Lecture 6 (12-1)

Sunday, March 7, 2021 1:43 AM

Assume a point charge $q$ instead of the source charge ⇒


$$\vec{E} = \frac{\vec{F}_e}{q_0} \Rightarrow \vec{F}_e = q_0 \vec{E}$$

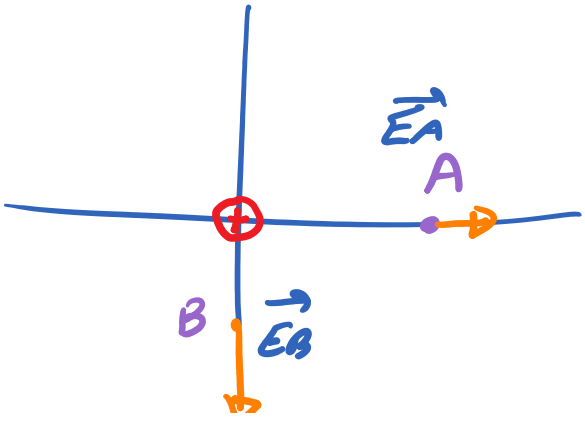
$$\Rightarrow k_e \frac{q q_0}{r^2} \hat{r} = q_0 \vec{E}$$

$$\Rightarrow \boxed{\vec{E} = k_e \frac{q}{r^2} \hat{r}}$$ → The electric field at a distance $r$ from a point charge $q$

- For a group of point charges, the total electric at a given point is:

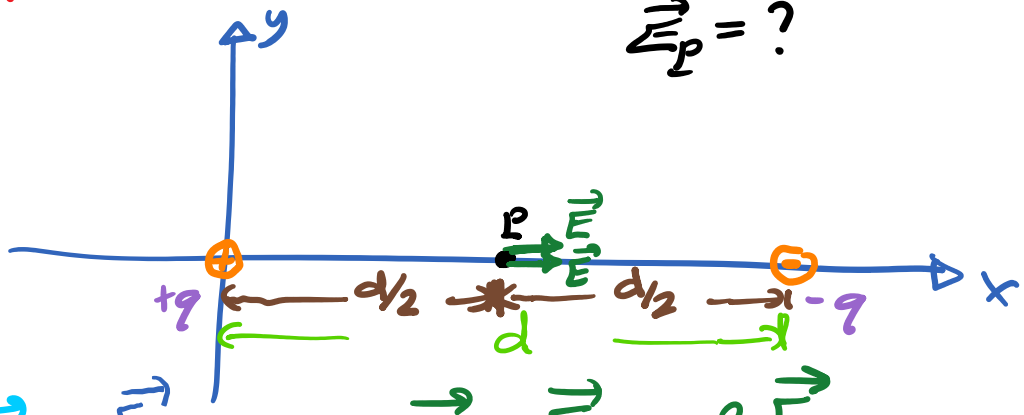
$$\vec{E} = \vec{E}_1 + \vec{E}_2 + \cdots = k_e \frac{q_1}{r_1^2} \hat{r}_1 + k_e \frac{q_2}{r_2^2} \hat{r}_2 + \cdots$$

$$= k_e \sum_i \frac{q_i}{r_i^2} \hat{r}_i$$



**Question:** In the figure shown below, find the total electric field at the midpoint between the two charges.

$\vec{E}_p = ?$

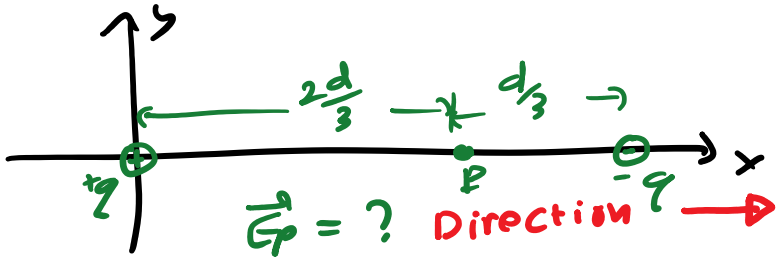



$$\vec{E}_p = \vec{E}_{+q} + \vec{E}_{-q} = \vec{E} + \vec{E} = 2\vec{E}$$

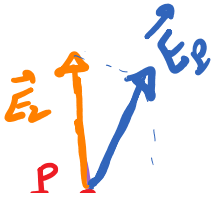
But $\vec{E} = k_e \frac{|q|}{(d/2)^2}\hat{i} = 4k_e \frac{|q|}{d^2}\hat{i}$

