

# What should be in your booklet?

## Title Page

Contains the name of your project, the school name, and the judging date (Feb. 21, 2005).

DO NOT PUT YOUR NAME ON THE TITLE PAGE

<place your title here>

A SCIENCE PAPER  
PRESENTED TO  
Norris Middle School

SCIENCE FAIR  
<place judging date here>

ACKNOWLEDGEMENT

I appreciate the help of

## Acknowledgement Page

Thanks the people who helped you with this project (parents, lab partners, teachers, librarians, etc.)

## Table of Contents

Lists the main pages in your booklet with their correct page numbers. **This should be the last page you write, after your final draft of every other page!**

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I. ABSTRACT

The problem being studied is

It is hypothesized that

To test this hypothesis,

The results of the test do / do not support the hypothesis.

## Abstract

Briefly summarizes your project. Should tell the problem being studied, your hypothesis, a brief explanation of your experiment, and whether the results support or do not support the hypothesis. Not more than one paragraph (120 words) long. **\*\*KEY PAGE\*\***

## Statement of the Problem

Tells what problem or question you are trying to answer. Should be one sentence long.

## Review of Literature (Background Research)

Provides background information related to your project. At least one paragraph from each of three separate sources (so three paragraphs in length). Sources should be cited in the bibliography portion of your booklet.

**\*\*KEY PAGE\*\***

### III. BACKGROUND RESEARCH

The most important characteristic of plants is their ability to photosynthesize, i.e. make their own food by converting light energy into chemical energy. This process is carried out in specialized organelles called chloroplasts.

Chloroplasts are one of three types of plastids, plant cell organelles that are involved in energy storage. The colorless leucoplasts are involved in the synthesis of starch, oils, and proteins. Yellow-to-red colored chromoplasts manufacture carotenoids. The green colored chloroplasts contain the pigments chlorophyll a and chlorophyll b, which absorb the light energy and convert it to chemical energy.

Light travels as packets of energy called photons and is absorbed in this form by light-absorbing chlorophyll molecules embedded in the thylakoid disks. When the chlorophyll molecules inside the thylakoids absorb the photons, they emit electrons. The free electrons are then taken up by molecules in the stroma to produce ATP (adenosine triphosphate). ATP is the chemical energy "currency" of the cell that powers the cell's metabolic activities. In the stroma, the light-independent reactions of photosynthesis occur; low-energy carbon dioxide is transformed into a high-energy compound like glucose.

### IV. HYPOTHESIS

It is hypothesized that the plant receiving the salty water will grow less than the plant receiving the fresh water.

## Hypothesis

Tells your hypothesis for your experiment in one sentence. What do you think will happen. Does not use the phrase "I think...". Just states the expected outcome or (if needed) uses "It is hypothesized that ...".

## Variables

Lists and defines the independent and dependent variables for your experiment as well as the any constants (temperature, container size, etc.) Independent variables are the ones you are testing (changing). Dependent ones are what you are measuring (writing down).

### V. VARIABLES

The independent variable, which will be changed and tested, is

The dependent variable will measure the change by measuring

The constant variables, which are the same for all the tests, are

## Data Sheet (Science Log)

This should be your hand written notes as you conducted your experiment. At the least, it should include hand-written tables with your data, but it can and should also include any thoughts, comments, explanations for changes, etc. that you made during your experiment.

## VI. PROCEDURE OF INVESTIGATION

### MATERIALS USED

- Fast growing snap plants (6)
- Salt
- Water
- Pots, soil, fertilizer

### SET-UP

Both plants in the pots. Add 2 cm to each pot of fertilizer. Mix in 3 cm each pot of soil. Set pots in sunlight outside. Bring them in at night if the temperature goes below 5 °C. Plant one fast growing snap plant in pot A and the other in pot B. Make two additional setups for each plant. Plants in pots A get salty water. Plants in pots B get fresh water. Each plant receives 100 ml of the water per day. Salty water is 10% salt, made by mixing 10 grams of salt with 90 ml of water.

### PROCEDURE

Perform the experiment for the first value of the independent variable, which is

Collect the results for each test by monitoring the dependent variable, which is

Repeat the test \_\_\_ times in all. Calculate and record the average for the first value of the independent variable.

