

Simulating Electric Potentials

Charges in free space:

Using the interactive simulation software for electric fields on the course website (directly below the game under Course Supplementals) please simulate each of the following distributions. Look at the electric potentials (V hi resolution) for the following distributions then map and sketch the equipotential lines (-30V to 30V in steps of 5V) and label their voltage value. Please also use an electric field probe to see where the electric field is strong, where it is weak, and where there are regions of constant field.

1. + (One positive charge).
2. - (One negative charge).
3. + + (Two positive charges separated by $\sim 1/3$ of the screen).
4. + - (One positive one negative charge).
 + -
5. + - (Three positive three negative charges).
 + -
6. An arrangement of your choice.

Finally please sketch out a voltage vs. position graph for the slice shown on the board.

Charges in a conductor:

Using the circuit construction kit on the course website to construct the following circuits.

1. One battery & one bulb.
2. Two batteries & one bulb (there are multiple ways to do this).
3. One battery & two bulbs (there are multiple ways to do this).

For each of these situations vary the battery voltage and the bulb resistance. For the situations with two bulbs note the brightness and relative rate of charge flow in each bulb when they have differing resistances.