1-A Introduction to Biology

I. Introductory Terms

A. Science: An organized way of using evidence, based on observations, to learn about the natural world.

B. Observations: Information gathered using the senses.

   1. Quantitative- involves numbers or measurements

   2. Qualitative-involves characteristics or descriptions not easily measured or counted.

C. Biology: The study of life (living things)

D. Organism: **a complete individual living thing**

1. Examples: spider, tree, etc.

2.How do we know if something is living?

It exhibits all of the characteristics of life

II. Characteristics of living things

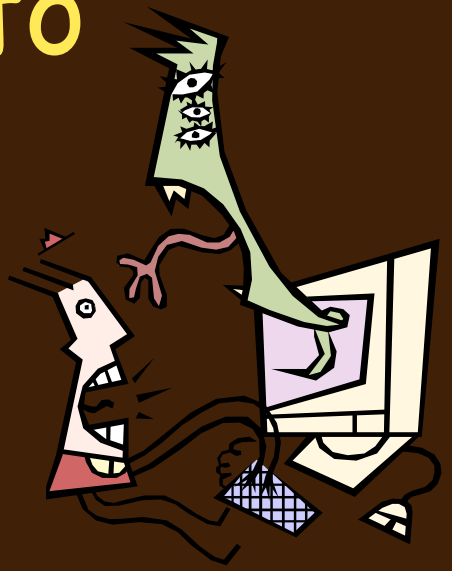
A. Living things are **M**ade up of units called **cells**

1. Cell = basic unit of structure and function in all living things
2. Multicellular = many cells
3. Unicellular = 1 cell (like bacteria)

B. Living things **R**eproduce
   1. **Asexual** – 1 parent, no joining of sex cells or DNA
   2. **Sexual** – usually 2 parents, sex cells joined and DNA combined

C. Living things **G**row & develop
   1. Cell division
   2. Cell enlargement
   3. Cell specialization

D. Living things **R**espond to stimuli

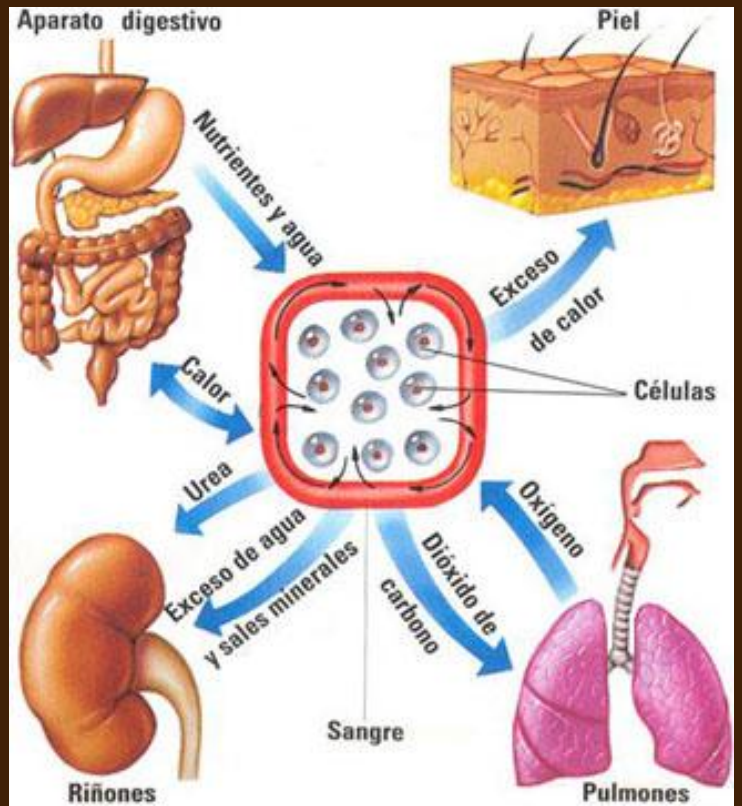


E. Living things Use energy

1. **Autotroph**: make own food (plants)
2. **Heterotroph**: eat something
3. **Metabolism**: chemical reactions that build up or break down materials

F. Living things Maintain homeostasis

1. Regulation of an organism's internal environment
2. Optimizes conditions for metabolism



G. Living things display organization

- Cell structures, cells, tissues, and organs work together to support the organism

H. Living things Evolve over time

- Adaptation: an inherited characteristic that results from changes to a species over time, usually something that helps them survive

If something is living, how many of these characteristics must it have?

ALL OF THEM!

III. The Scientific Method

- logical and organized methods of scientific study.

SCHyTCo!!

A. State the problem

1. The problem must specify how the results can be measured
2. Format: *What effect does the Independent (manipulated) Variable have on Dependant (responding) Variable?*
   a) IV: The variable being tested
   b) DV: results of experiment, what you will be measuring.

Good or bad example?

- How does drinking pop affect concentration?

- Better --> How does drinking mountain dew affect concentration in class?

- Best --> How does drinking 1 can of mountain dew affect performance on a memory test?

B. Collect Background Info – research your problem.

What things would you research for the mountain dew example?

- Ex. Amount of caffeine, how caffeine works, how memory works, etc.

C. Hypothesis = possible solution to problem; an educated guess based on background information

Ex: scores on memory tests will be lower after drinking mountain dew

D. Test the hypothesis (experiment)
   1. **Controlled experiment** – all conditions the same except one variable
   2. **Experimental group** – group exposed to the variable
   3. **Control group** – not exposed to the variable, used as a comparison
   4. **Number of trials**: how many times the experiment is repeated

F. Conclusions

1. **Data** – scientific facts collected during experiment
   - Tables, graphs, charts
2. **Statistics** – math that evaluates data
   - Ex. Average growth rate of frogs during development

F. Definitions:

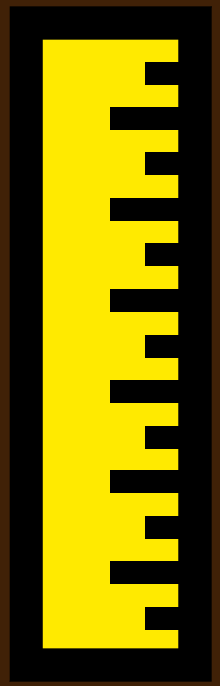
1. Theory:
   a) An explanation of how a specific natural phenomenon occurs
   b) A former hypothesis that has been tested with repeated experiments and observations and found always to work

2. Law: a rule that describes, but doesn't explain, a pattern in nature and predicts what will happen under specific conditions

IV. Metric system basics

A. Base units of the metric system

1. Length = meter
2. Mass = gram
3. Volume = liter
4. Time = second
5. Temperature = degrees Celsius



B. Common metric system prefixes used in Biology

1. Kilo = 1,000
2. Centi = 1/100
3. Milli = 1/1,000
4. Micro = 1 millionth
5. Nano = 1 billionth