

Submission Form

Fill up the following slots with appropriate content. You must submit the content of this document from this page only.

1. Your Name: Md Raihanul Islam Bhuiyan
2. Your ID: 20101239
3. Your Section: 16
4. Experiment No: 2
5. Experiment Title: Verify Ohm's Law
6. **You must write your ID in each of the graphs you insert here.**

7. Data Table 1:

$$R_1 = 359 \, \Omega$$

Sl:	Voltage, V (volt)	Electric Current, I (mA)
1.	1	2.8
2.	2	5.6
3.	3	8.4
4	4	11.1
5	5	13.9
6.	6	16.7
7.	7	19.5
8.	8	22.3

8. Data Table 2:

$$R_2 = 220\Omega$$

Sl:	Voltage, V (volt)	Electric Current, I (mA)
1.	1	4.5
2.	2	9.1
3.	3	13.6
4	4	18.2
5	5	22.7
6.	6	27.3
7.	7	31.8
8.	8	36.4

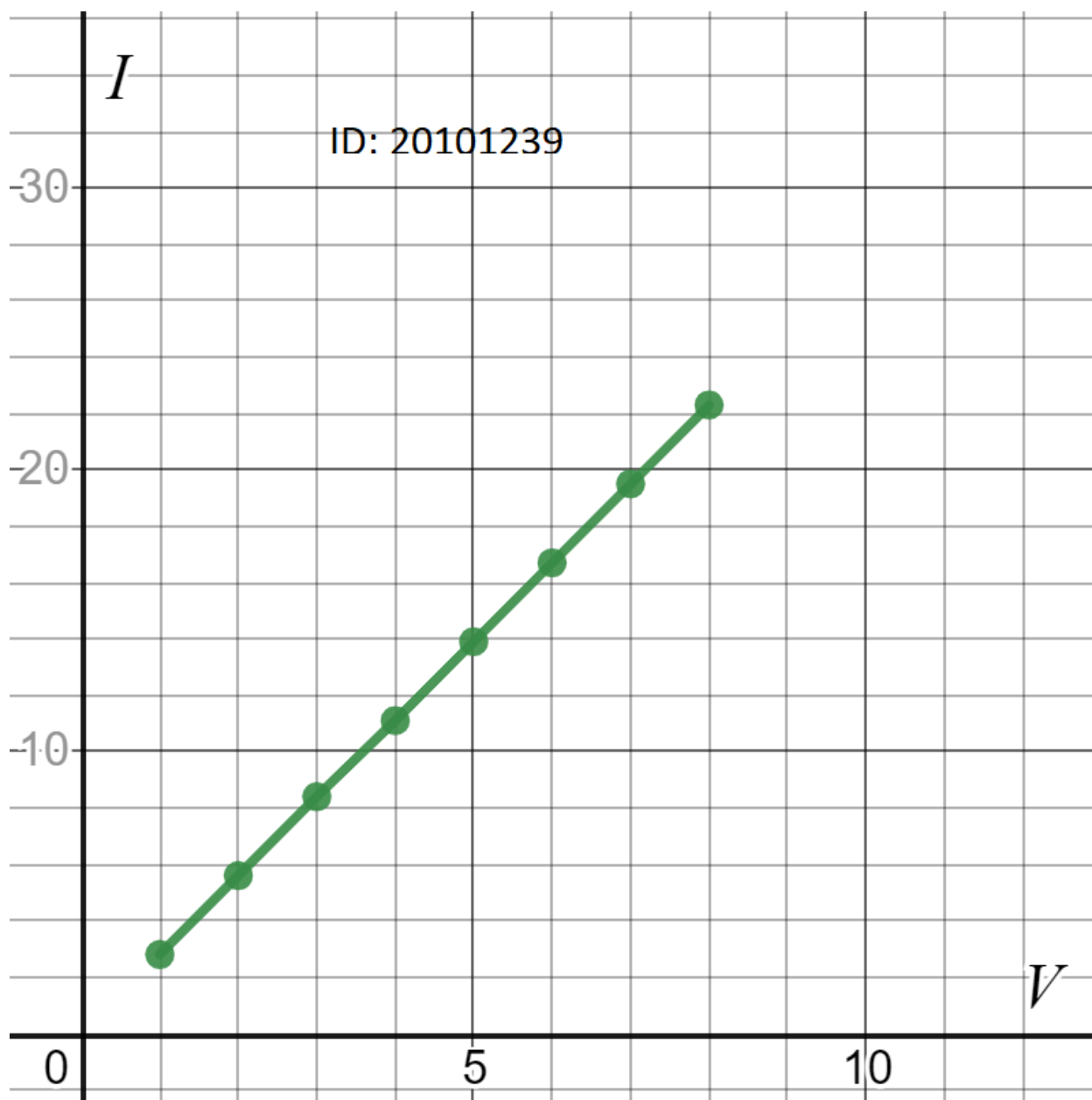
9. Data Table 3:

