

Welcome to Science Fair Information Night!

Lincoln Alternative School
Fifth Grade

Agenda

- ▶ Scientific Method
- ▶ Project Example
- ▶ Variables
- ▶ Experiment
- ▶ Notebook and Display Board
- ▶ Project Due Dates
- ▶ Questions



Steps of

the

Scientific Method

The **Scientific Method** involves a series of steps that are used to investigate a problem/question.



Scientific Method

Problem/Question

Observation/Research

Formulate a Hypothesis

Experiment

Collect and Analyze Results

Conclusion

Steps of the Scientific Method

1. Problem/Question: Develop a question or problem that can be solved through experimentation, not a demonstration.

Example: Which type of soil will help a seed sprout fastest: Lowe's potting soil, MiracleGrow garden soil or sand?

Steps of the Scientific Method

2. Observation/Research: Make observations and research your topic of interest. Use multiple, reliable sources of different types.

***Encyclopedia, Time for Kids Magazine, chem4kids.com

***No Wikipedia, ask.com, google.com

Steps of the Scientific Method

3. Formulate a Hypothesis:
Predict a possible answer to the problem or question.

Example: If a seed is planted in Lowe's potting soil, MiracleGrow garden soil and sand, then the seed planted in sand will sprout first.

Steps of the Scientific Method

4. Experiment: Develop and follow a **procedure** (list of steps).

Construct a detailed **materials** list.

Conduct experiment, keeping a detailed, handwritten log to record details of experiment and data collected.

The outcome must be measurable (quantifiable). Use tools such as a stopwatch, ruler, thermometer, speedometer, color stick.

Steps of the Scientific Method

5. Collect and Analyze Results:

Record all data in log. Confirm the results by repeating experiment (3 trials in all). Include tables and graphs to show data.

Steps of the Scientific Method

6. Conclusion: Include a statement that confirms or rejects the hypothesis.
Connect topic to real world importance.
Make recommendations for further study.

Let's put our knowledge of the Scientific Method to a realistic example that includes some of the terms you'll be needing to use and understand.



Problem/Question

John enjoys gardening.
He wants to decorate
his patio with flowers
for a birthday party in
a few weeks. He
decides to use flowers
in pots to decorate
the patio.



Problem/Question

John wonders which type of soil will help the flower seeds sprout the fastest.

Question: Which type of soil will help a seed sprout fastest: Lowe's potting soil, Miracle Grow garden soil or sand?

Observation/Research

John researches plant growth, the make up of Lowe's potting soil, Miracle Grow garden soil and sand, and factors affecting plant growth. He then develops a way to test his question.

He writes notes to document his research and includes the sources used. The notes will be used to write a research report and the sources will be listed in the bibliography.

Formulate a Hypothesis

After reviewing his research,
John develops a hypothesis.

Hypothesis: If seeds are planted
in Lowe's potting soil, Miracle
Grow garden soil and sand,
then the seed planted in sand
will sprout first (fastest).

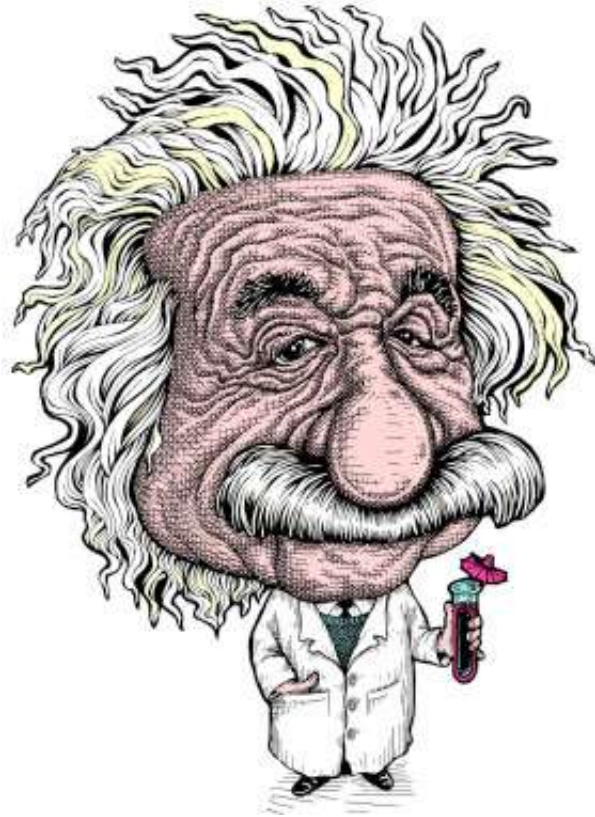


Hypothesis

The hypothesis is an educated guess about the relationship between the independent and dependent variables.

Note: These variables will be defined in the next few slides.

