

Ch 20

HW: Rev Con 14,17,18 Pro 21,23-25,27

Sec 20-2A

obj: State Coulombs Law and the variables that affect it.

Coulomb's Law

- Relates the force btw charges to the distance + charges of the objects.

$$F \propto q_1 q_2 \quad \& \quad F \propto \frac{1}{d^2}$$

$$F \propto \frac{q_1 q_2}{d^2}$$

* A proportion becomes an equality by the multiplication of a constant.

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$$F = k \frac{q_1 q_2}{d^2}$$

$$K = 9.0 \times 10^9 \frac{\text{m}^2 \cdot \text{N}}{\text{C}^2}$$

- Size of a Charge

* The unit for charge is called a coulomb (C)

$$1 \text{ C} = 6.25 \times 10^{18} \text{ electrons}$$


$$1 \text{ electron} = 1.6 \times 10^{-19} \text{ C} \quad * \text{elementary charge}$$

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- The charge of 1 electron equals the charge of 1 proton.
- The force bto the charges is a vector quantity
 - * Must show magnitude & direction.
 - * The direction will be repulsive or attractive.

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Problem Solving Rubric

- 1) Sketch
 
- 2) Known & Unknown
- 3) Solution
 - * Includes all equations
 - * All calculations w/ units
- 4) Answer w/ Units

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$q_A = +6 \mu\text{C}$
 $q_B = +3 \mu\text{C}$
 $d_{A+B} = 3 \text{ cm}$

Known
 $6.0 \times 10^{-6} \text{ C}$
 $3.0 \times 10^{-6} \text{ C}$
 $3 \text{ cm} \left| \frac{1 \text{ m}}{100 \text{ cm}} = .03 \text{ m} \right.$

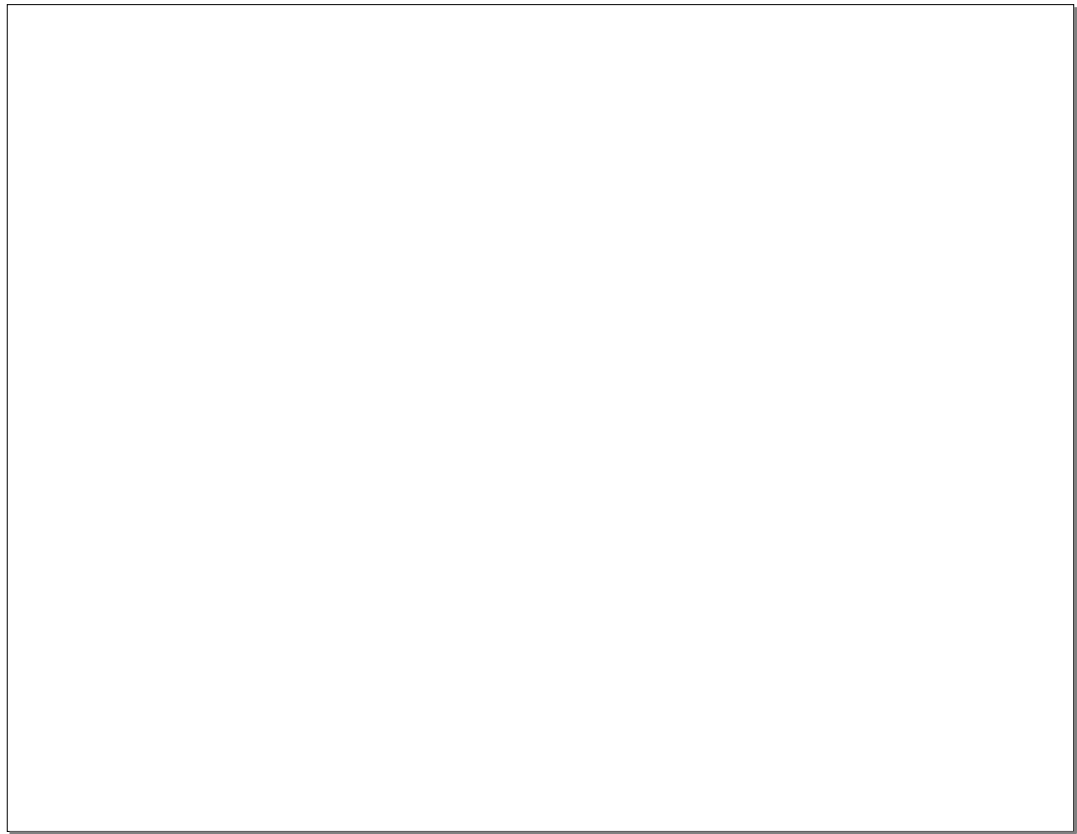
Unknown
 F_{A+B}

$$F = k \frac{q_1 q_2}{d^2}$$

$$= \frac{(9.0 \times 10^9 \text{ N} \cdot \text{m}^2 / \text{C}^2)(6.0 \times 10^{-6} \text{ C})(3.0 \times 10^{-6} \text{ C})}{(.03 \text{ m})^2}$$

$= 180 \text{ N}$ repulsive

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