$$V = 5.7 \text{ volts}$$

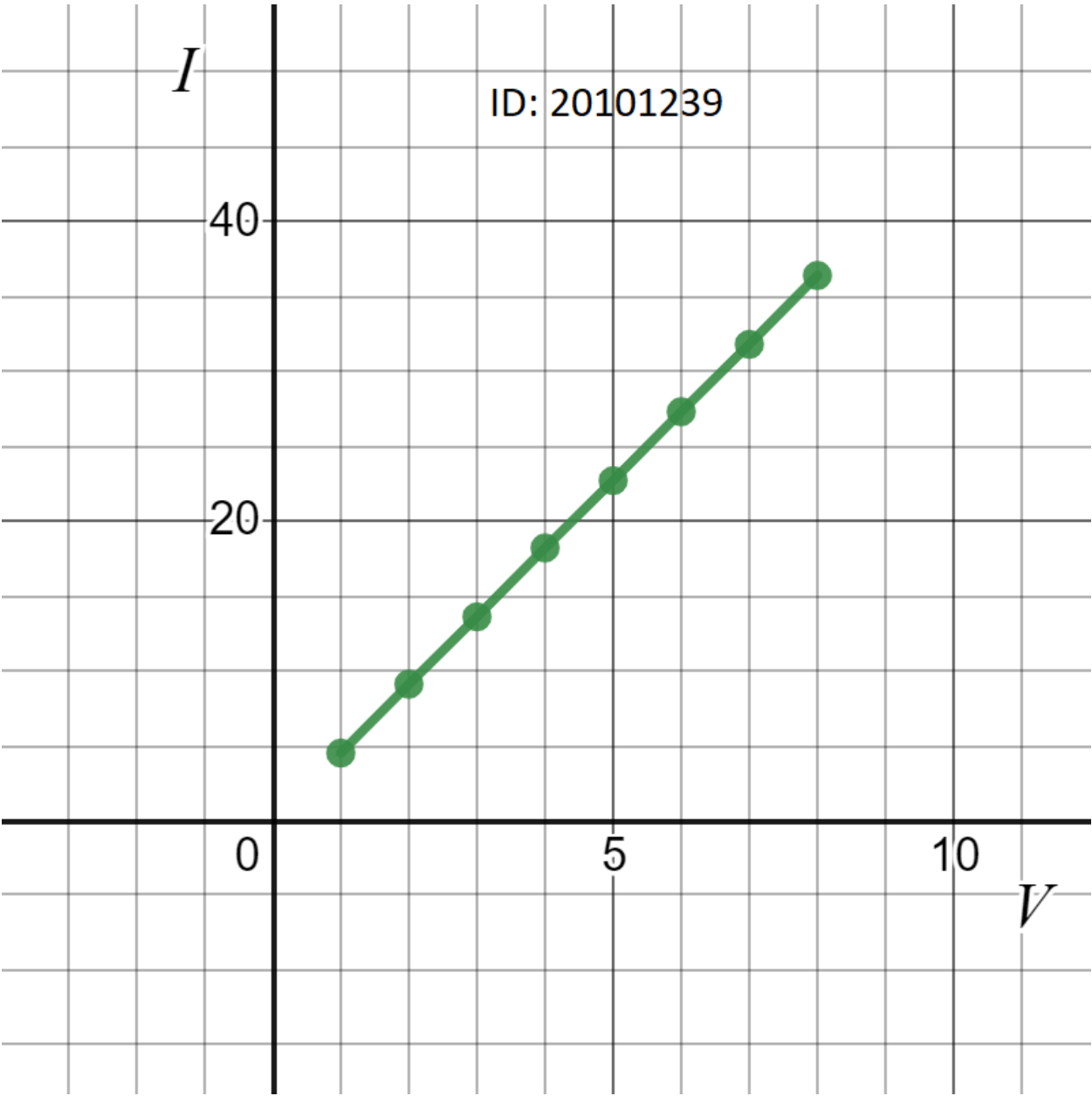
Sl:	Resistance, R (Ω)	Electric Current, I (mA)
1.	100.0	57.0
2.	200.0	28.5
3.	300.0	19.0
4	400.0	14.3
5	500.0	11.4
6.	600.0	9.5
7.	700.0	8.1
8.	800.0	7.1