$$\Rightarrow \boxed{\vec{E}_p = 8k_e \frac{|q|}{d^2}\hat{i}}$$

**What IF?**

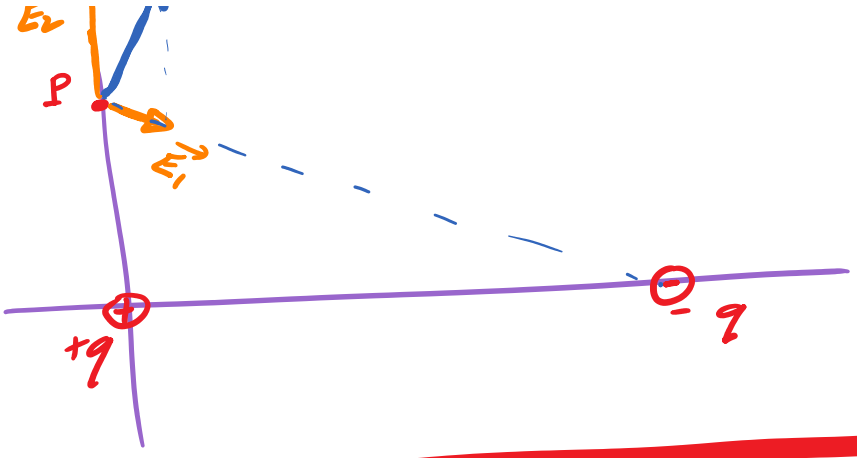



**What IF?**





$\vec{E}_p$ = ? $\vec{E}_p$ = zero

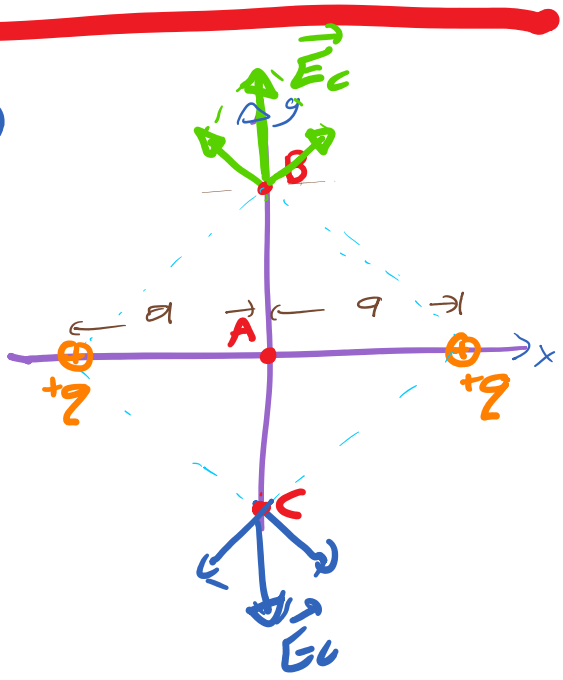



Q: Determine the direction of $\vec{E}$ at points A, B, and C.

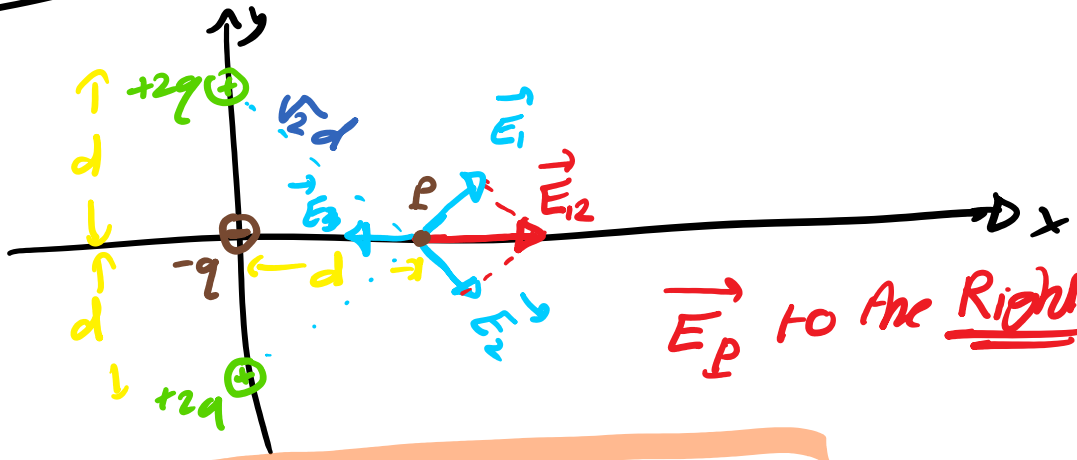
$\vec{E}_A = 0$

$\vec{E}_B$ up

$\vec{E}_C$ is down




## Question:




$\vec{E}_P$ to the Right !!

Try problem 25 /ch.23