

Ch. 1

What is science? Biology?

Science is a way of knowing, science is the process to learn new info through experimentation. Biology is the science of life.

1. Why study science? What is the goal of science?

The main goal of science is to provide natural explanations for events in the natural world

2. Hypothesis - define and recognize a scientific hypothesis.

a hypothesis is an inference with creative thinking to form an ethical explanation for a set of observations

3. Controlled experiments:

a. Steps we normally use when conducting a controlled experiment.

In a controlled experiment one variable is changed and all others are left unchanged in testing

b. Types of variables and how many of each there should be.

There are 2 types of variables, independent (manipulated) and dependent (Responding). There should only be one independent variable and usually one dependent variable

4. Explain and differentiate theories and laws.

Theories are hypothesis on which other hypothesis can be made, a Law is something that is proven (Ex. Law of conservation of matter, etc)

5. List and describe the characteristics of living things

- Made up of cells
- Based on Universal Genetic Code (DNA/RNA)
- Obtain and use materials and energy
- Grow/Develop
- Reproduce
- Respond to stimuli
- perform Homeostasis
- Change over time (evolve)

6. What role does science play in the study of life?

7. What are the "Big Ideas" (interconnecting themes) of Biology?

- Cellular Basis of life
- Information and heredity
- Matter and Energy
- Growth, Development, and reproduction
- Evolution
- Structure and function
- Unity and Diversity of Life

Ch. 2

1. Properties of Water

a. Describe the structure of the water molecule.

The water molecule is a polar molecule, which allows it to form many hydrogen bonds.

b. Explain how the structure of water contributes to its unique properties.

The water molecules Polarity allows it to form multiple hydrogen bonds, which allows for its unique properties

c. Differentiate between a solution and suspension.

In a solution, all the components are evenly distributed throughout the solution. In a suspension, some materials are not fully dissolved, and the components are Not evenly distributed.

d. Differentiate between acids and bases.

An acid is any substance on the pH Scale lower than 7. A base is any substance on the pH Scale Higher than 7

2. Differentiate between inorganic and organic compounds.

An organic compound is any compound that contains Carbon, any other compound is inorganic

3. Explain how the bonding properties of carbon make it such an important element in living things.

Carbon can bond with many elements, carbon can even bond with itself, making it possible for it to form Carbon-chains

4. Explain what monomers and polymers are.

Most macromolecules are made up of polymers, which are made up of monomers. monomers connect to each other and form polymers.

5.

	Carbohydrates	Lipids	Proteins
Properties/ Characteristics		insoluble in water, fats, oils, waxes	can do everything (see below)
Monomer Unit	Monosaccharide		Amino acids
Functions	Main Source of energy/Structure	storing energy/ biological membranes	control rate of reactions, form important cellular activities, transport substances
Sources	plants (Ex. potato)	fats	

6. Enzymes

- a. Explain what enzymes are, and how enzymes effect a chemical reaction.

Enzymes are a natural catalyst, they speed up chemical reactions.

- b. Explain activation energy and how enzymes affect activation energy.

Activation Energy is the energy required to "activate" a chemical reaction, enzymes lower the required activation energy, speeding up the reaction

- c. Describe the importance of enzymes to living things.

Enzymes make many Chemical reactions viable solutions for our body to live, without enzymes, these reactions would take too long to benefit the body

- d. Examples of environmental conditions that can affect enzyme activity and effectiveness.

Temperature, pH, and Regulatory Molecules can affect an enzymes' activity and effectiveness

Ch. 7/20

1. State and explain the cell theory.

- All living things are made up of cells
 - Cells are the basic unit of structure and function in Living Things
 - New cells are produced from existing Cells
- a. Explain how changes in microscopy helped advance our understanding of

cells.

