

Problem 4.12 Three point charges, each with $q = 3 \text{ nC}$, are located at the corners of a triangle in the x - y plane, with one corner at the origin, another at $(2 \text{ cm}, 0, 0)$, and the third at $(0, 2 \text{ cm}, 0)$. Find the force acting on the charge located at the origin.

Solution: Use Eq. (4.19) to determine the electric field at the origin due to the other two point charges [Fig.]:

$$\mathbf{E} = \frac{1}{4\pi\epsilon} \left[\frac{3 \text{ nC} (-\hat{\mathbf{x}}0.02)}{(0.02)^3} \right] + \frac{3 \text{ nC} (-\hat{\mathbf{y}}0.02)}{(0.02)^3} = -67.4(\hat{\mathbf{x}} + \hat{\mathbf{y}}) \text{ (kV/m) at } \mathbf{R} = 0.$$

Employ Eq. (4.14) to find the force $\mathbf{F} = q\mathbf{E} = -202.2(\hat{\mathbf{x}} + \hat{\mathbf{y}}) \text{ (}\mu\text{N)}$.

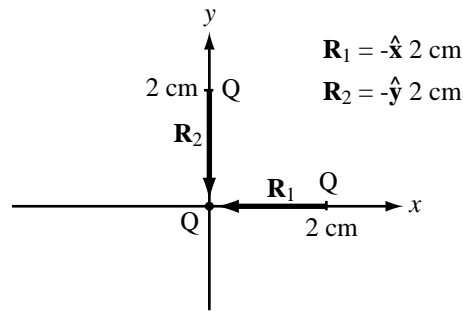


Figure P4.12: Locations of charges in Problem 4.12.