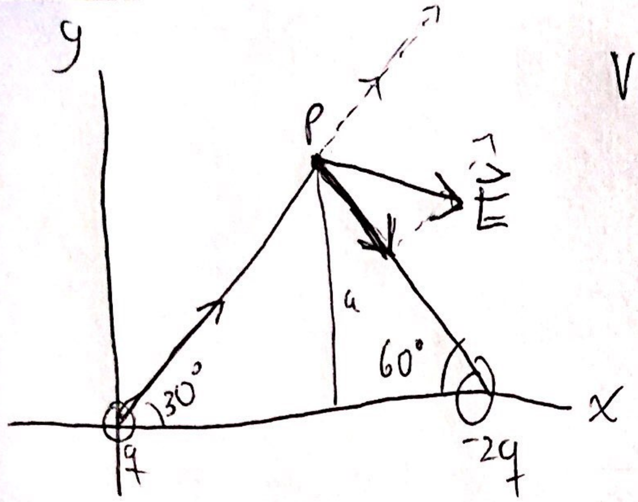
1)



$$V(P) = \sum_{i=1}^{N} \frac{K_e q_i}{r_i}$$

$$= \frac{K_e q}{\text{Sen } 30°} + \frac{K_e(-2q)}{\text{Sen } 60°}$$

$$= \frac{K_e q}{\frac{1}{2}} + \frac{K_e(-2q)}{\frac{\sqrt{2}}{2}}$$

$$= 2K_e q + \frac{2K_e(-2q)}{\sqrt{2}}$$

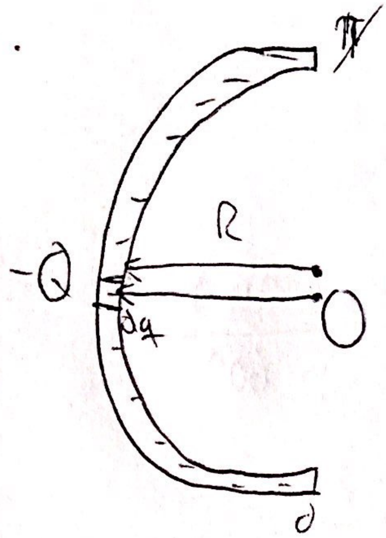
$$= 2K_e q + \frac{(-4K_e q)}{\sqrt{2}}$$

$$V(P) = K_e q\left(2 - \frac{4}{\sqrt{2}}\right) = K_e q\left(2 - \frac{\cancel{4}^{\,2}\sqrt{2}}{\cancel{2}}\right)$$

$$= K_e q\left(2 - 2\sqrt{2}\right) = \boxed{(2-2\sqrt{2})K_e q}$$

$$\cancel{= K_e q\left(2(1-\sqrt{2})\right)}$$

2.



$$V = \frac{K_e q}{r} \qquad K_e = \frac{1}{4\pi \varepsilon_0}$$

$$V = \frac{-q}{4\pi r \varepsilon_0}$$

$$\int dV = \int_0^{\pi} \frac{-dq}{4\pi r \varepsilon_0}$$

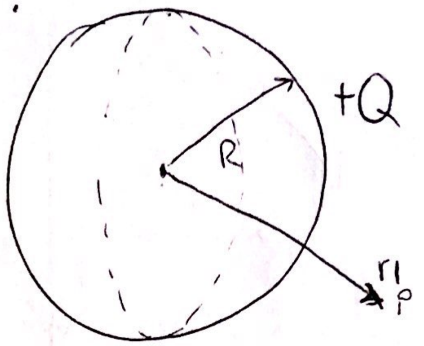
$$V = \frac{1}{4\pi r \varepsilon_0} \int_0^{\pi} -dq$$

$$V = \frac{1}{4\pi r \varepsilon_0}\, q \Big|_0^{\pi} = \frac{1}{4\pi r \varepsilon_0}\left(-Q - 0\right)$$

$$\boxed{V = \frac{-Q}{4\pi r \varepsilon_0}}$$

Escaneado con CamScanner

3.



P

$$\vec{E} = \begin{cases} \dfrac{K_e Q r}{R^3}\hat{r}, & r \leq R \\ \dfrac{K_e Q}{r^2}\hat{r}, & r \geq R \end{cases}$$

Mostrar que:

$$V = \begin{cases} \dfrac{K_e Q}{2R}\left(3 - \dfrac{r^2}{R^2}\right), & r \leq R \\ \dfrac{K_e Q}{r}, & r \geq R. \end{cases}$$

$\cancel{dV = -\vec{E}\,d\vec{s}}$

$\cancel{\int dV = -\int \vec{E}\cdot d\vec{s}}$

$\cancel{V = -\vec{E}\,S}$

$\cancel{V = -E\,4\cdot\pi\cdot r^2}$

• Para P:

$$\vec{E} = \cancel{-}\frac{dV}{dr}$$

$$dV = \vec{E}\,dr$$

$$\int dV = \int \vec{E}\,dr$$

$$\int dV = \vec{E}\int dr$$

$$V = \frac{K_e Q}{r^{\cancel{2}}}\cancel{r} \Rightarrow \boxed{V = \frac{K_e Q}{r}}$$

~~• Para r = R~~

$\cancel{dV = \vec{E}\,d\vec{S}}$

$\cancel{V = \vec{E}\int d\vec{S}}$

$V =$

Para $r \leq R$

$$V = -\int \frac{Q r K_e}{R^3}\, dr$$

$$V = -\frac{Q K_e}{R^3} \int r\, dr = -\frac{Q K_e}{2R^3} r^2 + C$$

En $r = R$, $V_1 = V_2$

$$\frac{Q K_e}{\cancel{R}} = -\frac{Q K_e}{2\cancel{R^3}} \cancel{R^2} + C_2$$

$$C_2 = \frac{Q K_e}{R} + \frac{Q K_e}{2R} \qquad C_2 = \frac{2Q K_e}{2R} + \frac{Q K_e}{2R}$$

$$C_2 = \frac{3 Q K_e}{2R}$$

$$V_2 = -\frac{Q K_e r^2}{2R^3} + \frac{3 Q K_e}{2R}$$

$$= \frac{Q K_e}{2R}\left(-\frac{r^2}{R^2} + 3\right)$$

$$\boxed{V_2 = \frac{Q K_e}{2R}\left(3 - \frac{r^2}{R^2}\right)}$$