Do you know the difference
between the independent and
dependent variables?



Independent Variable

The independent, or manipulated variable, is a factor that's intentionally changed by the experimenter. Be sure there is only 1 independent variable in the experiment.

John is going to use Lowe's potting soil, Miracle Grow garden soil and sand in his experiment (He is changing the soil type).

Dependent Variable

The dependent, or responding variable, is the outcome (data) that may be different due to changes made in the independent variable.

In this case, the dependent variable is the length of time it takes for each seed to sprout.

Experiment

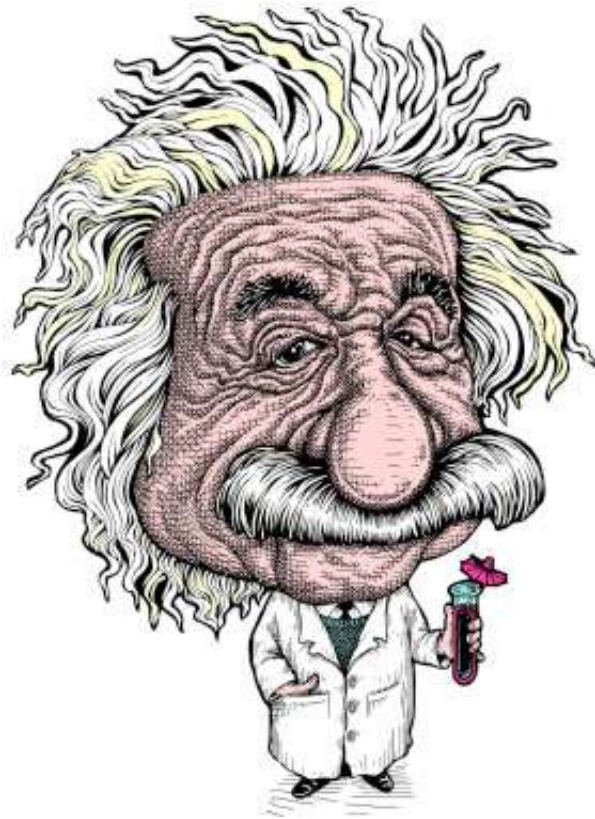
John will now write the detailed procedures or steps needed to perform the experiment.

John will write a list of needed materials.

Constants

A constant is a factor that affects the experiment but keeps constant (no change). All constants must remain constant (unchanging) so that any observed changes in the outcome or data (during the experiment) can be attributed to the change of the independent variable.

Can you think of some constants for this experiment?



Constants

The constants in an experiment are all the factors that the experimenter keeps the same.

The constants in John's experiment are the amount of soil used in each pot, the amount of water added to each seed, the amount of sunlight each seed receives and the type of pot used to plant each seed.

Trials

Trials refer to the number of times an experiment is performed. A detailed, handwritten log will be used to record all activity and data collected during the experiment trials.

John is going to perform his experiment 3 times. He will use 9 pots (3 in each trial). He will record all activities and data collected in a hand written log.

Collect and Analyze Results

A table is used to show data (outcome) from the experiment. The data will also be used to create a graph.

