

Section
17-2

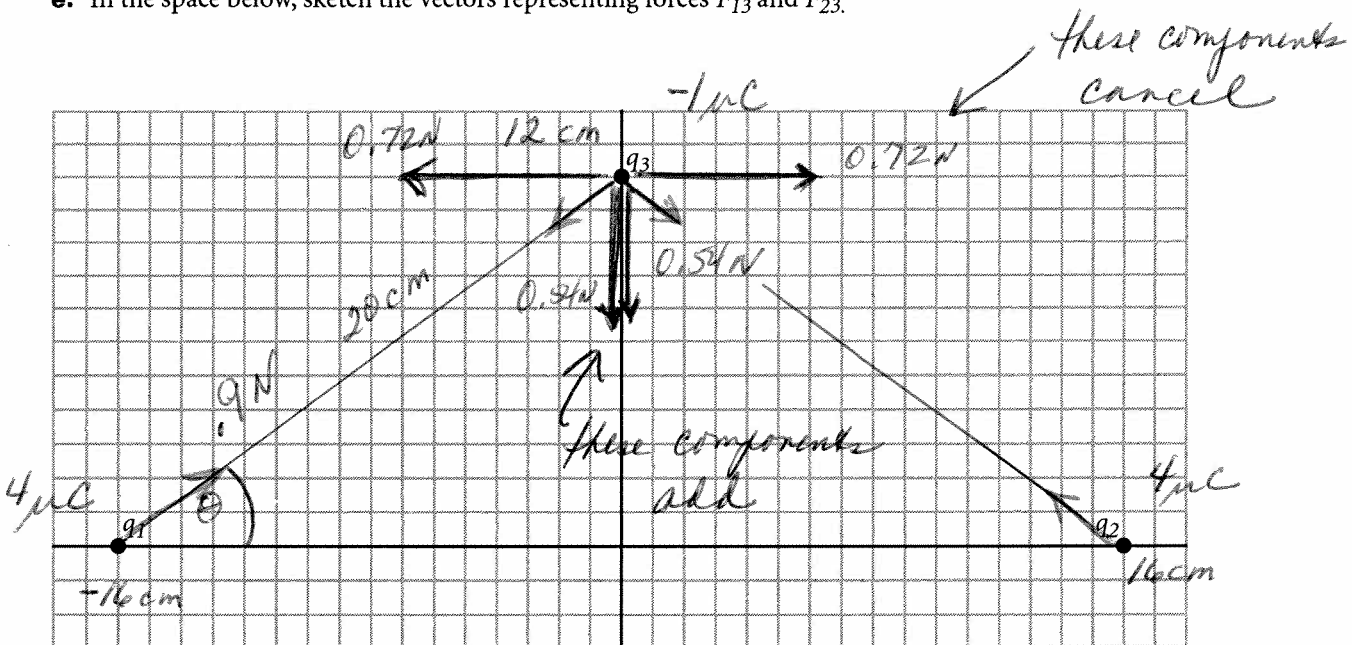
HOLT PHYSICS
Math Skills

Electric Force

Use $k_C = 8.99 \times 10^9 \text{ N}\cdot\text{m}^2/\text{C}^2$.

1. Two point charges, q_1 and q_2 , of $4.00 \mu\text{C}$ each, are placed -16.0 cm and 16.0 cm away from the origin on the x -axis. A charge q_3 of $-1.00 \mu\text{C}$ is placed 12.0 cm away from the origin on the y -axis.

- a. Find the distance from q_3 to q_1 and from q_3 to q_2 $\sqrt{16^2 + 12^2} = 20 \text{ cm}$
- b. Find the magnitude and the direction of the force F_{13} exerted by q_1 on q_3 . 0.9 N (36.9° below $-x$)
- c. Find the magnitude and the direction of the force F_{23} exerted by q_2 on q_3 . 0.9 N (36.9° below $+x$)
- d. Find the magnitude and the direction of the force F_{12} exerted by q_1 on q_2 . 1.4 N (along $+x$)
- e. In the space below, sketch the vectors representing forces F_{13} and F_{23} .



- f. Find the angle between the q_1 - q_3 line and the x -axis. $\theta = 36.9^\circ$ ($\theta = \tan^{-1}(\frac{12}{16})$)
- g. Find the x and y components of forces F_{13} and F_{23} . $0.9 \cos 36.9 = 0.72 \text{ N}$ (F_x)
- h. Find the resultant force of forces F_{13} and F_{23} . $0.9 \sin 36.9 = 0.54 \text{ N}$ (F_y)
- i. If q_3 is released, in which direction will it move? $F_{\text{net}} = 0.54 \text{ N} + 0.54 \text{ N}$

Notice - the forces in the x (horizontal direction) cancel

$F_{\text{net}} = 1.08 \text{ N}$
along $-y$ or 270°