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Lab partner(s):   Lab No./Title: 1
                                                                   Section # (GTA):   003

Instructions:
- *Submission must contain only original, individual, and current work.*
- *After completion, save as PDF before submitting.*

Task 1.10.1

Objective:

The objective of the task is to measure the DC voltage using a DMM.

Results/Calculations:

Step 1:

Table I: Measured Voltage and Percent Error.

Set Voltage (V)	Measured Voltage (V)	%Error
+13	13.001	0.00769%
-13	-12.998	0.0154%

Step 2:

We measure 26V DC by changing the ground wire to the negative sign so it will be the positive voltage plus negative voltage and all we had to do was make both sides to combine and equal to 26V.

Table II: Measured Voltage for 26V

Measured Voltage (V)	%Error
26.001	0.00385%

Step 3:

Table III: Measured Voltage vs Set Voltage

Set Voltage (V)	Measured Voltage (V)	%Error
4.122	4.124	0.0485%
4.118	4.122	0.097%

Step 4:

V = IR
I = V/R = 7/330 = 0.02121

Step 5:

I expect the circuit will overload because based on my answer from Step 4, the current is 0.02121A which is greater than 0.015A

After applying a 300 ohm resistance, the voltage stayed the same.

Step 6

V = IR
V = 7
I = 0.015A
R = 7/0.015 = 466.67.

Table IV: Type in an appropriate caption for the table below.

| Measured Voltage (V)	%Error	Measured Current (Units)
6.78	3.14%	0.014

Conclusion:

After using the 470 ohm resistor, the voltage stays the same and we changed the grey plug in the other direction then pressed DC I. It then showed the current and voltage. This task is to get us used to using the DMM for DC measurements.

Task 1.10.2

Objective:

> The objective of this task is to test us about Ohm's Law and let us know the relationship between the variables.

Circuit Schematic(s):

Figure 1: Test circuit for verifying Ohm's law.
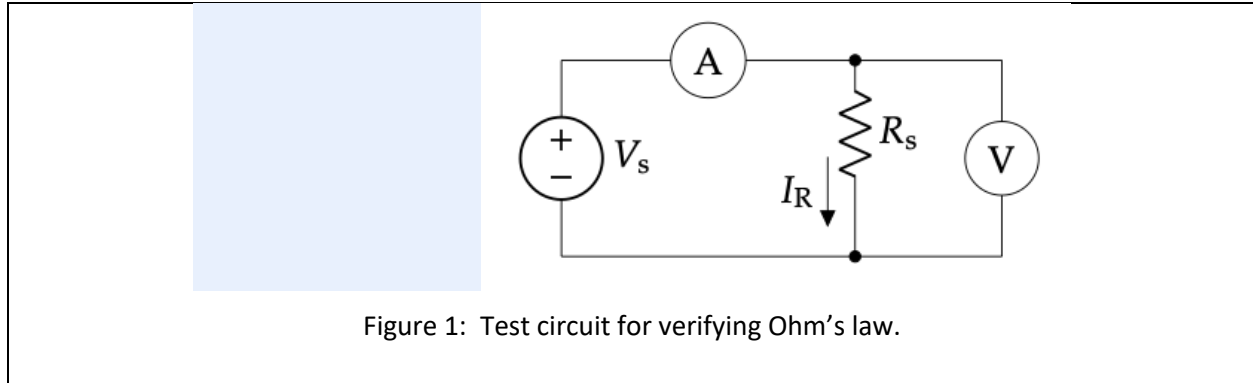
Results/Calculations:

Step 3

Table V: relationship between voltage and current.

Set Voltage (_V_)	Measured Current (_mA_)	Set Voltage (__)	Measured Current (__)
0	0.01	4	4.02
0.5	0.51	4.5	4.52
1	1.01	5	5.03
1.5	1.51		
2	2.01		
2.5	2.51		
3	3.02		
3.5	3.52		

Step 4

> I expect the relationship between them to be linear because they are directly proportional to each other so if one increases, the other should increase as well.

