**Lesson Plan Outline Geometry in Construction**

**Title:**

Proving a Quadrilateral is a Parallelogram

**Objective(s):**

The students will prove that a quadrilateral is a parallelogram, square, rhombus, or a rectangle using properties of parallelograms and coordinate geometry

**Learning Standard(s):**

[CCSS.MATH.CONTENT.HSG.CO.C.11](http://www.corestandards.org/Math/Content/HSG/CO/C/11/)Prove theorems about parallelograms. *Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals*.

[CCSS.MATH.CONTENT.HSG.CO.C.9](http://www.corestandards.org/Math/Content/HSG/CO/C/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; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints*.

[CCSS.MATH.CONTENT.HSG.GPE.B.4](http://www.corestandards.org/Math/Content/HSG/GPE/B/4/)Use coordinates to prove simple geometric theorems algebraically. *For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point (1, √3) lies on the circle centered at the origin and containing the point (0, 2).*

**Activities:**

Student Feedback & Assessment on Coordinate Proofs; the students will review and provide feedback about each other’s proof

Coordinate Proof #2; students will perform another coordinate proof of a special parallelogram and will write a summary of what shape represents

Pipe fitting activity; students will design and properly fit pipes that expand at an angle; students will prove that the shape is a parallelogram

**Materials:**

iPad with Geometry Pad App

Pipes of different sizes with pipe fittings

Coordinate Proof Outline #2