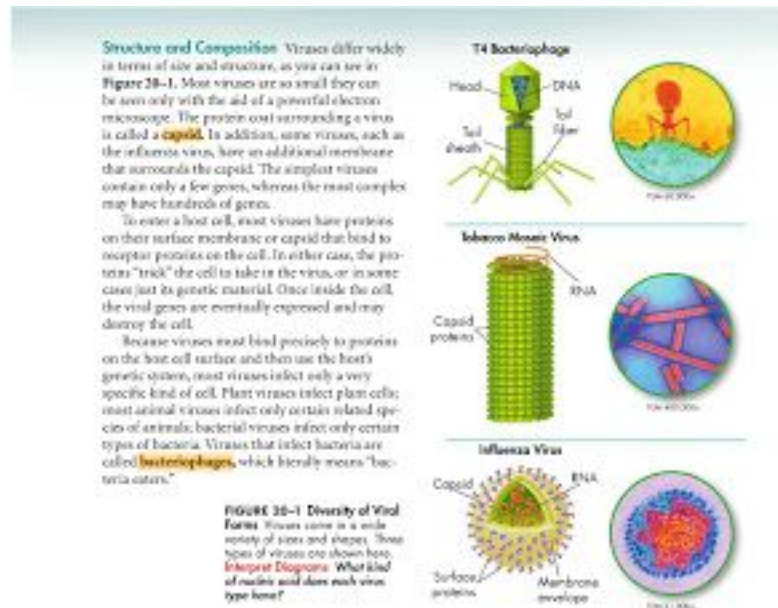
When the first microscopes were developed, observations were made that made it clear that cells were the basic units of life

2. Differentiate between prokaryotic and eukaryotic cells.

Prokaryotes do not enclose their DNA in a nucleus, Eukaryotes do. Eukaryotes are usually larger and more complex. Most Prokaryotes are Bacteria

3. Viruses and Bacteria:

- a. Describe the structure and composition of a virus.

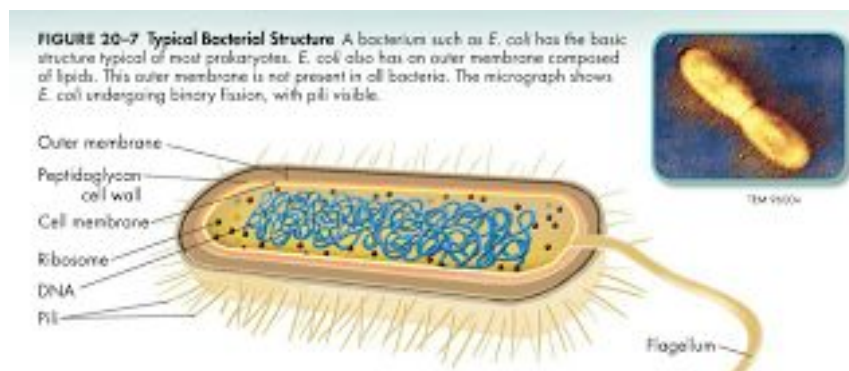


b. Explain how a virus reproduces.

Viruses Reproduce by "Tricking" other cells into reproducing for them

c. Compare a virus to a cell in terms of characteristics of life.

d. Describe the structure and composition of typical bacteria.

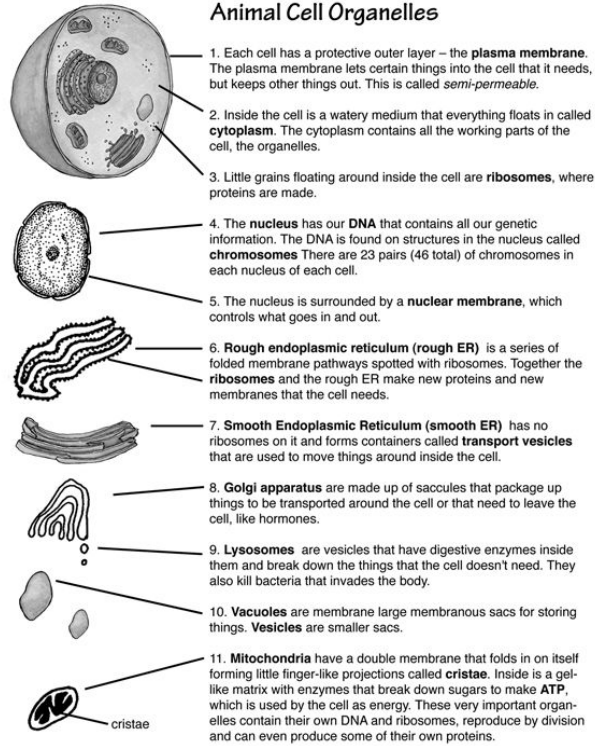


e. Explain the methods of reproduction observed in prokaryotes.

