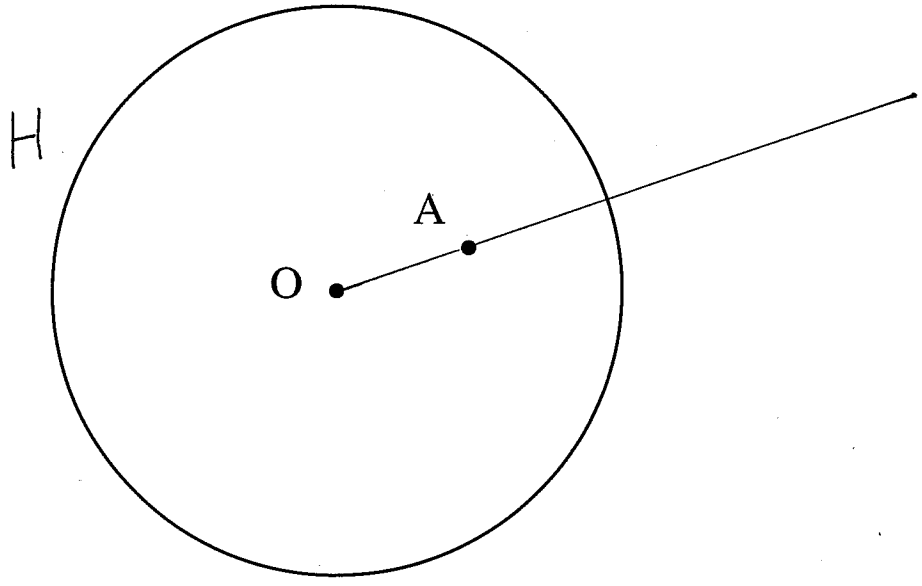
Hyperbolic Lines through A

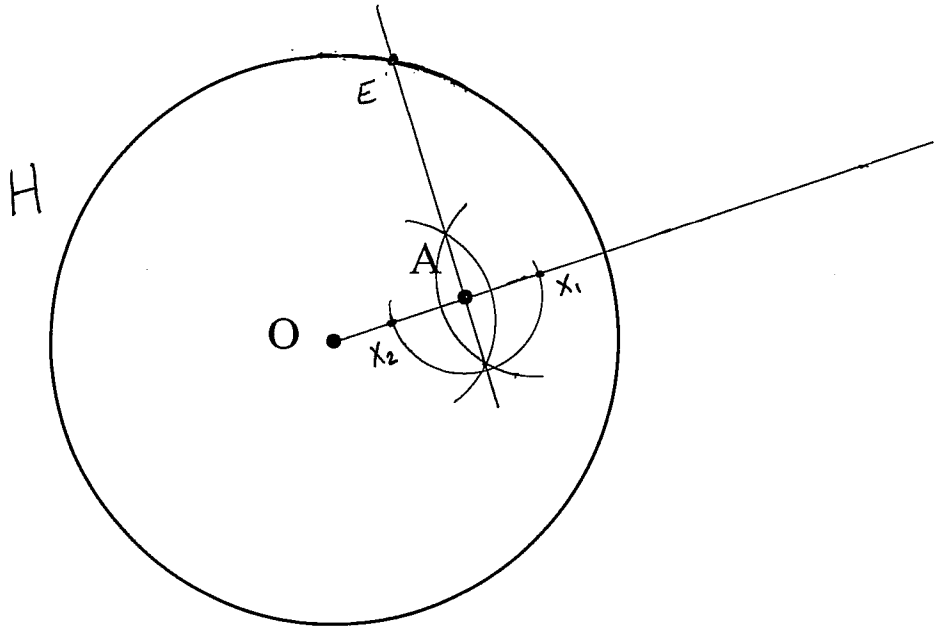


Step 1:

Draw the line $\overleftrightarrow{OA}$.

Extend this line beyond the circle H.

