

Interactive Problem Set 12, SP212 Spring 2013

Topic: 25.1 - 25.4 Capacitance, Capacitors in Parallel and Series.

IPS 12.1 (in-class) A 5.00 V battery is used to charge up a 7.00 μF capacitor. Once fully charged, calculate the charge on the capacitor. Explain what is meant by “charge on the capacitor”.

IPS 12.2 (in-class) Show that the capacitance of a parallel-plate capacitor is,

$$C = \frac{\epsilon_0 A}{d}$$

where A is the area of one of the plates and d is the distance between the plates. Here are some tips,

- Create a sketch and work in everything you know about this kind of arrangement (think back to lab from last week).
- Use this sketch to work through the fundamental definition of electric potential that shows it’s relationship to the electric field via a path integral.

IPS 12.3 (in-class) Consider three identical capacitors each of capacitance 4.00 μF . For each distinct arrangement of these capacitors,

- Sketch the arrangement.
- Calculate the equivalent capacitance of the arrangement.
- Calculate the equivalent charge on the arrangement if it is hooked up to a 5.00 V battery.

IPS 12.5 (homework) Revisit each of the arrangements above, and calculate the charges on each of the individual capacitors. *Organize your work so your solution clearly shows how you are able to break down systematically each scenario.*

Prep for next class: Reread WPC Chapter 25.