PhyzJob: Electric Fields Visualized

Remember: USE PENCIL ONLY!!!

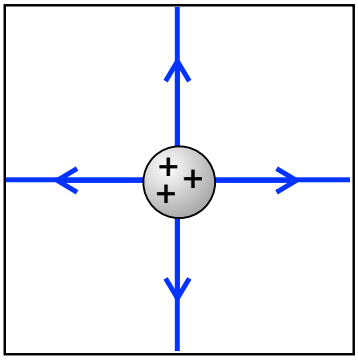
Felix

Using a pencil, draw the electric fields around the charged object(s) in each figure below. Employ the following conventions:

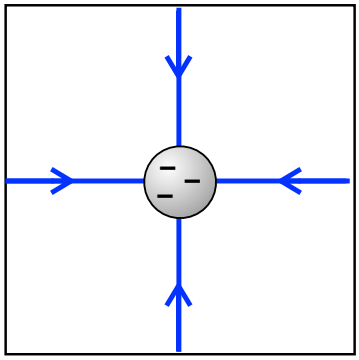
1. The direction of the electric field is the direction a positive test charge would move if placed in that field.
2. The strength of the field is indicated by the density (closeness) of field lines.
3. Field lines never cross.
4. Field lines emanate at right angles from the surfaces of charged objects.

I. SPHERICAL CHARGES

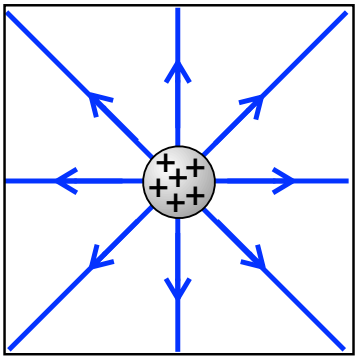
1. A positive spherical charge



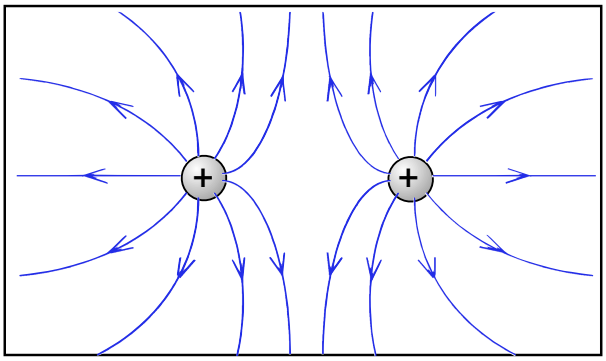
2. A negative spherical charge



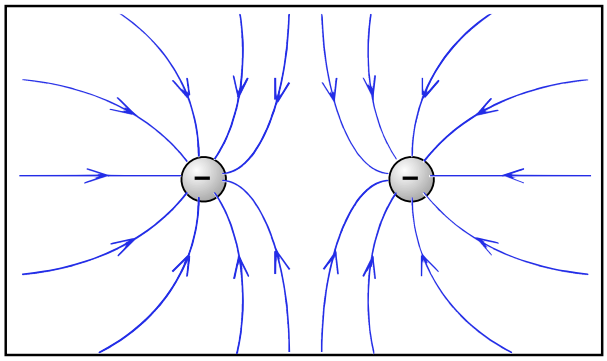
3. A larger positive spherical charge



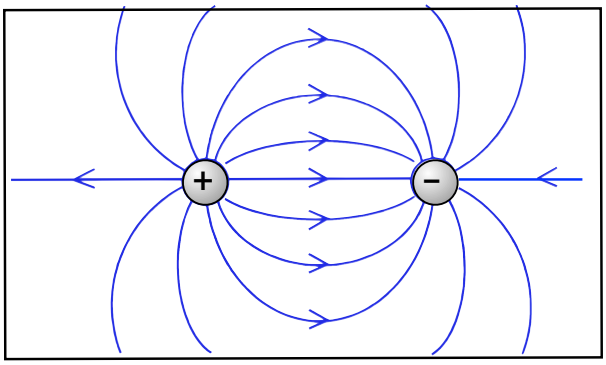
4. Two equal positive charges in close proximity



