

70 MC - 90 min no calc.

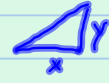
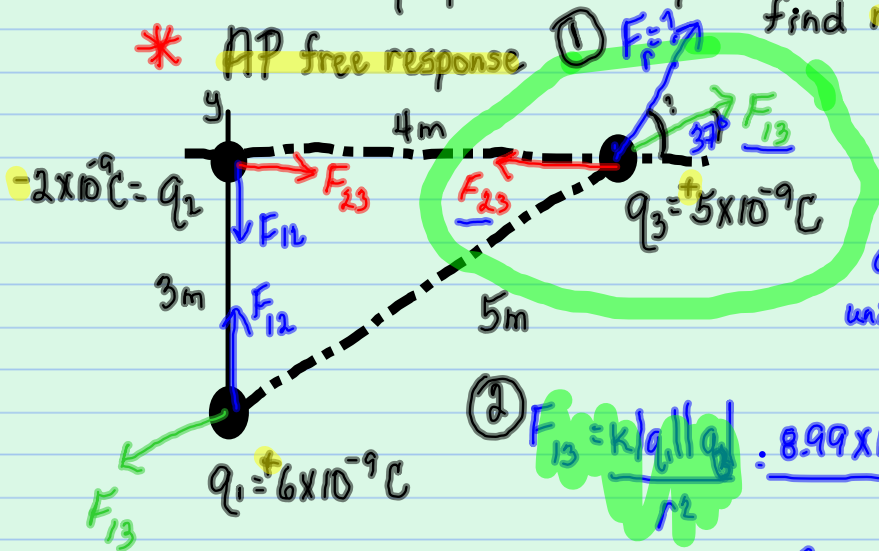
7 FR - 90 min

Ex 15.2

p473

Superposition Principle - combine forces to find resultant of $F_{13} + F_{23}$

* NP free response



k_e or k Coulomb's 9×10^9
 AP/wicker
 q charge / unit Coulomb book

① $F_{13} = k \frac{q_1 q_3}{r_{13}^2} = \frac{8.99 \times 10^9 (6 \times 10^{-9})(5 \times 10^{-9})}{5^2} = 1.1 \times 10^{-8} \text{ N}$

$F_{23} = \frac{8.99 \times 10^9 (2 \times 10^{-9})(5 \times 10^{-9})}{4^2} = 5.6 \times 10^{-9} \text{ N}$

add $F_{13} + F_{23}$
 use vector components

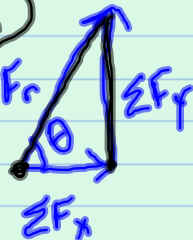
$\Sigma F_x = F_{13} \cos 37 - F_{23} = 1.1 \times 10^{-8} \cos 37 - 5.6 \times 10^{-9} = 3 \times 10^{-9} \text{ N}$

$\Sigma F_y = F_{13} \sin 37 = 6.5 \times 10^{-9} \text{ N}$



$\rightarrow F_r = \sqrt{(\Sigma F_x)^2 + (\Sigma F_y)^2} = \sqrt{(3 \times 10^{-9})^2 + (6.5 \times 10^{-9})^2} = 7.2 \times 10^{-9} \text{ N}$

$\tan \theta = \frac{\text{opp}}{\text{adj}}$
 $\theta = \tan^{-1} \frac{\text{opp}}{\text{adj}}$



$\rightarrow \theta = \tan^{-1} \frac{\Sigma F_y^{\text{opp}}}{\Sigma F_x^{\text{adj}}} = \tan^{-1} \frac{6.5 \times 10^{-9}}{3 \times 10^{-9}} = 65^\circ$

