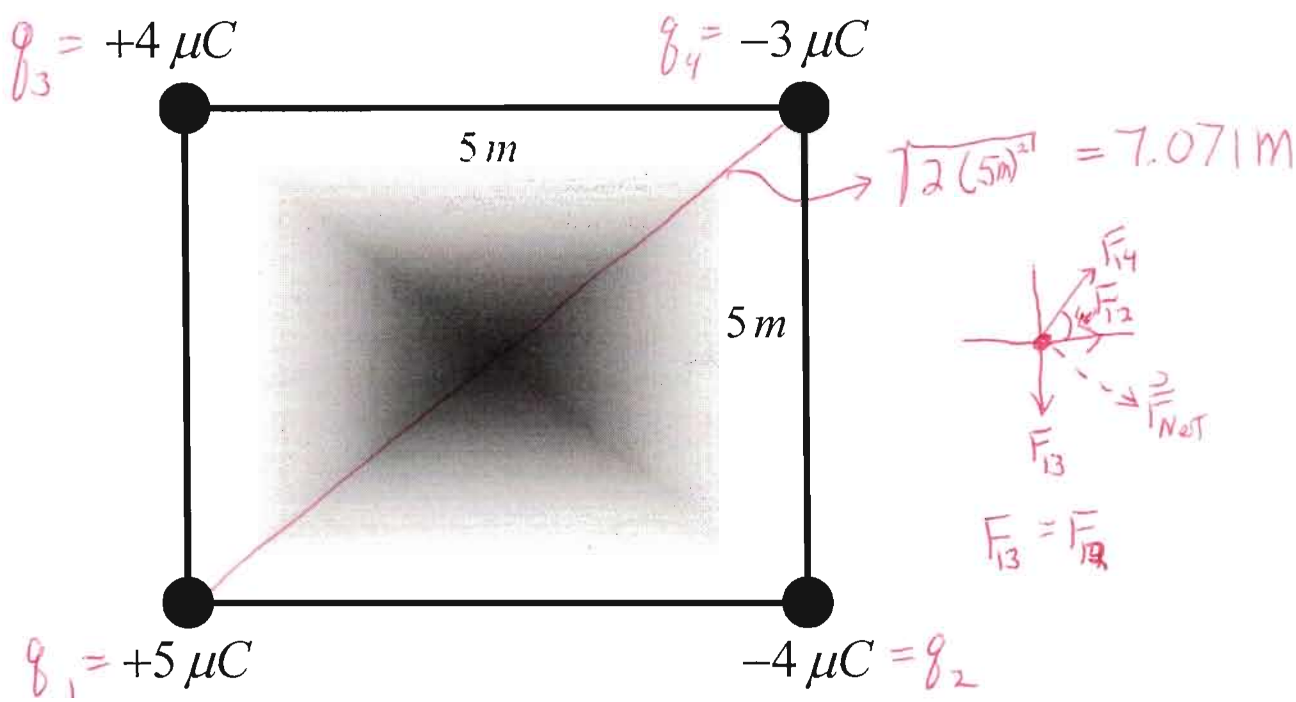
PHYS 2212
Principles of Physics II
Quiz 2
1/27/2014

Name: Charles Johnson



Find the net electric force (magnitude and direction) on the $5\,\mu C$ charge in the above square. (10 pts)

$$F_{13} = k\frac{q_1 q_3}{r_{13}^2} = \left(9\times10^9\,N\frac{m^2}{C^2}\right)\frac{(5\times10^{-6}C)(4\times10^{-6}C)}{(5m)^2} = .0072\,N$$

$$F_{14} = k\frac{q_1 q_4}{r_{14}^2} = \left(9\times10^9\,N\frac{m^2}{C^2}\right)\frac{(5\times10^{-6}C)(3\times10^{-6}C)}{(7.071m)^2} = .0027\,N$$

$$\Sigma F_y = -F_{13} + F_{14}\sin(45^\circ) = -(.0072N) + (.0027N)\sin(45^\circ) = -.0053\,N$$

