

Sheet (1)

1. Two charges are separated by a certain distance, how is the force between them affected if
 - a. the magnitudes of both charges are doubled?
 - b. the distance between the charges is tripled?
2. Two charges are separated by a certain distance. If the magnitude of one charge is doubled and the other tripled and the distance between them halved, how is the force affected?
3. A certain material has four electrons in its valence shell and a second material has one. Which is the better conductor?
4. Although gold is very expensive, it is sometimes used in electronics as a plating on contacts. Why?
5. Why is aluminum sometimes used while its conductivity is only about 60% as good as that of copper?
6. Compute the force between the following charges and state whether it is attractive or repulsive.
 - a. A +1 mC charge and a +7 mC charge, separated 10 mm
 - b. $Q_1 = 8$ mC and $Q_2 = -4$ mC, separated 12 cm
 - c. Two electrons separated by 12×10^{-8} m
 - d. An electron and a proton separated by 5.3×10^{-11} m
7. If 360 joules of energy are required to transfer 15 C of charge through a lamp, what is the voltage of the applied battery?
8. If 600 J of energy are required to move 9.36×10^{19} electrons from one point to the other, what is the potential difference between the two points?
9. If 1.2 kJ of energy are required to move 500 mC from one point to another, what is the voltage between the two points?
10. How much energy is gained by a charge of 0.5 mC as it moves through a potential difference of 8.5 kV?
11. If 27 C pass through the lamp in 9 seconds, what is the current in amperes?
12. If the current pass through a lamp $I = 4$ A, how many coulombs pass through the lamp in 7 ms?
13. How long does it take for 100 mC to pass a point if the current is 25 mA?
14. If 93.6×10^{12} electrons pass through a lamp in 5 ms, what is the current?
15. The charge passing through a wire is given by $q = 10t + 4$, where q is in coulombs and t in seconds,
 - a. How much charge has passed at $t = 5$ s?
 - b. How much charge has passed at $t = 8$ s?
 - c. What is the current in amps?