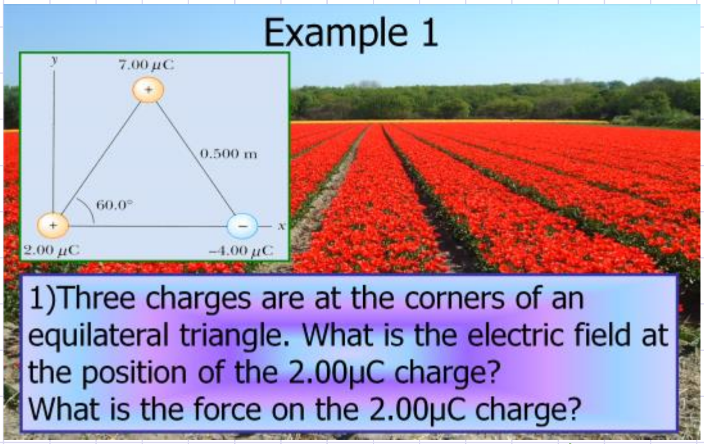
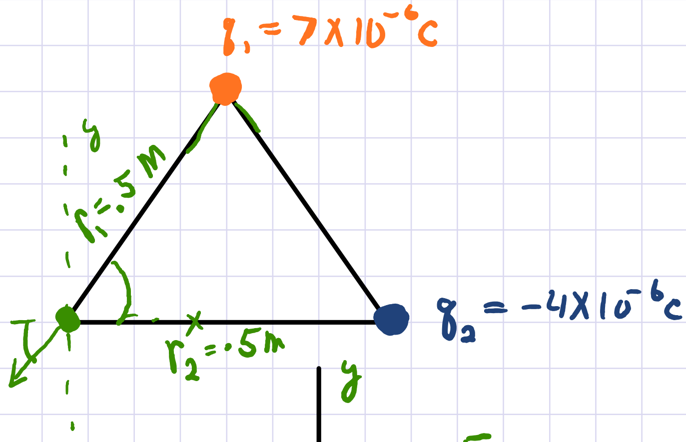
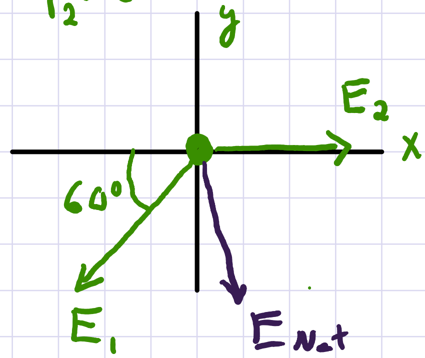
Example 1

Thursday, January 22, 2015 2:33 PM







$$E_1 = k\frac{q_1}{r_1^2} = \left(9\times10^9 \, N\frac{m^2}{C^2}\right)\frac{(7\times10^{-6} \, C)}{(.5 \, m)^2}$$

$$E_1 = 2.52\times10^5 \, N/C$$

$$E_2 = k\frac{q_2}{r_2^2} = \left(9\times10^9 \, N\frac{m^2}{C^2}\right)\frac{(4\times10^{-6} \, C)}{(.5 \, m)^2}$$

$$E_2 = 1.44\times10^5 \, N/C$$

$$\Sigma E_x = E_2 - E_1\cos(60^\circ) = (1.44\times10^5 \, N/C) - (2.52\times10^5 \, N/C)\cos(60^\circ)$$

$$\Sigma E_x = 1.8\times10^4 \, N/C$$

$$\Sigma E_y = -E_1\sin(60^\circ) = (2.52\times10^5 \, N/C)\sin(60^\circ)$$

$$\Sigma E_y = -2.18\times10^5 \, N/C$$

$$\theta = \tan^{-1}\left(\frac{\Sigma E_y}{\Sigma E_x}\right) = \tan^{-1}\left(\frac{-2.18\times10^5 \, N/C}{1.8\times10^4 \, N/C}\right) = -85.3^\circ$$

below +x axis

$$|E_{Net}| = \sqrt{(\Sigma E_x)^2 + (\Sigma E_y)^2}$$

$$|E_{Net}| = \sqrt{(1.8\times10^4 \, N/C)^2 + (-2.18\times10^5 \, N/C)^2}$$

$$|E_{Net}| = 2.19\times10^5 \, N/C$$

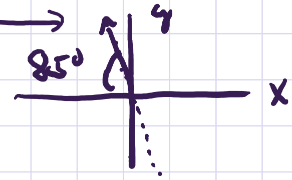
$q_3 = 2\times10^{-6} \, C$

$$F = E_{Net} \, q_3$$

$F = (2.19 \times 10^5 \, N/C)(2 \times 10^{-6} C)$

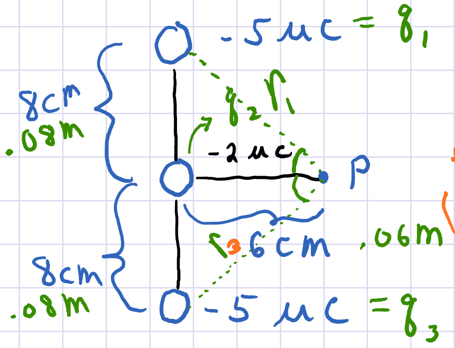
$F = 0.438 N$ at $85.3°$ below (+) x axis

