

**Scientific Method**

1. Which of the following are characteristics of living things? (Circle correct characteristics)

- Reproduction
- Gas exchange
- Growth
- Take in energy
- Assimilation of materials
- Respond to stimuli
- Definite shape
- Movement

2. Place the following list of events in the correct order (1, 2, 3, 4, 5)

- 2 form a hypothesis
- 1 ask a question
- 4 record and analyze results
- 3 set up a controlled experiment
- 5 draw conclusions

3. Using the following scenario: Two groups of students were tested to compare their speed working math problems. Each group was given the same problems. One group used calculators and the other group worked without calculators.

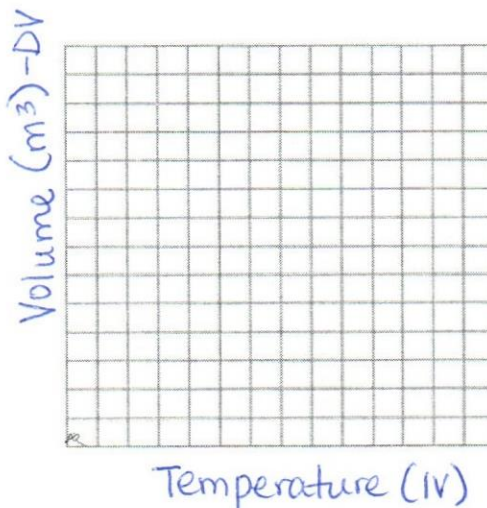
- a. Identify the responding variable speed of math calculations
- b. Identify the manipulated variable use of calculators
- c. Identify the control group group without calculators

4. A scientist wants to know if students do better on their homework if they listen to music while they do it. She asks one group of students to do their homework without listening to music. She asks another group to listen to classical music while they do their homework. She asks a third group to listen to rock music while they do their homework. After two months, she finds that the students who did not listen to music kept their grades the same. The students who listened to classical music brought their grades up, and the students who listened to rock music got lower grades.

- a. What is the question the scientist is trying to answer? How does music affect grades?
- b. What is the independent variable? type of music
- c. What is the dependent variable? grades
- d. Which group of students is the control group? group with no music
- e. Which groups of students would be the experimental group? groups with music

5. Create a graph from the following information. Include labels, increments, and a title. The following data was recorded during an experiment with a gas sample.

Temperature (K)	Volume (m <sup>3</sup> )
250	10
300	12
350	16
400	20
450	24



## Macromolecules/Chemistry of Life

- The process of polymerization occurs when small units called monomers are joined together to make a polymer/macromolecule. The monomers may be the same or different.
- The four groups of macromolecules are carbohydrates, proteins, lipids and nucleic acids.
- Fill in the table on the 4 major biomolecules:

Biomolecule	Monomer	Function
1. Carbohydrate	monosaccharide	quick energy source
2. Lipids	Glycerol and <sup>3</sup> fatty acids	long term energy storage
3. Proteins	amino acids	Some are important structural components of living things- some serve as enzymes.
4. Nucleic acids	nucleotide	stores and transmits genetic information

- Carbohydrates are made of carbon, hydrogen, and oxygen in a 1:2:1 ratio. Living things use carbohydrates for quick energy and for structural purposes. A single sugar called a monosaccharide is made of one sugar molecule. Examples of a single sugar are glucose. Large sugars called polysaccharides are made of many small sugars joined together. Glycogen is a large sugar in animals that is sometimes called animal starch. Cellulose is a large sugar found in plant cell walls that make them rigid.
- Lipids are also known as composed of carbon, hydrogen and oxygen. They are not in a specific ratio. They are not soluble in water. They are used to store energy and form biological membranes. Monomers of lipids are called triglycerides.
- Nucleotides are monomers of nucleic acids. They have three parts: sugar, phosphate, and nitrogen base. The job of nucleic acids is to store and transmit genetic information. There are two kinds of nucleic acids: DNA and RNA.
- Amino acids are monomers of protein. There are 20 different kinds of amino acids. Proteins have three main jobs: help fight disease, control rate of chemical reactions (enzymes) and build tissues such as bone or muscle.

