

Observation: what is seen

Inference: conclusion based on observation

Hypothesis: educated guess (if...then...)

Theory: supported by evidence

Graph: shows a trend

Control: group NOT tested, allows you to test a SINGLE variable

Independent Variable: the thing that is being tested (ex. New drug, sunlight)

Dependent Variable: the result being measured (ex. Height, weight)

What makes a good experiment? large sample size, tests one variable, can be repeated

Cells → Tissues → Organs → Organ Systems

All living things are made from cells except viruses

CHON: Carbon, Hydrogen, Oxygen, Nitrogen

Organic: CH (C₆H₁₂O₆)

Inorganic: does not have "C" and "H" (H₂O)

Carbohydrates (Starch): quick energy, glucose

Lipids: protection, warmth, energy, fatty acids & glycerol

Proteins: growth, repair body tissue, amino acids

Homeostasis → an organism must maintain internal stability to survive (body temperature)

Metabolism: ALL the life processes

Nutrition: Autotrophs make their own food; Heterotrophs eat other organisms

Respiration: Energy (ATP)

Transport/Circulation: Absorption and Distribution

Regulation: Coordination and Control

Growth: increase in size

Synthesis: simple to complex (glucose to starch)

Reproduction: offspring (not necessary for individual survival, necessary for species survival)

Excretion: Removes wastes

Digestion: Breaking down food

Enzymes: Catalysts (speed up reaction), Proteins, Reusable, end in "ase", Specific (lock & key model)

**Amylase → starch; Protease → Protein; Lipase → Lipids

Affected by: temperature, pH, amount of enzyme/substrate

Vitamins: Co-Enzymes

pH: pH scale goes from 1 to 14, measures acids and bases

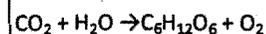
1-6 → acid

7 → neutral (water)

8-14 → base

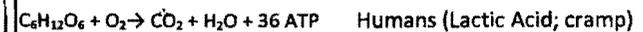
Photosynthesis & Cellular Respiration are OPPOSITE Reactions

Photosynthesis: (Chloroplast)



Cellular Respiration: (Mitochondria)

1. Aerobic: with O₂; more ATP 2. Anaerobic: no O₂; less ATP



Humans (Lactic Acid; cramp)
Yeast (Ethyl Alcohol)

Plant

Cell Wall: shape/protection

Chloroplast: color

Nucleus: control

Cytoplasm: holds organelles in place

Ribosome: protein

Vacuole: storage

Animal

Centriole: separate chromosomes

Lysosome: enzymes/digestion

Mitochondria: powerhouse

Cell Membrane: selective, lets things in and out, made of proteins/lipids

Passive Transport: No Energy; H → L Concentration **Active Transport:** Energy; L → H Concentration

Diffusion and Osmosis [H₂O into cell = swell; H₂O out of cell OR Salt = shrink]

System	Job	Organs	Miscellaneous
Digestive	Move food by peristalsis	Mouth, stomach, intestines	Chemical and mechanical digestion occur
Circulatory	Moves water, nutrients, hormones, wastes through body	Heart, veins, arteries, capillaries	RBC: carry O ₂ WBC: fight disease Plasma: fluid in blood Platelets: clot blood
Respiratory	breathing	lungs	Diaphragm: muscle Alveoli: surrounded by capillaries; O ₂ enters; CO ₂ leaves
Nervous	Regulates body	Brain: Cerebrum (voluntary) Cerebellum (balance) Medulla (involuntary) Spinal Cord	Stimulus: change you respond to Neuron: nerve cell Impulse: electrical signal carried by nerves Neurotransmitter: chemicals that help carry impulse
Endocrine	Regulates body	Pancreas: Insulin & Glycogen Hormones & Glands	Adrenal Gland: Adrenaline Sex Hormones: Testosterone, Estrogen, Progesterone Negative Feedback: controls hormone levels
Excretory	Removes wastes (salt, H ₂ O, CO ₂ , Urea)	Lungs, Kidney, Liver, Skin	Lungs (H ₂ O, CO ₂) Kidney (wastes from blood) Liver (toxins, dead RBC's) Skin (sweat)
Immune	Protect from pathogens (viruses, bacteria, parasites)	WBC's	Antigens: cause immune response Antibodies: attack antigens Blood Type O (universal donor) Blood Type AB (universal acceptor) Vaccine: dead/weakened pathogen, cause body to make antibodies

Asexual Reproduction:	Sexual Reproduction:
Advantages = faster, easier Disadvantages = no variation Mitosis → body cells 2 identical cells; same # of chromosomes Diploid (2n)	Advantages = faster, easier Disadvantages = no variation Meiosis → sex cells (gametes) egg/sperm ½ # of chromosomes as parent Haploid (n) 4 sperm & 1 egg (3 polar bodies die) Fertilized Egg → Zygote Egg → Ovary Fertilization → Fallopian Tube Embryo → Uterus Placenta → nutrients, O ₂