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Step 5

#5	Voltage	Current
	0	0.01
	0.5	0.51
	1	1.01
	1.5	1.51
	2	2.01
	2.5	2.51
	3	3.02
	3.5	3.52
	4	4.02
	4.5	4.52
	5	5.03

I - V RELATIONSHIP

$y = 1.0036x + 0.0064$
$R^2 = 1$
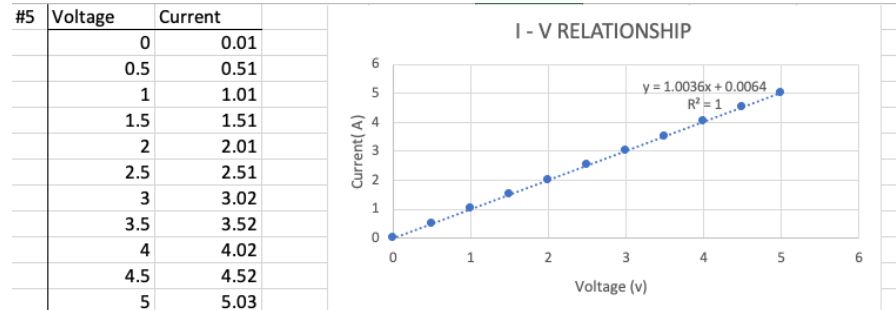
Current(A)

Voltage (v)

Figure 2: I-V relationship chart.

The best fit relationship is a linear relationship

Step 6

The resistance of R should be 1 as shown in the R^2 value on the chart. .

Step 7-8

Table VI: Type in an appropriate caption for the table below.

	Resistance (_k ohm_)	%Error (from labelled)
Measured	0.992	0.8%
Estimated	1	0%

Step 9

The tolerance band is brown and has a +- 1 % tolerance. So the minimum resistance should be 990 and the maximum should be 1100.

Conclusion:

This task is for us to verify Ohm's Law. We plotted values of the current and voltage on a chart and check their relationship with each other.

Task 1.10.3

Objective

The objective of this task is to measure the DC voltage and current using a light bulb and photoresistor.

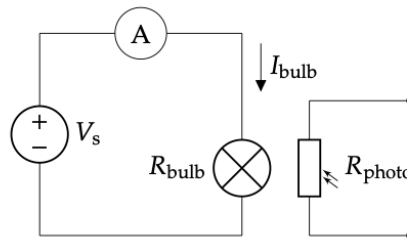### *Circuit Schematics*

Figure 3: Test circuit for measuring different parameters for the light box.

Results/Calculations

Step 1:

Measure Resistance of bulb (R_{bulb}) = | 8.72 | | Ohm |

Step 2-3:

Table VII: Type in an appropriate caption for the table below.

Set V_S (_V_)	Measured I_{bulb} (_A_)	Measured R_{photo} (_ohms_)	Calculated Power (_W_)
0.1	0.011	1350000	0.0011
1	0.028	780000	0.028
2	0.039	51490	0.078
3	0.049	9765	0.147
4	0.057	3610	0.228
5	0.065	1850	0.325

