

# Class 9



PHY 232  
Spring 2002  
Prof. S. Billinge

# Announcements

- Class web-page:  
<http://www.pa.msu.edu/courses/phy232>
- Exam results posted above
- Class average 63%
- Homework: set 4 is open but due Wednesday October 1st (next week)



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# Concepts

## 1. Kirchhoff's Rules

- Use for circuit analysis
- Needed in some cases where equivalent resistances don't work
- 2 rules: “junction” and “loop”

## 2. RC circuits

- Combine a capacitor (C) and resistor (R) and current in the circuit becomes **time dependent**



# Problem solving

- Strategies for solving circuit problems
  - Understand rules for voltage and charge in circuits
  - Apply  $V=IR$  again and again
  - Always try and reduce the number of resistors by using the rules of “equivalent resistors”
  - Where necessary, apply Kirchhoff’s rules



A bird sits on a 20000V high-voltage power transmission line. It is not fried to a crisp because:

1. Its legs are insulating so it isn't charged to the high potential
2. Its legs are insulating so no current flows through it
3. Its legs are conducting, but there is but a tiny voltage drop between them and therefore not much current flows through the bird
4. The wires are insulating so it isn't a problem anyway

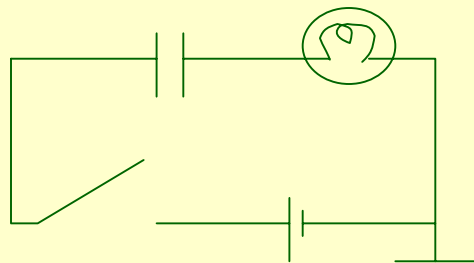
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A bulb is in series with a capacitor and a battery:



on closing the switch:  $-$

1. The bulb lights initially gets dimmer and goes out
2. The bulb glows dimly and brightness increases as the capacitor charges
3. Bulb flashes on and off as capacitor charges and discharges
4. Bulb stays dark because it is on the negative side of the battery at ground potential

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