

# UNIT 1: NATURE OF SCIENCE AND LAB SAFETY

## **Topics Covered:**

- ☐ Observations and Inferences
- ☐ Chemistry
- ☐ Scientific Method

# UNIT OBJECTIVES

- ☐ Know the definition of chemistry and be knowledgeable about specific disciplines of chemistry
- ☐ Understand the nature of the scientific method and distinguish among hypothesis, theory, and law



# SCIENTIFIC METHOD

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A quick refresher course featuring... T-Swift!





# SCIENTIFIC METHOD

1. State the problem/question



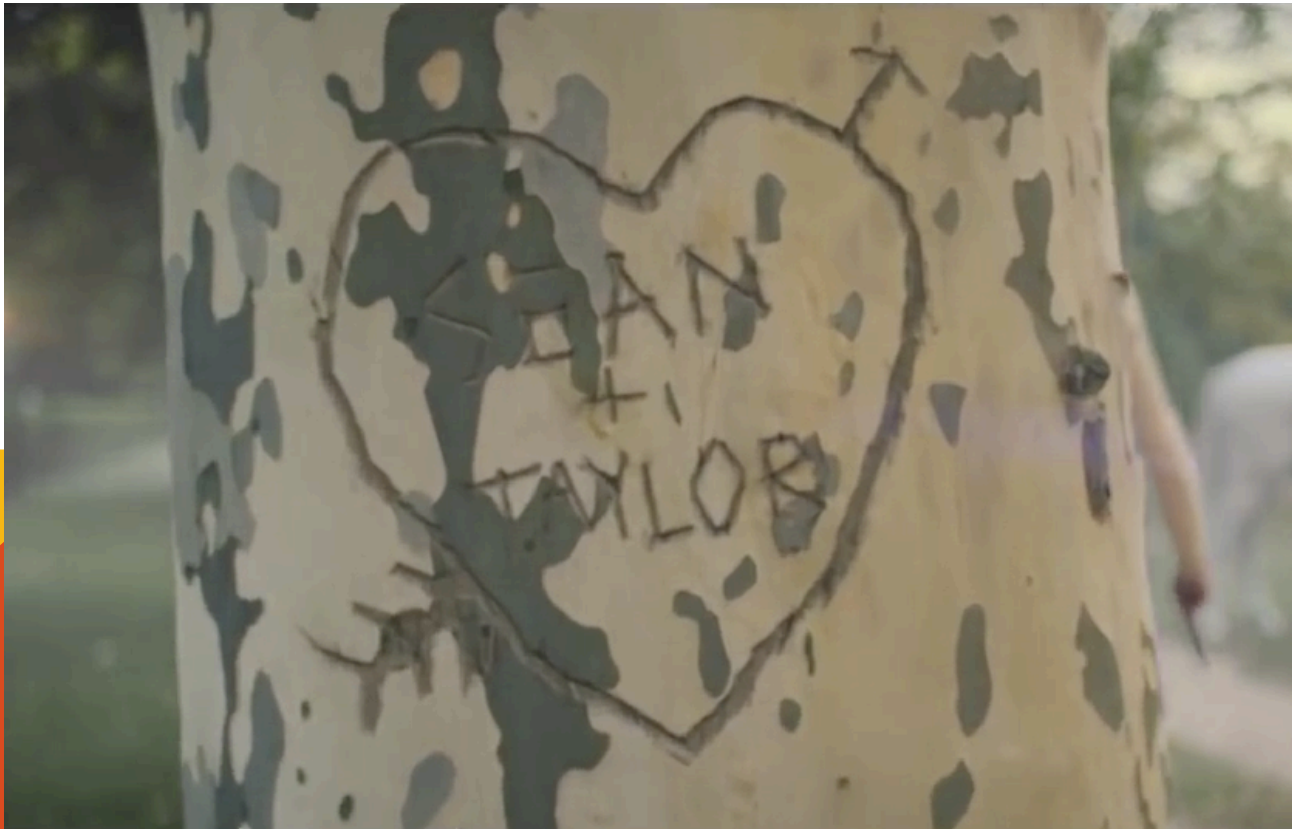
# SCIENTIFIC METHOD

## 2. Make observations/research

Pros:	Cons:

# SCIENTIFIC METHOD

## 3. Form a hypothesis



# SCIENTIFIC METHOD

## 4. Experiment

Independent Variable:

Dependent Variable:

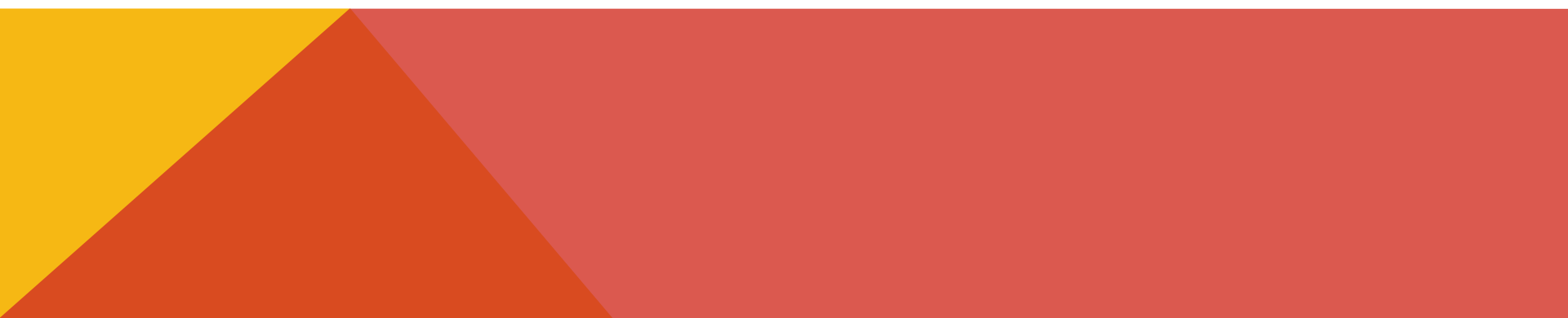
Control:

Constants:



# SCIENTIFIC METHOD

## 5. Collect and analyze data

- Measure his happiness from the control.  
(No date with Taylor)
  - Measure his happiness during the  
experiment (Date with Taylor)
  - Compare happiness.
- 

# SCIENTIFIC METHOD





# SCIENTIFIC METHOD

## 5. Collect and analyze data

- Measure his happiness from the control. (No date with Taylor)
- Measure his happiness during the experiment (Date with Taylor)
- Compare happiness.



