

68. (a) From the second measurement (at  $(2.0, 0)$ ) we see that the charge must be somewhere on the  $x$  axis. A line passing through  $(3.0, 3.0)$  with slope  $\tan^{-1} 3/4$  will intersect the  $x$  axis at  $x = -1.0$ . Thus, the location of the particle is specified by the coordinates (in cm):  $(-1.0, 0)$ .
- (b) Using  $k = 1/4\pi\epsilon_0$ , the field magnitude measured at  $(2.0, 0)$  (which is  $r = 0.030$  m from the charge) is

$$|\vec{E}| = k \frac{q}{r^2} = 100 \text{ N/C} .$$

Therefore,  $q = 1.0 \times 10^{-11} \text{ C}$ .