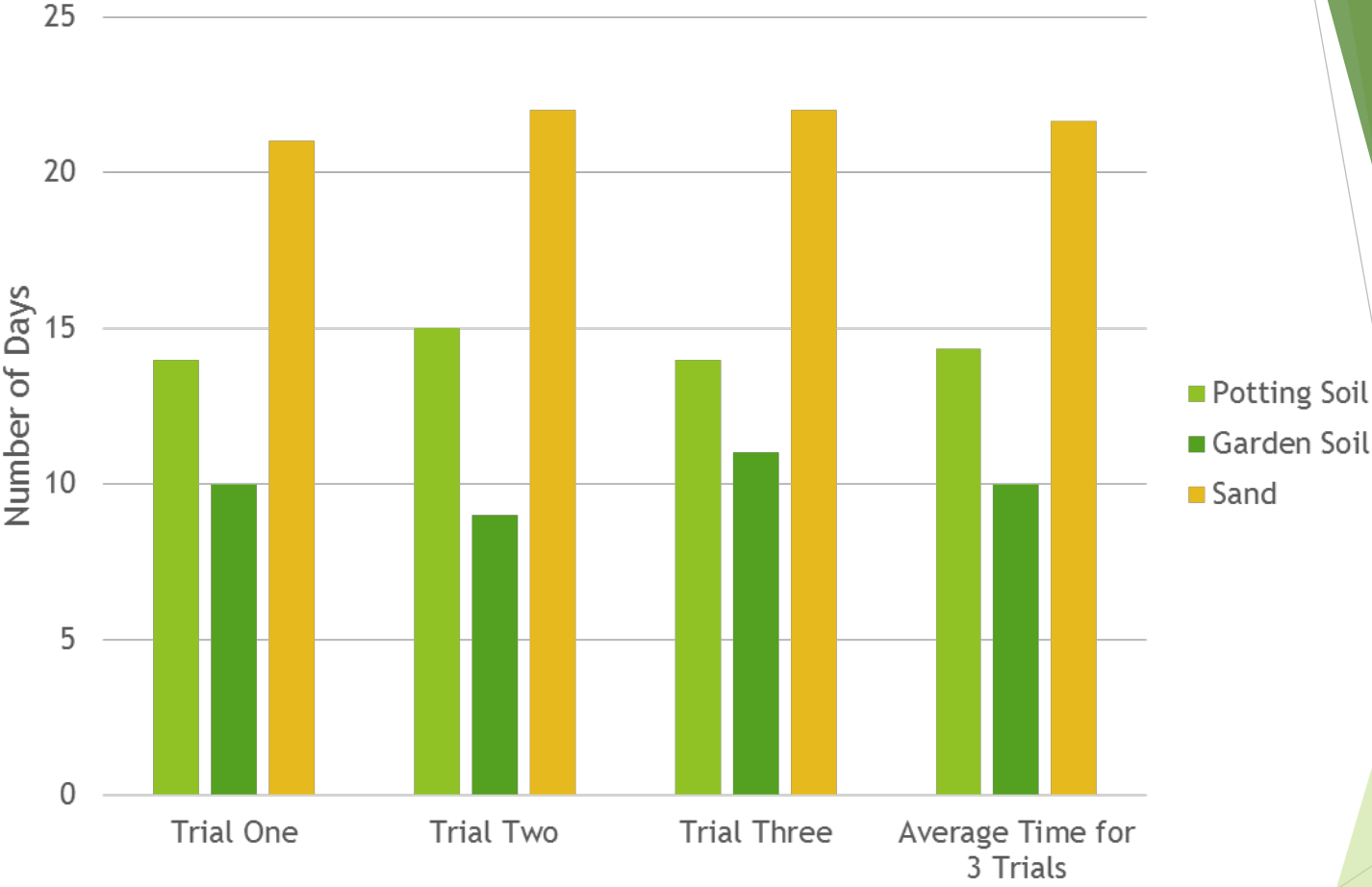
John uses the data recorded in his log to construct a table showing the data collected during the experiment. He will also use the data to create a graph.



Number of Days for Seed to Sprout

Type of Soil	Trial 1	Trial 2	Trial 3	Average Number of Days to Sprout
Lowe's Potting Soil	14	15	14	14.33
Miracle Grow garden soil	10	9	11	10
Sand	21	22	22	21.66

Number of Days for Seed to Sprout



Conclusion

Examine the data to determine a conclusion and whether the hypothesis is correct.

John determines that his hypothesis is incorrect. The sand did not help the seed grow the fastest. The Miracle Grow garden soil helped the seed grow the fastest.



Conclusion

Explain how the results of the experiment can be used in the real world. Also, suggest ways the topic may be investigated further in the future.

John explains that his results may assist others in choosing soil for planting, when flowers are needed quickly.

He also suggests performing the experiment in the future using different types of soils and/or plant vitamins.



**Now you are prepared to
help your child dive into his
or her Science Fair Project!
Remember, our goal is for our
students to learn about the
scientific process, enjoy**

Notebook and Display Board

- ▶ Each student is required to complete a Science Project Notebook
- ▶ A display board is extra credit and are only required for students who wish to enter the LFS Science Fair.

<h1 style="text-align: center;">STEPS AND TIMELINE FOR SCIENCE PROJECT</h1>	DATE DUE
1. Choose a problem to investigate. State the problem as a question. Make a list of the materials needed. Submit Proposal Form to your teacher for approval.	
2. Type your question/problem. (Follow procedure in Science Project Notebook Guide)	
3. Type your procedure and materials in the form of a list. (Follow procedure in Science Project Notebook Guide)	
4. Conduct Research. (Take detailed notes) Submit a written list of the resources you are using for your research (Books, Encyclopedias, Websites). Write 2-3 sentences summarizing what you learned from each source. MUST HAVE AT LEAST 3 DIFFERENT SOURCES. Type your hypothesis.	
5. Write, type, and turn in your research report and bibliography covering all major ideas relevant to your project.	
6. Gather materials and conduct experiment. Turn in <u>handwritten</u> log.	
7. Organize data/results in a table.	
8. Make a graph on excel using data results. (Students learned how to do this in the computer lab)	
9. Type your conclusion.	
10. Write and type abstract.	
11. Type Title Page.	
12. Type table of contents.	
13. Organize and finalize notebook.	
14. Turn project in.	
15. Present project.	

Questions

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