Hyperbolic Lines through A



Step 2:

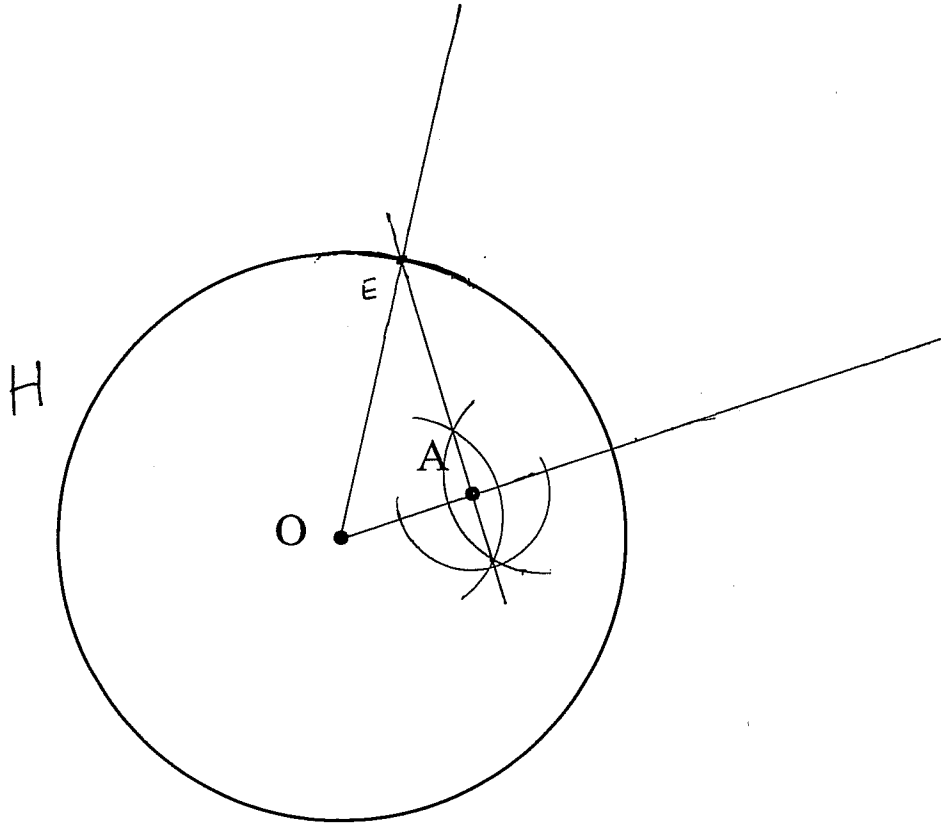
Construct the line that is perpendicular to OA at A.

- Construct a circle centered at A to find points X_1 and X_2.
- Find the perpendicular bisector of X_1 and X_2.

This line meets the circle H at point E.

Note: There are two choices for the point E, one above OA and one below. Either point is valid

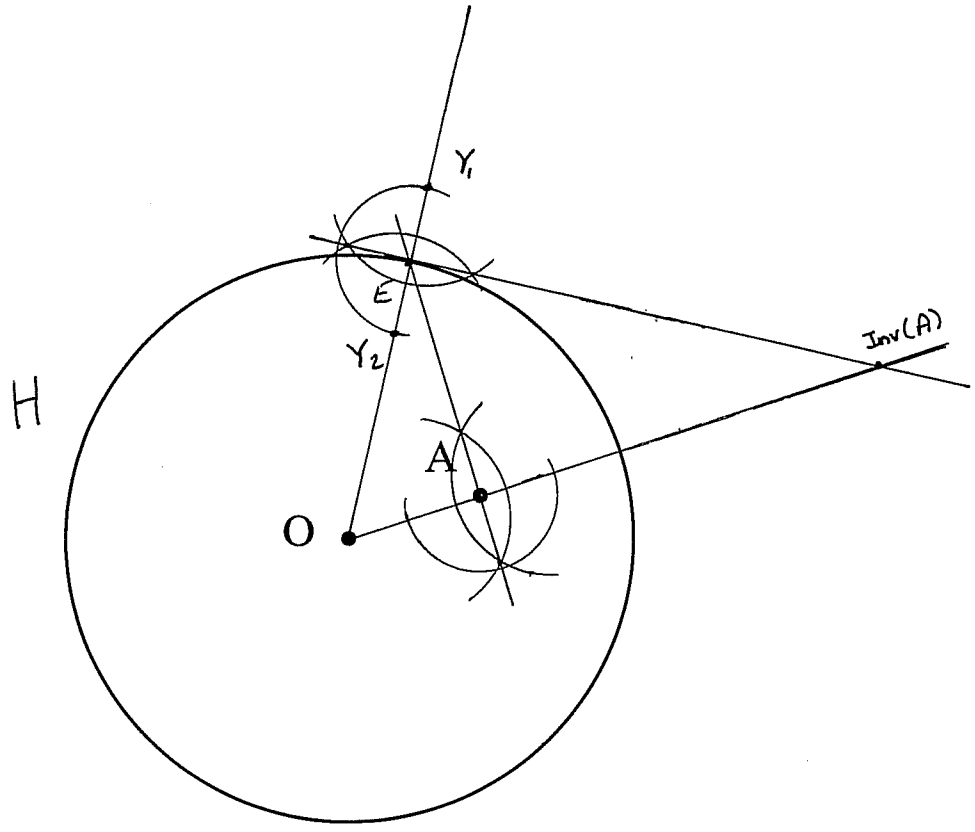
Hyperbolic Lines through A



Step 3

Draw the line OE. Extend this line beyond the circle H.

