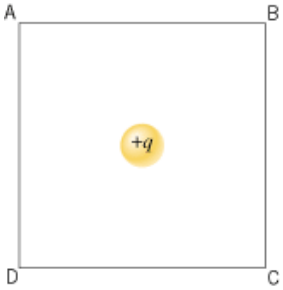
Answer on Question #42475-Physics-Electromagnetism

A positive point charge +q is fixed in position at the center of a square, as the drawing shows. A second point charge is fixed to either corner B, corner C, or corner D. The net electric field at corner A is zero. (a) At which corner is the second charge located? (b) Is the second charge positive or negative? (c) Does the second charge have a greater, a smaller, or the same magnitude as the charge at the center?

Solution



(a) The second charge is located at corner C, because it must be located on the line passing through the center of a square and corner A to create zero net electric field at corner A.

(b) The second charge is negative, because the electric field from it must have opposite direction to the electric field from positive charge at the center of a square to counterbalance its influence at corner A.

(c) The second charge have a greater magnitude as the charge at the center, because the electric field from the point charge is proportional to the magnitude of charge and inversely proportional to the square of the distance between the point charge and corner A. The distance between corner A and corner C is greater than the distance between corner A and the center of a square, so second charge must have a greater magnitude as the charge at the center.