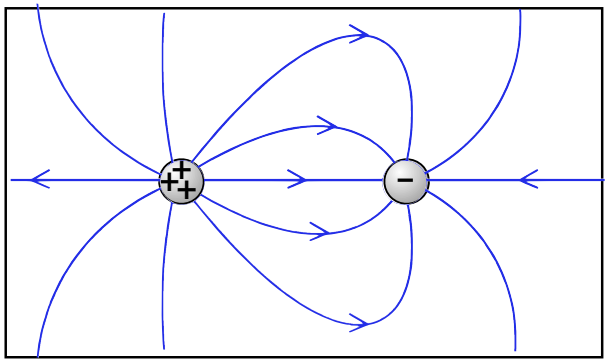
5. Two equal negative charges in close proximity



6. Two equal and opposite charges in close proximity

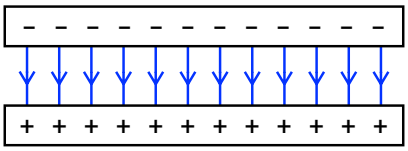


7. Two unequal and opposite charges in close proximity

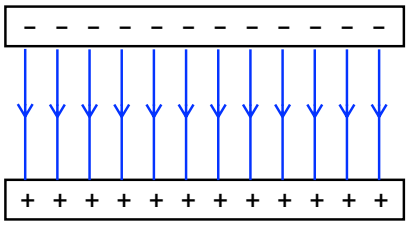


II. CHARGED PLATES (Draw the field between the plates)

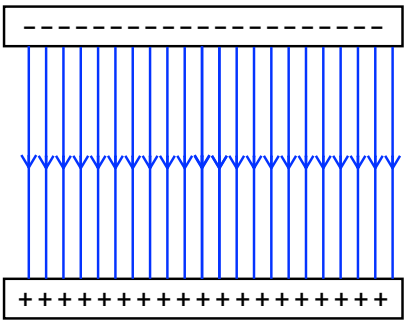
8. Parallel plates close to each other



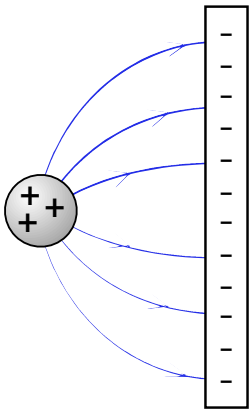
9. Parallel plates (same charge) farther apart

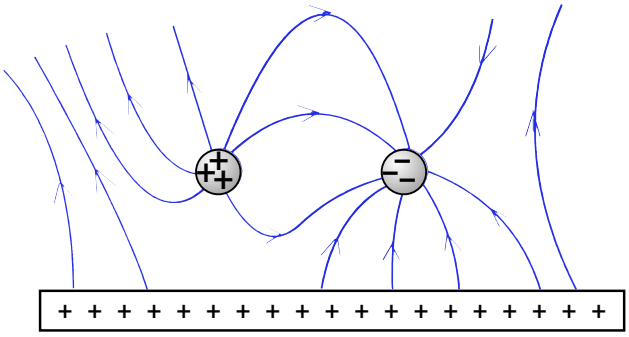


10. More charge, even farther apart



III. COMBINATIONS





QUESTIONS

1. Look at the diagrams of the single spherical charges (#1, #2, and #3). How does your sketch represent the fact that the electric field gets weaker with increased distance from the charge?

The farther you get from the charge, the less dense the lines get.

2. In diagram #4, is there any point at which a charged object would experience a zero net force? If so, where is it?

Yes; halfway between the two charges.

3. In diagram #6, is there any point at which a charged object would experience a zero net force? If so, where is it?

No; field is always from + to – so there will be a force everywhere from + to – charge.

4. In diagram #7, is there any point at which a charged object would experience a zero net force? If so, where is it?

No (same answer as above).

5. Look at diagrams #8 and #9. Notice that the amount of charge on the plates doesn't change, but the distance does. Which configuration results in the stronger field (or is it a tie)?

Tie!

6. Why is the field stronger in diagram #10?

More charge per area ($E=4\pi kQ/A$)