

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 $\phi(A) \in$ _____ 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 \overleftrightarrow{AB} and lies on M . The line l is the perpendicular bisector of \overline{AB} .

3. Let l be the perpendicular bisector of A and B . 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?