

p. 354 #1, 2, 4

1. $V_1 = 30\text{V}$

$V_2 = 150\text{V}$

a) $\Delta E_e = ?$

$$V = \frac{E_e}{q} \Rightarrow E_e = Vq$$

$$\begin{aligned}\Delta E_e &= E_{e2} - E_{e1} \\ &= V_2 q - V_1 q \\ &= q(V_2 - V_1) \\ &= (1.602 \times 10^{-19} \text{C})(150\text{V} - 30\text{V}) \\ &= 1.9 \times 10^{-17} \text{J}\end{aligned}$$

b) $E = ?$

$d = 10\text{cm}$

$= 0.10\text{m}$

$$\Delta E_e = qEd \Rightarrow E = \frac{\Delta E_e}{qd}$$

$$E = \frac{1.9 \times 10^{-17} \text{J}}{(1.602 \times 10^{-19} \text{C})(0.10\text{m})}$$

$$E = 1.2 \times 10^3 \text{N/C}$$

2. $d = 3.0\text{mm}$
 $= 3.0 \times 10^{-3} \text{m}$

$E = 250\text{V/m}$

$\Delta V = ?$

$$E = \frac{\Delta V}{\Delta d} \Rightarrow \Delta V = E \Delta d$$

$$\begin{aligned}\Delta V &= (250\text{V/m})(3.0 \times 10^{-3} \text{m}) \\ &= 0.75 \text{V}\end{aligned}$$

4. $\Delta V = 45\text{V}$

a) $w = ?$

$$w = qE_e$$

But $E_e = Vq$

$$\begin{aligned}\therefore w &= q(V_2 - V_1) \\ &= (1.602 \times 10^{-19} \text{C})(45\text{V}) \\ &= 7.2 \times 10^{-18} \text{J}\end{aligned}$$

b) Electric potential energy.