

# Proofs

Discovery and Presentation

# Writing $\neq$ 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.*

# Step2: Translate Starting Point into Operational Terms

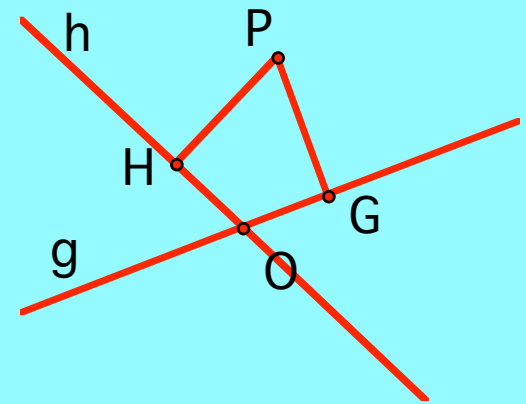
*P is equidistant from  
g and h.*



*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

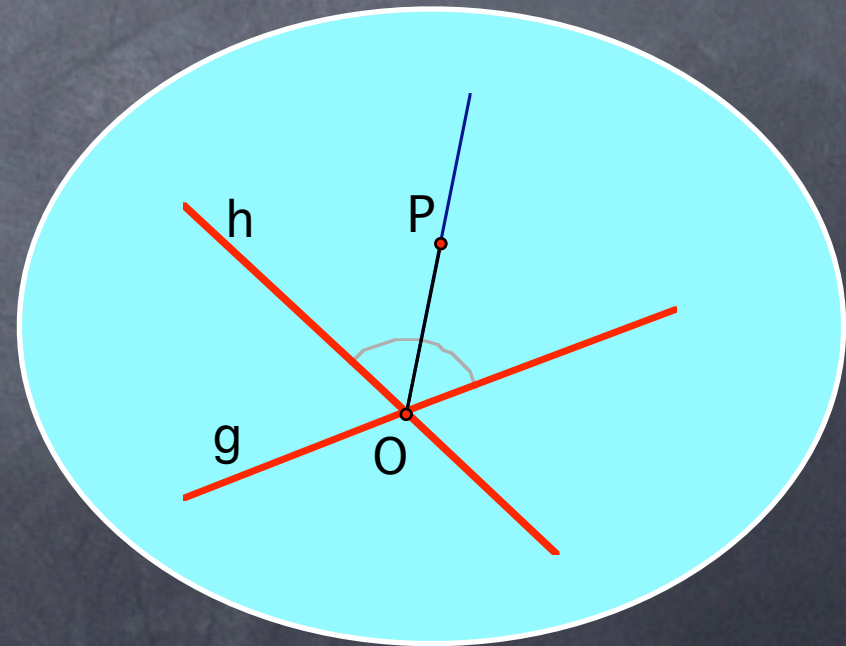
*P lies on the bisector  
of one of the angles  
formed by the two  
lines.*



