTIONS: <i>Students will explore & address these recurring questions:</i></p> <ol style="list-style-type: none"> A. What strategies can I use to solve the problem? B. What do I need to support my answer? C. How does classifying bring clarity? D. What makes these shapes the same? </td> </tr> </table>	Transfer:		<i>Students will be able to independently use their learning in new situations to...</i>		<ol style="list-style-type: none"> 1. Draw conclusions about graphs, shapes, equations, or objects. (Analyzing) 2. Make sense of a problem, initiate a plan, execute it, and evaluate the reasonableness of the solution. (Analyzing) 3. Justify reasoning using clear and appropriate mathematical language. 		Meaning:		<p>UNDERSTANDINGS: <i>Students will understand that:</i></p> <ol style="list-style-type: none"> 1. Effective problem solvers work to make sense of the problem before trying to solve it 2. Mathematicians compare the effectiveness of various arguments, by analyzing and critiquing solution pathways. 	<p>ESSENTIAL QUESTIONS: <i>Students will explore & address these recurring questions:</i></p> <ol style="list-style-type: none"> A. What strategies can I use to solve the problem? B. What do I need to support my answer? C. How does classifying bring clarity? D. What makes these shapes the same?
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Geometry Level 2 Curriculum

<p>CCSS.MATH.CONTENT.HSG.CO.C.11 Prove theorems about parallelograms.</p>	<p>3. Mathematicians analyze characteristics and properties of geometric shapes to develop mathematical arguments about geometric relationships.</p>	<p>Different?</p>
<p>CCSS.MATH.CONTENT.HSG.GPE.B.4 Use coordinates to prove simple geometric theorems algebraically.</p>	Acquisition:	
<p>CCSS.MATH.CONTENT.HSG.GPE.B.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).</p>	<p><i>Students will know...</i></p> <ol style="list-style-type: none"> 1. The perpendicular bisector theorem and its converse 2. The formula for slope 3. Horizontal lines have zero slope while vertical lines have no slope 4. Parallel lines have equal slope 5. The slope of perpendicular lines are negative reciprocals 6. The exterior angle inequality theorem 7. alt. int (alt, ext. or corr) angles congruent \Rightarrow \parallel lines 8. If 2 int (ext) angles are supplementary \Rightarrow \parallel lines 9. If two coplanar lines are perp. to a third line, they are parallel 10. Five ways to prove a quadrilateral is a parallelogram 11. The definition of each quadrilateral 12. Properties of special quadrilaterals and applications of those props 13. The properties of parallelograms in depth 14. A trapezoid is a quadrilateral with exactly one pair of parallel sides 15. Vocabulary: distance, equidistance, plane, coplanar, noncoplanar, interior, exterior, alternate, corresponding, transversal, polygon, convex polygon, diagonals, base angles of a trapezoid 	<p><i>Students will be skilled at...</i></p> <ol style="list-style-type: none"> 1. Using detours in proofs 2. Applying the midpoint formula 3. Recognizing special angles pairs formed by transversals 4. Identifying visually whether a slope is positive, negative, zero or if there is no slope 5. Use the relationships of the slopes of parallel and perpendicular lines to solve problems 6. Identifying the exterior angle, adjacent interior angle and remote interior angles of a triangle 7. Using various methods to prove lines parallel 8. Applying parallel lines and the angles formed by the transversal to solve problems 9. Identifying polygons and non polygons 10. Naming polygons via their vertices 11. Identifying properties of specific quadrilaterals relating to their diagonals, sides and angles 12. Prove that a quadrilateral is a parallelogram. 13. Classifying quadrilaterals based on definitions and properties 14. Applying the properties of parallelograms 15. Applying the properties of special quadrilaterals 16. Proving info about special quadrilaterals on the coordinate plane
<p>CCSS.MATH.CONTENT.HSG.GPE.B.7 Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.*</p>		