Geometry 3 (Putting It All Together) - Hints

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Remember that you should not be looking at these until you have at least given the problem serious thought (as in, you're about to bash your head against a wall)! If you would like further hints on a problem or have a solution you would like to discuss, feel free to find me during the day or email me.

5. A theorem would be helpful in showing these three lines concur. Ceva may be difficult because there isn't a triangle readily available to compute ratios for. What other theorem might we use? What does this reduce the problem to showing?

6. It'd be nice if we could directly relate the angles $\angle GAC$ and $\angle CAE$ to the angles $\angle BAC$ and $\angle CAD$. Strategically adding some parallel lines might do the trick.

7. Equal lengths within the same circle cut off equal arcs, so we have plenty of trapezoids. Trapezoids mean parallel lines, and parallel lines give lots of nice ratios.

8. This is a cool problem. How might you relate PQ to QC through an equation? Try to utilize the helpful 60° angles. Also, if we throw Ceva into the mix, we should be able to handle PC, AQ, and RB as well. Finally, don't forget Sohail's inequalities lecture (No, this question has nothing to do with smoothing.)!

9. Extend the altitude from B to side AO to meet the altitude from C to side OD at point X. Construct K, the midpoint of AB, and connect KN and KM. Notice that parallel lines give you many equal angles. Finding a certain set of a similar triangles (aside from the obvious to prove) finishes the problem. (Further hint: AA similarity will not work; try another technique.)