Rutgers University

Physics 2 lab

Resistance

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Signatures

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Part 1a - resistance of a light-bulb

Procedure and Goal

We have a light-bulb. We send varying amounts of current through the light-bulb. We then measure the voltage across the light-bulb for each current. Our goal is to see if the the resistance of the light-bulb is dependent on the current supplied to it.
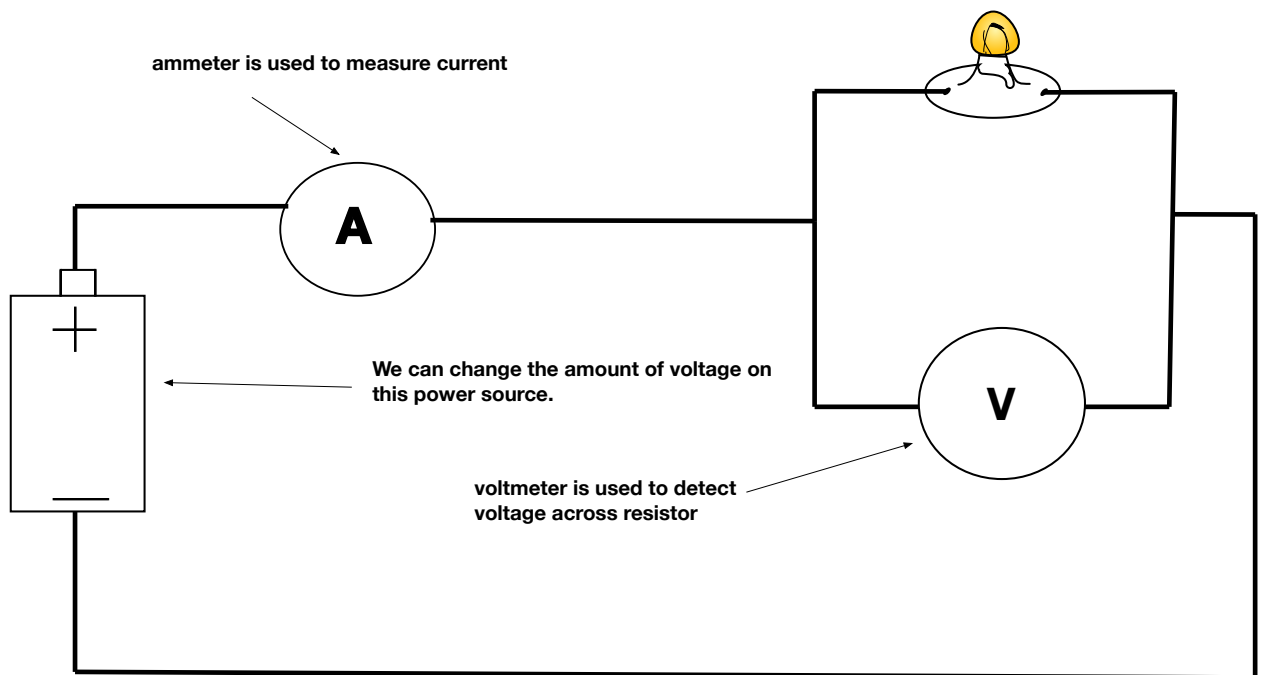

ammeter is used to measure current

We can change the amount of voltage on this power source.

voltmeter is used to detect voltage across resistor

Figure 1: the circuit of our experiment

Prediction

We can follows these steps to show more current $\Rightarrow$ more resistance

1. More current $\Rightarrow$ brighter light-bulb

2. brighter light-bulb $\Rightarrow$ more heat

3. more heat $\Rightarrow$ more resistance

4. therefore we can conclude more current $\Rightarrow$ more resistance

we can say more current $\Rightarrow$ more resistance but can not guess the exact relationship between the current supplied and resistance

Results and Analysis

Here are the results we achieved.

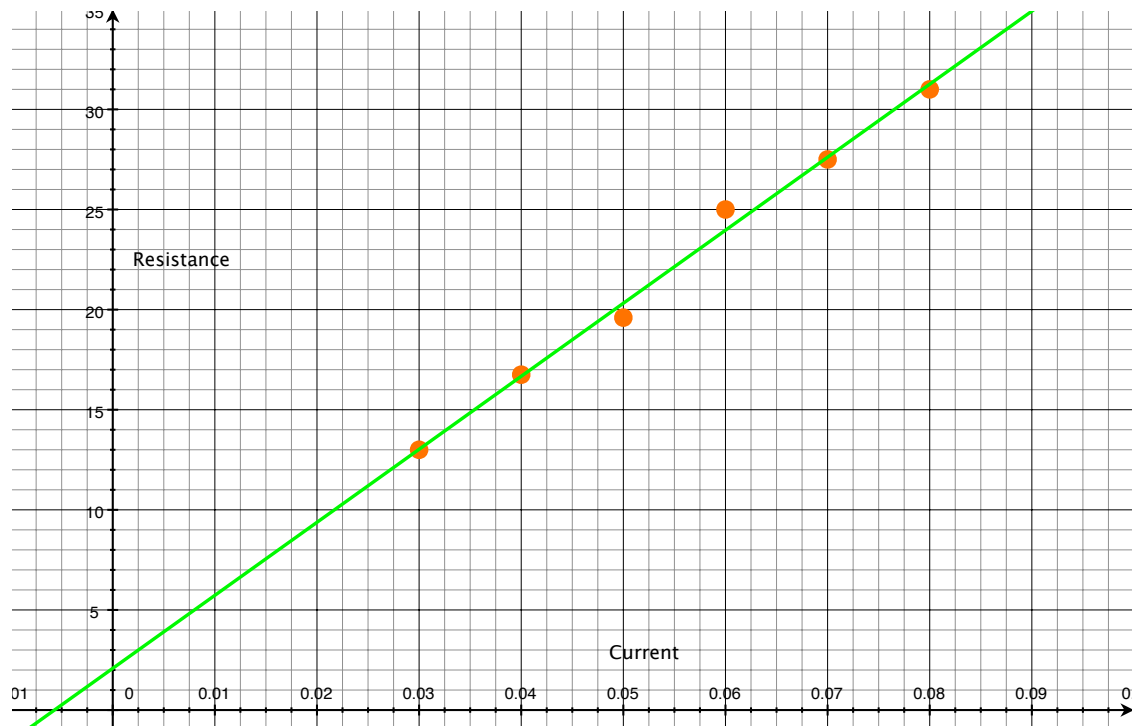| current supplied	voltage across light-bulb	resistance of light-bulb
.03	.39	13
.04	.67	16.75
.05	.98	19.6
.06	1.5	25
.07	1.93	27.5
.08	2.5	31

Figure 2: plotting the resistance as a function of current

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Our prediction was correct.We found out that the resistance of the light-bulb is directly proportional to the current supplied. The best fit curve we got was $R = 364.71I + 2.08$.

Part 1b - ohmic resistance

Procedure and goal

In this part we repeat part 1a except we replace the light-bulb with a resistance box. We set the box's resistance to 50.

Prediction

Since by the box has a fixed relationship, there should be no relation between current and resistance. Resistance should stay fixed at 50.

Results and Analysis

current supplied	voltage across light-bulb	resistance of light-bulb
.02	1	50
.03	1.7	56.6
.05	2.5	50
.06	2.9	56.6
.07	3.4	55.71
.08	4.3	53

In the second part of this experiment our prediction was correct. The resistance recorded stayed at around 50, so the box is an ohmic resistor. The