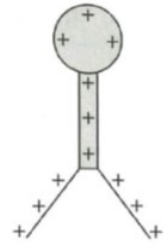


1.

A positively charged electroscope has separated leaves.

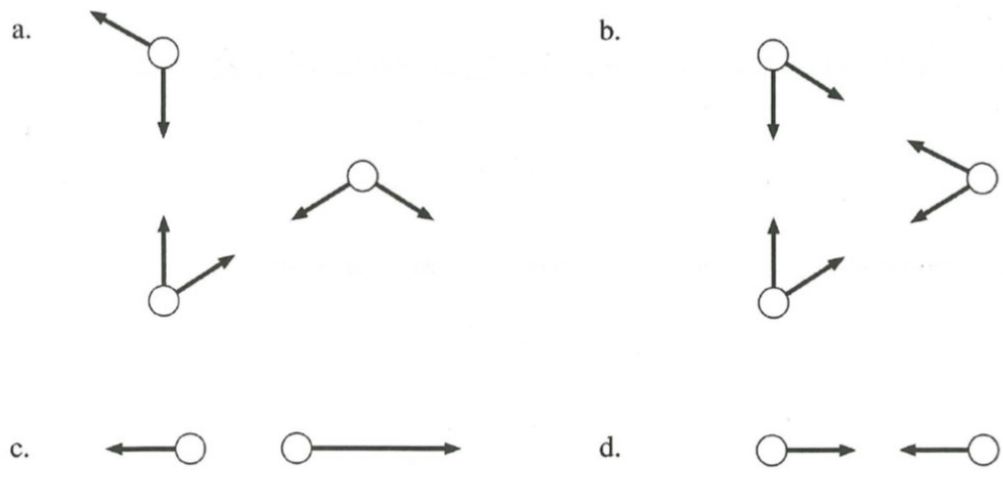
- a. Suppose you bring a positively charged rod close to the top of the electroscope, but not touching. How will the leaves respond? Use both charge diagrams and words to explain.



- b. How will the leaves respond if you bring a negatively charged rod close to the top of the electroscope, but not touching? Use both charge diagrams and words to explain.

2.

Can you assign charges (positive or negative) so that these forces are correct? If so, show the charges on the figure. (There may be more than one correct response.) If not, why not?



3.

Draw a + on the figure below at the position or positions where a proton would experience no net force.

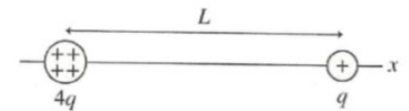


Draw a - on the figure below at the position or positions where an electron would experience no net force.



4.

Positive charges $4q$ and q are distance L apart. Let them be on the x -axis with $4q$ at the origin.



- a. Suppose a proton were placed on the x -axis to the *right* of q . Is it *possible* that the net electric force on the proton is zero? Explain.

- b. *On the figure*, draw a proton at an arbitrary point on the x -axis to the *left* of q , between $4q$ and q . Draw two force vectors and label them \vec{F}_{4q} and \vec{F}_q to show the two forces on this proton. Is it *possible* that, for the proper choice of r , the net electric force on the proton is zero? Explain.

- c. Write expressions for the magnitudes of forces \vec{F}_{4q} and \vec{F}_q . Your expressions should be in terms of K , q , e , L , and r .

$F_{4q} =$ _____ $F_q =$ _____

- d. Find the specific position—as a fraction of L —at which the net force is zero.

5.

a. The electric field of a point charge is shown at *one* point in space.



Can you tell if the point charge is + or -? If not, why not?

b. Here the electric field of a point charge is shown at two positions in space.



Now can you tell if the point charge is + or -? Explain.

c. Can you determine the location of the charge? If so, draw it on the figure. If not, why not?