Prokaryotes Divide Through Binary Fission, a form of asexual reproduction.

4. Cell Structures:

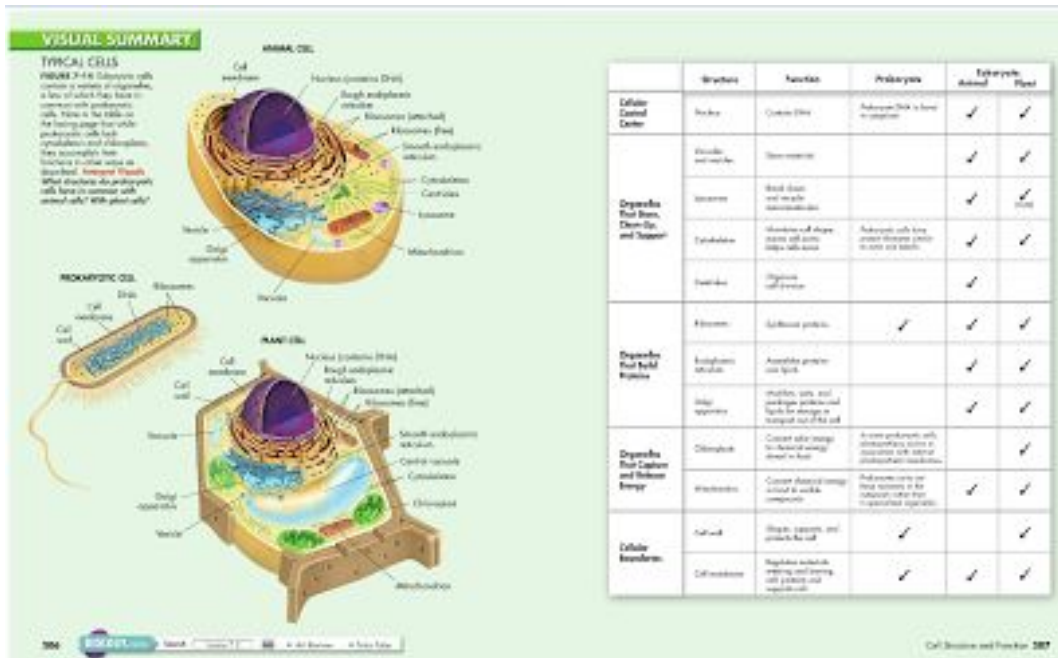
Animal Cell Organelles



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5. Differentiate between plant and animal eukaryotic cells.



6. Explain passive and active transport processes.

a. Predict the direction of molecule movement across the cell membrane when a cell is exposed to different environmental conditions.

b. Give examples of materials that are moved passively or actively across the cell membrane.

Passively	Actively
<ul style="list-style-type: none">• Water• Air• Small molecules	<ul style="list-style-type: none">• Calcium• Potassium• Sodium ions

7. Give examples of cell specialization and communication in multicellular organisms.

Nerve cells, muscle tissue, Liver tissue; cells are specialized for their Specific Tasks