Step 4-5

Task 3	I bulb	V bulb
	0.011	0.1
	0.028	1
	0.039	2
	0.049	3
	0.057	4
	0.065	5

I bulb versus V bulb
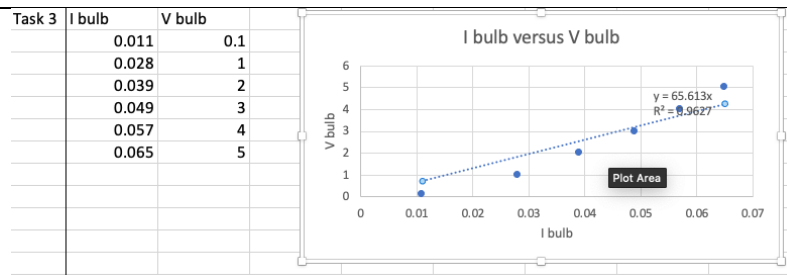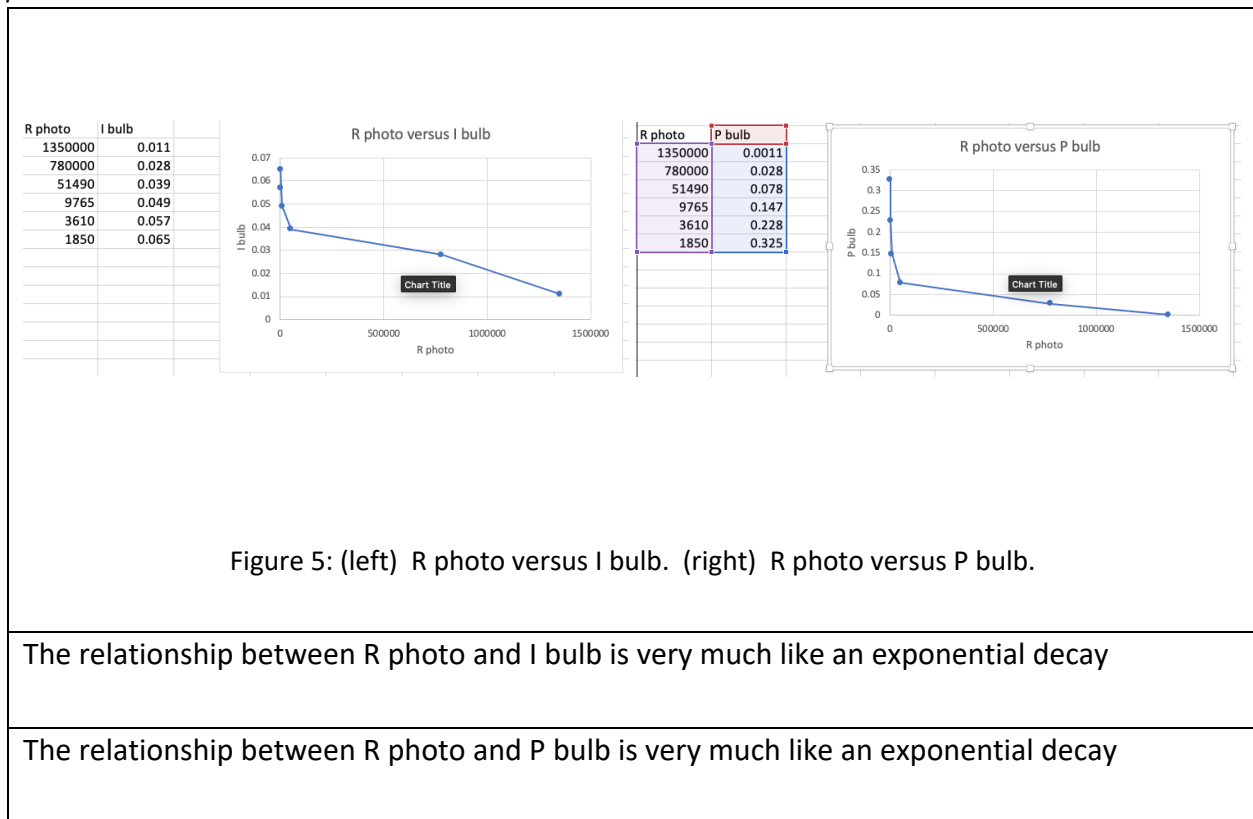
$y = 65.613x$
$R^2 = 0.9627$

Figure 4: I bulb versus V bulb graph.

No, the light bulb cannot be accurately modeled as only a resistor because as we can see that the points are pretty far away from the line of best

Step 6-7

R photo	I bulb
1350000	0.011
780000	0.028
51490	0.039
9765	0.049
3610	0.057
1850	0.065

R photo	P bulb
1350000	0.0011
780000	0.028
51490	0.078
9765	0.147
3610	0.228
1850	0.325

Figure 5: (left) R photo versus I bulb. (right) R photo versus P bulb.

The relationship between R photo and I bulb is very much like an exponential decay

The relationship between R photo and P bulb is very much like an exponential decay

Conclusion:

After this task we know the relationship between the photoresistor, the current, and the power of the bulb.

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