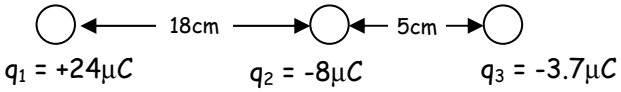
ELECTROSTATICS

Chapter 16-17 In-Class Example Problems

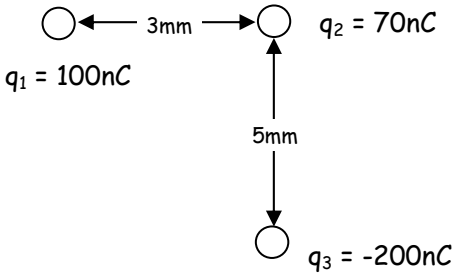
ELECTRIC FORCES:

1. 3.5×10^{10} electrons are transferred from one object to another. If the objects are 0.42cm apart from one another, calculate the electric force between the two objects after the electron transfer.

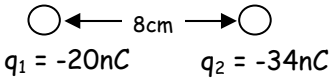
2. In the given diagram, find the magnitude and direction of the net electric force acting on q_3.



3. Use the diagram to find the magnitude and direction of the net electric force acting on q_2 and q_1.



4. Two charges are arranged as in the figure. Where can a third charge $q_3 = 4\mu C$ be placed, so that the net force acting on q_3 will be zero?

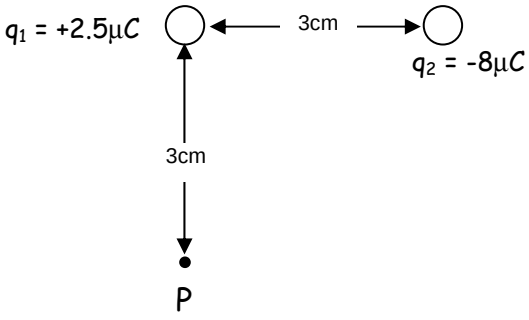


Electric Field:

5. In A uniform electric field exists in a region of space. This field has a strength of 50,000N/C, and is directed to the right. What force (magnitude and direction) will an electron experience when released in this field?

6. Find the magnitude and direction of the electric field at a distance of 4cm from a +5nC charge.

7. Find the magnitude and direction of the net electric field at point P. Then find the instantaneous acceleration experienced by a proton if placed at point P.



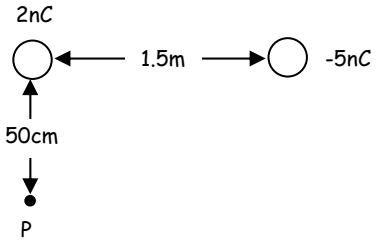
8. An electron is suspended directly above a sheet of charge, which creates a uniform electric field in the region of the electron. Calculate the magnitude and direction of the electric field created by this sheet of charge.

Electric Potential

9. How much work does the electric field do in moving a proton from ground to a point whose potential is 70V? (Express answer in S.I. units, and then in eV.)

10. A +5C charge moves 3cm parallel to a uniform electric field of magnitude 300V/m. What potential difference did the charge move through?

11. Two charges are arranged as shown in the figure. Find the electric potential at the point P.



How much energy would be expended in moving a proton from point P to infinity?

How fast would the proton be moving when it gets very, very far away from point P?

CAPACITANCE:

12. A 12μF capacitor is connected across a 60V battery. How much charge is stored on each plate of the capacitor?

13. Each plate of a parallel-plate capacitor has an area of 4.0cm^2 and the plates are separated by a distance of 2.3mm. If it stores a charge of 300pC, what is the potential difference across the plates of the capacitor?

14. What is the capacitance of two plates of area 25cm^2 that are separated by 8mm of paper?

15. How much energy is stored in a 2200pF capacitor that is connected across a 650V source?