

The World of Science

Scientific Explanation
Section 1

Kick off to the section

- [Challenger Space Shuttle](#)
- How could viewing video of the accident help scientists explain what has happened?
 - It would allow scientists to gather information about what was happening to the shuttle before it exploded.
- Read the insert
 - How did they determine a scientific explanation for the challenger disaster
 - What did they conclude from their investigations
 - How did the weather affect the challenge
 - How did this scientific explanation help scientist and engineers learn from the mistake

Vocab words

- Scientific explanation
 - Describes how something works or why something happens
- Empirical evidence
 - Data and observations that have been collected through scientific processes
- Opinion
 - Is a idea that may be formed from evidence but has not been confirmed by evidence.

How do scientists form scientific explanation?

- The shape of the Florida coastline is changing.
- Adult flamingos are pink because of the food they eat.
- What do these statements have in common?

They are scientific explanations

What are the methods used to form scientific explanation?

- There are three
 1. Researching information
 2. Designing experiment
 3. Making models

What is the basis for scientific explanations?

- Scientist can't say that Florida is changing due to erosion because they have to have some evidence to support it.
- They need

Empirical evidence

How do they get it?

Collecting and analyzing evidence
Evaluating what they collected

If you don't have evidence what is it then?

Opinion

Need some examples?

- Empirical evidence
- Scientific explanation
- Opinion

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Scientists and Society
Section 2

Vocab words

- Controversy
 - Public disagreement between groups

Intro

How do Scientist Affect Society?

- [Galileo Galilei](#)
- What happened next?
 1. published discoveries about the night sky
 2. His discoveries supported ideas that conflicted with those in society
 3. Books about the heliocentric model were banned
 4. Published another book about the heliocentric model
 5. Was tried and found guilty
 6. Was placed under house arrest

Analogies

- Interaction between science and society
 - Game of tug of war
 - When one sides pull on a rope the other side is affected.

*What else is the interaction between
science and society like?*

- [Rachel Carson](#)
- What was the controversy was Carson involved in?
 - Society disagreed with her ideas about pesticide harming animals

Question

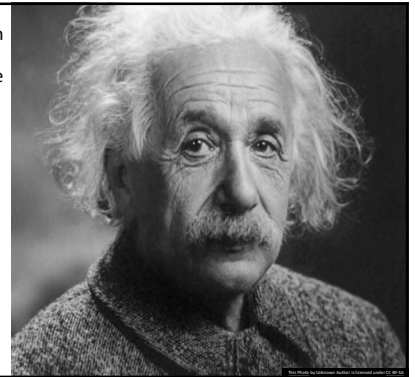
- Why do you think people were resistant to the ideas of Semmelweis and Carson despite being presented with data that proved their points ?
 - People were resistant to the ideas of Semmelweis ideas Carson because the data they had went against the thinking of society

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How has Science Changed?
Section 3

"No amount of experimentation can ever prove me right; a single experiment can prove me wrong"

"Intellectual growth should commence at birth and cease only at death"



Vocab

- Scientific Theory
 - A well tested explanation for a wide range of observations or experimental results
- Scientific Law
 - Statement that describes what scientist expect to happen every time under a particular set of conditions

How does scientific knowledge change?

- [Marie Curie](#)
 - Radium gave off thermal energy
 - Scientists couldn't explain why
 - Until Einstein
- Einstein
 - Studying relationship between mass and energy
 - Stated that mass could be converted into energy
 - Other scientist couldn't explain it because they didn't put the two together. Each was a separate quantities.
- Demonstrated one of two ways in which scientific knowledge can change.

Cont.

- Demonstrated one of two ways in which scientific knowledge can change.
 - Scientific knowledge changes as a result of new evidence
 - Or new interpretation of existing evidence

Describe another instance of how scientific knowledge has changed?

How is a Scientific Law & Theory Different?

Scientific Theories

- Only excepted when large body of evidence that supports it.
- Future testing can still prove an accepted theory to be incorrect

Scientific Law

- Describes an observed pattern in nature without attempting to explain it.
- Verified over and over again.

List two more examples of scientific laws.

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Models as tools in science
Section 4

Vocab

- Model
 - Any representation of an object or process
 - Pictures, diagrams, computer programs, math equations
- System
 - A group of parts that work together to perform a cution or produce a result
- Input
 - Material or energy that goes into a system
- Process
 - What happens in a system
- Output
 - The material or energy that comes our of a system
- Feedback
 - Output that changes the system in some way

Why do scientists use models?

- [Models in science](#)
- Maps
- Watershed maps
- Globes
- Concept maps
- Dioramas
- Terrariums and aquariums
- Computer

What is a system

All systems have

- Input
- Process
- Output



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Parts of System	The parts are the batteries, the bulb, the bulb holder, the container, and the switch
Input	Turning on the switch and starting chemical reactions in the batteries
Process	The chemical energy in the batteries is converted into light energy
Output	The output is light

How are models of systems used?

- Scientists use models to understand how systems work
- Predict changes in a systems as a result of feedback or input changes
- Start a model of a system they begin with certain assumptions
 - This allows them to made a basic model
 - Food chain to study how energy moved through living things in an environment

