

Ch 21.

$$7. \quad k \frac{q_1 q_2}{x^2} = k \frac{q_3 q_4}{(8-x)^2}$$

$$(a) \quad 8x^2 + 16x - 64 = 0 \quad x = 2 \text{ cm} \quad \text{or} \quad x = -4 \text{ cm} \left(\frac{1}{2} \right)$$

$$(b) \quad q = 0$$

$$(c) \quad \frac{q_3}{q} = \frac{q \times (0.02)^2}{(0.08)^2} = -0.5625$$

$$10. \quad (a) \quad k \frac{q_1 q_2}{R^2} = \cos \theta \left(\frac{k q_1 q_3}{R^2 + d^2} + k \frac{q_1 q_4}{R^2 + d^2} \right)$$

$$\frac{e}{R^2} = \frac{2q}{R^2 + d^2} \cos \theta \quad \therefore \frac{e}{2 \cos^2 \theta} = q$$

$$2. q \leq 5e \quad \therefore \cos \theta \geq \frac{1}{(2n)^{\frac{1}{3}}} \quad \theta \leq 7.5^\circ$$

$$(b) \quad \theta = \cos^{-1} \left(\frac{1}{\sqrt[3]{2}} \right) \approx 51.0^\circ$$

$$(c) \quad \theta = \cos^{-1} \left(\frac{1}{6^{\frac{1}{3}}} \right) \approx 56.6^\circ$$

$$16. \quad (1) \quad A = 2Q \quad B = -12Q \quad C = 2Q$$

$$(2) \quad A = 2Q \quad B = -5Q \quad C = -5Q$$

$$(3) \quad A = -1.5Q \quad B = -5Q \quad C = -1.5Q$$

$$F_{AB} = k \frac{7.5Q^2}{r^2}$$

$$17. \quad B = -6Q \quad C = -6Q \quad F_{AB} = \frac{6kQ^2}{r^2}$$

$$B = -Q \quad C = -Q$$

$$\therefore \text{ratio} = \frac{6}{7.5} = \frac{4}{5}$$

