**PHYS040C – PRE-LAB 05 – DC Electrical Circuits**

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**Section 109**

1. Using the Power Law, , and Omh’s Law, , obtain an expression for the maximum current you can safely apply to a ¼ watt 3 resistor.

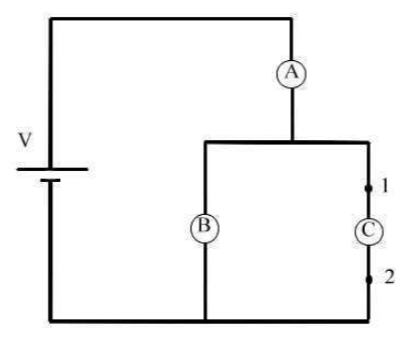
We can write the power law as

If we plug this into Ohm’s Law,

Now we solve for :

Plugging in the given values into this formula:

2. Bulbs A, B and C in the circuit diagram below are identical.



1. Rank in order, from most to least, the brightest of the three bulbs. Explain your reasoning.

Voltage across A:

Voltage across B and C:

because , so

So , , and . Since , .

By power law ,

, , and . Since , then

. The power of a light bulb determines how bright it shines, and therefore in terms

of brightness, B = C > A.

1. Suppose an ideal wire (with zero resistance) is connected between points 1 and 2. What happens to each bulb? Does it get brighter, dimmer, or go out completely? Explain your reasoning for each bulb.

It seems that if we pass a wire from point 1 to point 2, we would be undoing the resistance that light C is providing. Therefore:

Bulb A:

* For this lightbulb, since we removed one of the resistors in the parallel component, resistor B is practically in series. Thus the total resistance of the circuit increases and thus since , this bulb should become brighter.

Bulb B:

* Bulb B is not as if it was connected in series, so it should become brighter because the current is the same as in A, and not split by the junction.

Bulb C:

* This light should go out because now current passes through the wire instead of the resistor.