

C H A P T E R

1 Notes

- **Chapter 1 Lesson 1: The Science of Biology**

- What Science **IS** and is **NOT**:

- You need to understand that Scientific knowledge is always changing.

- Science is a human process of trying to understand the world around us.

- Like all Science, Biology is a process of inquiry.

- It is based on both curiosity and skepticism.

- What are the **GOALS** of science?

- The goal of science is to provide natural and testable explanations for natural events.

- Science also uses explanations that are supported by data to understand patterns in nature.

- Scientific explanations can then be used to make useful predictions about natural events.

- Can Science answer **ALL** questions?

- No!

- Some answers to questions are left up to opinion.

- **Examples:**

- Beauty

- Luck = Black Cat

- Celestial Predictions = Horoscopes

○ **Scientific Methodology: What does Methodology mean????**

- Methodology is a system of methods used in a particular area of study or activity.
- So Scientific Methodology is the new "trendier" version of the old school term = Scientific Method.

• **The Scientific Method:**

- Common set of steps that biologist and other scientist use to gather info and answer questions.

- It is not a rigid approach, it is not fixed. It is actually very free flowing (common sense).

○ **Scientific Methodology: Broken down....**

- All scientific inquiries begin with careful observations

• **Observation:**

Using your senses to study the world.

- From our observations: *data can be collected and analyzed.*

- Two Types of **Data:**

- **Qualitative** = *Descriptive data*

- **Quantitative** = *Anything that can be expressed by #'s.*

- **Hypothesis** = *A proposed answer for a scientific question*

- A hypothesis leads to testable predictions of what would happen if the hypothesis is valid.

- **Testing a Hypothesis:**

- *This is called an Experiment.*

○ One test of the hypothesis is not enough.
Why????

○ Experiments must be
repeatable.

● **Experiment** = *A test of a hypothesis*

○ **Constants** =
Things that are held/kept the same.

○ **Variables** = *Anything that changes during an experiment.*

○ **Independent Variable**
▪ This is what you change.
▪ It is the thing that you
are testing.

○ **Dependent Variable**
▪ Are observed and measured
during and experiment.
▪ They are the changes that occur
because of what YOU
changed.
▪ Dependent variables depend on the
independent variable

*This was the
fertilizer example that
was given in
class.*

Experiment: Example and Practice

● Constants:

● Independent Variable:

● Dependent Variable:

* Define Control:

*Part of the experiment
that does not receive the
test or treatment. In the
end, you use it as a comparison
for your experimental results.*

▪ **Scientific Theory:**

- A scientific explanation of events in the natural world that has been tested and is reliable.
- They come from many repeated observations and include several well supported hypothesis.
- Important... A Scientific Theory can change as more research is done and more data is collected.

Review, Synthesize, Infer and Summarize:

1. In your own words, define the term science.
2. Why is there no one correct process of scientific investigation?
3. Why are hypotheses so important to controlled experiments?
4. What is a scientific theory?
5. How does a theory differ from a hypothesis?

Chapter 1 Lesson 2: Science in Context

- **Lesson Summary: The process of science includes...**
 - Exploration and discovery
 - Community analysis and feedback
 - Benefits and outcomes.

- **Biologist, like all scientists, ask questions about the world and try to find answers through observations and experimentation. How do your daily observations help answers questions that you have about the world?**
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- Like all Science, Biology is a process of inquiry. It is based on both curiosity and skepticism.
 - Scientific attitudes that help scientists and engineers ask new questions and define new problems:
 - Curiosity
 - Skepticism
 - Open-mindedness
 - Creativity

- **Science and Society:**
 - Science interacts with
 - Society
 - Laws
 - Moral principles
 - Science also has a big impact on
 - Health issues
 - Medical issues
 - Environmental issues

- **Science and Ethical Concerns:**

- Ethics = Standards for what is accepted as right & wrong.

- Group Discussion = Why and How do ethics play a role in science?

- Is it okay to kill for a cure???

- **Avoiding Bias in Science:**

- Bias = A personal view _____ for or against something.

- Bias comes from the French word biais _____ meaning "slant" or "slope".

- **Important! Please read through Chapter 1 Lesson 2 thoroughly. It does contain some material that may be on the test that was not covered through lecture.**

Chapter 1 Lesson 3: Patterns of Life

- **Biology** = The study of life

- Bio = Life

- logy = Study of

- An **organism** is defined as any individual living _____ thing.

- But how do we DEFINE living????

- **Characteristics of Living things:**

- # 1 = Made of one or more cells.

- Cells = Basic units of life _____.

- Each cell contains the genetic material = DNA _____

- DNA provides the info needed to control an organism's life processes.

- #2 = Living things Need Energy.

- All organisms need Chemical energy _____ to carry out life processes.

- What is Energy???

- The ability to do work _____!

- All of the "work" or processes that go on inside the body is known as metabolism _____.

- Metabolism is all of the chemical processes that build up or break down materials.
 - Example: Digestion is a process that breaks down food material inside of our bodies.
 - # 3. = A living thing must adjust or respond to its environment.
 - Stimulus and Response.
 - Example: When a plant bends towards a window what is the stimulus and what is the response?
 - Stimulus = Sun
 - Response = Bending
 - Although conditions outside an organism may change dramatically, most organisms need to keep conditions inside their bodies as constant as possible. This process is called homeostasis
 - Organisms must maintain homeostasis to survive in diverse environments.
 - Homeostasis = The maintenance of constant internal conditions in an organism.
 - Our bodies function best within a limited range of conditions. When conditions exceed this range Then life-threatening issues arise.

Examples =

 - Body temp
 - Blood sugar
 - pH
 - An organism must be able to react, respond and adjust or else it will eventually..... Die !!!! ☹

○ # 4. = *Reproduce & Develop*

▪ **Reproduction:**

- Reproduction is not essential for individual survival but what would happen if no organisms reproduced?

- *For life to continue, organisms must*

- **Two main types of reproduction:**

- **Sexual Reproduction:**

- *Involves the fusion of cells from two different parents.*

- **Asexual Reproduction:**

- *Only requires one parent*

We will explain & clarify more as the year progresses!

▪ **Development:**

- As organisms grow they also develop.

Development leads to *mature organisms* that can usually reproduce.