1.1 Introduction to Biology

biology- the study of life

bio- greek for life

logos- Greek for study

Biologists- people who study biology, make discoveries, and seek explanations by experimenting in the lab and in the field.

5 things that biologists do:

1. Study diversity of life
2. Research disease
3. Develop Technologies
4. Improve Agriculture
5. Preserve the environment

Technology - application of scientific knowledge to solve human needs and extend human capabilities

Characteristics of Life

1. Made of one or more cells

2. Displays organization - arranged in an organized way such as specialized cells, tissues, organs, organ systems

3. Grows and Develops

4. Reproduces - production of offspring
5. Responds to stimuli - stimulus - anything internally or externally that an organism responds to
6. Requires energy - need sources of energy to fuel life functions
7. Maintains homeostasis - regulation of internal conditions to maintain life
8. Adaptations evolve over time - adaptation - any inherited characteristic that results from changes to a species over time

1.2 The Nature of Science

Science - a body of knowledge based on the study of nature

examples - biology, chemistry, physics, earth science

What is science?
Relies on evidence-

Biological theories - cell theory, theory of evolution, germ cell theory of disease

physiognomy - judging someone's character or personality based on physical features. Was used in the 1700-1800's. Even though it's based on observations it's not really considered a real science. It's a pseudoscience - imitations of science based on cultural or commercial goals. More examples - astrology, psychic readings, face reading, palmistry.

Expands scientific knowledge - Research is constantly reevaluated to help find new information. New findings cause scientists to ask even more questions.
Challenges accepted theories-
Debate is welcome. They research and attend seminars. Sometimes debate leads to more investigation. By sharing ideas and challenging information more work can be done.

Questions results- sometimes data isn't consistent with current scientific understanding. Example- bats used to be classified with birds but we know now that they are closer to rats and other mammals. we can use anatomy, genes and proteins to prove it.

Tests Claims- scientists use experiments to make claims based on unbiased data. Conclusions are drawn from evidence.

Undergoes peer review- process by
which procedures and results of an experiment are evaluated by other scientists who are in the same field.

**Uses metric system**- based on units of ten also called SI (International system of units)

meter- distance  
gram- mass  
liter- volume  
second- time  
Celsius- temp

Science in everyday life- Many TV shows are about science like CSI which deals with forensics which applies science to matters of legal interest.

Ethics- set of moral principles or values. Based in societies values and beliefs
1.3 Methods of Science

See chart pg 17

Terms you need to know:

observation - direct method of gathering information in an orderly way

inferences - process of combining what you know to what you have learned to draw logical conclusions

scientific method - systematic way of observing, asking questions and finding answers.

hypothesis - testable explanation of a situation

serendipity - occurrence of accidental or
unexpected but fortunate results.

experiment- investigation in a controlled setting to test a hypothesis

control group- group used to measure experimental group. (Standard, normal, know results)

experimental group- group exposed to factor being tested.

independent variable- factor that scientists change to possibly change outcome

dependent variable- second factor that results from the independent variable

constant- factors that remain fixed or the same through the whole experiment
data- information gained from observation

quantitative data- something that can be measured. length, number of girls

qualitative data- no measure, usually detected by our senses like smell, color, texture

Analyzing data- scientists look for patterns

Reporting findings- usually done in scientific journal