$$\Sigma F_x = F_{12} + F_{14}\cos(45^\circ) = .0072N + (.0027N)\cos(45^\circ) = .0091\,N$$

$$|\vec{F}_{Net}| = \sqrt{(\Sigma F_x)^2 + (\Sigma F_y)^2} = \sqrt{(-.0053N)^2 + (.0091N)^2} = .01\,N$$

$$\theta = \tan^{-1}\left(\frac{\Sigma F_y}{\Sigma F_x}\right) = \tan^{-1}\left(\frac{-.0053N}{.0091N}\right) = -30.22^\circ$$

PHYS 1112
Introductory Physics II
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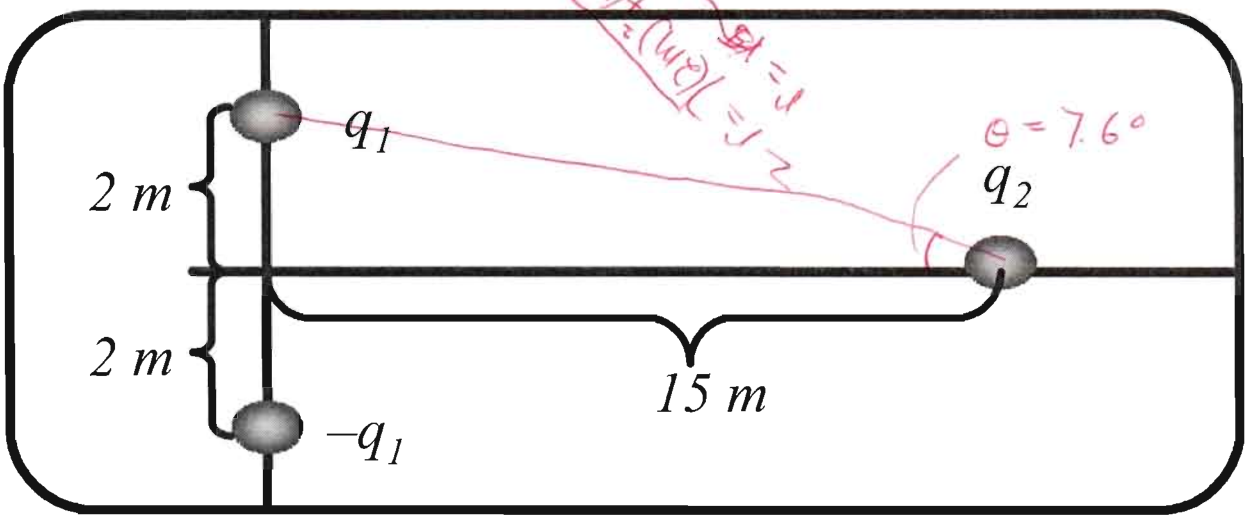
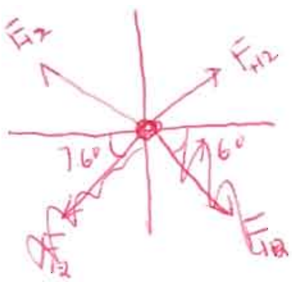
Show all work in the spaces provided.



1) In the figure above q_1=20 μC and q_2=−15 μC.

a) Draw a free body diagram of charge q_2. (3 pts)



$F_{+12} = k\frac{q_1 q_2}{r^2} = (9\times10^9 N\frac{m^2}{C^2})\frac{(20\times10^{-6}C)(15\times10^{-6}C)}{(15.13m)^2}$

$F = F_{-12} = F_{+12} = .0118 N$

b) What would be the net force (magnitude and direction) on a q_2 (7 pts)

$\Sigma F_x = F_{-12}\cos(7.6°) - F_{+12}\cos(7.6°) = 0$

$\Sigma F_y = +F_{-12}\sin(7.6°) + F_{+12}\sin(7.6°) = 2F\sin(7.6°)$

$\Sigma F_y = -2(.0118N)\sin(7.6°) = .00312 N$