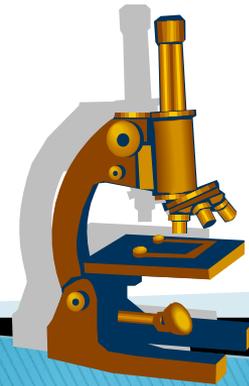


SCIENTIFIC METHOD



What is it?

- ▶ The scientific method is a set of rules and procedures that allows people to test their ideas about how the world works, make predictions about events and create theories.
 - ▶ There are many steps to the scientific method.
 - ▶ The most important parts of the sci. method are making a hypothesis, gathering data, interpreting data and drawing conclusions.
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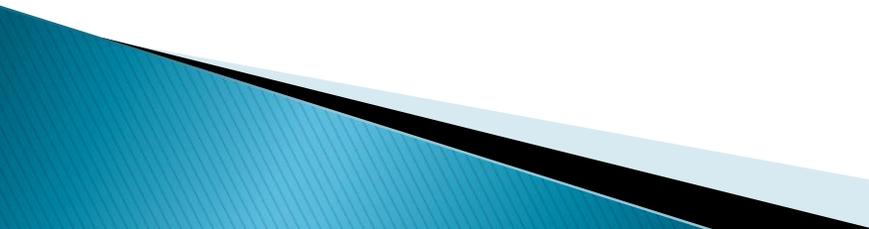
What does the Scientific Method do?

- ▶ The sci. method is used whenever someone has questions about how stuff works or why something happens.
- ▶ Scientists use the sci. method to form scientific laws and theories.

