PHYSICS HOMEWORK #131 ELECTROSTATICS

ELECTRIC FIELDS

1. A pith ball has a surplus of 4.20×10^{15} electrons. What will be the net charge on this ball is Coulombs?

2. A pith ball has a shortage of 1.85×10^{17} electrons. What is the net charge on this ball in Coulombs?

3. How many electrons will be contained in a net charge of 1250 microCoulombs (μC)?

4. A pith ball , which has a residual charge of -36.0 μC, is brought into contact with a second, identical pith ball which is initially neutral, allowing charge to flow between them. These two ball are then separated.
   a. What will be the final residual charge on each pith ball?
   b. How many extra electrons will be present on each ball after they have been separated?

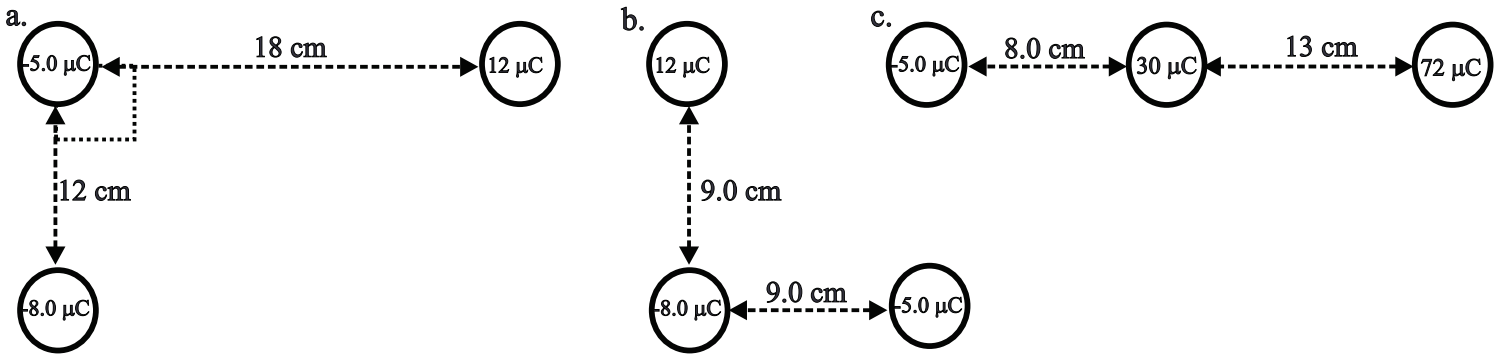
5. A pith ball, which has a residual charge of 54.0 μC is brought into contact with a second, identical pith ball which has an initial residual charge of -38.0 μC. What will be the final residual charge on each pith ball after they have been separated?

6. A pith ball, which has a residual charge of 66.0 μC is brought into contact with a second pith ball, which has an initial residual charge of -33.0 μC and which has twice the surface area of the first pith ball. What will be the final residual charge on each pith ball after they have been separated?

7. What will be the magnitude of the electrostatic force between two identical pith balls, each of which has a residual charge of 24.0 μC, which are 15.0 centimeters apart?

8. What will be the magnitude of the electrostatic force between two pith balls 23.0 centimeters apart if the residual charge on the first ball is -31.0 μC while the residual charge on the second ball is 12.0 μC ?

9. What will be the **direction** and **magnitude** of the net electrostatic force acting **<u>on the -5.0 μC</u>** charge in each of the following sets of charges?



10. What will be the electrostatic force between a proton [$q = 1.6 \times 10^{-19}$ C] and an electron [$q = -1.6 \times 10^{-19}$ C] when they are placed 0.5 Angstroms [1 Å $= 10^{-10}$ meters] apart? [0.5 Å is the approximate radius of the Hydrogen atom!]

11. What will be the magnitude of the electrostatic force between two protons in the nucleus of an atom, which are approximately 3.0×10^{-15} meters [3.0 Fermi] apart?

Answers to opposite side: 13. 9000 N/C 14. 0.068 N 15a. 1.04×10^{-12} N b. 6.23×10^{14} m/sec^2

