

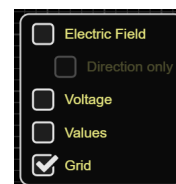
Plotting Equipotentials and Electric Fields



Purpose

The purpose of this lab is to develop the concept of electric field and electric potential by investigating the space between a pair of electrodes connected to a source of direct current (DC), creating an electric dipole. You will plot equipotential lines (lines of equal electric potential) and sketch in lines representing the electric field between the electrodes.

Procedure

- Open the PhET Interactive Simulations [Charges and Fields](#).
- In the upper right corner of the simulation, check the settings as shown:
- Create the same configuration of charges found on the first frame of the Equipotential Lab Jamboard by dragging charges from the bottom tray in the simulation.



- Next, use the blue voltmeter  to find the electric potential value anywhere in the field. For the first configuration of charges on the Jamboard (dipole), find a place where the voltmeter reads 0.0V (± 0.1 V). Using the pencil button on the voltmeter, record the line of equipotential at the value that is shown on the voltmeter. Remember, **the potential will be the same anywhere on the line because that is what an equipotential is**. Move the voltmeter to somewhere else on the line to see that it reads the same value. **Equipotentials are actually surfaces rather than lines. The lines show a cross-section of the 3-D equipotential surface.**
- Record the following equipotential lines for the different configurations. Your values don't have to be exact as long as they are within 1%. **Do not move any charges once you begin recording equal potential lines; doing so will delete the equipotentials you have already recorded.**
 - Frame 1: 0V, ± 5 V, ± 10 V, ± 15 V, ± 20 V, ± 25 V, ± 30 V
 - Frame 2: 0V, ± 10 V, ± 20 V, ± 30 V, ± 40 V, ± 50 V, ± 60 V
 - Frame 3: 25V, 50V, 75V, 100V, 125V (make sure to do inside and outside circle)
- Once finished placing all of the equipotential lines, take a screenshot of the field and save it to your device. (Google how to do this if you don't know already.) In Jamboard, replace the background with the image you saved using the "Set Background" button in the top banner menu.
- Discuss with your lab team how you think that equipotential surfaces and electric field lines are oriented in relation to each other. To help you, you might think about what the gravitational equipotential surfaces look like in your room and what the gravitational field lines look like.
- Using the marker tool in the left menu of Jamboard, carefully draw at least five electric field lines on each frame of the Jamboard. Remember that electric field line rules from this website still hold true:
 - [Electric Field Lines from The Physics Classroom](#)
- Repeat the whole procedure for all of the frames of the Jamboard.
- Finally, answer the questions in the Equipotential Questions document in Google Classroom. Submit the questions as well as the Jamboard in the  Google Classroom assignment.

