

**LOGBOOKS:** The logbook must be a bound composition book, if you plan to go to the school fair. If you do not plan to go to the school fair you may use a spiral notebook or folder.

**ALWAYS write only in blue or black ink.**

**Title page** – Title and your name; decorate (*page 1 – do not write on the back of pages*)

**Table of Contents** (copied in class – *page 2*)

**Problem** – the question you want to answer; needs to be clear and precise. Use words such as first, longest, not better, best (*page 3*).

Example: Does temperature of water affect the germination of bean seeds?

**Purpose** – 1 to 3 sentences stating the usefulness of the project (*also page 3*).

Example: The purpose of this project is to determine if hot or cold water – thermal pollution- affects the germination of bean seeds.

**Research** – At the top of the page write the bibliographical information (use the example copied in class) and then use your own words to summarize the information you read in the source. You need at least five sources if you are going to participate in the school fair and three if you are not. (*pages 4 – 14; use the appendix if more pages are needed*)

**Hypothesis** – “If, Then, Because” statement of what you expect to happen when you do your experiment; make sure that it answers your problem. If states exactly what you will do, then states what you expect to happen and because states the reason you expect that result. **Never** change your hypothesis after the experiment has started. **Do not use the words “I think”**. (*page 15*)

Example: If seeds are watered with different temperatures of water, then more seeds receiving the room temperature water will germinate than the seeds receiving ice water and boiling water. This is because the cold water will keep the soil cold and the boiling water will prevent the seeds from germinating.

**Materials**– use the example below listing all of your needed materials (*page 16*)

	How much? How many?	What size? What kind?	Brand, if different	Item
1.	300	lima		bean seeds
2.	3	3 liter		Plastic flower pots
3.	3,000 ml			water

\* use this chart to help you write your materials list; everything must be in metrics

**Procedure** - Procedure needs to be: (*pages 17 – 19*)

1. Listed step-by-step
2. Numbered
3. Detailed enough for someone else to carry out the procedure
4. Use the phrase “Repeat steps...” where appropriate
5. List the step “measure and record” in your steps each time a measurement is needed
6. Use the phrase “repeat steps \_\_\_\_ more times” to make a total of at least five times
7. Make two sets of procedures if you have to construct something. The one for conducting the experiment goes in the procedure section and the one for constructing the item goes in the appendix

**Variables** – (pages 20-21)

Independent variable – what you are testing

Dependent variable – what you will measure or count

Constant or controlled variables – what you will keep the same (remember that everything needs to be the same except for what is being tested)

Control – list your control, if possible (this is your standard of comparison)

**Daily Log**– (pages 22 – 44) includes tables and notes on your thoughts such as what worked well and what didn't. Make notes in this section and be sure to **date** them. If you complete all of your experimentation in one day, note the time for each trial. Make notes on your observations for each separate trial. Make sure you tell your thoughts and not just what you did and observed. Take pictures as you do your experiment.

**Data Chart** –(pages 45 – 46) Make a chart to record your data as you do the experiment. This is in addition to the explanation in your daily log.

**Results** – tell what happened (pages 47 – 48)

\*summarize the data

\*make a data chart for the data chart section; graph will be made in class

\* give percentages or averages, if possible

\* identify problems

\* tell why experiment is important

Example: One hundred seeds were planted in each pot. In the pot receiving boiling water, 2% of the seeds sprouted. In the pot receiving ice water, 27% of the seeds sprouted. In the control or tap water pot, 59% of the seeds sprouted. Since such a small percentage of seeds watered with boiling water sprouted, boiling water must hurt seed growth. Ice water might delay or slightly hurt seed growth and tap water must encourage it. This is an important fact when we consider thermal pollution.

**Conclusion** (pages 49 – 50)

- You may want to bullet your conclusion statements.
- Write one sentence that states whether or not the data supported the hypothesis
- Tell what happened that was unusual or unexpected
- What would you change if you did this project again?
- How would you extend the project?
- Write a revised hypothesis only if your data did not support your hypothesis

Example: The results of this investigation support the hypothesis. Seeds watered with tap water sprout at a higher percentage than seeds watered with ice or boiling water. Seeds receiving tap water sprouted at 59%, which is about a 1:2 ratio. Seeds receiving boiling water sprouted at 2%, which is a 1:50 ratio and seeds receiving ice water sprouted at 27 %, which is a little higher than a 1:4 ratio. I would like to do further experimentation to see if there is a best temperature for seed germination.

**Appendix** (pages 51 – 60) This section is for any additional information you feel that you need to include. This may be such things as brochures from companies, drawings and instructions for models and acknowledgements or thank-you to people who helped.