Proofs

Discovery and Presentation
Writing ≠ Discovering

- Proofs are usually presented in a clean, logical, linear order.
- This is probably not the order in which the proof was discovered and worked out.
- Figuring out a proof is not so linear.
Sample Statement to Prove

Prove: Given two intersecting lines, a point is equidistant from the two lines if it lies on the bisector of one of the angles formed by the lines.
Step 1: Introduce Notation

- Usually it is a good idea to give names to important actors in the drama of your proof.
- If you introduce an object by name, be sure to explain what it is.

Let the lines $g$ and $h$ intersect at point $O$.
Let $P$ be a point.
Step 2: Translate Starting Point into Operational Terms

- **P** is equidistant from **g** and **h**.

There are points **G** on **g** and **H** on **h**:
- **PG** perpendicular to **g**,
- **PH** perpendicular to **h**,
- **PG = PH**.
Step 2': Draw a Picture of the Starting Point

There are points G on g and H on h:
PG perpendicular to g, PH perpendicular to h, PG = PH.
Step 2: Translate Conclusion into Operational Terms

P lies on the bisector of one of the angles formed by the two lines.

OP bisects one of the angles formed by g and h.
Step 3’: Draw a Picture of the Conclusion

OP bisects one of the angles formed by g and h.
Step 5: Look for ways to fill in the gap

Using the figures or the words, look for steps in between the beginning and end. You may not immediately see how to justify the steps, but you can brainstorm a path and then try to fill in the reasons later.
Congruent right triangles!