

## Week 18 - Electrostatics

---

### **Read Page 212 (Electric Charges)**

- TQ1. What particles are inside the nucleus of an atom?
- TQ2. What must an electron do to move to a higher energy level?
- TQ3. What is an atom called if it gains or loses an electron?
- TQ4. If it gains an electron, what kind of charge will it have? If it loses an electron, what kind of charge will it have?
- TQ5. What do like charges do with each other? What do unlike charge do with each other?
- TQ6. What is the symbol for charge? What are the units of charge?
- QQ7. An object possessing an excess of  $8.0 \times 10^6$  electrons has what net charge?
- QQ8. What is the net electrical charge on an aluminum ion that is formed by losing three electrons?
- QQ9. How many electrons are present in a charge of  $-4.8 \times 10^{-16}$  C?

### **Read Page 214 (Conductors and Insulators and Charging by Conduction)**

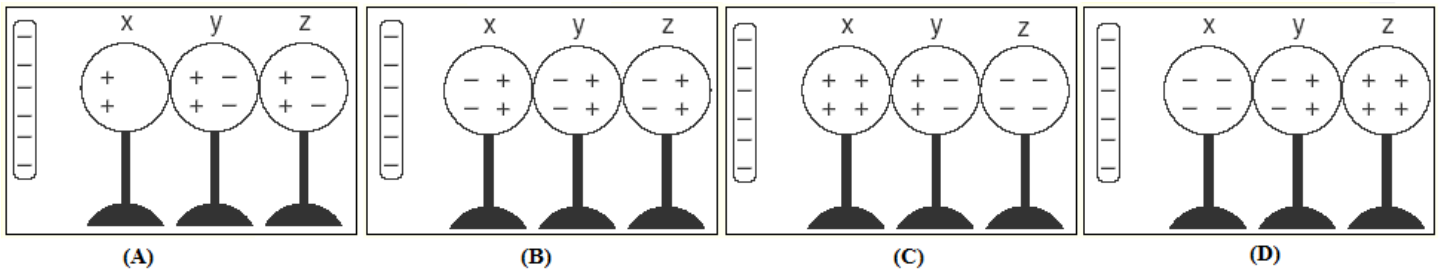
- TQ10. Why are metals, such as gold, copper, and lead, good conductors?
- TQ11. What is one example of an insulator?
- TQ12. How does one charge an object by conduction?
- TQ13. In any scenario, what happens to the overall charge of a system?
- CQ14. If a conductor carrying a net charge of  $14e$  is brought into contact with an identical conductor with no charge, what will be the charge on each conductor after they are separated?
- CQ15. If a conductor carrying a net charge of  $8e$  is brought into contact with an identical conductor with a net charge of  $12e$ , what will be the charge on each conductor after they are separated?
- QQ16. What is the net charge, in Coulombs, on each conductor in CQ15?
- CQ17. Since metals are great conductors, they are known to have a “sea of electrons.” What does this phrase mean practically?
- CQ18. If a positive conducting rod is brought near an electroscope, why do the leaves move apart?

### **Read Page 216 (Charging by Induction)**

- TQ19. What does it mean to charge something by induction?
- CQ20. A negatively charged rod repels an unknown object. What is the relative net charge of the unknown object?

## Week 18 - Electrostatics

CQ21. Which diagram best represents the charge distribution on the spheres x, y, and z when a negatively charged rod is brought near but does not touch them?

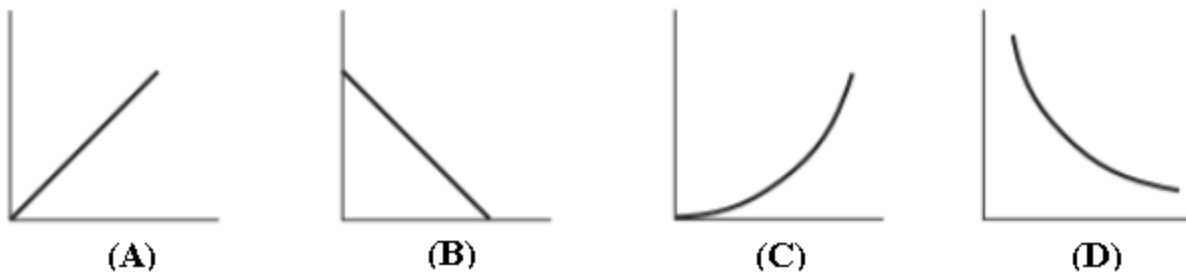


**Read Page 218 (Coulomb's Law)**

CQ22. What kind of electrostatic force is present when one positive and one negative charge come near each other?

