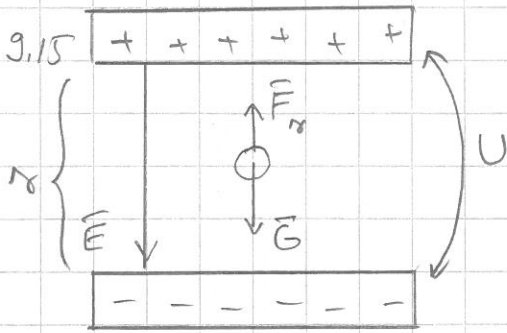
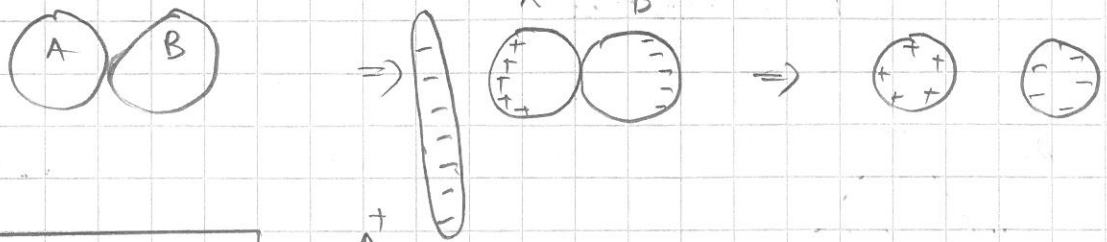


3.7



$r = 1,0 \text{ cm}$, $U = 10,2 \text{ kV}$, $m = 3,3 \cdot 10^{-11} \text{ g}$

Puoleen on paikallaan $\Rightarrow \sum \vec{F} = \vec{F}_E + \vec{G} = \vec{0}$

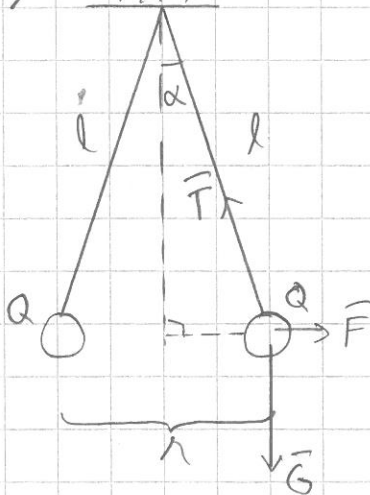
$\Rightarrow F_E - G = EQ - mg = \frac{U}{r} Q - mg = 0$

$\Leftrightarrow Q = \frac{m g r}{U} = \frac{3,3 \cdot 10^{-11} \cdot 10^{-3} \text{ kg} \cdot 9,81 \frac{\text{m}}{\text{s}^2} \cdot 0,010 \text{ m}}{10,2 \cdot 10^3 \text{ V}}$
 $\approx 3,17382 \cdot 10^{-19} \text{ C}$

$\vec{F}_E \uparrow \perp \vec{E} \Rightarrow Q > 0 \Rightarrow \underline{Q = -3,2 \cdot 10^{-19} \text{ C}}$

$\frac{Q}{e} = \frac{3,17382 \cdot 10^{-19} \text{ C}}{1,60218 \cdot 10^{-19} \text{ C}} \approx 1,9805 \Rightarrow \underline{Q \approx -2e}$

18.2016/17



$l = 0,20 \text{ m}$, $m = 8,5 \text{ g}$, $r = 4,2 \text{ cm}$

\vec{G} : paino

\vec{T} : langan jännitys

\vec{F} : sähköinen voima

Kunla on tasapainossa: $\sum \vec{F} = \vec{G} + \vec{T} + \vec{F} = \vec{0}$

\Rightarrow voimat muodostavat kolmion:



$\sin \alpha = \frac{r}{2l} = \frac{4,2 \text{ cm}}{2 \cdot 20 \text{ cm}} \Rightarrow \alpha \approx 6,02717^\circ$

$\tan \alpha = \frac{F}{G} = \frac{k \cdot \frac{Q \cdot Q}{r^2}}{mg} \quad | \cdot \frac{m g r^2}{2} \sqrt{\quad}$

$\Rightarrow Q = \pm \sqrt{\frac{\tan \alpha m g r^2}{2}} = \pm \sqrt{\frac{\tan 6,02717^\circ \cdot 8,5 \cdot 10^{-3} \text{ kg} \cdot 9,81 \frac{\text{m}}{\text{s}^2} \cdot (0,042 \text{ m})^2}{2 \cdot 8,98755 \cdot 10^9 \frac{\text{N}}{\text{C}^2}}}$

$\approx \pm 42 \cdot 10^{-9} \text{ C}$