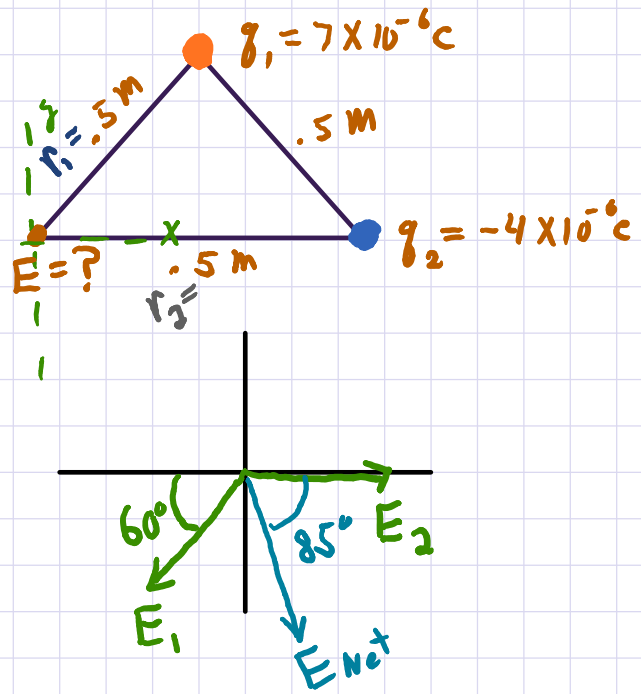
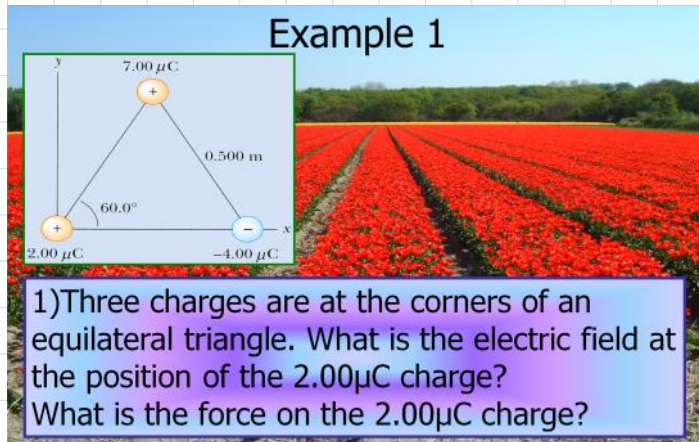


Example 1

Thursday, January 22, 2015 2:33 PM



$$E_1 = k \frac{q_1}{r_1^2}$$

$$E_1 = (9 \times 10^9 \text{ N} \frac{\text{m}^2}{\text{C}^2}) \frac{(7 \times 10^{-6} \text{ C})}{(.5 \text{ m})^2}$$

$$E_1 = 2.52 \times 10^5 \text{ N/C}$$

$$E_2 = k \frac{q_2}{r_2^2}$$

$$E_2 = (9 \times 10^9 \text{ N} \frac{\text{m}^2}{\text{C}^2}) \frac{(4 \times 10^{-6} \text{ C})}{(.5 \text{ m})^2}$$

$$E_2 = 1.44 \times 10^5 \text{ N/C}$$

$$\sum E_x = -E_1 \cos(60^\circ) + E_2 = -(2.52 \times 10^5 \text{ N/C}) \cos(60^\circ) + 1.44 \times 10^5 \text{ N/C}$$

