

# Lab Combine - Capacitance

## Overview

You will be working on a combination lab this week. The objective is to integrate your understanding of energy, capacitance, voltage and electric field.

## Queries

Capacitance of Spheres:

- What is the capacitance of the Earth? Determine this by finding the electric field and then the voltage for the earth with a charge  $Q$ .
- What is the capacitance of the Van de Graaff generator? How much charge and energy can be stored?

Capacitance of Leyden Jar:

- How much charge could you store in your Leyden jar?
- Supposedly a Leyden jar made from a 2-liter bottle is dangerous. Why?

### USEFUL INFORMATION:

The radius of the Earth is approximately 6370 km.

The dielectric breakdown of air is approximately 30kV/cm.

### BOOK STATEMENTS:

There are 2000 lightening storms with about 100 bolts every second. Each lightening bolt can transfer 20 C over 150 MV.

## Experimental Considerations

- What would you need to experimentally verify any of the above questions?
- How does a Van de Graaf generator work? Do you have to have the belt touch the inside of the sphere? Would it still work if it touched the outside of the sphere?