25.66 | serway

$x = a = 1.0\,m$

$x = a + 1 = 3.0\,m$

$Q = 1.6\,nC$

modelo: Flujo electrico

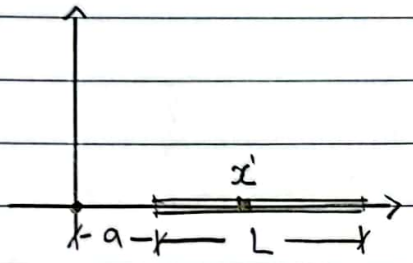
sistema: Filamento

a) 1 part. -> $x = 2.00\,m$

b) 2 part. -> $x = 1.5, 2.5\,m$, $q = 0.8\,nC$

c) 4 part. -> $x = 1.25, 1.75, 2.25, 2.75\,m$

$q = 0.4\,nC$



$\vec{r} = 0$

$\vec{r}' = x'$

$$\frac{Q}{L} = \lambda$$

$$d\phi = \frac{1}{4\pi\varepsilon_0}\frac{\lambda\, dx'}{x'}$$

$$\phi = \frac{\lambda}{4\pi\varepsilon_0} \ln x' \Big|_a^{L+a}$$

$$\phi = \frac{\lambda}{4\pi\varepsilon_0}\left(\ln(L+a) - \ln(a)\right)$$

$$\phi = \frac{\lambda}{4\pi\varepsilon_0} \ln\left(\frac{L+a}{a}\right) \qquad \phi = \frac{Q}{4\pi\varepsilon_0 L} \ln\left(\frac{L+a}{a}\right)$$

a) $\phi = \frac{1}{4\pi\varepsilon_0}\sum \frac{q_i}{x_i}$ -> $\phi = \frac{1}{4\pi\varepsilon_0}\left(\frac{1.6\times10^{-9}}{2.00}\right) = 7.19\,V$

b) $\phi = \frac{1}{4\pi\varepsilon_0}\left(\frac{0.8\times10^{-9}}{1.5} + \frac{0.8\times10^{-9}}{2.5}\right) = 7.67\,V$

c) $\phi = \frac{1}{4\pi\varepsilon_0}\left(\frac{0.4\times10^{-9}}{1.25} + \frac{0.4\times10^{-9}}{1.75} + \frac{0.4\times10^{-9}}{2.25} + \frac{0.4\times10^{-9}}{2.75}\right) = 7.84\,V$

d) $\phi = \frac{1}{4\pi\varepsilon_0}\left(\frac{1.6\times10^{-9}}{2}\right)\ln\left(\frac{2+1}{1}\right) = 7.9012\,V$

$\frac{7.84}{7.90} \times 100 = 99.2\%$