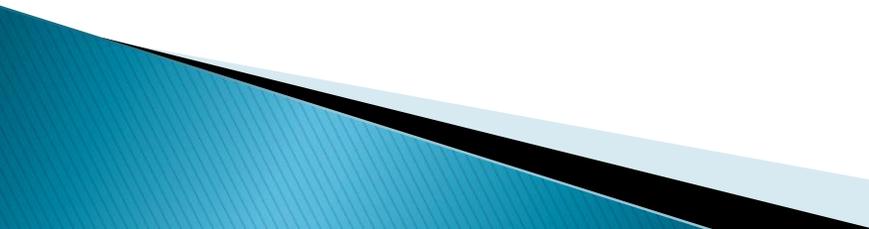
Scientific law vs. Scientific Theory

- ▶ **Scientific Law:** a statement of fact that explains an action or set of actions.
 - ▶ It is generally accepted to be true and universal. This is because laws have always been observed to be true.
 - ▶ Sci. law can sometimes be expressed as a mathematical equation.
 - ▶ Examples: law of gravity, Newton's laws of motion, the law of conservation of mass and energy, etc.
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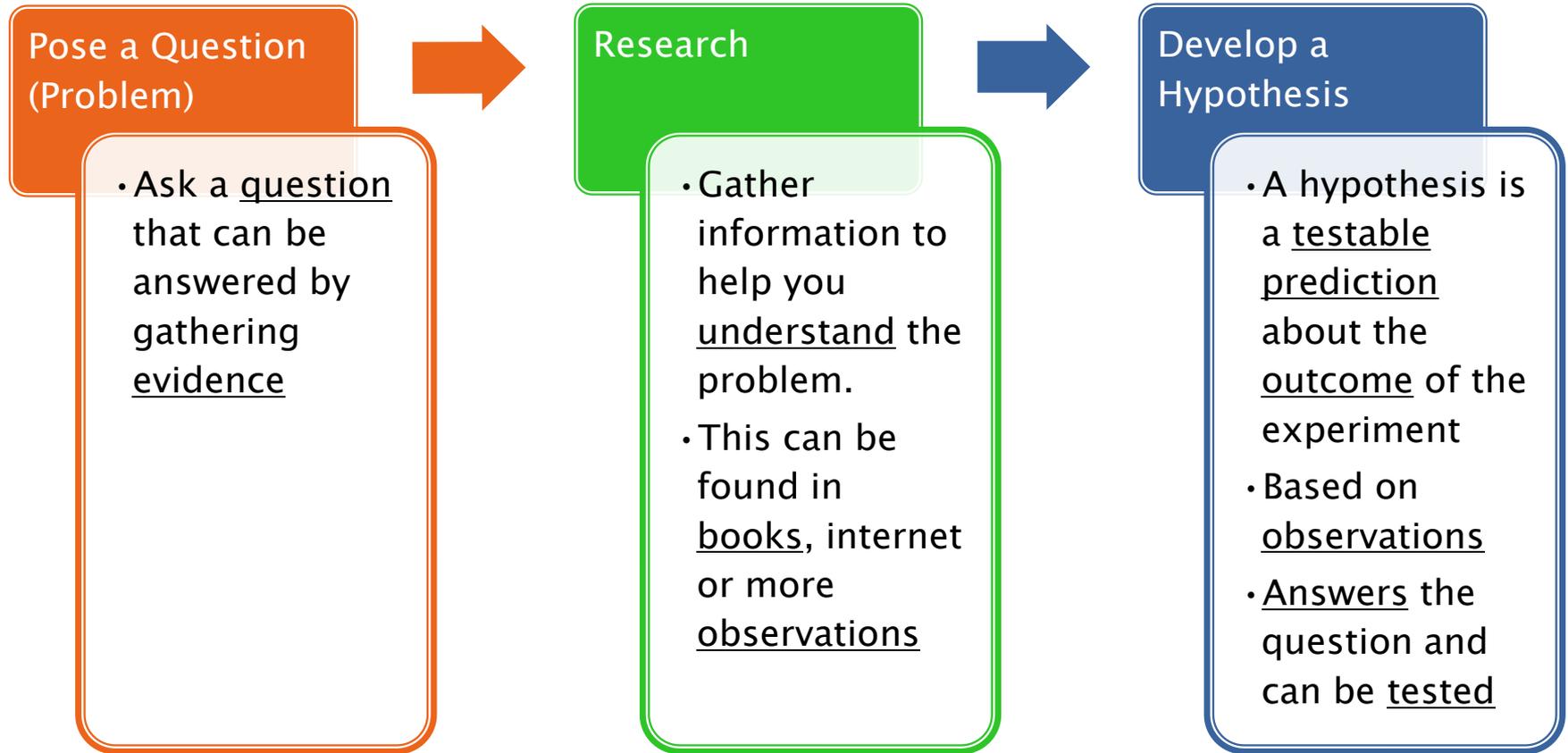
laws vs. Theories

- ▶ **Scientific Theory:** is an explanation of related observations or events that are based on proven hypothesis.
 - ▶ Theories are made after many different scientists perform similar experiments that attempt to answer the same question or hypothesis.
 - ▶ One scientist cannot create a theory, they can only create a hypothesis.
 - ▶ Examples: Theory of plate tectonics, atomic theory, evolution, etc.
- 

Similarities and Differences

- ▶ In general, both a scientific theory and a scientific law are accepted to be true by the scientific community.
 - ▶ Both are used to make predictions of events and are used to advance technology.
 - ▶ The biggest difference between a law and a theory is that a theory is much more complex.
 - ▶ A law explains a single action, but a theory explains an entire group of related phenomena.
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Steps Of The Scientific Method



Design an Experiment



- Plan how to test your hypothesis.
- Written as step-by-step instructions.
- Design the experiment so you control the variables, (things you change in an exp.)
- Results should support or disprove the hypothesis.

Variables

Experimental/Manipulated Variable = The factor you test in an experiment. (Example: amount of salt added to water in an exp. testing how salt affects the freezing point of water.) Hint: Look at the hypothesis.

Dependent/Responding Variable = This is what is observed, or what changes as a result of the Experimental variable. This is what you measure or observe to obtain results. (Example: How long the water takes to freeze.) Hint: Look at the purpose/question.

Parts of an Experiment

▶ Experimental Group

- The test group that has the experimental variable

➤ Control Group

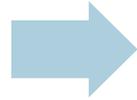
- Test group without experimental variable
- Used to see if there was a change in the experiment
- Also ensures that some other factor isn't effecting the results

- Good experiments are controlled experiments, without a control it is impossible to know what might have caused the results you observed.

More Steps

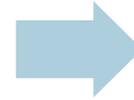
Gathering and Interpreting Data

- Gather and record information from the exp.
- Put the info. together and analyze.
- Use charts, tables, graphs, etc. to represent the data



Conclusion

- Look at all the data, does it support your hypothesis or not? Why or why not?
- Were there any problems during the exp.?



Conduct experiment again.

- Conduct the same exp. again to see if the results are the same.
- You may need to modify the problem and/or hypothesis.