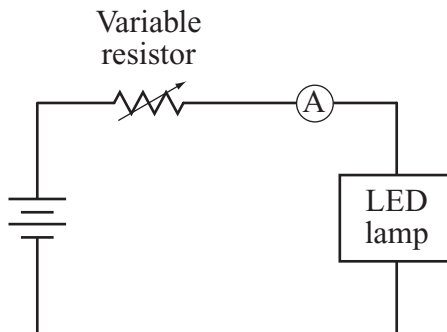


An electrician places a variable resistor in series with an LED lamp and a 6 V battery, as shown below.



LED lamps are efficient sources of light that operate at a specified voltage for a wide range of currents. The LED lamp in this circuit operates at a constant 3 V for all settings of the variable resistor, while the remaining 3 V is always dropped across the variable resistor.

- a. Calculate the current passing through the variable resistor when it is set to **each** of the values shown in the table below. Show your calculations and include units in your answers.

Voltage (V)	Resistance ( $\Omega$ )	Current (A)
3.0	4	
3.0	6	
3.0	10	
3.0	15	
3.0	20	

- b. On the grid in your Student Answer Booklet, make a graph using your answers to part (a). Current should be on the  $y$ -axis and resistance should be on the  $x$ -axis. Clearly label the axes and use a proper scale.
- c. Based on the graph, describe what happens to the LED lamp as the resistance decreases.

The maximum recommended current for the LED lamp is 0.3 A.

- d. If the LED lamp is operated for a long time with the variable resistor set at 4  $\Omega$ , describe the **most likely** effect on the LED lamp.