

SCIENTIFIC METHOD

1. PROBLEM/QUESTION

- ✓ This testable QUESTION is the purpose for the investigation
- ✓ Answered by performing an experiment
- ✓ Should contain independent & dependent variable
 - Independent Variable-variable that is deliberately manipulated (measured in equal increments)
 - Dependent Variable-variable that changes as a result of the manipulation of the independent variable (the “unknown” being measured/observed).

2. RESEARCH

- ✓ Brainstorm topics that deal with the scientific problem
- ✓ Background information is needed to make a hypothesis
- ✓ Use several resources: encyclopedia, computer, books, magazines,
- ✓ Be sure to write bibliography for each resource when doing a project

3. HYPOTHESIS

- ✓ An explanation that answers the scientific problem
- ✓ An assumption to be tested
- ✓ Shows cause and effect (use if, then statement)
- ✓ Include independent & dependent variable

4. EXPERIMENT

- ✓ Performed to test your hypothesis
- ✓ Make a materials list
- ✓ Consider all variables that can affect your experiment
- ✓ Run a controlled experiment- keep all variables the same between test groups except the ONE independent variable. Test only ONE VARIABLE at a time
- ✓ Write the procedures using short, concise, numbered steps that can be replicated by others.
- ✓ Include safety rules and use metric units in procedures.
- ✓ Use large test groups or repeated trials to produce valid data. Must be replicable.

5. RESULTS

- ✓ Make careful & accurate observations of what happened
 - QUALITATIVE: use appropriate senses and be descriptive
 - QUANTITATIVE: collect numerical data (use metric system)
- ✓ Record data on a data table to keep organized
- ✓ Create appropriate graphs that are well labeled.
- ✓ Data analysis-make sense of data (compare & contrast, similarities, etc)
- ✓ Summarize data in paragraph format. Must be open to peer review.
- ✓ Use neat drawings, clear photographs, and graphs to visually present data

6. CONCLUSION- the ending of the experiment

- ✓ Answer the scientific question using observations and results
- ✓ Restate the hypothesis and compare to the results
- ✓ Write an inference about one observation
- ✓ Discuss possible errors that may have happened
- ✓ Discuss how the experiment could be changed if it is repeated.

7. APPLICATION

- ✓ Relate the knowledge learned (the conclusion) to a real life situation
- ✓ Explain how the scientific knowledge gained could be used by ordinary people