**General Physics eJournal 7**

**Inverse-Square Law of Light**

**Instructions:**

Follow the Writeup and fill out the eJournal as you complete the lab activities. Submit your eJournal report by uploading the completed WORD or PDF document to our class Learninghub site. If the Learninghub site is down, email the completed report file directly to a lab TA.

**Preliminaries:**

* Title:
* Name(s):
* Date:
* Time In & Out:

**Plan:**

**Hypothesis**

Form a hypothesis regarding light intensity as a function of distance from the source.

**Experiment Outline**

Briefly describe your plan for testing your hypothesis.

**Equipment List**

* List
* Equipment
* Here

**Action:**

Describe the techniques used to collect data by responding to the bullet point questions:

* What did you use as your point source of light?
* What did you use for your light detector/how did you make it?
* How did you vary the distance from the detector to the light source?
* How did you measure the light intensity?

*Insert labeled image of your apparatus*

**Results:**

Record the distances and corresponding voltage measurements in Table I. Be sure to include appropriate units.

**Table I: Distance and Voltage Measurements**

|  |  |
| --- | --- |
| **Distance, r (units)** | **Voltage, V (units)** |
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**Analysis:**

Generate a plot of voltage, V (y-axis), vs. distance, r (x-axis), and apply a power law fit. Record the exponent, b, from the fit parameters and compare it with the predicted value of -2.

*Insert graph of V vs r*

**Table II: Power Law Graph Analysis**

|  |  |  |
| --- | --- | --- |
| **Predicted Exponent** | **Experimental Exponent, b** | **% Error** |
| -2 |  |  |

Compare the intensity at 10 cm with the intensity at 5 cm by computing the ratio of the two. Check to see if the ratio is approximately ¼ as predicted by Eq. (5). If you compare the intensities at 20 cm and 10 cm, do you see roughly the same relation?

Generate a plot of log(V) (y-axis) vs. log(r) (x-axis), and apply a linear fit. Record the slope, m, and the correlation coefficient, R.

*Insert graph of log(V) vs log(r)*

**Table III: Log-Log Plot Analysis**

|  |  |  |
| --- | --- | --- |
| **Predicted Slope** | **Experimental Slope, m** | **% Error** |
| -2 |  |  |

Correlation Coefficient, R = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Based on the correlation coefficient, R, how linear is your data? Recall that R = +1 is a perfect positive correlation, R = -1 is a perfect negative correlation, and R = 0 is no correlation.

**Conclusion:**

Interpret your results in light of your hypothetical predictions. How well did your hypothesis match the results? Do your results support the inverse-square law equations? If not, what might be the problem, and what could you have done differently to minimize the errors? How might you improve this experiment or explore it further?