CHAPTER 2

Getting started on your lab report

Task 1: Does this abstract answer the four questions? Which parts answer which question?

The "energy gap" theory of thermal excitation of a silicon semiconductor in which the resistance decreases with increasing temperature was tested by measuring variation of resistance with temperature of a thermistor made of a fairly pure sample of silicon. The trend of readings fitted that expected by the theory both in and out of the intrinsic region. A value for the energy gap of 1.05±0.02 eV was calculated, which is consistent with the expected value of 1.0–1.1 eV.

Theory

Method

Results

Conclusions

Task 2: Underline the verbs in the following extract from an Introduction. What tenses are used and why?

Semiconductors act as non-metals at low temperatures, with high resistivity. However, when the temperature is increased, the energy levels of the electrons in the valence band also increase, allowing the electrons to move more freely. This results in conduction and a decreased resistivity, and these are characteristics of metals. The energy difference between the top of the valence band and the energy required for an electron to move freely is called the 'energy gap'. The energy gap theory of semi-conductor resitance states that charge carriers in the semi-conductor can be in one of two energy states, separated by an energy gap Eg (Holgate, 2009). The aim of the experiment is to test the validity of the 'energy gap' theory of semi-conductor resistance by using a thermistor (a specialised temperature-sensitive resistor) made of silicon. The resistance of the thermistor is obtained by measuring both current and voltage actross the thermistor. However, in order to eliminate any possible systematic error in the measurement of resistance, a potential divider can be used. A thermocouple is used to measure voltage, as it will give a more accurate measurement than a liquid-glass thermometer, which can be fragile at high temperatures.

The Introduction mainly uses present and future forms. This is because theory remains true (present) and objectives may test predictions (future).

Task 3: Look at the underlined verbs in this extract from the method section of a physics lab report. What tense is used and how does the writer create an objective, impersonal style?

A first reading was taken at the point where the image on the screen was considered to be sharpest. Then upper and lower bound readings were taken around this point by adjusting the lens position until the image became unambiguously out of focus in either direction. These bounded readings were used to estimate the error in the focal length of the lens...

Tense: *past simple (because it was done in the past)*

Style: *passive voice (in purple) to keep the writing objective, rather than personal* (see Chapter 7, Writing in academic style).

Task 4: Find at least 7 problems with the following table.

No colon in titles

Data should be aligned rather than centred

Units should be in the title section

	Rider position	Correction
Mirror:	50cm	0.0cm
Pointer A:	47.445cm	+2.6cm
Pointer B:	46.5cm	+3.50cm

Font size needs to be uniform

Titles of columns and rows should be bold

Decimal places should be uniform

Table three – Calibration data

Caption incorrectly labelled

Caption incorrectly positioned

Task 5: Label the following sample from the Discussion for the following features.

1. Significance of the results and what they demonstrate.
2. Further clarification of significance and limitation.
3. Development of discussion of errors.
4. Explanation of cause of error.

The function of the different parts is highlighted.

The value of 1.05 ± 0.02 eV is consistent with the quoted value for a silicon energy gap of 1.0–1.1eV [1], and the results from this experiment lie within this range at the one-sigma level. Whilst this supports the validity of the theory, it does not constitute an accurate determination of the energy gap value for silicon as the silicon used was not a pure sample. Other errors to be considered include errors in the readings of the voltages across the potential divider. The method used for recording these measurements involved trying to read off a continually changing scale at the right moment. It is therefore likely that the reaction time of the person taking the readings affected the result. This is likely to be the main source of systematic error.

Significance of the results and what they demonstrate.

Clarification of significance and limitation.

Development of discussion of errors.

Explanation of cause of errors.

Task 6: Decide which section of the report the following extracts are most likely to be taken from.

A = Discussion (there is a comment on the results, and a discussion of possible errors)

B = Method (the steps that were taken are described)

C = Introduction (the aim of the experiment and a mention of theory)

D = Results (reference to a Figure that includes the plots of the data)

E = Conclusion (overall findings are described with a final comment on the value of the experiment)

F = Abstract (the entire experiment is described including results)

Task 7: Using the editing checklist, identify problems in the following paragraph from a method section of a lab report and make some revisions.

1. Avoid first person (we): *The first reading was taken ...*
2. Use commas to aid clarity: *After this,*
3. Delete unnecessary words: *After this, upper and lower bound readings were taken around this point by adjusting the lens position so until the image just becomes unambiguously out of focus in either direction.*
4. Organise ideas more logically within sentences: *These bounded readings were used to estimate the error in the focal length of the lens.*
5. Write concisely: ~~*It is also noted that*~~ *The distance from the mirror to the lens should make no difference ...*
6. Ensure clarity within sentences:
   ~~*It is also noted that*~~ *The distance from the mirror to the lens should make no difference as if the lens is at the focal point it should refract the diverging rays into a set of parallel rays.* This is not clear. For example, '*as if*' is ambiguous – it could mean '*because if*' or '*like/similar* to', so it causes a strain to the reader.
   Rewrite as:
   The distance from the mirror to the lens should make no difference because the lens is positioned at the focal point, meaning the diverging rays will be refracted into a set of parallel rays.