Hyperbolic Lines through A



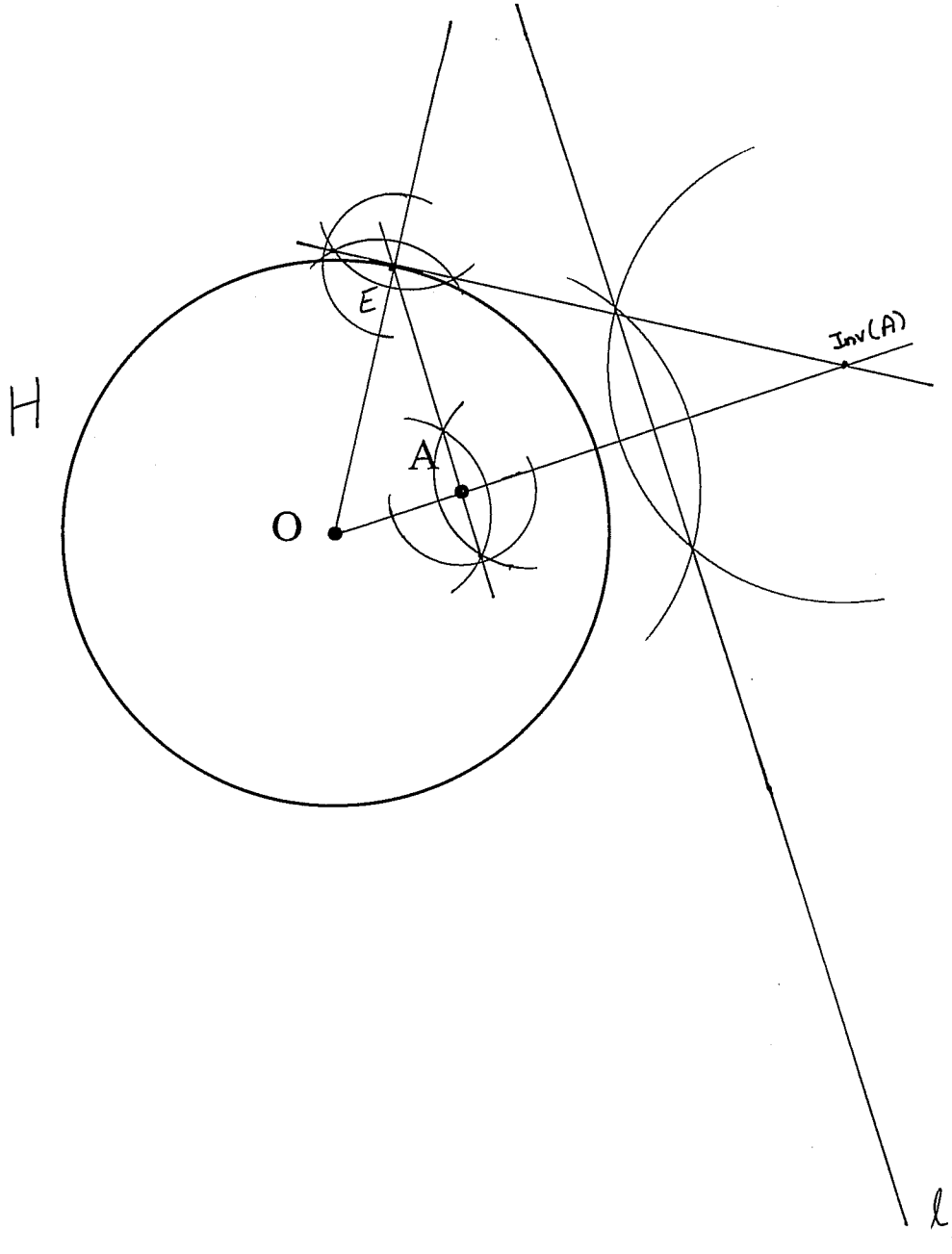
Step 4

Construct the line that is perpendicular to OE at E.

