Mathematics
Topics in Algebra and Geometry
Unit 7: Parallel and Perpendicular Lines

Essential Understandings	- Geometry requires identifying special relationships between lines. - Geometry uses properties of parallel and perpendicular lines.
Essential Questions	- What are relationships between lines? - What theorems apply to perpendicular lines? - What are the relationships among the angles formed when two parallel lines are cut by a transversal? - What are the congruent angles formed when a transversal cuts parallel lines? - How can it be shown that two lines are parallel? - What are the properties associated with parallel and perpendicular lines?
Essential Knowledge	- Lines can be perpendicular, parallel, and skew. - If two lines are perpendicular, then they intersect to form right angles. - If two lines intersect to form adjacent congruent angles, then the lines are perpendicular. - If two sides of adjacent acute angles are perpendicular, then the angles are complementary. - The angles formed by a transversal are same-side interior angles, corresponding angles, alternate interior angles and alternate exterior angles. - The angles formed by a transversal are congruent. - If two lines are cut by a transversal so that corresponding angles are congruent, then the lines are parallel. - If two lines are cut by a transversal so that alternate interior angles are congruent, then the lines are parallel. - If two lines are cut by a transversal so that alternate exterior angles are congruent, then the lines are parallel. - If two lines are cut by a transversal so that same-side interior angles are congruent, then the lines are parallel. - If there is a line and a point not on the line, then there is exactly one line through the point parallel to the given line. - If there is a line and a point not on the line, then there is exactly one line through the point perpendicular to the given line. - If two lines are parallel to the same line, then they are parallel to each other. - In a plane, if two lines are perpendicular to the same line, then they are parallel to each other.
Vocabulary	- Terms: - theorem, parallel, perpendicular, transversal, complementary, vertical, supplementary, alternate interior angles, alternate exterior angles, same-sided interior angles, corresponding angles

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Essential Skills	▪ Identify parallel, perpendicular skew and skew lines. ▪ Use theorems about perpendicular lines. ▪ Identify angles formed by transversals. ▪ Find the congruent angles formed when a transversal cuts parallel lines. ▪ Show that lines are parallel. ▪ Use properties of parallel and perpendicular lines.

Related Maine Learning Results	Mathematics
	C. Geometry
	  Geometric Figures
	  C1.Students justify statements about polygons and solve problems.
	    a. Use the properties of triangles to prove theorems about figures and relationships among figures.
	    b. Solve for missing dimensions based on congruence and similarity.
	    c. Use the Pythagorean Theorem in situations where right triangles are created by adding segments to figures.
	    d. Use the distance formula.

Sample Lessons And Activities	▪ Students will construct parallel lines cut by a transversal, and then they will explore the relationships among the angles formed utilizing a protractor. The students will discuss their findings with other students.
Sample Classroom Assessment Methods	▪ Students will present their findings to the class; which will confirm congruent angles formed by a transversal.

Sample Resources	▪ Publications:
	  o Geometry, Jurgensen, Brown, Jurgensen (McDougal-Littell)
	  o Geometry: Concepts and Skills, Larson, Boswell, Stiff (McDougal-Littell)
	▪ Other Resources:
	  o protractor, ruler