Rubric for the Experiment Write-Up

Introduction: explain the physical variables to be studied and the goal	10
Procedure: enough description so that I could repeat your experimental method	10
Diagram(s) illustrating the procedures (hand drawings with black pen are fine). Include a ray diagram of the optical path.	10
Justification of procedure. Show evidence that you thought about ways to optimize the measurement.	10
Results: Present data in table(s). Column titles should include units.	10
Graphs are well labeled and clearly presented. Uncertainty brackets and lines of best fit are shown in at least one graph.	10
Uncertainty analysis: Document the standard uncertainty and how it propagates	10
Conclusion: What can you conclude from your experiment?	10
General communication: See below	20

Notes on general communication:

・Paragraph structure and sentence structure are easy to follow.

・Algebraic variables are defined the first time they are used.

・All graphs, diagrams and tables are numbered (Fig. 1, Fig 2, Table 1 etc.). All graphs/diagrams have helpful captions. All tables have titles.

・Each graph, diagram or table must have an accompany discussion in the main text. For example

> "Figure 2 shows the two lengths that were used to determine the angle θ. The relationship between l_1, l_2 is given by…"

・Equations are integrated into the text. For example

> "Fractional uncertainties were added in quadrature using the rule
>
> $$\frac{u(A)}{A} = \sqrt{\left(\frac{u(L)}{L}\right)^2 + \left(\frac{u(W)}{W}\right)^2}$$
>
> where A is the area of the rectangle and L and W are the lengths of the two sides of the rectangle."

・Additional tips for a profession write-up are given on the next page.

Tips for a professional lab write-up

Unprofessional or wrong	Professional	Comment
✘ Our data proves hypothesis 2.	✓ We disproved hypothesis 1 and determined that our measurements are consistent with hypothesis 2.	Science progresses by disproving hypotheses. It's impossible to prove a hypothesis.
✘ The linear fit has $R^2 = 0.72$ and the inverse fit has $R^2 = 0.75$, therefore, the inverse fit is correct.	✓ There is too much uncertainty in the measurements to claim that one theoretical curve fits better than the other.	R^2 is used for noisy data sets to verify that some correlation exists. It is not the best statistic for deciding which functional form is the best model.
✘ $C = 1.6 \times 10^{-16}$ nm·J ± 0.3×10^{-16} nm·J	✓ $C = (1.6 \pm 0.3) \times 10^{-16}$ nm·J	The professional version is more compact.
✘ $\theta = 0.674740942 \pm 0.0106479$	✓ $\theta = 0.67 \pm 0.01$ or ✓ $\theta = 0.675 \pm 0.011$	Uncertainty is always rounded to 1 or 2 significant figures. Then the measured value stops at the same decimal place as the uncertainty.
✘ Wavelength=d*sin(theta)	✓ $\lambda = d \sin\theta$	Notice the spaces around the equal sign. Italic is used for the symbol variables. The sine function is not italic.
✘ VLED	✓ V_{LED}	Use subscript
✘ 1E12	✓ 10^{12}	Use superscript
✘ 4.11 * 10^-19	✓ 4.11×10^{-19}	Use superscript
✘ kiloOhm	✓ kΩ	In Microsoft Word, you can use the font "Symbol" for Greek letters
✘ Voltage (v)	✓ Voltage (V)	Units are case sensitive.
✘ Graph with no axis labels		Graphs without axis labels have no meaning. The measured numbers need units. The variables need names. The named variables must be carefully defined in the text.