*OP bisects one of the  
angles formed by g and  
h.*

# Step 3': Draw a Picture of the Conclusion

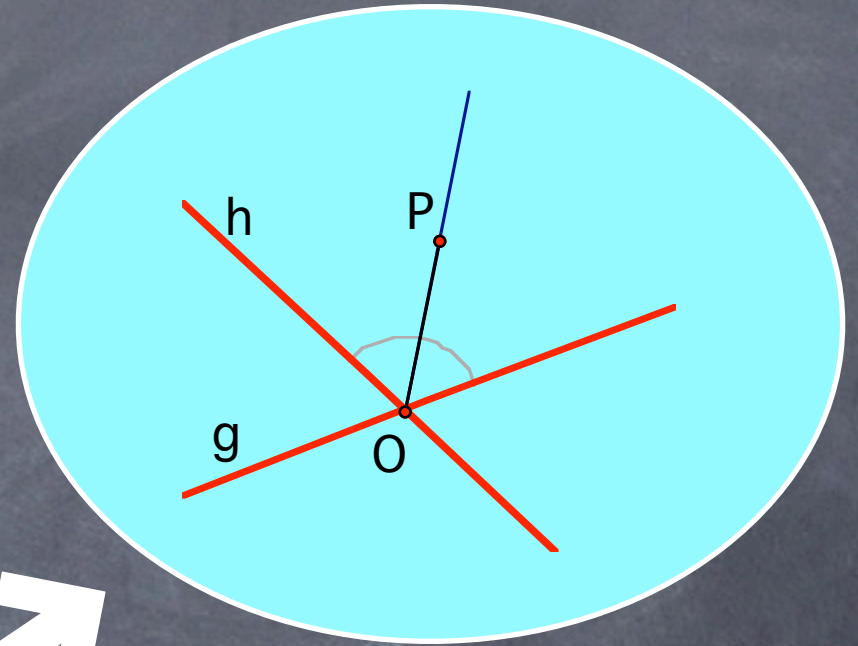
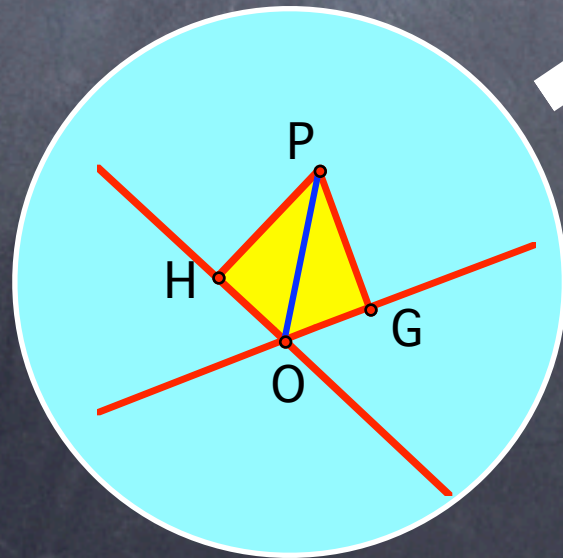
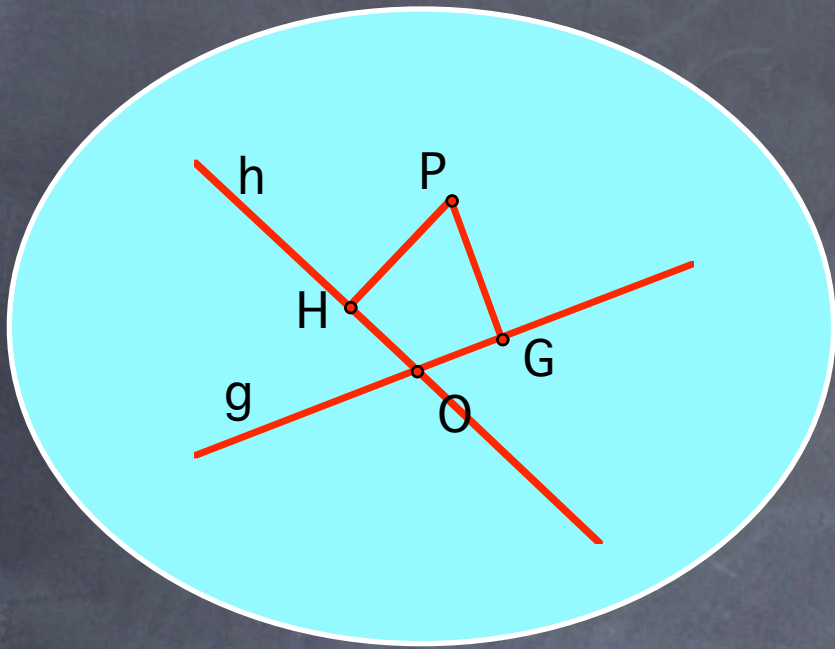
*OP bisects one of the angles formed by g and h.*





# 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!