$$\sum E_x = 1.8 \times 10^4 \text{ N/C}$$

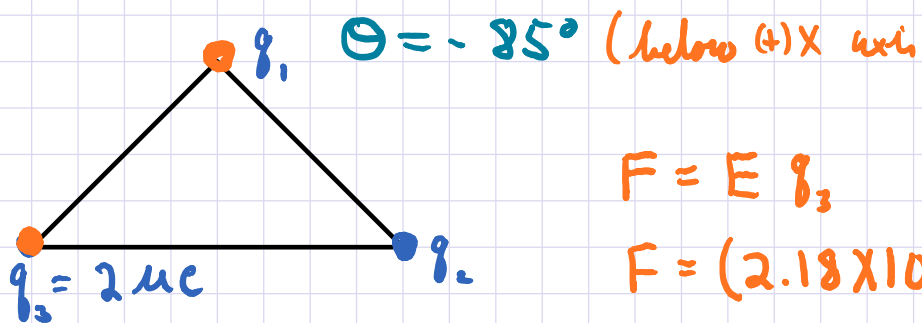
$$\sum E_y = -E_1 \sin(60^\circ) = -(2.52 \times 10^5 \text{ N/C}) \sin(60^\circ)$$

$$\sum E_y = -2.18 \times 10^5 \text{ N/C}$$

$$|E_{\text{net}}| = \sqrt{(\sum E_x)^2 + (\sum E_y)^2}$$

$$|E_{\text{net}}| = \sqrt{(1.8 \times 10^4 \text{ N/C})^2 + (-2.18 \times 10^5 \text{ N/C})^2} = 2.18 \times 10^5$$

$$\Theta = \tan^{-1} \left(\frac{\sum E_y}{\sum E_x} \right) = \tan^{-1} \left(\frac{-2.18 \times 10^5 \text{ N/C}}{1.44 \times 10^4 \text{ N/C}} \right)$$



$$F = E q_3$$

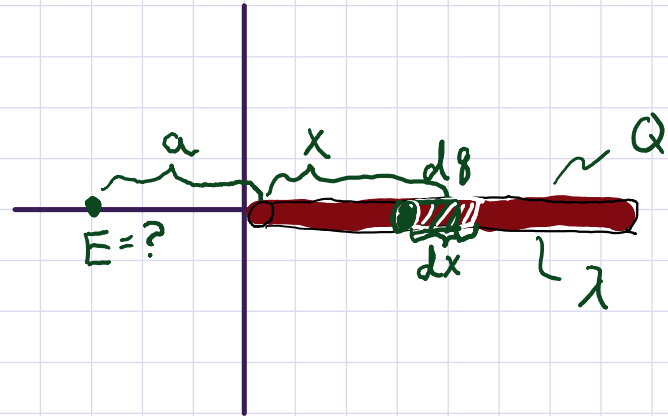
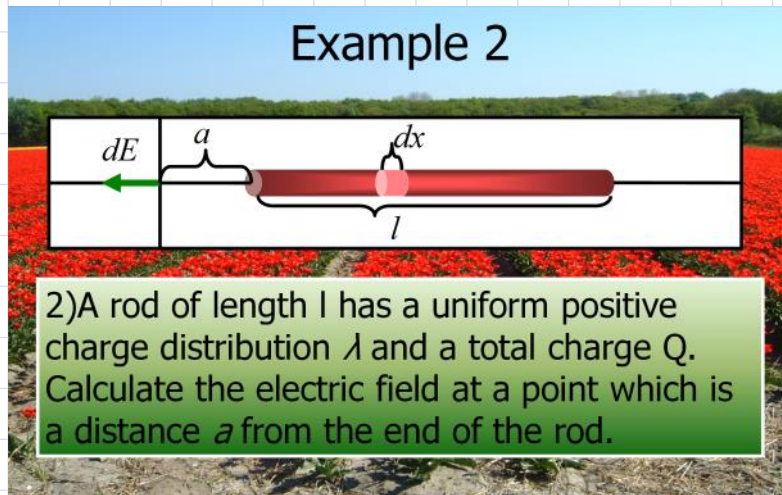
$$F = (2.18 \times 10^5 \text{ N/C}) (2 \times 10^{-6} \text{ C})$$

