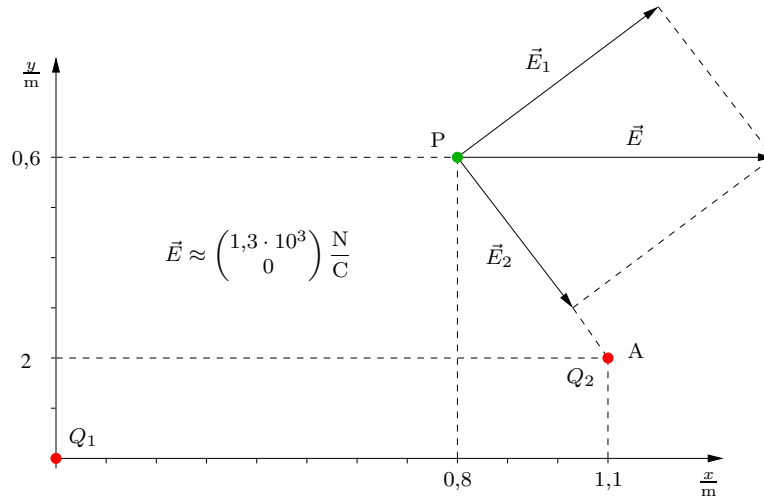


1. (a) $r = \sqrt{1,1^2 + 0,2^2} \text{ m} = 1,118 \text{ m}$, $F = \frac{kQ_1Q_2}{r^2} = \frac{Q_1Q_2}{4\pi\epsilon_0 r^2} = 1,7 \cdot 10^{-5} \text{ N}$

(b) $r_1 = \sqrt{0,8^2 + 0,6^2} \text{ m} = 1,0 \text{ m}$, $r_2 = \sqrt{0,3^2 + 0,4^2} \text{ m} = 0,5 \text{ m}$

$$E_1 = \frac{Q_1}{4\pi\epsilon_0 r_1^2} = 1,0 \cdot 10^3 \frac{\text{N}}{\text{C}}, \quad E_2 = \frac{|Q_2|}{4\pi\epsilon_0 r_2^2} = 7,5 \cdot 10^2 \frac{\text{N}}{\text{C}}$$

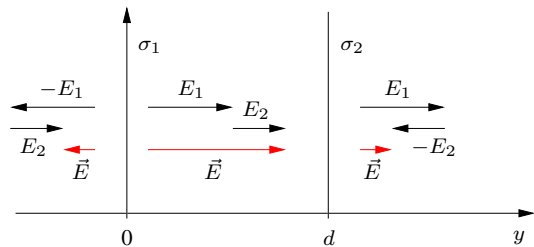
Für die Zeichnung: $E_1 \hat{=} 5 \text{ cm}$, $E_2 \hat{=} 3,75 \text{ cm}$



2. (a) $\vec{E}_1 = \begin{pmatrix} 0 \\ \pm E_1 \\ 0 \end{pmatrix}$, + für $x > 0$

$$\vec{E}_2 = \begin{pmatrix} 0 \\ \pm E_2 \\ 0 \end{pmatrix}$$
, + für $x < d$

$$\vec{E} = \vec{E}_1 + \vec{E}_2 = \begin{pmatrix} 0 \\ E \\ 0 \end{pmatrix}$$



$$E_1 = \frac{\sigma_1}{2\epsilon_0} = 700 \frac{\text{N}}{\text{C}}, \quad E_2 = \frac{|\sigma_2|}{2\epsilon_0} = 500 \frac{\text{N}}{\text{C}}$$

$$E = \begin{cases} E_2 - E_1 = -200 \frac{\text{N}}{\text{C}} & \text{für } y < 0 \\ E_1 + E_2 = 1200 \frac{\text{N}}{\text{C}} & \text{für } 0 < y < d \\ E_1 - E_2 = +200 \frac{\text{N}}{\text{C}} & \text{für } y > d \end{cases}$$

(b) $\frac{m_e}{2} v^2 = Fd = eEd \implies v = \sqrt{\frac{2eEd}{m_e}} = 9,19 \cdot 10^6 \frac{\text{m}}{\text{s}}$

oder:

$$a = \frac{F}{m_e} = \frac{eE}{m_e} = 2,11 \cdot 10^{14} \frac{\text{m}}{\text{s}^2}, \quad \frac{a}{2} t^2 = d \implies t = \sqrt{\frac{2d}{a}} = 4,35 \cdot 10^{-8} \text{ s}$$

$$v = at = 9,19 \cdot 10^6 \frac{\text{m}}{\text{s}}$$