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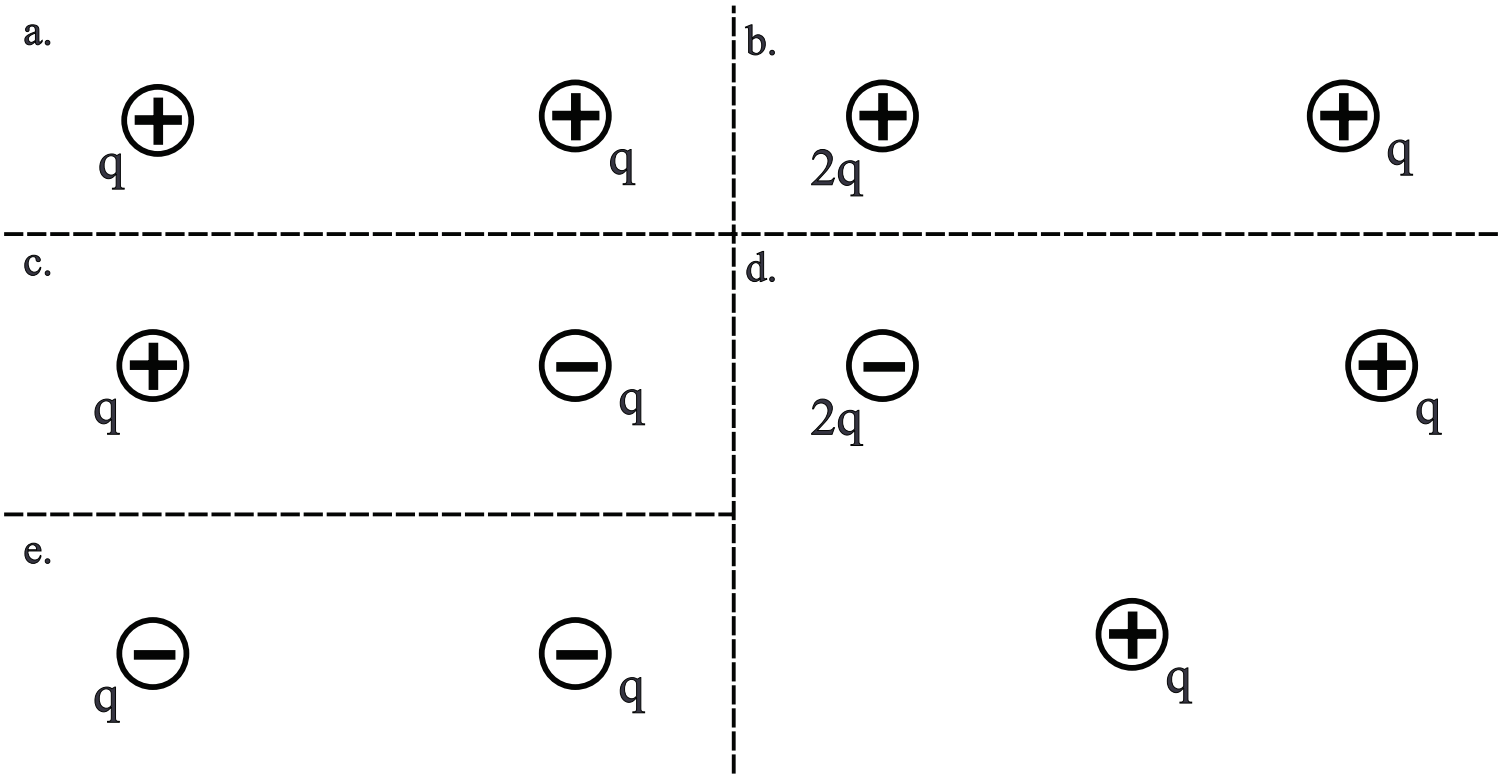
12. Sketch the electric field for each of the following arrangements of charge. Use **at least 8 field lines** for each diagram, indicate the directions of the field lines with arrows pointing in the appropriate directions. [The field lines should always **point away from the positive** charges and **towards the negative** and the number of field lines leaving or converging on a charge should be directly proportional to the intensity of the charge!]



13. What will be the strength of the electric field at a point in space where a 5.00 μC charge feels an electrostatic force of F = 0.045 Newtons?

14. A charge of 8.5 μC is placed in a uniform electric field which has an intensity of E = 8,000 N/C. What will be the magnitude of the resulting force?

15. A proton [q = 1.6 x 10^{-19} C and mp = 1.67 x 10^{-27} kg] is placed in a uniform electric field which has an intensity of E = 650,000 N/C.
    a. What will be the magnitude of the resulting electrostatic force?
    b. What will be the resulting acceleration of the proton as a result of this field?

Answers to opposite side: 1. 670 μC 2. 29,600 μC 3. 7.80 x 10^{15} e- 4a. -18.0 μC b. 1.125 x 10^{14} e- 5. 8.0.0 μC 6. 22.0 μC & 11.0 μC 7. 230 N 8. 63.3 N 9a. 30.6 N at 56° NE b. 31.5 N at 49° NE 9c. 284 N East 10. -9.2 x 10^{-8} N 11. 25.6 N