Answer on Question #68717-Physics-Electromagnetism

in a similarly electric field the potential is 10 volt on coordinates of origin and potential of every point (1,0,0),(0,1,0) and (0,0,1) is 8 volt. Then what will be the value of potential at point (1,1,1)?

Solution

Potential at points at the distance of 1 is the same. Thus, we have spherically symmetrical field (the center is the origin). The potential is

$$V(r) = V(0) - \frac{kq}{r}.$$

So,

$$\frac{V(r') - V(0)}{V(r) - V(0)} = \frac{r}{r'} = \frac{1}{\sqrt{1^2 + 1^2 + 1^2}} = \frac{1}{\sqrt{3}}$$

$$V(r') = V(0) + \frac{1}{\sqrt{3}}\left(V(r) - V(0)\right) = 10 + \frac{1}{\sqrt{3}}(8 - 10) = 10 - \frac{2}{\sqrt{3}} \approx 8.845\ V.$$

Answer: $8.845\ V$.