EJERCICIO F2BE3312:

"achimagec.com"

$q_1 = -1\,\mu C$; en $A(-3,0)$

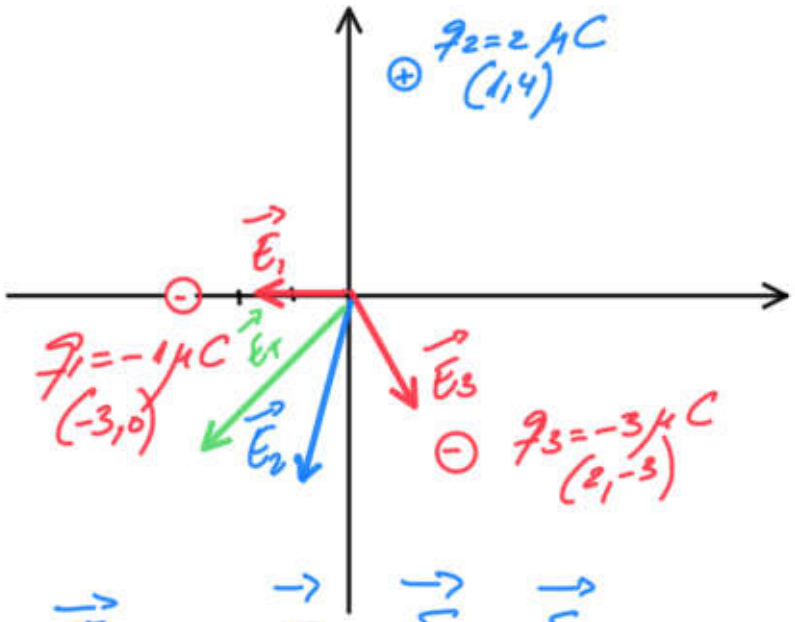
$q_2 = 2\,\mu C$; en $B(1,4)$

$q_3 = -3\,\mu C$; en $C(2,-3)$

a) $\vec{E}(0,0) = ?$

b) $V(0,0) = ?$

c) $W_{q_4 = 4\mu C}$ del $(0,0)$ al ∞



$$\vec{E}_{(0,0)} = \vec{E}_1 + \vec{E}_2 + \vec{E}_3$$

$$\vec{E}_1 = k\frac{q_1}{r_1^2}\frac{\vec{r}_1}{r_1} = 9.10^9\,\frac{-1.10^{-6}}{3^2}\,\frac{(3\vec{\imath})}{3} =$$

$\vec{r}_1 = 3\vec{\imath}$; $|\vec{r}_1| = 3\ m$

$$\boxed{\vec{E}_1 = -10^3\,\vec{\imath}\left(\frac{N}{C}\right)}$$

$$\vec{E}_2 = K\frac{q_2}{r_2^2}\frac{\vec{r}_2}{r_2} = 9\cdot10^9\frac{2\cdot10^{-6}}{17}\frac{-\vec{i}-4\vec{j}}{\sqrt{17}} =$$

$$\vec{r}_2 = -\vec{i}-4\vec{j}\ ;\ |\vec{r}_2| = \sqrt{(-1)^2+(-4)^2} = \sqrt{17}\ m$$

$$\boxed{\vec{E}_2 = -256{,}80\vec{i} - 1{,}03\cdot10^3\vec{j}\ \left(\frac{N}{C}\right)}$$

$$\vec{E}_3 = K\frac{q_3}{r_3^2}\frac{\vec{r}_3}{r_3} = 9\cdot10^9\frac{-3\cdot10^{-6}}{13}\frac{-2\vec{i}+3\vec{j}}{\sqrt{13}} =$$

$$\vec{r}_3 = -2\vec{i}+3\vec{j}\ ;\ |\vec{r}_3| = \sqrt{(-2)^2+3^2} = \sqrt{13}\ m$$

$$\boxed{\vec{E}_3 = 1{,}15\cdot10^3\vec{i} - 1{,}73\cdot10^3\vec{j}\ \left(\frac{N}{C}\right)}$$

$$\boxed{\vec{E}_{(0,0)} = \vec{E}_1 + \vec{E}_2 + \vec{E}_3 = \ldots = -106{,}8\vec{i} - 2760\vec{j}\ \left(\frac{N}{C}\right)}$$

b) $V_{(0,0)} = ?$

$$V_{(0,0)} = V_1 + V_2 + V_3 =$$

$$= K\frac{q_1}{r_1} + K\frac{q_2}{r_2} + K\frac{q_3}{r_3} =$$

$$= 9\cdot10^9\frac{-1\cdot10^{-6}}{3} + 9\cdot10^9\frac{2\cdot10^{-6}}{\sqrt{17}} + 9\cdot10^9\frac{-3\cdot10^{-6}}{\sqrt{13}} =$$

$$= -3000 + 4365{,}64 - 7488{,}45 =$$

$$\boxed{V_{(0,0)} = -6122{,}81\ V}$$

c) $W(q_4)[(0,0) \to \infty] = -\Delta U_E = -q_4(V_\infty^{\,0} - V_{(0,0)}) =$
(F. del Campo)

$= -4 \cdot 10^{-6}(-(-6122{,}81)) =$

$$\boxed{W_{F\,Campo} = -0{,}024\ J}$$

El trabajo no lo hace el campo, la transformación se realiza a través de una F exterior