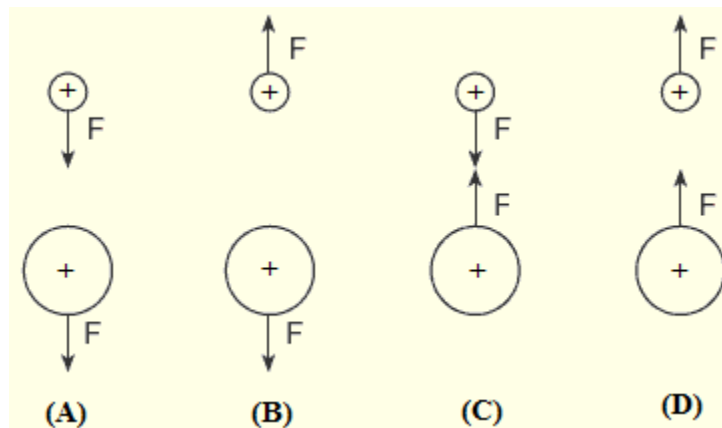
TQ23. What is the formula for Coulomb's Law? (Note: we will use  $k = 9 \times 10^9$  in our class)

CQ24. Which graph best represents the relationship between the electrostatic force and the charge of an object?



TQ25. If you were to quadruple (x4) the distance of two charges (keeping the magnitude of the charges the same), what would happen to the electrostatic force on a charge?

CQ26. Two charges are placed at a distance apart as shown below. One charge (the charge on top) has a charge of  $+3 \times 10^{-6}$  C. The other charge (the one on the bottom) has a charge of  $+6 \times 10^{-6}$  C. Which diagram best represents the electrostatic force vectors experienced by each charge?

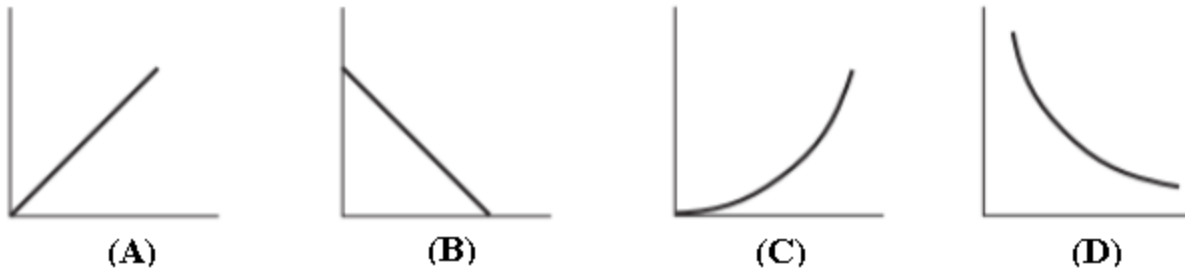


## Week 18 - Electrostatics

QQ27. One charge of  $q = +2.0 \times 10^{-6} \text{ C}$  is placed at a distance of 0.01 m away from another charge of  $q = -2.0 \times 10^{-6} \text{ C}$ . Calculate the electrostatic force between these two charges and indicate whether it is an attractive or repulsive force.

QQ28. Two charges, each with a charge of  $q = +8.0 \times 10^{-6}$ , are placed at a distance of 0.05 m away from each other. Calculate the electrostatic force between these two charges and indicate whether it is an attractive or repulsive force.

CQ29. Which graph best represents the relationship between the electric force between two charged particles and the distance between them?



CQ30. Positively-charged alpha particles are fired through the region between two oppositely charged parallel plates in a cathode-ray tube as shown below. Which point (A, B, C, or D) best shows where the alpha particles are most likely to travel.

