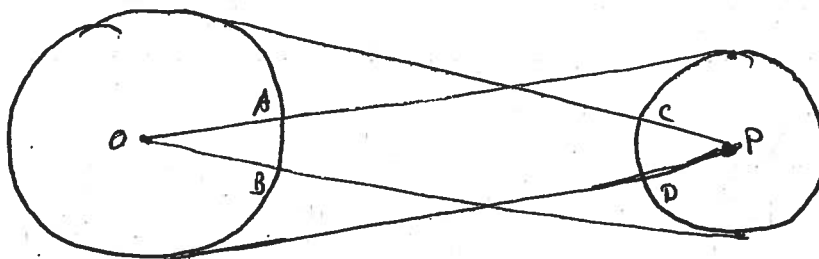1. A and B are two points on circle O. AB is not the diameter of the circle. XY is any diameter of O. AX and BY intersect at point p.

   Find the locus of point p.

2. A cyclic hexagon has three consecutive sides of length a and the remaining sides are of length b. Determine the radius of the circle.
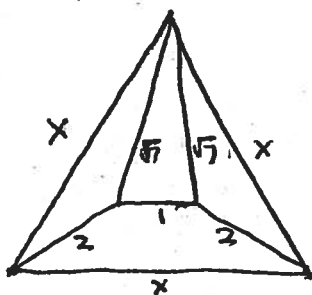
3. 

   OA, OB are tangents to circle P and PC and PD are tangents to circle O.
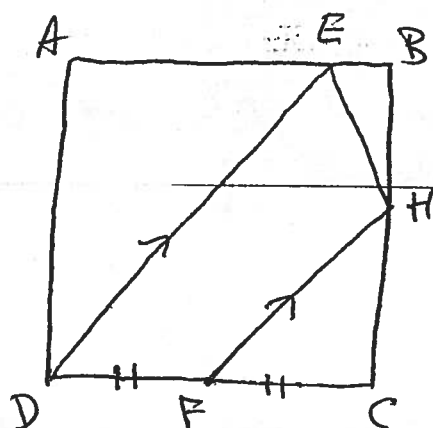
   Prove. AB = CD.

4. 

   Determine the length of x.

5. A, B, C, D, are four points in space such that $AC \perp BD$. A', B', C', D' are any four points such that
   $$AB = A'B', \quad BC = B'C', \quad CD = C'D' \text{ and } DA = D'A'$$

   Prove that $A'C' \perp B'D'$.

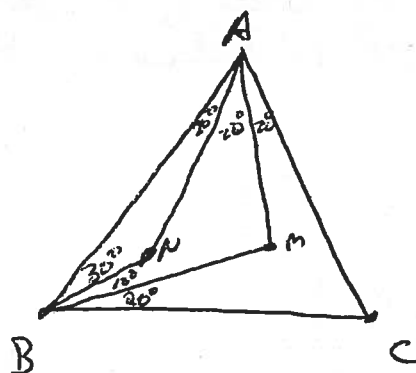**6.**



ABCD is a square and E is on AB such that AE > EB.

H is on BC such that FH ∥ DE
Prove that EH is tangent to the inscribed circle of ABCD.

**7.**



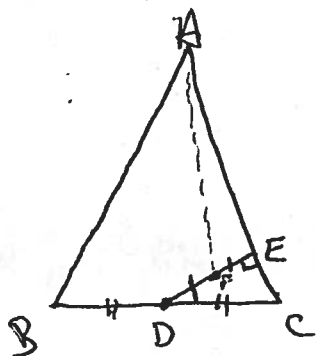N and M are points as shown.
Prove that NM ∥ BC.

**8.** In triangle ABC, AB = AC. D is the midpoint of BC. E is on AC such that $DE \perp AC$. F is the midpoint of DE.



Prove $AF \perp BE$.

B