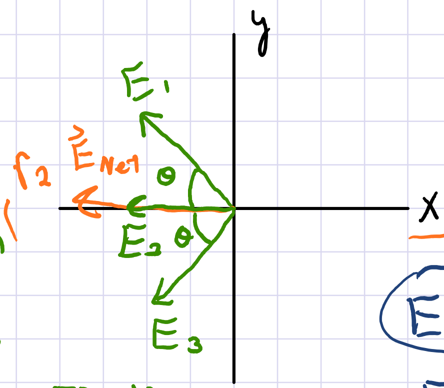
if $q_3 = -2 \mu C$ →



~~Example 2~~ #43 Ch 17

Thursday, January 22, 2015 2:34 PM





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

$$E_1 = \left(9\times10^9\, N\frac{m^2}{c^2}\right)\frac{(5\times10^{-6}\, C)}{(.1\, m)^2}$$

$$E_1 = 4.5\times10^6\, N/c$$

$$E_3 = E_1 = E$$

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

$$E_2 = \left(9\times10^9\, N\frac{m^2}{c^2}\right)\frac{(2\times10^{-6}\, c)}{(.06m)^2}$$

$$E_2 = 5\times10^6\, N/C$$

$$\theta = \tan^{-1}\left(\frac{8cm}{6cm}\right) = 53.13°$$

$$r_1 = r_3 = \sqrt{(.08m)^2 + (.06m)^2}$$

$$r_1 = r_3 = .1\, m$$

$$\Sigma E_x = -E_2 - E_1\cos\theta - E_3\cos\theta$$

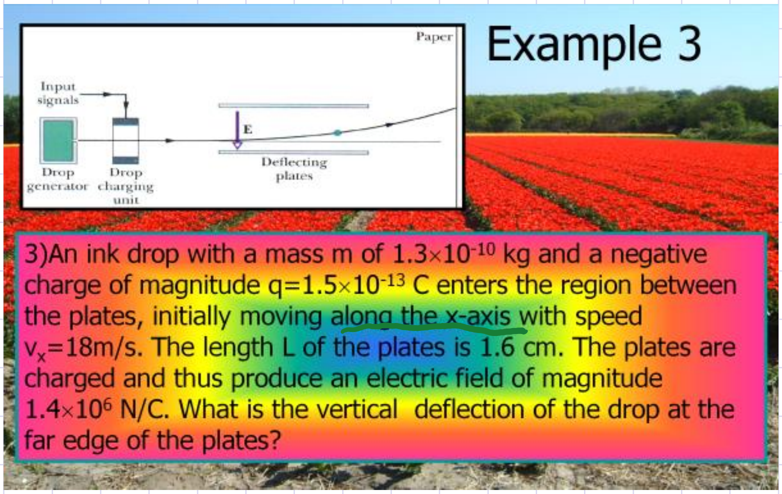
$$\Sigma E_x = -E_2 - 2E\cos\theta$$

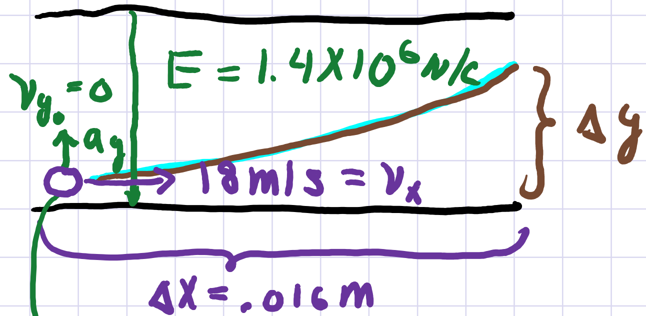
$$\Sigma E_x = -(5\times10^6\, N/c) - 2(4.5\times10^6\, N/c)\cos(53.13°) = -1.04\times10^7\, N/c$$

$$\Sigma E_y = E_1\sin\theta - E_3\sin\theta = 0$$

Example 3

Thursday, January 22, 2015 2:34 PM





$q = -1.5 \times 10^{-13}\,C$

$m = 1.3 \times 10^{-10}\,kg$

$v_y = v_{y_0} + a_y t$

$v_y^2 = v_{y_0}^2 + 2 a_y \Delta y$

$\Delta y = \left[\frac{v_y + v_{y_0}}{2}\right] t$

$\Delta y = v_{y_0} t + \frac{1}{2} a_y t^2$ (with $v_{y_0} = 0$)

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

$\Delta X = v_x t$

$t = \frac{\Delta X}{v_x}$

$t = \frac{.016\,m}{18\,m/s}$

$t = 8.89 \times 10^{-4}\,s$

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

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

$a = 1.6 \times 10^{3}\,m/s^2$

$\Delta y = \frac{1}{2}(1.6 \times 10^{3}\,m/s^2)(8.89 \times 10^{-4}\,s)^2$

$\Delta y = 6.3 \times 10^{-4}\,m$