

Electric Field Lines Lab

Teacher's Guide

Topic:

Static Electricity

The following information is provided to the student:

Question:

What is the nature of the electric field line pattern in the space surrounding a positive charge, a negative charge and a configuration of two or more charges?

Purpose:

To describe the nature of the electric field line pattern in the space surrounding a positive charge, a negative charge and a configuration of two or more charges.

A complete lab write-up includes a Title, a Purpose, a Data section, and a Conclusion/Discussion of Results. The Data section should include several diagrams depicting the electric field line patterns for a positive charge, a negative charge, a configuration of two identically and two oppositely charged objects, and two other multi-charge configurations. The diagrams should include arrowheads on the electric field lines and contain a sufficient number of lines to provide a feel for the pattern. The Conclusion/Discussion should identify the general principles which characterize all the patterns.

URL: http://qbx6.ltu.edu/s_schneider/physlets/main/efield.shtml

Materials Required:

There are several web sites which consist of Java Applets (physlets) which model the electric field around a source charge or a configuration of source charges. One such site is:

http://qbx6.ltu.edu/s_schneider/physlets/main/efield.shtml

Description of Procedure:

Students visit the above page and click on the text links in order to modify the simulation. An electric field line pattern is constructed for the single charge or configuration of two charges. Students take notes and construct electric field line diagrams in their lab notebook. They then write a conclusion in which they generalize the principles which characterize all the patterns.

Alternative Materials and Procedure:

Other web sites might be more useful or even have more sophisticated features. The one above is simple, clean and user friendly - good features for a student's initial exposure.

Safety Concern:

There is always a higher than usual level of risk associated with working in a science lab. Teachers should be aware of this and take the necessary precautions to insure that the working environment is as safe as possible. Student *horseplay* and off-task behaviors should not be tolerated.

Suggestions, Precautions, Notes:

The Laboratory

1. The listed web page allows the user to move charges around the screen; the configuration is updated in real time as a source charge is dragged about. There is also a test charge constructed on the screen. This test charge can be dragged and the field force vector is constructed and modified as it is dragged.

Auxiliary Materials:

None

Scoring Rubric:

SE7. Electric Field Lines Lab	Score
____ Included, labeled and organized all parts of the lab report. ____ Data section includes at least six electric field line diagrams – for a positive charge, a negative charge, a configuration of two identically and two oppositely charged objects, and two other multi-charge configurations. Diagrams have a sufficient number of lines to provide a sense of the pattern; arrowheads are placed on each line to indicate the direction of the field. ____ Conclusion/Discussion describes the general principles which characterize each pattern.	____/____

Connections to The Physics Classroom Tutorial:

The following reading is a suitable accompaniment to this lab:

<http://www.physicsclassroom.com/Class/estatics/u8l4c.cfm>

Connections to Minds on Physics Internet Modules:

Sublevel 12 of the Static Electricity module is a suitable accompaniment to this lab:

<http://www.physicsclassroom.com/mop/module.cfm>