

## Pre-Lab Exercises

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Lab Section:

**Hand this in at the beginning of the lab period.** The grade for these exercises will be included in your lab grade this week.

1. Should you use metallic or plastic-coated magnets for the electrodes? Why?

metallic! manual specifically said to use metallic and it would make sense so that the magnets can actually be a conductor between the wires and the paper

2. Why are electric field lines always perpendicular to equipotential lines?

We have the relationship  $E = -\nabla V$

the electric field is the negative gradient of the electric potential, and the gradient of a constant value (which is the case along an equipotential line) must be perpendicular to the direction in which that value is constant.

3. In an electrostatic field, explain why all parts of the same conductor are at the same potential. Explain what happens in the conductor to make this happen.

in a conductor the charges can move freely. if there was a difference in potential there would be an E field generated (see above relationship between potential and E field), and the electrons would redistribute themselves until there is no potential difference.

TLDR: any difference is neutralized by free movement of electrons/charges.

4. Why must you “clean” (i.e., polish) the conductors?

to make sure there is a good electrical contact. perhaps a poor contact could cause some errors and we don't want that.