Post-course survey

- Completing both the Pre- and Post-test is worth 1% of your grade; Completing both the Pre- and Post-Survey is worth another 1% of your grade.
- The Physics 100 Post-Course Test and Physics 100 Post-Course Survey are now available on WebCT(also linked to phys100 course site).
- The survey will be open from now until 11 PM on Nov 30 (Friday)

More PRS questions on circuits

-power, short circuits and power bars

Energy Dissipation of Ohmic materials

$P = I^2 \cdot R$ or $P = \Delta V^2/R$

These equations apply only to the transfer of electrical energy into thermal energy in a resistive material: Useful for light bulbs, space heaters, computers, etc.

Q1

Rank in order, from largest to smallest, the powers P_a to P_d dissipated in resistors a to d.



1.
$$P_{b} > P_{a} = P_{c} = P_{d}$$

2. $P_{b} = P_{c} > P_{a} > P_{c}$
3. $P_{b} = P_{d} > P_{a} > P_{c}$
4. $P_{b} > P_{c} > P_{a} > P_{d}$
5. $P_{b} > P_{d} > P_{a} > P_{c}$



Rank in order, from brightest to dimmest, the identical bulbs A to D.





Consider two light bulbs designed for 120 V. Is the filament resistance lower or higher in a 500 W light bulb than in a 100 W light bulb?

- 1. Higher in the 500 W light bulb.
- 2. Lower in the 500 W light bulb.
- 3. Same in both bulbs.
- 4. Answer depends on the current.



Consider two light bulbs in series. The rated power for each bulb is indicated. Which bulb emits more light in this circuit?

60 W 40 W

- 1. The 40 W bulb.
- 2. The 60 W bulb.
- 3. Both emit the same amount of light.
- 4. I am so confused.

Short Circuits

- Sometimes faulty appliances can lead to short circuits (often due to overheating, moisture buildup on circuit boards, etc.)
- Short circuit: Positive and negative terminal connected by very small resistance leading to large currents.
- Household wiring and can only handle current of fixed amount ~ 15A. Larger currents can damage the wire.
- (Nail burner demo)

A light bulb is connected to an ideal battery. Suppose a wire of low resistance R is connected across the bulb as shown. When the wire is connected, the brightness of the bulb

b

a

1) increases.

- 2) decreases to half of the initial brightness.
- 3) stays the same.
- 4) decreases depending on the resistance of the wire.
- 5) increases or decreases depending on the resistance of the bulb.

The circuit below consists of two identical light bulbs burning with equal brightness and a single 12 V battery. When the switch S is closed, bulb *a* s

- 1. burns more brightly.
- 2. burns as brightly.
- 3. burns more dimly.
- 4. goes out.





Appliances and electronics are designed for 120 V. If you need more plugs than are available in one location, you can connect a power bar with 6 plugs, for example.

Are the 6 plugs wired

- 1. in parallel,
- 2. or in series?





Q8

As you plug in more devices into your power bar, the total resistance in the circuit

- 1. goes up.
- 2. goes down.
- 3. stays the same.





Power Bars

- Good power bars have a build-in breaker as a safety feature limiting the current to a maximum of ~ 15 A.
- You are working at your computer, which consumes ~ 200 W of power. You are cold and you also want to connect your space heater that consumes 500 W of electric power. Will your power bar be able to handle both appliances?
- What's the maximum power that you can connect to the power bar?
- 1. 500 W
- 2. 1000 W
- 3. 2000 W
- 4. 3000 W



Alternating current