(
- Construct a circle centered at E to find points Y_1 and Y_2
- Find the perpendicular bisector of Y_1 and Y_2.
)

This line meets the line OA at the point Inv(A).

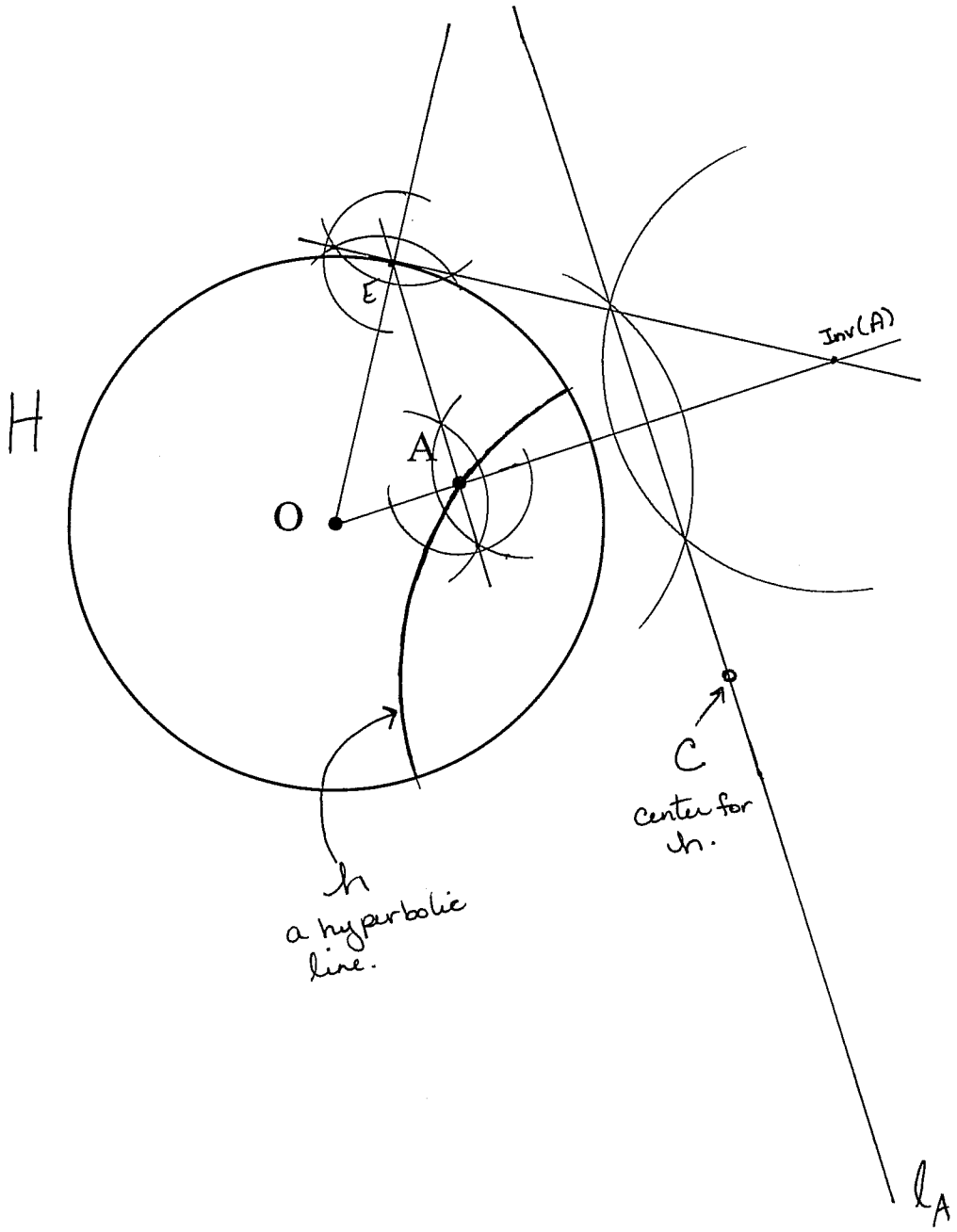
Hyperbolic Lines through A



Step 5:

Find the perpendicular bisector of A and Inv(A). This line is the center line for A, ℓ_A.

Hyperbolic Lines through A



Interpretation of the center line for A:

- If you choose a point on l_A (for example C) and draw a circle centered at C that passes through the point A, then the portion of that circle that is inside H is a hyperbolic line (in this case, h).
- Every hyperbolic line that passes through A is either the diameter through A, or it is a circle (portion) whose center is on l_A.