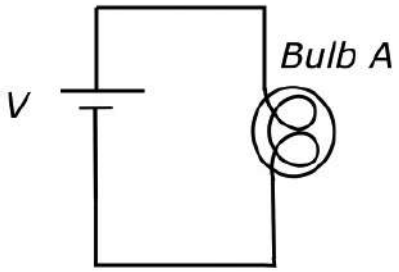
NAME _____ DATE _____

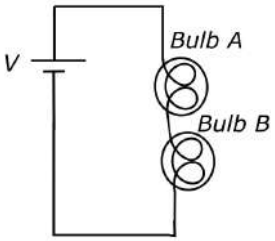
Scenario

A simple circuit is constructed with a single battery, a wire, and a single bulb with resistance R.



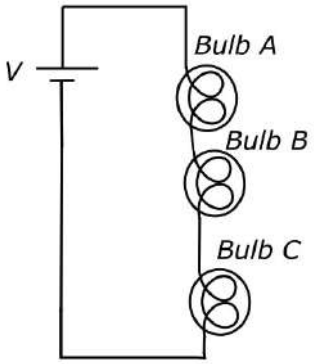
Quantitative Analysis

PART A: Describe what happens to the total resistance of the circuit when a second identical bulb (Bulb B) is placed in the circuit as shown below. Provide evidence.



PART B: Write an expression for the total resistance of the circuit in terms of R, the resistance of a light bulb.

PART C: A third identical bulb (Bulb C) is now added to the circuit. Fill in the following table to show what changes and what stays the same in each circuit after Bulb C is added. Place a check mark or an X in the correct box: increases, decreases, or remains the same.



	Increases	*Decreases*	*Remains the Same*
Total ΔV			
ΔV (across Bulb A)			
ΔV (across Bulb B)			
Total Current			
Current through Bulb A			
Current through Bulb B			
Total Resistance			

Argumentation

PART D: Your lab partners make the following statements:

i. ***Angela:*** "Since power is equal to $P = I^2R$, and brightness is proportional to power, the larger the resistance, the more power the bulbs will have and the brighter they will be. So, we need to add more bulbs in series to make more light." Is Angela correct? Justify using the equations for power and the table completed in Part C.

ii. ***Blake:*** "When we add more bulbs, the one closest to the negative terminal of the battery will be the brightest. The second and third bulb will get fewer electrons because the first bulb will use up some of the electrons. So, adding more bulbs in series won't make more light." Is Blake correct? Justify using the table completed in Part C.