Point of Concurrency and (more) Circumcircle

Problem #1:

This first problem is taken from NCTM’s Illumination project. An interactive version of the exploration could be found here.

Use the following steps on GSP to construct a circumcircle:

1. Construct the perpendicular bisector of each side of the triangle.
2. Label the intersection of the bisectors point $O$. This point is the circumcenter of the triangle. (Note that all three perpendicular bisectors meet at the same point; therefore, it would have been sufficient to only construct two of the perpendicular bisectors in Step 1 to identify the circumcenter.)
3. Using $O$ as the center, construct a circle that passes through the vertices of the triangle.

Point $M$ is the midpoint of $AB$, and $O$ is the circumcenter of triangle $ABC$. The circumcircle with center $O$ and radii $OA$ and $OB$ has been constructed.

**Question 1:** Triangles $OAM$ and $OBM$ are congruent. Do you see why?

**Question 2:** What does this mean about $OA$ and $OB$?

**Question 3:** What about $OC$? How is it related to $OA$ and $OB$?

**Question 4:** What does this prove about the circle?
Problem #2:

Your family is considering moving to a new home. The diagram shows the locations of where your parents work and where you go to school. The locations form a triangle.

In this diagram, how could you find a point that is equidistant from each location? Explain your answer.

Make a sketch, by hand, of the situation. Indicate the best location for the new home.