Interactive Lecture Demonstrations

Prediction Sheet**—RC Circuits**

**Directions:**  Write your name at the top to record your presence and participation in these demonstrations.  For each demonstration below, write your prediction on this sheet before making any observations. You may be asked to send this sheet to your instructor.

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| **Demonstration 1:** The circuit on the right consists of capacitor C in series with a bulb of resistance R. The capacitor is initially charged with +Q on the top plate and -Q on the bottom plate.  Predict what will happen to the bulb after switch S is closed.  After you have made your prediction, download and view the [video](http://pages.uoregon.edu/sokoloff/RCcircuitvideo.mp4). Compare to your prediction and explain your observation.  Sketch on the top axes to the right your prediction for the *voltage across the capacitor* *Vc* vs. time after the switch S is closed. Sketch on the bottom axes your prediction for the *voltage across the bulb Vb* vs. time after the switch S is closed.  After you have made your prediction, download and view the [video](http://pages.uoregon.edu/sokoloff/RCvoltages.mp4). Compare to your prediction and explain your observation.  Now open the RC circuit simulation: <https://www.compadre.org/Physlets/circuits/illustration30_6.cfm>  Select Show graph of voltage vs. time. Note that with the initial position of the switches, the capacitor has charged through the bulb, and is initially charged. (When you start graphing, the capacitor voltage is 1 V and the bulb voltage is 0.) When you click on **open/close**, the charged capacitor discharges through the bulb. Observe the voltage graphs for the capacitor (red) and bulb (green) as the capacitor discharges. Also observe the bulb (black represents off). Do your observations of the bulb and graphs agree with the ones you observed above in the video? Explain. | A picture containing clock  Description automatically generated  A screenshot of a cell phone  Description automatically generated |
| What happens to the charge Q on the capacitor after switch S is closed? Does it *increase, decrease, or stay the same*? (circle one)  Sketch on the axes to the right your prediction for the magnitude of the *current* *, I* in the circuit vs. time after S is closed.  Now view the [graph](http://pages.uoregon.edu/sokoloff/Current.png) of current vs. time and compare it to your prediction. Do these observations agree with your predictions? Explain. | A close up of a logo  Description automatically generated |
| **Demonstration 3:** The circuit to the right consists of an uncharged capacitor, a bulb (resistance R) and a battery of voltage V connected in series. The switch S is initially open.  Predict what will happen to the light bulb after switch S is closed.  Also, sketch on the axes to the right your prediction the *voltage across the capacitor ,Vc* vs. time after switch S is closed. Sketch on the axes to the right the *voltage across the bulb ,* Vb vs. time after switch S is closed.  After you have made your predictions, open the RC circuit simulation: <https://www.compadre.org/Physlets/circuits/illustration30_6.cfm>  Select Show graph of voltage vs. time. Begin graphing, click on **open/close as before,** and watch the voltages decay. Then click again on **open/close so that** the capacitor is now charging through the bulb. Observe the voltage graphs for the capacitor (red) and bulb (green) as the capacitor charges. Also observe the bulb (black represents off). Do your observations of the bulb and graphs agree with your predictions? Explain. | A picture containing object, clock  Description automatically generated  A screenshot of a cell phone  Description automatically generated |
| **Demonstration 4:** Sketch on the axes to the right your prediction for the magnitude of the *current* *, I* in the circuit vs. time after S is closed.  Now view the [graph](http://pages.uoregon.edu/sokoloff/Current.png) of current vs. time and compare it to your prediction. Do these observations agree with your predictions? Explain. | A close up of a logo  Description automatically generated |