# SCIENTIFIC METHOD

## 6. Form your conclusion



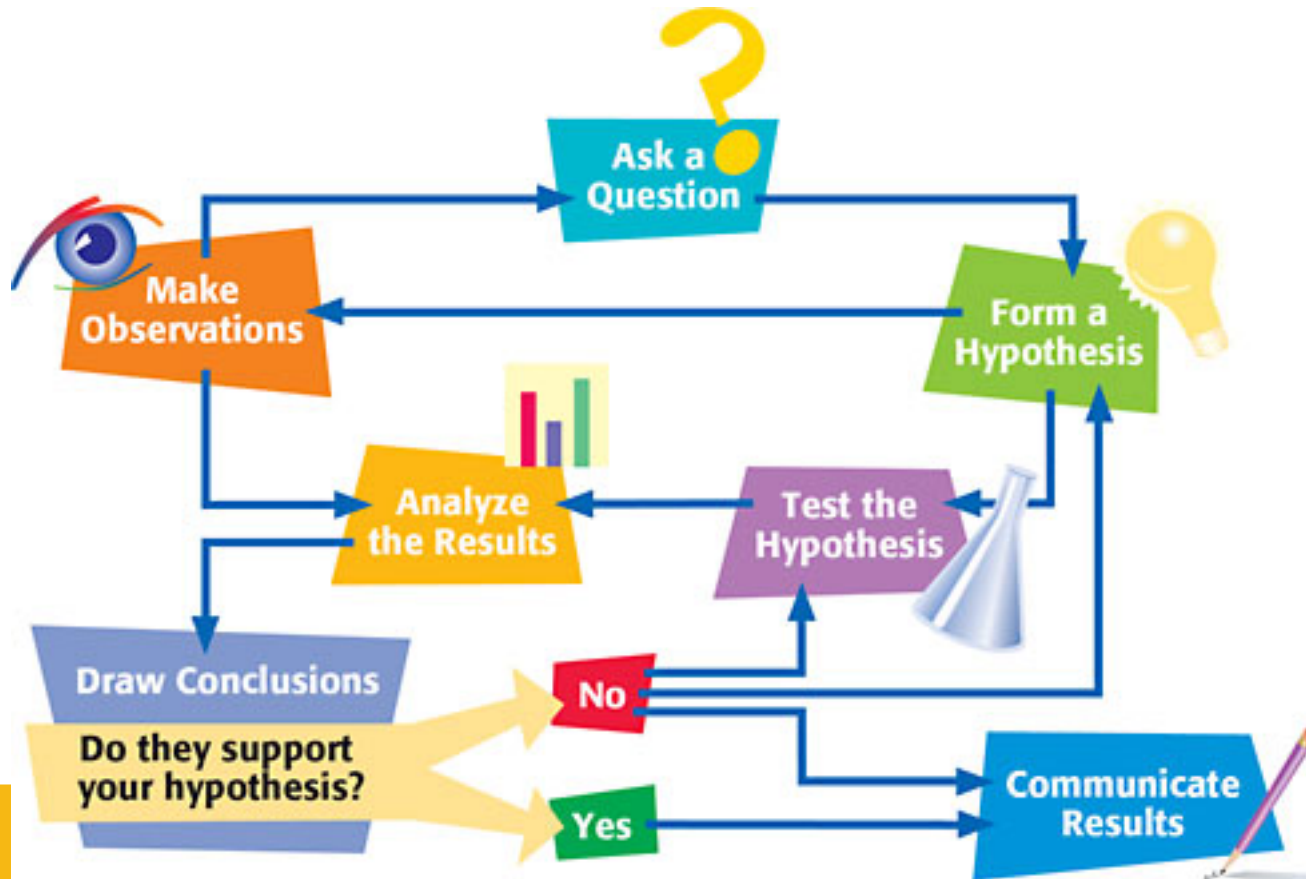


# SCIENTIFIC METHOD

## 7. Repeat experiment



# SCIENTIFIC METHOD



# SCIENTIFIC METHOD

## Scientific Hypothesis:

### What is a Hypothesis?

**Directions:** Put an X next to the statements that describe a hypothesis.

- |   |   |
|---|---|
| _____ A. A tentative explanation.                               | _____ H. Included as part of all scientific investigations.     |
| _____ B. A statement that can be tested.                        | _____ I. Used to prove whether some is true.                    |
| _____ C. An educated guess.                                     | _____ J. Eventually becomes a theory, then a law.               |
| _____ D. An investigative question.                             | _____ K. May guide an investigation.                            |
| _____ E. A prediction about the outcome of an investigation.    | _____ L. Used to decide what data to pay attention to and seek. |
| _____ F. A question asked at the beginning of an investigation. | _____ M. Partly developed from imagination and creativity.      |
| _____ G. A statement that may lead to a prediction.             | _____ N. <b>MUST</b> be in the form of “if...then...”           |

# SCIENTIFIC METHOD

Question: Will giving my teacher chocolate reduce the amount of homework I have?

Independent Variable:

Dependent Variable:



# SCIENTIFIC METHOD

Question: Will giving my teacher chocolate reduce the amount of homework I have?

Hypothesis:



# SCIENTIFIC METHOD

Question: If I study will I get a better grade in chemistry?

Independent Variable:

Dependent Variable:



# SCIENTIFIC METHOD

Question: If I study will I get a better grade in chemistry?

Hypothesis:



# SCIENTIFIC METHOD

## Scientific Theory:

### Examples:

#### What is a Theory?

A ‘theory’ in science has a different meaning than the ‘theories’ we talk about in everyday life.

**Directions:** Put an X next to the statements that describe a theory.

- \_\_\_\_\_ A. Theories include observations.
- \_\_\_\_\_ B. Theories are “hunches” scientists have.
- \_\_\_\_\_ C. Theories can include personal beliefs or opinions.
- \_\_\_\_\_ D. Theories have been tested many times.
- \_\_\_\_\_ E. Theories are incomplete, temporary ideas.
- \_\_\_\_\_ F. A theory never changes.

- \_\_\_\_\_ G. Theories are inferred explanations, strongly supported by evidence.
- \_\_\_\_\_ H. A scientific law has been proven and a theory has not.
- \_\_\_\_\_ I. Theories are used to make predictions.
- \_\_\_\_\_ J. Laws are more important to science than theories.
- \_\_\_\_\_ K. A hypothesis is upgraded to a theory, then a law.



# SCIENTIFIC METHOD

Scientific Law:

Examples:

## What is a Law?

A 'law' in science has a different meaning than the 'laws' we talk about in everyday life.

**Directions:** Put an X next to the statements that describe a law.

- \_\_\_\_\_ A. Laws are theories that have 'graduated', and once were a hypothesis.
- \_\_\_\_\_ B. A law can be framed as an equation.
- \_\_\_\_\_ C. Laws are explanations of a physical event.

- \_\_\_\_\_ D. Laws are descriptions of a physical event.
- \_\_\_\_\_ E. Laws are more important to science than theories.
- \_\_\_\_\_ F. A scientific law has been proven and a theory has not.
- \_\_\_\_\_ G. A law never changes.