

Electric Field Simulator

Classroom worksheet · Interactive simulation: <https://lkforge.com/tools/physics/electric-field/>

Name: _____ Date: _____

Learning objectives

- Interpret electric field lines and their direction.
- Apply superposition of fields from multiple charges.
- Relate field strength to distance and charge.

Variables to change

- Charge sign
- Charge magnitude
- Charge positions

Procedure

1. Place a single positive charge and observe the field-line pattern.
2. Add a negative charge of equal magnitude nearby (a dipole) and observe the lines.
3. Add a second like charge and observe how the fields combine.

Observations

Sketch the field-line patterns for a single charge, a dipole, and two like charges.

Questions

1. Which way do field lines point relative to a positive charge? A negative charge?
2. What does the density of field lines indicate?
3. How does electric field strength depend on distance from a point charge?

4. What is the field like between two equal and opposite charges (a dipole)?
5. How do you find the total field from several charges?

Answer key (instructors)

- **1.** Away from positive charges and toward negative charges.
- **2.** Field strength — lines are closer together where the field is stronger.
- **3.** It falls off as $1/r^2$ ($E = k \cdot q/r^2$).
- **4.** Field lines run from the positive to the negative charge, densest between them.
- **5.** By vector superposition — add the individual field vectors at each point.

Electric field lines point away from positive and toward negative charge, with density showing strength. A point charge's field weakens as $1/r^2$. For multiple charges the total field is the vector sum (superposition) of each charge's field.