S. 351

A1: $d = 2\,cm$, $U = 1\,kV$

$C = Q/U$; $C = \varepsilon_0 \cdot \frac{A}{d}$

$E = U/d = \frac{1000\,V}{0.02\,m} = 50'000\,V/m = \underline{50'000\,N/C}$

$F = E \cdot q = 50'000\,N/C \cdot 10\,nC = \underline{0.0005\,N}$

$W = U \cdot q = 1000\,V \cdot 10\,nC = \underline{0.00001\,Joule}$

A2: $m = 0.01\,g = 10^{-5}\,kg$

$q = 0.1\,nC$

$U = 108\,kV$

$W = U \cdot q = \frac{1}{2} m v^2$

$\Rightarrow v = \sqrt{\frac{2Uq}{m}} \cong \underline{1.41\,m/s}$

$E = \frac{U}{d}$; $F = E \cdot q = F_G = mg$

$\frac{U}{d} \cdot q = mg$

$d = \frac{U \cdot q}{mg} \cong 0.1\,m = \underline{10\,cm}$

A3: Änderung des Abstands d: $d \rightarrow d'$

Ladung Q bleibt;

$$\left.\begin{aligned} C &= \varepsilon_0 \frac{A}{d} \\ C' &= \varepsilon_0 \frac{A}{d'} \end{aligned}\right\} \quad \frac{C}{C'} = \frac{d'}{d};$$

$C = \frac{Q}{U} \Rightarrow U = \frac{Q}{C}$; $U' = \frac{Q}{C'}$

$$U' = \frac{Q}{C'} \quad , \quad \frac{C}{C'} = \frac{d'}{d} \quad , \quad \frac{C'}{C} = \frac{d}{d'}$$

$$\hookrightarrow \quad C' = C \frac{d}{d'}$$

$$U' = \frac{Q}{C'} = \frac{Q}{C \frac{d}{d'}} = \frac{Q d'}{C d}$$

$$U = \frac{Q}{C} \Rightarrow U' = U \cdot \frac{d'}{d}$$