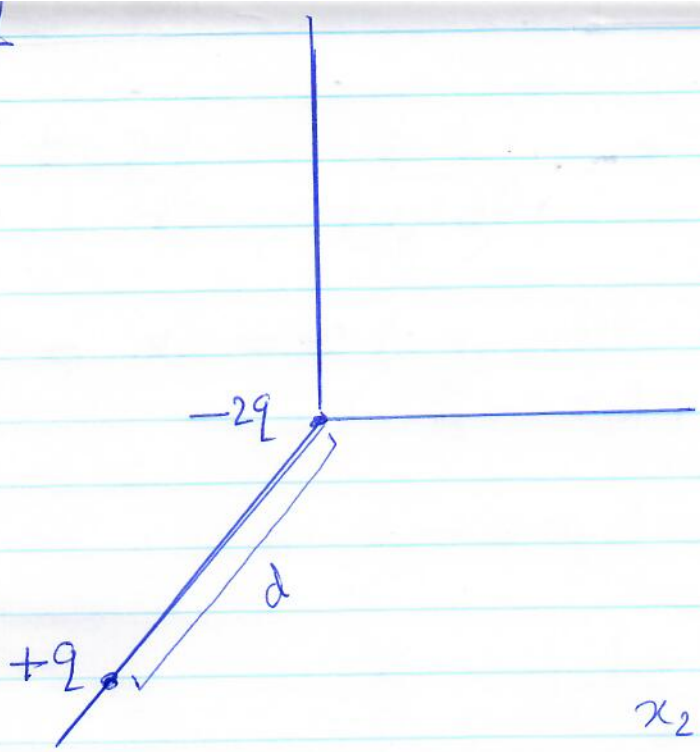
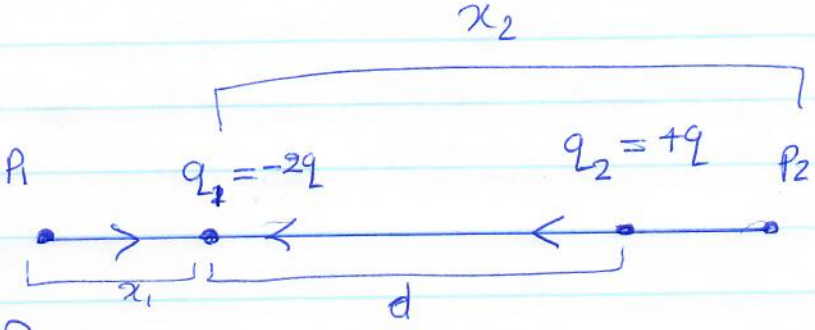
Q1





For P_1 :

$$E_1 = E_2$$

$$\frac{k\,2q}{x_1^2} = \frac{k\,q}{(x_1+d)^2} \Rightarrow \frac{2}{x_1^2} = \frac{1}{(x_1+d)^2}$$

$$\Rightarrow x_1^2 = 2(x_1+d)^2 \Rightarrow$$
$$x_1^2 = 2(x_1^2 + 2x_1 d + d^2)$$

$$\Rightarrow x_1^2 + 4x_1 d + 2d^2 = 0$$

$$x_1 = \frac{-4d \pm \sqrt{16d^2 - 8d^2}}{2} = d(-2 \pm \sqrt{2})$$

the points where electric vied is zero

For P_2

$$k\frac{2q}{x_2^2} = \frac{kq}{(x_2-d)^2} \Rightarrow \frac{2}{x_2^2} = \frac{1}{(x_2-d)^2}$$

$$\Rightarrow x_2^2 = 2(x_2-d)^2$$
$$= 2(x_2^2 - 2x_2d + d^2)$$

$$\Rightarrow x_2^2 - 4x_2d + 2d^2 = 0$$

$$x_2 = \frac{4d \pm \sqrt{16d^2 - 8d^2}}{2} = d(2 \pm \sqrt{2})$$

the all possible points where the electric field is zero is $d(\pm 2 \pm \sqrt{2})$