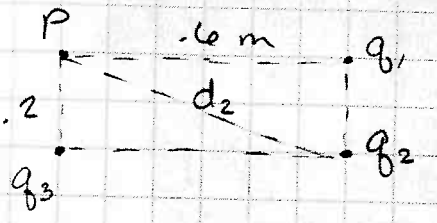
P #24

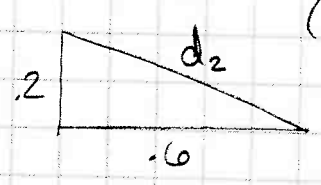
Ch 15

$q_1 = +6.00\ nC = 6.00 \times 10^{-9}\ C$
$q_2 = +5.00\ nC = 5.00 \times 10^{-9}\ C$
$q_3 = +3.00\ nC = 3.00 \times 10^{-9}\ C$



$d_1 = .600\ m$
$d_3 = .200\ m$

Find d_2 with Pyth. th



$(.2\,m)^2 + (.6\,m)^2 = d_2^2$
$d_2 = .632\ m$

Calc all individual E magnitudes:

$E = \frac{F}{q} = \frac{k \cdot q}{r^2}$

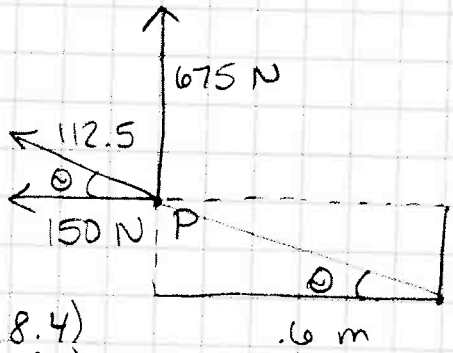
$E_1 = \frac{k_e \cdot (6.00 \times 10^{-9} C)}{(.60\ m)^2} = 150\ N$

$E_2 = \frac{k_e \cdot (5.00 \times 10^{-9} C)}{(.632\ m)^2} = 112.5\ N$

$E_3 = \frac{k_e \cdot (3.00 \times 10^{-9} C)}{(.20\ m)^2} = 675\ N$

Calculate Enet:

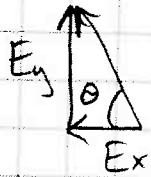
Find θ:
$\tan\theta = .2/.6$
$\theta = 18.4°$



All E's point away from point charges (+q_o would be repelled)

Find E_x and E_y:
$E_x = 150\ N + 112.5 \cdot \cos(18.4)$
$E_x = 256.7\ N$ (left)

$E_y = 675\ N + 112.5 \cdot \sin(18.4)$
$E_y = 710.6\ N$ (up)



Find Enet: $E_x^2 + E_y^2 = E^2$
$(256.7\ N)^2 + (710.6\ N)^2 = E^2$

$\tan\theta = \frac{E_y}{E_x} = \frac{710.6\ N}{256.7\ N}$

$\theta = 70°$ above $-x$-axis
$E = 756\ N/C$