Constructions Using Patty Paper

Complete the following definitions:

If two lines are perpendicular, then any two adjacent angles formed are _____.

If a line segment is bisected, then the two segments formed are _____.

If an angle is bisected, then the two adjacent angles formed are _____.

Construct a line perpendicular to a given line

Step 1: Draw a line on your patty paper. Label the line *m*.

Step 2: Fold your patty paper so that the two parts of line *m* lie exactly on top of each other. Crease the patty paper on the fold.

Step 3: Open the patty paper and draw a line on the crease. Label this line *n.*

Step 4: What is the relationship of line *n* to line *m*? Describe how you could use the corner of your patty paper to justify this relationship.

Construct a line through a given point perpendicular to a given line

Step 1: Draw a line on your patty paper. Label the line *m*. Draw a point on the patty paper that is **not** on line *m* and label this point P.

Step 2: Fold your patty paper so that the two parts of line *m* lie exactly on top of each other. Slide the patty paper so that point P will be on the fold. Crease the patty paper on the fold.

Step 3: Open the patty paper and draw a line on the crease. Label this line *n.*

Step 4: What is the relationship of line *n* to line *m*? Describe how you could use your patty paper to justify this relationship.

Construct a perpendicular bisector of a given line segment using patty paper

Step 1: Draw a line segment on your patty paper. Label the line segment AB.

Step 2: Fold the patty paper so that points A and B, the two end points of the segment you drew on the patty paper, coincide with each other. Crease the paper along the fold.

Step 3: Open the patty paper and draw a line on the crease. Label this line *k*. Label the intersection of line *k* with line segment AB as point M.

Constructions Using Patty Paper (Continued)

Construct a perpendicular bisector of a given line segment using patty paper continued

Step 4: What is the relationship of line *k* to $\overline{AB}$?

Step 5: What is the relationship between $\overline{AM}$ and $\overline{BM}$?

Step 6: Point M is the _____ of $\overline{AB}$.

Step 7: Select a point on line *k*. Label this point X.

Step 8: What is the relationship between AX and BX? Describe how you could use your patty paper to justify this relationship.

Step 9: Select a different point on line *k* and repeat steps 7 and 8.

Step 10: Write a conjecture stating the relationship between any point on the perpendicular bisector of a line segment and the endpoints of that line segment.

Construct the bisector of an angle using patty paper

Step 1: Draw an angle on a sheet of patty paper. Label this angle $\angle QRS$.

Step 2: Fold your patty paper so that the two sides of the angle, $\overrightarrow{RQ}$ and $\overrightarrow{RS}$, coincide. Crease the paper along the fold.

Step 3: Unfold your patty paper. Select a point on the interior of $\angle QRS$ that lies on the crease. Label this point T. Draw ray RT.

Step 4: What is the relationship between $\angle QRT$ and $\angle SRT$? How can you use your patty paper to justify this relationship?

Step 5: What is the relationship between the distances from point T to each of the sides of the angle? Using your patty paper, explain how you determined this relationship.

Step 6: Select another point on ray RT. Label this point W. What is the relationship between the distances from point W to each of the sides of the angle?

Step 7: Write a conjecture comparing the distances from a point that lies on an angle bisector to each of the sides of the angle.

Answers: Definitions – right angles, congruent, congruent

Construct a line perpendicular to a given line

Step 4: Perpendicular. Perpendicular lines can be demonstrated using patty paper by matching the corner of the paper to demonstrate right angles.

Construct a line through a point perpendicular to a given line

Step 4: Perpendicular. Perpendicular lines can be demonstrated using patty paper by matching the corner of the paper to demonstrate right angles.

Construct a perpendicular bisector of a given line segment

Step 4: Perpendicular

Step 5: Congruent segments

Step 6: Midpoint

Step 8: Congruent segments. This can be shown using patty paper by copying the length of one segment and overlaying it over the second segment and confirming congruence.

Step 10: Any point on the perpendicular bisector of a segment is equidistant from the endpoint of the segment.

Construct the bisector of an angle

Step 4: Congruent angles. This can be shown by tracing one angle and then overlaying it over the second angle to confirm congruence.

Step 5: Point T is equidistant to each side of the angle. This can be shown using patty paper by placing point T on one edge of the patty paper. Line up the edge of the patty paper that is perpendicular to the edge along T with one side of the angle. Mark point T on the patty paper. Repeat the process with the other side of the angle to confirm equal distance.

Step 6: Equidistant

Step 7: Every point on the bisector of an angle is equidistant from both sides of the angle.