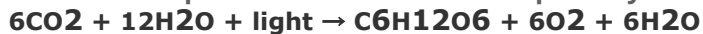
Ch. 8

1. What are the steps of photosynthesis and where does each take place?

The 1st step is the LDR, which takes place in the thylakoid membrane

The 2nd step is the LIR (or Calvin Cycle), which takes place in the Stroma

2. What are the products and reactants of photosynthesis (the chemical equation)?

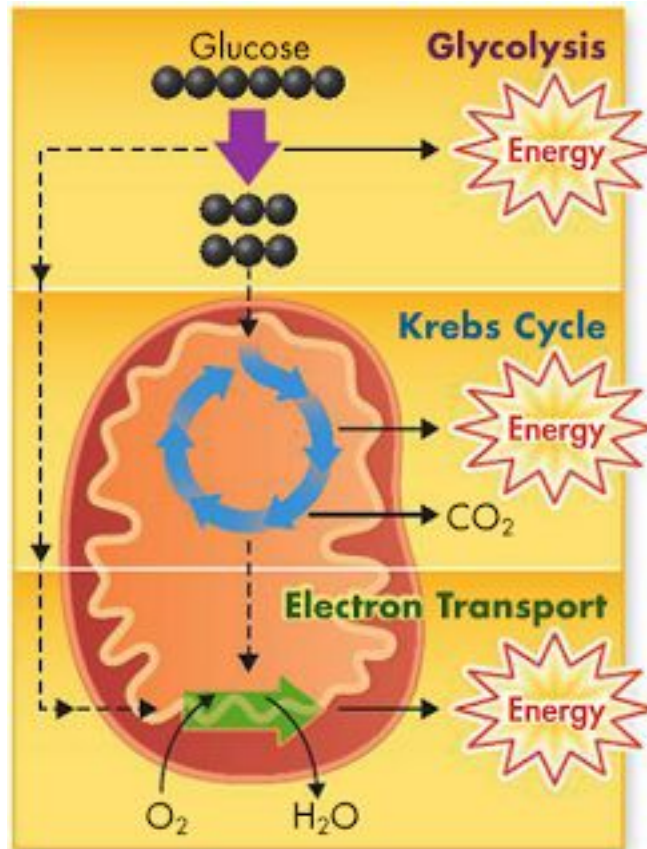


3. What organelle carries out photosynthesis?

Chloroplasts in plant cells

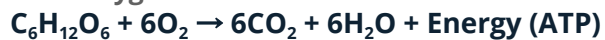
Ch. 9

1. What are the steps of cellular respiration and where does each take place?



2. What goes in and comes out of each step of cellular respiration?

Glucose+oxygen→Carbon+Water+ATP



3. What are the reactants and products of cellular respiration (the chemical equation)?

See above

4. Why do plant cells need mitochondria and chloroplasts?

Plant cells require chloroplasts to produce and store energy. They require Mitochondria to convert the stored energy (glucose) back into energy (ATP)

5. Overall, how much energy is released from one molecule of glucose?

36 ATP

6. Fermentation

a. What's the goal of fermentation?

To enable glycolysis to continue when the Krebs Cycle and ETC cannot continue, to allow the cell to produce energy without oxygen

b. What are the two types of fermentation?

Alcoholic (releases ethyl alcohol + Carbon) and Lactic Acid (releases Lactic acid)

Ch. 10

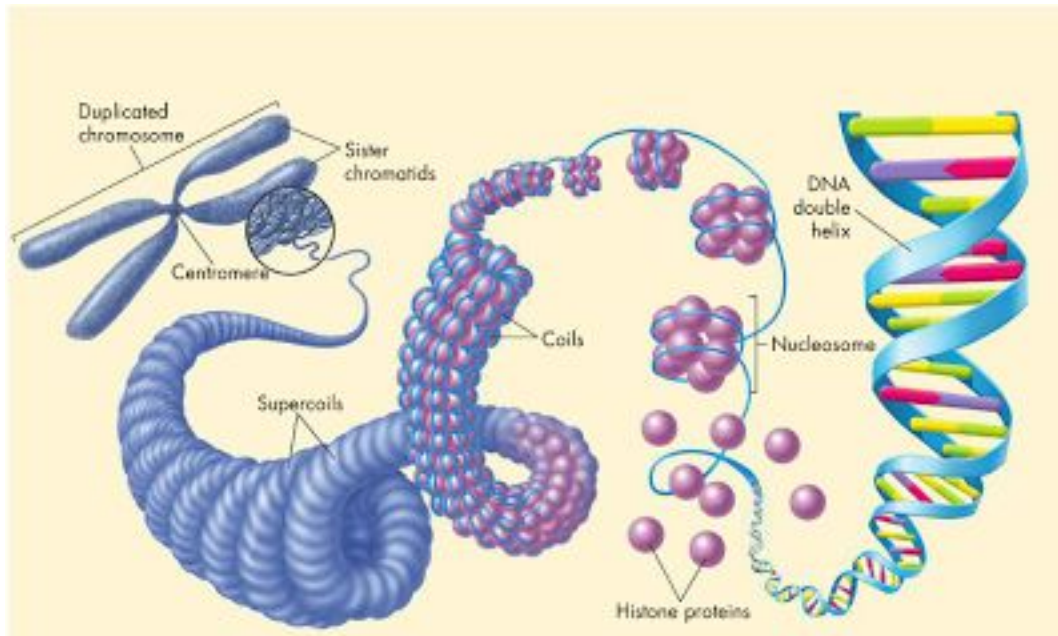
I. Describe the main events in the cell cycle.