$$F = .436 \text{ N} \quad 85^\circ \text{ below } (+) \text{ X axis}$$

if q_3 was $(-)$ 85° above $(-)$ X axis

Example 2

Thursday, January 22, 2015 2:34 PM



$$dE = k \frac{dq}{(a+x)^2}$$

$$dE = k \frac{\lambda dx}{(a+x)^2}$$

$$\int dE = \int_0^l k \frac{\lambda dx}{(a+x)^2}$$

$$E = k \lambda \int_0^l \frac{dx}{(a+x)^2}$$

$$E = k \lambda \int_a^{a+l} \frac{dz}{z^2}$$

$$E = k \lambda \left[-\frac{1}{z} \right]_a^{a+l}$$

$$E = k \lambda \left[-\frac{1}{z} \right]_a^{a+l}$$

$$E = k \lambda \left[-\frac{1}{a+l} - \left(-\frac{1}{a} \right) \right]$$

$$E = k \lambda \left[-\frac{1}{a+l} + \frac{1}{a} \right]$$

$$E = k \lambda \left[-\frac{1}{a+l} + \frac{a+l}{a(a+l)} \right]$$

$$E = k \lambda \left(\frac{1}{a(a+l)} \right) = k \frac{Q}{a(a+l)}$$

$$z = a + x$$

$$dz = dx$$

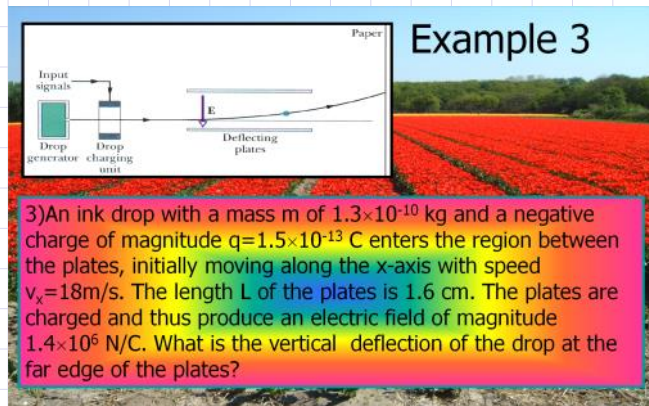
$$\lambda = \frac{Q}{\lambda}$$

Example 3

Thursday, January 22, 2015 2:34 PM

$$F = Eq \text{ and } F = ma$$

$$\Delta x = .016 \text{ m}$$



$$\begin{aligned} & \text{Diagram showing a drop entering a region between two parallel plates. The top plate is positively charged (+) and the bottom plate is negatively charged (-). The electric field E is directed downwards. The drop has an initial horizontal velocity $v_x = 18 \text{ m/s}$ and a negative charge $q = -1.5 \times 10^{-13} \text{ C}$. The mass is $m = 1.3 \times 10^{-10} \text{ kg}$. The vertical deflection is Δy . The horizontal distance is $\Delta x = .016 \text{ m}$. The acceleration is a_y . The final velocity is v_y . The final position is y . The final time is t . The final deflection is Δy . The final velocity is v_y . The final position is y . The final time is t . The final deflection is Δy .$$

$$\Delta y = v_{y0} t + \frac{1}{2} a_y t^2$$

$$\Delta y = \frac{1}{2} a_y t^2$$

$$\Delta y = \frac{1}{2} (1.615 \times 10^3 \text{ m/s}^2) (8.89 \times 10^{-4} \text{ s})^2$$

$$\Delta y = 6.38 \times 10^{-4} \text{ m}$$

$$\Delta x = v_x t$$

$$t = \frac{\Delta x}{v_x} = \frac{.016 \text{ m}}{18 \text{ m/s}} = 8.89 \times 10^{-4} \text{ s}$$

$$a_y = \frac{Eq}{m}$$

$$a_y = \frac{(1.4 \times 10^6 \text{ N/C})(1.5 \times 10^{-13} \text{ C})}{1.3 \times 10^{-10} \text{ kg}}$$

$$a_y = 1.615 \times 10^3 \text{ m/s}^2$$