Locus and Circle: Homework

In this homework, we are going to solve a problem related to circle.
Given two points $A(10,0), B(-10,0)$ on the rectangular coordinate plane.

1. Find the equation of the perpendicular bisector L of the straight line AB, and the midpoint M of A and B. Show that M is on L.

2. Denote P and Q be points such that P is equidistant from A and L, and Q is equidistant from B and L.

   (a) Denote the locus of P by C_1 and locus of Q by C_2. Find the equation of C_1 and C_2.

   (b) Denote the closest point on C_1 to M by X, and that on C_2 to M by Y. What is the geometric relationship between A, B, X, Y, M?

   (c) Find the equation of circle with radius XM and center M.

3. Denote the circle in (2c) by C_0. Denote the intersection points of C_0 and L by H and K.

   (a) Find the equations of tangent to C_0 at H,K,X,Y.

   (b) Find the area enclosed by the above tangent lines and C_0.