

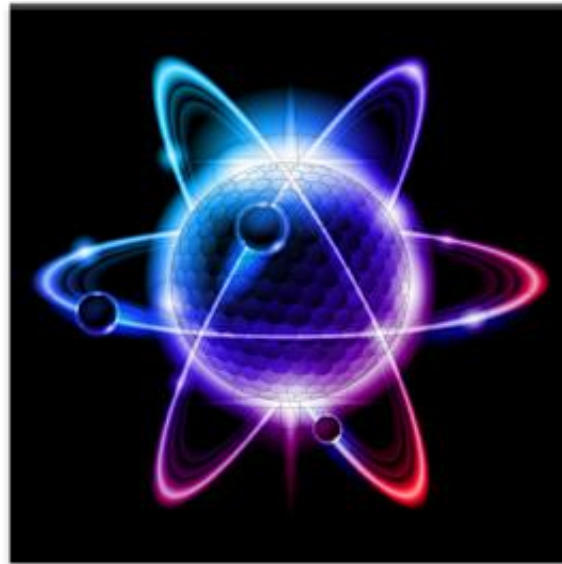
Investigative Science

Learning goal: Know how current knowledge compares with the expectations of this course and estimate the work load needed to succeed.



Tuesday, July 30, 2019

Welcome to Investigative Science with Mr. Fireng



4

Contrast application

3

Contrast differences

2

Identify new content

1

Complete pre test

Investigative Science



Learning goal: Know how current knowledge compares with the expectations of this course and estimate the work load needed to succeed.

Page n/a

Monday July 20, 2015

Learning goal: Know how current knowledge compares with the expectations of this course and estimate the work load needed to succeed.

“Learning Scale”

Learning scale:

1	2	3	4
Complete the pre test	Complete the pre test and identify new content versus existing knowledge	Contrast the differences in content from past years to this year	Contrast the differences in application of concepts

4	Contrast application
3	Contrast differences
2	Identify new content
1	Complete pre test

Students will be responsible for copying the “Leaning goal” and “Learning scale” notebooks, at the beginning of each unit.

Student’s self-evaluation: Complete at home or at the end of class, use the 4-3-2-1 Learning scale. The Evaluation is a two to three sentence summary of the day’s lesson and your own successes or difficulties with the content and application.

The self-evaluation will be written under the “warm-up” objective.

Investigative Science

Learning goal: Properly apply all steps in the scientific method when problem solving.

1.Science is a way to answer questions & solve problems and understand the world around us.

2.The Universe Is Understandable

3.The Universe Is a System In Which the Basic Rules Are Everywhere the Same

4.Scientific Ideas Are Subject To Change

5.Science is built on evidence that can be observed.

6.Science is the ability to connect different evidence to form a hypothesis

7.Science is open ended.

Nature of Science

Write all Cues!!



Summary:

Investigative Science

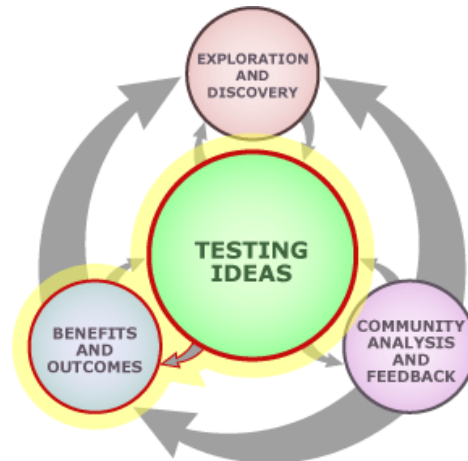
Learning goal: Properly apply all steps in the scientific method when problem solving.



Characteristics of the Nature of Science

1. Science is a way to answer questions & solve problems and understand the world around us.

Science is a process for producing knowledge. The process depends both on **making careful observations of phenomena and on inventing theories for making sense out of those observations.**



4

Design, complete, valid conclusion

3

Design & complete

2

Know steps, follow directions

1

Know the steps

Investigative Science

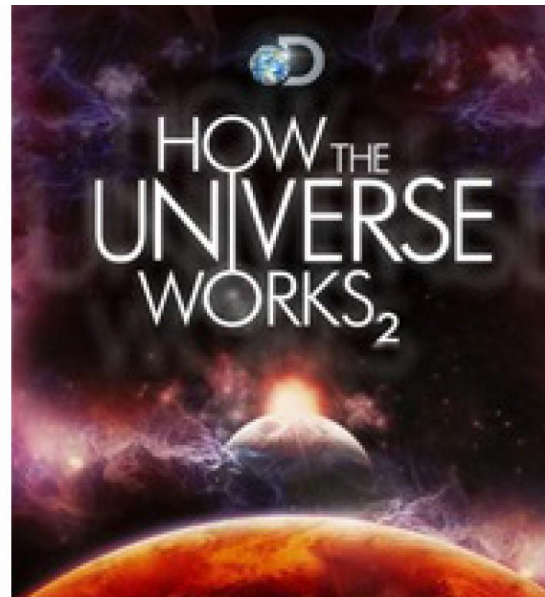
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Characteristics of the Nature of Science

2. The Universe Is Understandable

Science presumes that the things and **events in the universe occur in consistent patterns that are understandable** through careful, systematic study.