Repeat the same procedure for the remaining values of the independent variable, which

## Procedure of Investigation

Lists materials, set-up (what goes where) and step-by-step procedures that you followed. Should be as specific as possible. Have someone else read it over to see if they understand what you mean. Should include a diagram or drawing of the setup (either computer graphics or neatly hand drawn).

## Results

Relates the **average results** for your experiment **in words**. DO NOT include a table in this section. You should reference your table and graph (using Table 1 and Graph 1). You should not discuss the results in this section. **\*\*KEY PAGE\*\***

## VIII. DATA TABLE

Date	Rat 1	Rat 2
24-Feb	6 min. 35 sec.	5 min. 32 sec.
25-Feb	3 min. 47 sec.	5 min. 4 sec.
26-Feb	4 min. 1 sec.	2 min. 24 sec.
27-Feb	3 min. 32 sec.	3 min. 5 sec.
28-Feb	3 min. 38 sec.	3 min. 11 sec.
29-Feb	3 min. 50 sec.	1 min. 45 sec.
1-Mar	2 min. 30 sec.	1 min. 15 sec.
2-Mar	3 min. 35 sec.	29 sec.
3-Mar	4 min. 50 sec.	28 sec.

## Data Table (Chart)

Shows your data in table format (Microsoft Excel). Include averages of several experimental runs. Needs to include units (sec, cm) if necessary. Title should mention both variables (x & y axis labels). If you used a scale (1-5), include an explanation.

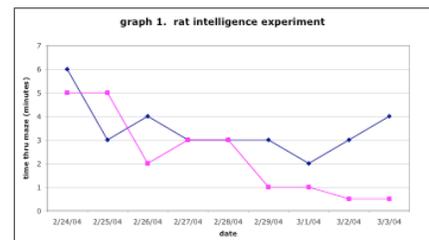
## Graph

Shows your data in graph format (bar for discrete variables or line for continuous variables). **\*\*KEY PAGE\*\***

## Analysis

Use this section to discuss your findings. Give your interpretation of the results and discuss their significance. You should explain any inconsistencies or mistakes in your tests and justify the exclusion (leaving out) of any data that you felt was “bad”. You should reference your table and graph (by using Table 1 and Graph 1). You need to explain the overall meaning of what you discovered during your investigation. How does what you’ve learned fit into the “Big Picture”? Try to tie your results in with your background research. Do they agree? If significance testing was done, explain it here.

## IX. GRAPH



## X. CONCLUSION

The hypothesis was

The results showed

Therefore, the hypothesis was / was not supported.

## Conclusion

Restate your hypothesis. Summarize what your results showed in the past tense. States whether your hypothesis was supported or not.

**\*\*KEY PAGE\*\***

## Future Study

Indicates how you might change this experiment in the future to continue this study. No more than one paragraph in length.

## Bibliography

Cites the sources (books, Internet) used for your background research and/or for designing your experiment. You need at least three sources (5 for an 'A' on this section). Any major format (MLA, APA) is acceptable. Arrange the list alphabetically by (1) author, (2) editor, or (3) title of source. If the citation takes up more than one line, indent the second line by half an inch.

### Book

Lane, R. How to Wield A Sword. San Francisco: Nueva Press, 1990.

### Encyclopedia: Author Given

Harnish, David. "Bali." The Garland Encyclopedia of World Music. Ed. Terry E. Miller and Sean Williams. 10 vols. New York: Garland, 1998.

### Encyclopedia: No Author Given

"Television." The World Book Encyclopedia. 22 vols. Chicago: World Book, 2000.

### Magazine Article

Smuin, S. "My Life in Middle School." Life. November, 1990, p. 13.

### Internet

"Burlingame Intermediate School Home Page", Burlingame Intermediate School, accessed October 2004, <http://www.smcoe.k12.ca.us/besd/bis/BIS.html>.

### Interview

Archer, N., personal interview, October 11, 1993.

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## REMEMBER

1. **Double space everything**
2. **Use 1" margins**
3. **Font: Times or Times New Roman**  
**Size 12 (except title page and headings)**
4. **Your name(s) should only appear at the bottom of the last page (bibliography)**