Genetics
Humans have 46 chromosomes
Genes determine traits; but environment can affect expression
Mutation: change in DNA
Selective Breeding: produces plants/animals with desired traits (larger fruit, more meat, disease resistant)
Genetic Engineering: insert gene of 1 organism into another; bacteria often used <i>ex) Gene to make human insulin inserted into bacteria & these bacteria can now make insulin exactly like human insulin</i>
Karyotyping & DNA Fingerprinting: new technologies used to help genetic diseases

DNA: A-T C-G } Bases
RNA: A-U C-G }

Evolution: species change over time; species come from ONE common ancestor
Darwin's Theory of Natural Selection [overproduction, competition, survival of the fittest, variation → sexual reproduction & mutations]
Gradualism: slow change **Punctuated:** quick spurts of change
Evidence of Evolution: fossils, radioactive dating, biochemistry, comparative anatomy, embryology, genetics

Ecology:	Ecological Problems: human's negative action → OVERPOPULATION																												
Biodiversity: differences in living things in an ecosystem (↑ genetic variation, ↑ survival during env't change, ↑ medical discoveries for humans) Abiotic: non-living / Biotic: living things Carrying Capacity: maximum # of organisms an ecosystem can support. Niche: role in ecosystem / Competition: results in 1 species occupying a niche at a time Food Webs/Flow of Energy: starts with producers (plants, algae); energy is lost at each level b/c each organism uses/stores energy Consumer- organism which eats another organism / Producer- makes their own food Herbivore- plant eater / Carnivore- animal eater / Omnivore- eats both plant and animal Predator- kills its food / Scavenger- eats already dead animal / Decomposer- breaks down wastes Parasite- feeds upon the tissues or fluids of another organism (host), does not kill the organism Ecological Successions: gradual long term changes in altered ecosystems (pioneer organisms: first organisms to reoccupy; climax community: new point of point of stability)	<table border="1"> <thead> <tr> <th>Problem</th> <th>Cause</th> <th>Negative Effect</th> <th>How can Humans Help?</th> </tr> </thead> <tbody> <tr> <td>Acid Rain</td> <td>Burning fossil fuels</td> <td>↓ forest/ marine life; gases release in air</td> <td>• Recycling</td> </tr> <tr> <td>Loss of Diversity</td> <td>New technology</td> <td>Pollution (resources unusable)</td> <td>• Renewable Resources</td> </tr> <tr> <td>Global Warming</td> <td>Burning fossil fuels</td> <td>↑ sea level, flooding, climate change</td> <td>• Protect Habitats/ Endangered Species</td> </tr> <tr> <td>Ozone Layer</td> <td>CFC pollutants from manufacturing</td> <td>Skin cancer from UV radiation</td> <td>• NO Pesticides</td> </tr> <tr> <td>Introduced Species</td> <td>Humans (purple loosestrife)</td> <td>Outcompetes native species</td> <td>• Farm Native Plants</td> </tr> <tr> <td>Industrialization</td> <td>New technology</td> <td>↑ burning of fossil fuel, air pollution</td> <td>• Plant Trees to Replace • Rotate Crops</td> </tr> </tbody> </table>	Problem	Cause	Negative Effect	How can Humans Help?	Acid Rain	Burning fossil fuels	↓ forest/ marine life; gases release in air	• Recycling	Loss of Diversity	New technology	Pollution (resources unusable)	• Renewable Resources	Global Warming	Burning fossil fuels	↑ sea level, flooding, climate change	• Protect Habitats/ Endangered Species	Ozone Layer	CFC pollutants from manufacturing	Skin cancer from UV radiation	• NO Pesticides	Introduced Species	Humans (purple loosestrife)	Outcompetes native species	• Farm Native Plants	Industrialization	New technology	↑ burning of fossil fuel, air pollution	• Plant Trees to Replace • Rotate Crops
Problem	Cause	Negative Effect	How can Humans Help?																										
Acid Rain	Burning fossil fuels	↓ forest/ marine life; gases release in air	• Recycling																										
Loss of Diversity	New technology	Pollution (resources unusable)	• Renewable Resources																										
Global Warming	Burning fossil fuels	↑ sea level, flooding, climate change	• Protect Habitats/ Endangered Species																										
Ozone Layer	CFC pollutants from manufacturing	Skin cancer from UV radiation	• NO Pesticides																										
Introduced Species	Humans (purple loosestrife)	Outcompetes native species	• Farm Native Plants																										
Industrialization	New technology	↑ burning of fossil fuel, air pollution	• Plant Trees to Replace • Rotate Crops																										