Scientific Method

Scientific Method

- When conducting a experiment, change one factor and keep everything else exactly the same. The one thing you change is called the dependent variable. All the things you keep the same are called independent variables.

Review

Variable: the one thing you change in an experiment.	Data: the information you get when you test the variable.	Controls: the parts of the experiment that stay the same.
Manipulated variable: you change this yourself.	Responding variable: responds to the change you made.	Controlling variables
Independent variable: on its own.	Dependant variable: depends on the change you made.	Controlling variables

Scientific Method Steps

- State the problem.
- Make a hypothesis.
- Conduct the experiment.
- Record/analyze data.
- Make a conclusion.
- Report findings to others so they can repeat the experiment.

Hypothesis

- An educated guess
- a prediction
- Use "If", "then" format
- We predict that if we drop a ball from a higher height, then it will bounce higher.
- "If" is the manipulated variable.
- "Then" is the responding variable.

Observations

- Observations: We use our senses to gather information about the world around us. There are two types of observations.

Qualitative

- Qualitative observation: (quality) Usually made with our senses.
- Color, shape, feel, taste, sound.
- Olivia is wearing a blue sweater.
- The lab tabletop is smooth.
- The dog's fur is shiny.

Quantitative

- Quantitative observation: (quantity) How many. Will always have a number.
- Based on exact measurement.
- The room is 8 meters across.
- Sarah is 141-cm tall.
- Sam weighs 450 Newtons.

Inferences

- Inference:
- A logical interpretation of an event that is based on observations and prior knowledge.
- What does this mean in 6th grade terms?

Theory defined

- An explanation based on many observations during repeated experiments that is valid only if it is consistent with observations, makes predictions that can be tested, and is the simplest explanation.

- So the theory of gravity, theory of electricity, the germ theory of disease, and the theory of evolution are tested, accepted explanations for events that occur in nature.
- Theories can really never be completely proven, only disproven. When new evidence comes along, we must modify our theory or at times even get rid of it and start over again.

Graphing

- Graphs are a useful tool in science.
- The visual characteristics of a graph make trends in data easy to see.
- One of the most valuable uses for graphs is to "predict" data that is not measured on the graph.

Graphing Steps

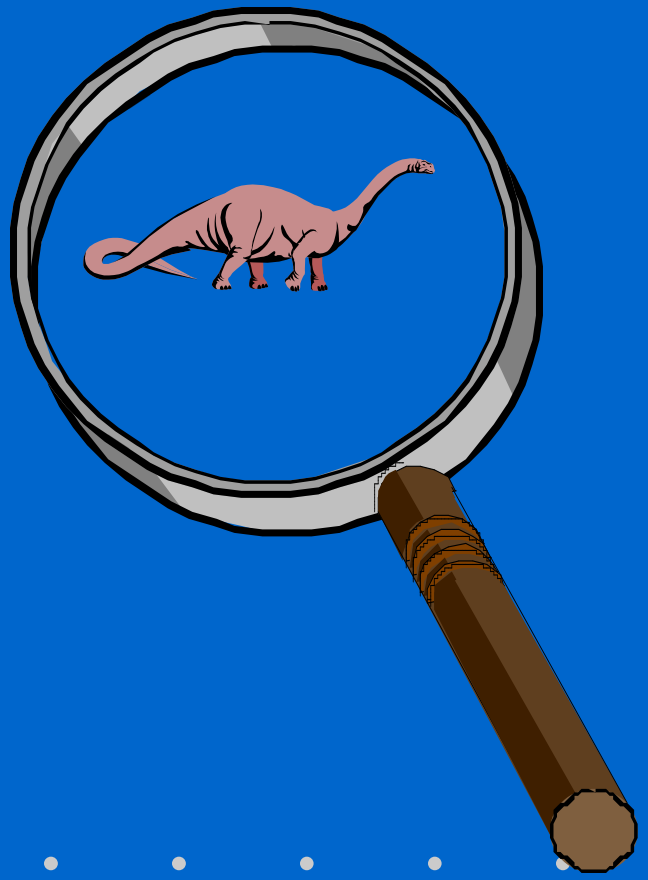
- Identify the Variables
- Determine the range
- Determine the scale
- Number and label each axis
- Plot the points
- Draw the graph
- Give your graph a title

Identify the Variables

- Independent Variable - (the thing you changed)
- Goes on the X axis (horizontal)
  - Should be on the left side of a data table.
  - Dependent Variable - (changes with the independent variable)
- Goes on the Y axis (vertical)
  - Should be on the right side of a data table.

There are six steps to the Scientific Method.

- **1. Problem**
- **2. Information**
- **3. Hypothesis**
- **4. Experiment**
- **5. Observations**
- **6. Conclusion**



Problem

*This is the question that you are trying to answer or problem that you are trying to solve.

*Try to narrow it down and be very specific.

Information -

- gather data about your question. -

books

magazines

reports

experts

your past experiences

Experiment

- This is broken into 2 parts, materials and procedure.
- Materials is a list of equipment that you will need for the experiment.
- Procedure is a list of instructions that you need to follow for the experiment.

Observations

- Collection of information and data from the experiment.
- It may be charts, graphs, or written work.
- This is WHAT HAPPENED!!!!!

Conclusion

- What did you find the answer to the question was?
- It is **OK** if it turns out that your hypothesis was not correct. You learned!!!!!!!!