LAB REPORT FORMAT OUTLINE

A ***log book*** format, rather than a ***formal lab report*** format will be used. The emphasis is on whether or not you understood and properly performed the experiment. The information contained in the log book should clearly indicate how the experiment was performed, what measurements were made, how these measurements were analyzed, and what conclusions were drawn. It is essential that you read the laboratory manual before coming to the lab so that you have a basic understanding of what you will be doing.

The report for each experiment will contain the following sections: (Since it may not be possible to completely finish the report during the lab period, the **Analysis** section should be left until after the measurements for *all* parts of the experiment have been completed.)

Heading
- title of experiment, date experiment performed, your name, partner's name
- overall format of report worth ½ mark

Object
- one or two sentences describing purpose of experiment
- worth ½ mark

Experiment
- for each part of the experiment: short procedure note, diagram of circuit and/or equipment, and data
- data should be tabulated whenever possible
- data must be recorded, with their errors and units, directly into the lab notebook (data on loose paper are unacceptable)
- worth 3 marks

Analysis
- sample calculation and error calculation for each different equation
- units must be carried through calculations
- analysis results should be presented in tabular form whenever possible
- graphs:
  - separate page for each graph
  - use easily-interpolated scales (1, 2, 4, 5, ...) such that data points are scattered across the full page
  - graphs must be titled, axes labelled (including units)
  - error bars may be required
  - calculation of slope should be done on graph
- worth 3 marks
- marks are lost in ½ mark increments for the following:
  - calculation errors
  - graph format errors
  - units not carried through calculations
  - poor presentation of results

Conclusion
- state results (with experimental error) and state whether or not there is agreement within experimental error with theoretical or accepted values
- *must include a discussion of the physical concepts examined in the experiment*
- worth 2 marks

Sources of Error
- at least three sources of error that were not quantified
- discussion of magnitude and type (random or systematic) of effect on results, worth 1 mark

Point-form may be used for the written sections of the report, but you must ensure that the meaning of your comments is clear. A person with a similar educational background should be able to easily follow through the experiment by reading your log book, and if desired should be able to easily perform the experiment, obtaining results similar to yours.

At the discretion of the marker, a report may be worth an additional 1 mark (max. mark = 10). To receive this bonus mark the report must contain work in addition to that required by the manual. For example, provide constructive criticism and suggestions for improvement of the experiment or obtain additional data from which further conclusions relating to the experiment can be drawn.

NOTE:
An average lab report is worth 7.0 marks.
A good lab report is worth 8.0 marks.
A very good lab report is worth 8.5 to 9.0 marks.
An excellent lab report is worth 9.0 to 10 marks.

LOG BOOK STYLE SAMPLE

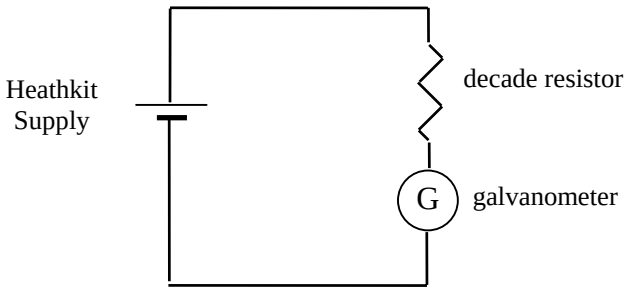
The following is intended to show by example the style that is expected for your log book reports.

---

15 DEC 94 DETERMINATION OF GALVANOMETER FULL-SCALE DEFLECTION CURRENT BRIAN ZULKOSKEY

Object: to determine the current required to deflect the galvanometer needle to full-scale.

Experiment:
The following circuit was connected:



Decade Resistance Box: R = 20,000 Ω ± 1%

The Current Control of the Heathkit Supply was set at maximum. The Voltage Control was initially set at minimum and was then slowly increased until the Galvanometer read full-scale (50) when button #3 was depressed.

With the Galvanometer reading full-scale when button #3 was depressed: Heathkit Supply Voltage = 10.20 ± 0.01 V

Analysis:
Calculation of Full-scale Deflection Current (galvanometer resistance ignored):

$$I = \frac{V}{R} = \frac{10.20\ \text{V}}{20{,}000\ \Omega} = 5.100 \times 10^{-4}\ \text{A} = 510.0\ \mu\text{A}$$

Error Calculation for Full-scale Deflection Current:

$$I = \frac{V}{R} = VR^{-1}$$

$$\delta I = \delta V \cdot R^{-1} + V|(-R^{-2}\delta R)| = \frac{\delta V}{R} + V\frac{\delta R}{R^2} = \frac{0.01\ \text{V}}{20{,}000\ \Omega} + (10.20\ \text{V})\left(\frac{200\ \Omega}{(20{,}000\ \Omega)^2}\right)$$

$$\delta I = 5.6 \times 10^{-6}\ \text{A} = 0.056 \times 10^{-4}\ \text{A} = 5.6\ \mu\text{A}$$

The experimental value obtained for the galvanometer full-scale deflection current is 510.0 ± 5.6 μA.

Conclusion:
The experimental value of 510.0 ± 5.6 μA is reasonably close to the quoted nominal value of 500 μA for the galvanometer full-scale deflection current. Using a simple circuit and Ohm's Law enabled determination of one of the galvanometer parameters that must be known to use the galvanometer as a measuring instrument.

Sources of Error:
All of the errors in this procedure are expected to have small effects on the result.

- if the galvanometer is not properly zeroed the measured full-scale current value will be too large or too small depending on which side of 0 the needle initially lies (systematic error).
- mechanical friction in the needle suspension may cause varying needle response (random error).
- judgement error in deciding when the meter is reading exactly full-scale (random error).
- to account for possible variations in the meter response due to 'direction of deflection'-dependent mechanical properties, the full-scale deflection currents should have been measured for the meter deflecting to each side of 0, and the results averaged.