10. Draw I vs V graph for Data Table 1 and 2, that is you plot V along the x -axis and I along the y -axis. You should label the axes accordingly. For two tables you will get two straight lines. You can either draw both the lines in the same graph or use two graphs; one for each table. You must label the lines such that we can identify the lines corresponding to the tables. Insert the **graph /graphs** here:

Graph for Data Table 1:



Graph for Data Table 2:



11. For Data Table 1,

$$\text{Slope} = 2.782142857 \text{ mA/V}$$

Calculated Resistance,

$$R'_1 = 1000/\text{SLOPE}$$

$$= 359.4351733 \, \Omega$$

Percentage of error

$$= [| \text{Calculated Resistance} - \text{Given Resistance} | / \text{Given Resistance}] * 100$$

$$= [| R'_1 - R_1 | / R_1] * 100$$

$$= 0.1212\%$$

For Data Table 2,

$$\text{Slope} = 4.552380952 \text{ mA/V}$$

Calculated Resistance,

$$R'_2 = 1000/\text{SLOPE}$$

$$= 219.665272 \, \Omega$$

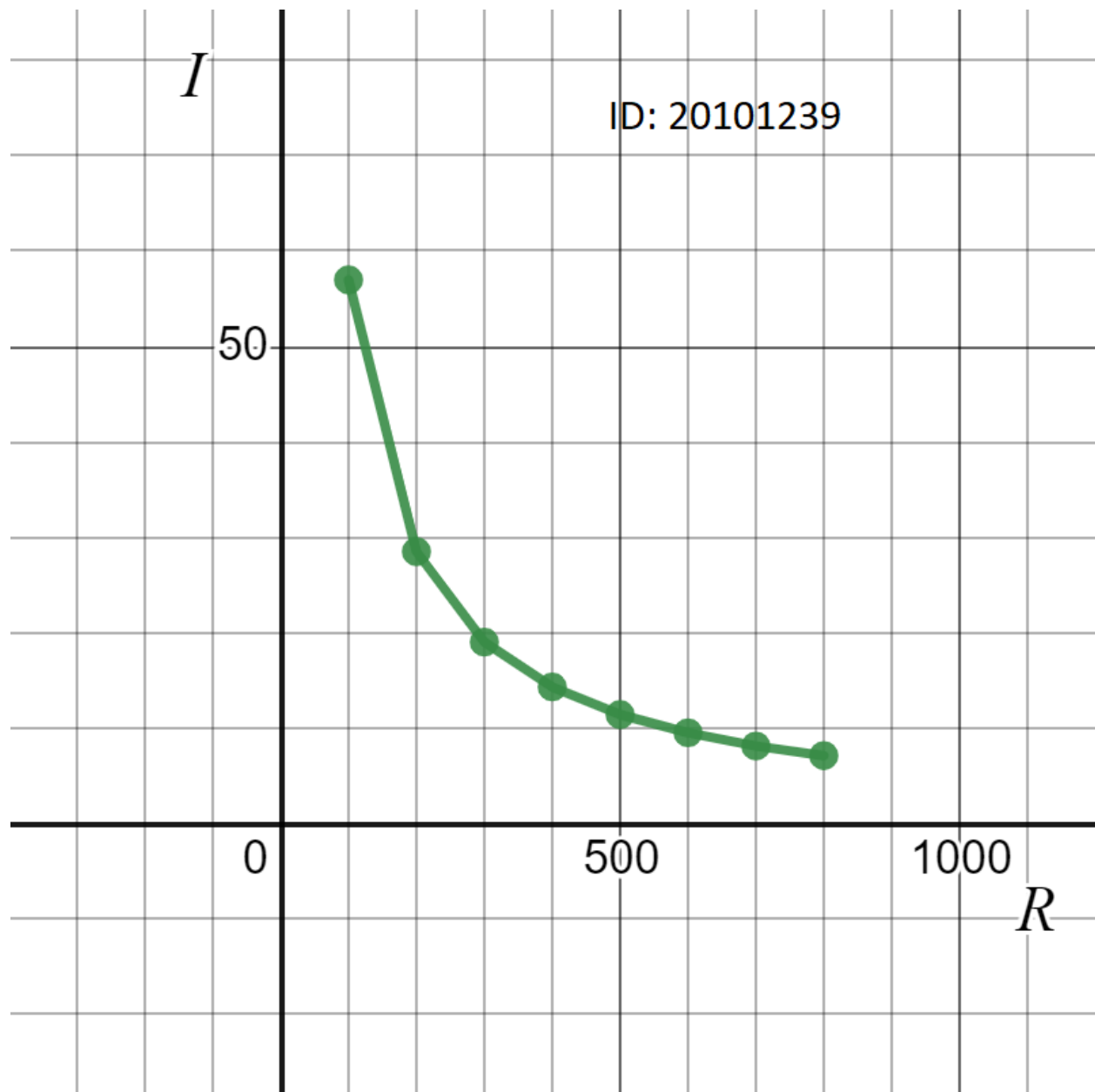
Percentage of error

$$= [| \text{Calculated Resistance} - \text{Given Resistance} | / \text{Given Resistance}] * 100$$

$$= [| R'_1 - R_1 | / R_1] * 100$$

$$= 0.152 \%$$

12. Draw I vs R graph for Data Table 3, that is you plot R along x-axis and I along y-axis. You should label the axes accordingly. Insert **graph-3** here:



You are *strongly* encouraged to use your **own words** to describe your thoughts. **However, any kind of plagiarism (such as copying from other students' lab-reports) will not be tolerated and will be subject to disciplinary action according to BracU policy.**

Please briefly answer the following questions:

13.Explain the graph you see in step 12. [Hint: What kind of function does the curve represent? How does it relate to Ohm's law?]

Ans:

From this graph, we can see that R and I will never be 0. Because the graph never touches the x and y axis.

From Ohm's Law,

$$I=V/R$$

So I and V has a inverse relation. This is why the graph is hyperbolic.

14.What assumption do you have to make about the temperature for Ohm's law to hold true? [Write the assumption in one line.]

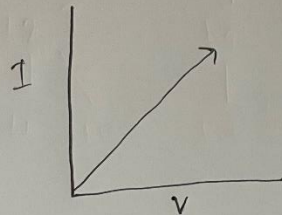
Ans: Ohm's Law states that, resistance is a constant value. But when temperature changes, Resistance also changes. So, we have to assume that temperature is constant so that Ohm's law holds true.

15. Sketch **I-V** graphs for the following cases and identify which graph corresponds to which type of material?
- Resistance increases linearly with temperature
 - Resistance decreases inversely with temperature

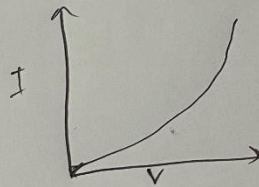
(**Hint:** You may ask yourself the question - Is this the graph for a Conductor/Semiconductor/Superconductor/Insulator?)

You can either plot both the cases in the same graph or use two graphs; one for each case. Insert the graph/graphs here with the comment on the graph representing which material type. The comment should be precise and concise.

(a) Resistance increase with temperature;



(b) Resistance decrease with temperature.



- a) When temperature decreases, resistance increases and I vs V graph is linear. This is a graph for metals.
- b) When the temperature increases, resistance decreases and I vs V graph is not linear. This is a graph for insulators.