Constructing Squares and Rectangles with Patty Paper

Distribute several sheets of patty paper to each students and communicators with blank sheets of paper in them.

Starter Activity:

- Ask students to draw a picture of a right angle on their communicator and use appropriate labels. (The two line segments used by the students should appear to form a 90 degree angle.)

- Ask students to draw a line segment and label the midpoint of the line segment on their communicator. (Students should draw a line segment and show two equal parts separated by a point.)

- Ask students to draw a rectangle on their communicator and label any information they know must be true. (The picture should resemble a box with 4 right angles, opposite sides equal, and opposite sides parallel.)

- Ask students to draw an isosceles triangle on their communicator and label any information they know must be true. (The picture should resemble a triangle with 2 equal sides.)

Constructing Figures on Patty Paper:

- Ask students to draw a segment on a piece of patty paper. Show students how they can duplicate this segment so two segments are equal and share a endpoint. Trace the line. If the other two endpoints are connected, what figure have your created. (Isosceles triangle)
- Ask students to draw a long line segment on a sheet of patty paper. Through experimentation ask students to discover a way to locate the midpoint of the segment. (Fold the line segment in half.) Ask students to label this point the midpoint by marking the two parts of the segment equal. Ask students how they know the two parts are equal? (They fold over on each other, therefore showing congruence.)
- Ask students to take the same sheet of patty paper and fold the line that perpendicularly bisects the first line segment. (Fold the line segment in half and crease the paper.) How do you know this line is perpendicular? (The two angles are equal - visually congruent and the two angles are supplementary. Therefore if two angles are equal and add up to 180 degrees each angle is 90 degrees.)
- Give students another sheet of patty paper and have they draw a line and select a point on the line. Ask students to create a perpendicular to the line through the selected point. (Fold the line on top of itself with the point in the fold.) Ask students why they know the two lines are perpendicular. (Same argument as before.)
- Give students another sheet of patty paper and have they draw a **line** and select a point off the line. Ask students to create a perpendicular to the line that passes through the selected point. (Fold the line on top of itself with the point in the fold.) Ask students why they know the two lines are perpendicular. (Same argument as before.)
- Students now know three ways to create a perpendicular. Let's see what we shapes we can construct.
- Let's try to fold a rectangle. Ask students to begin with a line on their patty paper. Ask students to mark two points on the line that will represent one of the sides of

the rectangle. Ask students if they can fold a perpendicular to this line through the two points. (Should follow steps learned above.) How many sides of the rectangle are defined right now? (One) Select a point on either perpendicular and ask students what they must do to create the rectangle. (Fold another perpendicular to this perpendicular through the selected point.) What shape have your folded? (A rectangle)

- With another sheet of patty paper ask students to create a square through folding perpendicular lines. (Students can begin the same as they did the last time, but the four sides must be equal. Distances can be duplicated by folding the paper as we did in creating the isosceles triangle.)
- After students have created a square and a rectangle have they draw over their shapes with a colored pencil. If sides are equal they can put them in the same color. Ask students to add both diagonals to each figure. Ask students to use another sheet of patty paper to trace the two angles formed by the diagonals. Have students mark which angles are equal in each picture. (In a square the diagonals bisect the angles, but not in a rectangle) Have students compare the two diagonals in each figure. (The two diagonals are equal in the square and equal in the rectangle.) Ask students to compare the two drawings to see if the diagonals bisect each other. (Yes they bisect each other in both figures.) Are the angles formed at the center of each figure by the diagonals equal to each other? (Yes there are two pairs of equal angles in each figure.)