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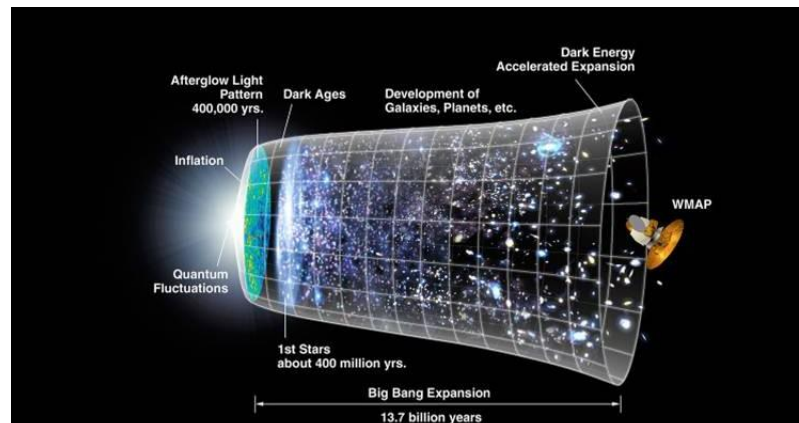
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Characteristics of the Nature of Science

3. The Universe Is a Single System In Which the Basic Rules Are Everywhere the Same

Knowledge gained from studying one part of the universe is applicable to other everywhere. For instance, the same principles of motion and gravitation that explain the motion of falling objects on the surface of the earth also explain the motion of the moon and the planets.



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Characteristics of the Nature of Science

4. Scientific Ideas Are Subject To Change

Change in theories are inevitable because new observations may challenge theories. No matter how well one theory explains a set of observations, it is possible that another theory may fit just as well or better, or may fit a still wider range of observations. In science, the testing and improving and occasional discarding of theories, whether new or old, go on



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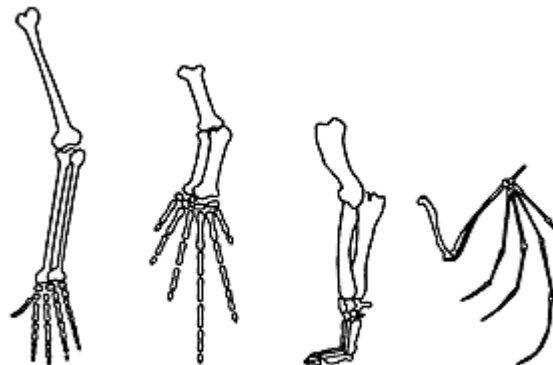
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Characteristics of the Nature of Science

5. Science is built on evidence that can be observed.

The validity of scientific claims is settled by gathering evidence. Such evidence is obtained by observations. To make their observations, scientists use their own senses or taking measurements.



HUMAN

WHALE

DOG

BAT

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Characteristics of the Nature of Science

6. Science is the ability to connect different evidence to form a hypothesis

As evidence is collected in the form of observations and measurements, scientist attempt to explain by formulating hypotheses. **Observations lead to inferences which are used to develop hypotheses which can be a starting point for further investigation.**

Building a scientific argument:



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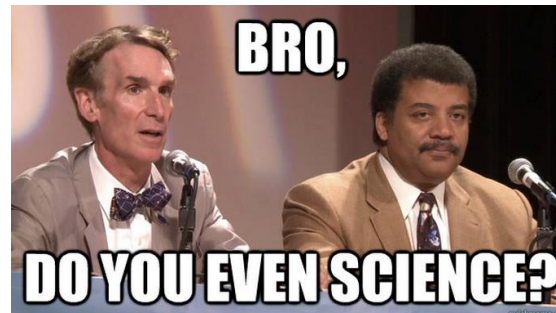
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Characteristics of the Nature of Science

7. Science is open ended.

Often there is not enough information to say with certainty that a conclusion is absolutely accurate. Science can't really PROVE anything absolutely. We can not examine every possible case--past, present and future. Scientists assume that even if there is no way to secure complete and absolute truth, increasingly accurate approximations can be made to account for the world and how it works. However!! We can DISPROVE an explanation or generalization by finding conflicting evidence.



