2 Dimensional Folds

definitions & theorems from Origametry by Daniel Heath.

While working in a group make sure you:

- Expect to make mistakes but be sure to reflect/learn from them!
- Are civil and are aware of your impact on others.
- Assume and engage with the strongest argument while assuming best intent.

Use patty paper when working on #1 to build enough intuition to complete the postulate.

Postulate 6. Given a line l, there is a unique bijective function ϕ from the plane to the plane called a fold with crease l or a reflection with mirror l, such that:

- 1. The function ϕ leaves l _____
- 2. Let H_0 and H_1 be the half planes determined by l. Then $A \in H_i$, implies $\phi(A) \in \underline{\qquad}$ for i = 0, 1.
- 3. If $\overline{AB} \subset \overline{H_i}$, then $\phi(A)\phi(B) =$ _____
- 4. If $\angle ABC \subset \overline{H_1}$, then $\mu(\angle \phi(A)\phi(B)\phi(C)) =$ _____
- 1. Crease your patty paper to create a line l.
 - (a) If $A \in l$, what can you say about $\phi(A)$?
 - (b) Notice that the line l divides the plane into three sets, l, H_0 , and H_1 by the plane separation postulate. If $A \in H_1$, then what can you say about where $\phi(A)$ is?
 - (c) Draw the points A and B on the same side of l. Compare the length of line segments before and after ϕ .
 - (d) Extend \overline{AB} from above to an angle $\angle ABC$ by selecting a point C on the same side. Compare the angles before and after ϕ .

2. Let A and B be points. Find a fold such that A folds onto B.

Definition 4.13. Let A and B be points, and M the midpoint of \overline{AB} . The unique line l that is perpendicular to \overrightarrow{AB} and lies on M. The line l is the perpendicular bisector of \overline{AB} .

3. Let l be the perpendicular bisector of \overline{AB} . Let C be any points on l. Compare CA and CB.

4. Draw an angle $\angle ABC$ on patty paper. Find a fold ϕ so that $\phi(\overrightarrow{BA}) = \overrightarrow{BC}$. How does the crease relate to the original angle $\angle ABC$?

5. Start with two lines l and m that intersect. Can you find a fold ϕ that folds l onto m and m onto l? Is ϕ unique?