► **G₁ Phase: Cell Growth** Cells do most of their growing during the G₁ phase. In this phase, cells increase in size and synthesize new proteins and organelles. The G in G₁ and G₂ stands for "gap," but the G₁ and G₂ phases are actually periods of intense growth and activity.

► **S Phase: DNA Replication** The G₁ phase is followed by the S phase. The S stands for "synthesis." During the S phase, new DNA is synthesized when the chromosomes are replicated. The cell at the end of the S phase contains twice as much DNA as it did at the beginning.



2. Differentiate between chromosomes and chromatids



3. Explain the importance of chromosomes to the cell.

Chromosomes make the division of the nucleus easier and possible, without the ability to divide its nucleus, a cell would never be able to divide.

4. Define mitosis and explain the process of mitosis:

"Division of the nucleus", DNA is duplicated and wrapped into chromosomes, these (duplicated) chromosomes line up at the center of the cell, spindle fibers "grab" the centromeres of the chromosomes, the spindle fibers then pull the chromosomes into 2 (one for each cell)

a. Know the four (4) phases of mitosis.
Prophase, Metaphase, Anaphase, Telophase. (P-MAT)

b. For each phase, know the events and characteristics for that phase
Prophase: genetic material condenses into chromosomes, spindle begins to form.

Metaphase: Centromeres of duplicated chromosomes line up at the center of the cell, spindle fibers connect to the centromere of each chromosome

Anaphase: Chromosomes separate and move along spindle fibers to opposite side of the cell

Telophase: Chromosomes spread out into chromatin, nuclear envelope re-forms

5. Know the differences between plant and animal cell mitosis.

In plant cells, a cell plate is formed after telophase. In animal cells, the cell is split through cytokinesis

6. Tell how the cell cycle is regulated.

The cell cycle is regulated by regulatory proteins inside and outside of the cell. (Cyclin)

a. identify the internal and external regulators of the cell cycle, and how they work
One internal regulator makes sure that the cell does not enter mitosis until the chromosomes have replicated, another prevents anaphase until the spindle fibers have attached to the chromosomes

Some external regulators are the growth factors of a cell. Other external regulators would be regulatory proteins on the surface of neighboring cells that stop or slow down cell division.

7. What are stem cells?

Undifferentiated cells that can be any type of cell

a. What is the difference between embryonic and adult stem cells?

Embryonic stem cells can become any cell, Adult stem cells can only become a limited amount of cells.

b. Why is there controversy with regard to this issue?

There is controversy over whether or not the embryo is alive and whether or not harvesting the stem cells is killing a "person"

c. What are some ways stem cells might be used in the medical field?

- Repair organ damage
- replace/repair badly damaged body tissue

d. What is the difference between totipotent, pluripotent, and multipotent stem cells?

Amount of cells possible they can change into. totipotent (almost all cells) > Pluripotent (most)

> Multipotent (many)

8. Cancer

a. What is cancer?

A disorder in which, cells begin to divide uncontrollably

b. Know common causes of cancer.

Defects in Genes, smoking/Chewing tobacco, radiation exposure, and viral infection

c. Know common treatments for cancer.

Removal by surgery, radiation damage, chemotherapy

d. Know the common vocabulary associated with cancer: malignant, benign. metastasized. etc...

Malignant-Malicious cancer; benign-cancer that doesn't spread; metastasized-cancer that spread