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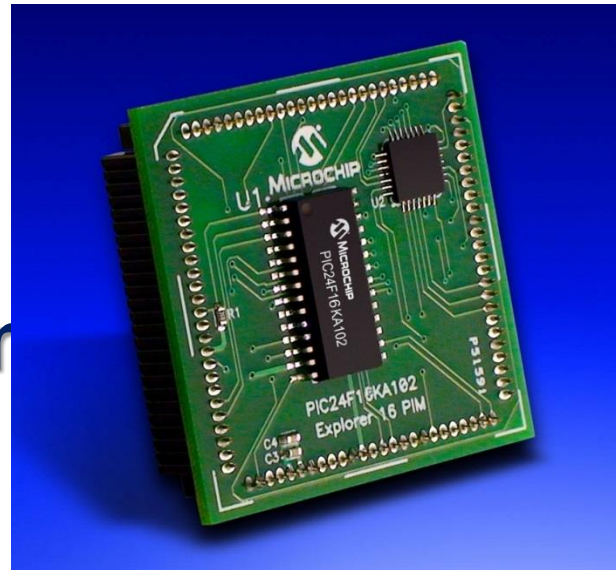
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The Nature of Science: The Case of the Missing Microchip

The suspects

- Coffee Cart Doug
- Cowboy Paul
- Security Guard Jim
- Ginny Fletcher
- Steve Randak
- Buck



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THE CASE OF THE MISSING COMPUTER CHIP (IT'S PLUM CRAZY TO STEAL FROM US)

INTRODUCTION

It's the morning of July 5 in the northern California city of Cupertino. You are working the burglary watch, day shift. As commander of the electronic theft division you have a team of experts, skilled in the collection of all types of evidence relating to theft of computers and electronic stuff. At 9:50 a.m. you get a call that someone has attempted to steal an advanced chip from the Plum Computer Company. You and your team respond immediately to the call. When you arrive, you find that the plant is sealed off and all the uniformed employees in the plant have been confined to a single room, the lounge. Within the hour, the missing chip is found in an envelope in a pile of mail. The envelope was addressed to Gordon Lidy, the security chief of a rival computer firm. A cassette tape was also found in the envelope.

You assign one of your best officers, JoAnn Lane, to interview everyone present. Here is what she finds:

- A. Steve Randak, the president, arrived at 8:50 this a.m. to find the tone-operated security door to his private lab open and the prototype of his new computer chip missing. He immediately pushed the panic button that alerts security to close the gates. The guard at the gate reported that no person had left the plant since 8:00 a.m. today.
- B. A map of the crime scene
- C. Jo Ann begins accumulating clues, and as she does, tries to develop a hypothesis for how it was done, and who did it. She keeps her clues in an envelope.

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Learning goal: Properly apply all steps in the scientific method when problem solving.

INSTRUCTIONS for each team:

1. Read the Introduction (above)
2. Study the map of the crime scene (overpage)
3. After reading the above introduction and studying the map of the crime scene, your team should draw 5 (five) clues at random from the envelope.
4. Using the information at hand, try to solve the crime. You can organize the evidence in various ways, until your team develops a tentative hypothesis. Do not discourage minority opinions. Commit yourselves by writing down this hypothesis.
5. Once you have exhausted all your ideas with these clues, more evidence can be uncovered. Your team may now draw 3 (three) more clues from the envelope, at random. Repeat step 4.
6. After a few minutes, get together with another team or two...collaborate...compare clues, compare notes, compare ideas. See if you can reach a better hypothesis collaboratively.
7. Draw the last 3 clues, and continue as before until there is some general agreement, always allowing for minority opinions. Record your final team consensus...your hypothesis for what happened, and who was probably responsible. Be able to defend your hypothesis.
8. When all teams have pretty well arrived at some "final" hypothesis, you will be asked by your teacher to participate in a class-wide discussion in which you can share hypotheses and the rationales for arriving at those hypotheses. You will be asked to critique each other's hypotheses and reasoning. Hopefully, you may be able to arrive at a class-wide general consensus.

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Beau Lotto + Amy O'Toole:

Science is for everyone, kids included

TEDGlobal 2012 · 15:25 · Filmed Jun 2012

 28 subtitle languages 

 View interactive transcript



https://www.ted.com/talks/beau_lotto_amy_o_toole_science_is_for_everyone_kids_included/transcript?language=en