

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Period: \_\_\_\_\_

### Worksheet 17B-Superposition Principle

1. Consider three point charges,  $q_1 = 4.50 \text{ C}$ ,  $q_2 = 4.50 \text{ C}$ , and  $q_3 = 6.30 \text{ C}$ , located at the corners of an isosceles triangle as shown. The charges  $q_1$  and  $q_2$  are  $5.00 \text{ m}$  apart and form the base. The other two sides are each  $4.3 \text{ m}$ . The triangle is  $3.50 \text{ m}$  high, and  $q_3$  is located at the top. Calculate the magnitude and direction of the resultant force on  $q_3$ .

*Show all work, circle your answer.*

**GIVEN:**

$$q_1 = 4.50 \text{ C}$$

$$r_{1,2} = 5.00 \text{ m}$$

$$\theta_1 = 45^\circ$$

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

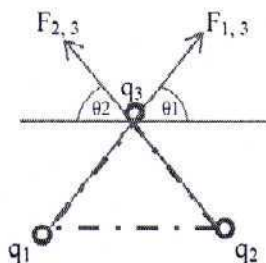
$$q_2 = 4.50 \text{ C}$$

$$r_{2,3} = 4.3 \text{ m}$$

$$\theta_2 = 45^\circ$$

$$q_3 = 6.30 \text{ C}$$

$$r_{1,3} = 4.3 \text{ m}$$



2. Consider four electrons at the corners of a square. Each side of the square is  $3.02 \times 10^{-5}$  m. Find the magnitude and direction of the resultant force on  $q_4$ . *show work, circle your answer*

**GIVEN:**

$$q_{\text{electron}} = -1.60 \times 10^{-19} \text{ C}$$

$$q_1 = q_2 = q_3 = q_4$$

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

$$r_{3,4} = 3.02 \times 10^{-5} \text{ m}$$

$$r_{1,4} = 4.27 \times 10^{-5} \text{ m}$$

$$r_{2,4} = 3.02 \times 10^{-5} \text{ m}$$

$$\theta_1 = \theta_2 = 45^\circ$$

