23.28 (28)

\[ d = x \]

\[ E = 12.0 \text{ V/m} \]

\[ V = +4.98 \text{ V} \quad (V = 0 \text{ m} \to d \to \infty) \]

\[ V \text{ positive so } q \text{ positive and } E \text{ directed from } q \]

(Svar c uppgeben)

\[ q = \frac{1}{4 \pi \varepsilon_0} \frac{q}{x^2} \rightarrow q = E \cdot 4 \pi \varepsilon_0 x^2 \]

\[ V = \frac{1}{4 \pi \varepsilon_0} \frac{q}{x}, \quad V = \frac{1}{4 \pi \varepsilon_0} \cdot \frac{1}{x} (E 4 \pi \varepsilon_0 x^2) \]

\[ V = Ex \]

\[ x = \frac{4.98}{12.0} = 0.415 \text{ m} \]

b) \[ q = 4 \pi \varepsilon_0 V \cdot x = 4 \pi \varepsilon_0 \cdot 4.98 \cdot 0.415 = 2.3 \cdot 10^{-10} C \]

\[ = 0.23 \text{ mC} \]

23.28. At a certain distance from a point charge, the potential and electric-field magnitude due to that charge are 4.98 V and 12.0 V/m, respectively. (Take the potential to be zero at infinity.)

(a) What is the distance to the point charge? (b) What is the magnitude of the charge? (c) Is the electric field directed toward or away from the point charge?