

Science Skills

Review

Science Skill #1: Scientific Method

What is the scientific method?

- A logical, organized method for solving problems.
 - Observation
 - Problem identification
 - Hypothesis
 - Experiment
 - Data collection
 - Conclusion

Science Skill #1: Scientific Method

What are the different types of observations?

Qualitative = descriptive

(usually describes things that can not be counted.)

Quantitative = measured

Science Skill #1: Scientific Method

What are the different variables we deal with?

Independent = the factor that is manipulated

Ask yourself “*what did we do?*”

Dependent = the data collected in the experiment.

Ask yourself “*what did we measure?*”

Science Skill #2: Hypothesis Writing

What format should hypotheses be written in?

**If [independent] is related to [dependent],
then [prediction].**

***If beetle mass is related to pulling power,
than beetles with a larger mass will have a
greater pulling power.***

Science Skill #3: Graphing

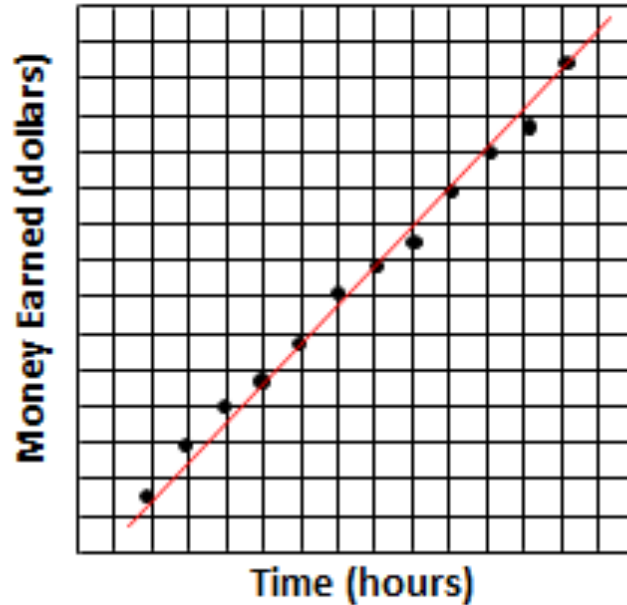
What should every good graph have?

1. Scientific and Descriptive title
2. Labeled x-axis and y-axis (with units)
3. Intervals and Scaling (use the entire graph)
4. Best fit line
5. Some graphs will require a key or legend.

Science Skill #3: Graphing

THE "PERFECT" GRAPH...

Time vs. Money Earned



Science Skill #3: Graphing

What is the difference between a line and bar graph?

Line graphs show *relationships* between two variables.

Bar graphs show *comparisons* between two variables.

Science Skill #4: Conclusion Writing

What are the components of a good conclusion?

1. Restate your hypothesis.
2. Explicitly state whether your hypothesis was supported or refuted by your data (include specific data).
3. Include an explanation of any potential errors.
4. Relate your results to current content being studied in class.
5. Explain whether your results make sense or if further investigation is required.

Science Skill #4: Conclusion Writing

Weak or Strong hypothesis?

“My original hypothesis was that if the beetle has a smaller mass then it will pull more. My hypothesis proved correct because the smallest beetle was able to pull the most paper clips. Potential errors in this experiment were that we had a lazy beetle and he did not want to pull any paper clips. Another error was that we forgot to include the weight of the petri dish in our total weight pulled so we got inaccurate data. Our results make sense according to the class data so no further investigation is required.”

Science Skill #4: Conclusion Writing

Weak or Strong hypothesis?

“The hypothesis tested stated, if beetle mass is related to pulling power, than the beetle with the least mass will pull more. The data collected supported this hypothesis. As shown in the graph there is a decline in pulling power as beetle mass increases. The largest beetle (with a mass of 2.46g) had a calculated pulling power of 16.43, while the smallest beetle (with a mass of 1.1g) had a calculated pulling power of 37.94. Due to extensive testing over the course of two days some beetles may have been less active than others which would have resulted in inaccurate results- a beetle may have stopped pulling prior to hitting its maximum pulling power. Some beetles were missing the “grip” part of their feet which prevent them from hanging onto the fabric and being able to pull the petri dish. Again, these beetles may have skewed the data resulting in a lower pulling power than may have been achieved had the beetles not been missing the “grips” on their feet. Due to the relatively low number of beetles tested over the course of two days more testing is required to ensure that the hypothesis tested remains supported.

Science Skill #4: Conclusion Writing

*What should **not** be written in a conclusion?*

- “I hypothesized” or “my hypothesis was”
 - The hypothesis tested was...
- “I”, “we”, “my group”, “my data”
 - “The data collected...”
- Proved
 - We support hypotheses we do not prove them.
- No further testing is required
 - More testing is always a good thing!
- Limit human errors
 - Focus on errors that you as the scientist can not control.