2a) In Δ's HBD and HAC we have:
(AD) perp (CB) at H. (given)
- then, $B\hat{H}D = A\hat{H}C$ (vertically opp. angles between perp. st. lines).

- $C\hat{A}D = C\hat{B}D = \text{mes } \frac{\overset{\frown}{CD}}{2}$ (two inscribed angles of circle (γ) intercepting same arc $\overset{\frown}{CD}$ are equal).

Thus Δ's HBD and HAC are similar by Angle-Angle postulate.

→ Ratio of similitude:

$$\begin{array}{c|c} \Delta HAC & \frac{HA}{HB} = \frac{HC}{HD} = \frac{AC}{BD} = K. \\ HBD & \end{array}$$

b) Since $BD < AC$ (Given)
then $\frac{AC}{BD} = K > 1$

Thus Δ HAC is an enlargement of Δ HBD of center H.

3a) Quadrilateral ABDC is cyclic since all of its vertices : A, B, D & C are given on the circle (γ) of center O.

b) Quadrilateral ABDC is cyclic (proved)
then, $A\hat{C}D + A\hat{B}D = 180°$ (sum of opp angles in an inscribed quadrilateral).
(AB) intersects (CD) at E (given)
then, pts A, B & E are collinear.
So $E\hat{B}D + A\hat{B}D = 180°$ (sum of adjacent supplementary $\measuredangle$'s)

Thus, $A\hat{C}D = E\hat{B}D$ (two angles having the same supplement are equal)