**Cells and Cell Transport**

1. The cell is the basic unit of structure and function in all living organisms.

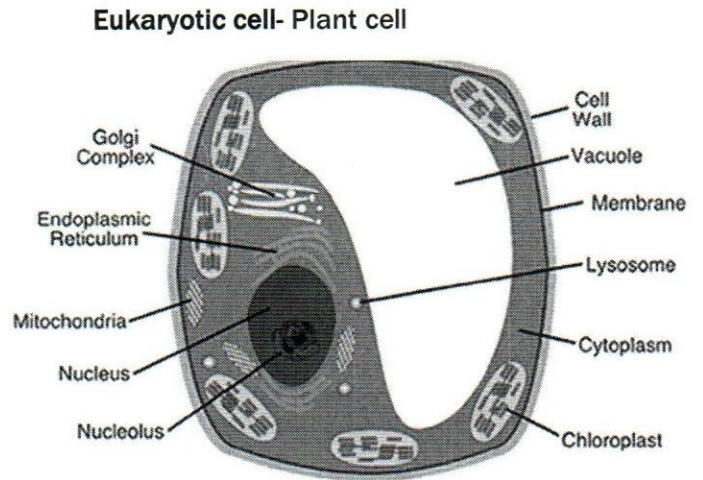
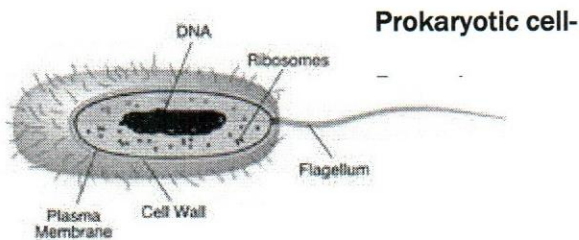
2. Match the following people with their contributions to our understanding of cells.

- |                |          |  |
|----------------|----------|--|
| a. Hooke       | <u>e</u> | Concluded that all cells come from other cells                       |
| b. Leeuwenhoek | <u>b</u> | Saw living cells in pond water (protists) and named them animalcules |
| c. Schleiden   | <u>a</u> | Observed cork under the microscope and named the boxes "cells"       |
| d. Schwann     | <u>c</u> | Concluded that all plants are made of cells                          |
| e. Virchow     | <u>d</u> | Concluded that all animals are made of cells                         |

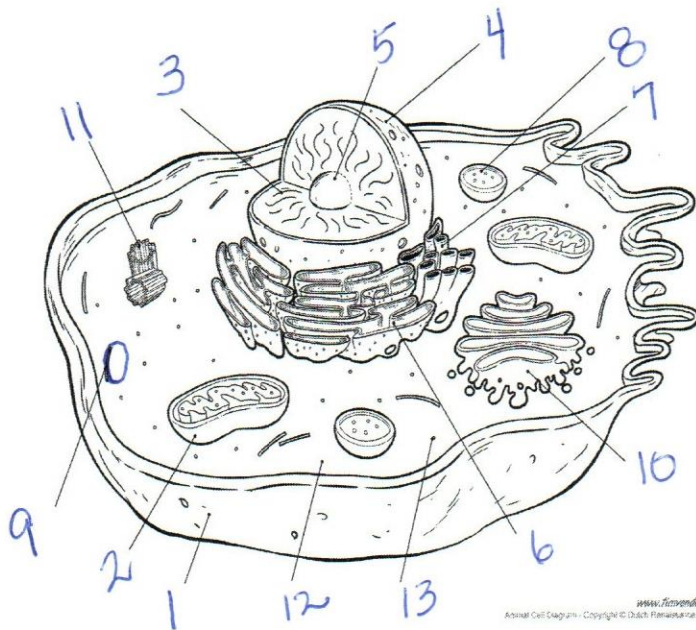
The three parts of the **cell theory** state:

- a. All organisms are composed of cells.
- b. Cells are the basic unit of structure and function.
- c. All cells come from pre-existing cells.

3. There are 2 main types of cells: Prokaryotic and Eukaryotic.



**Eukaryotic cell-  
Animal cell**

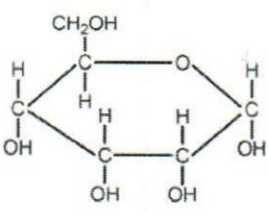
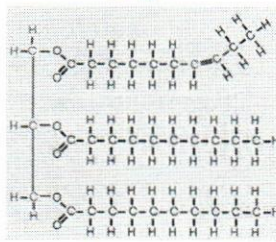
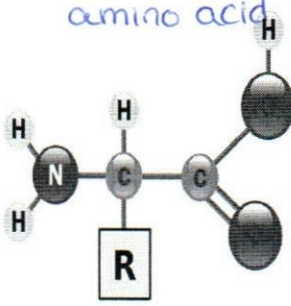
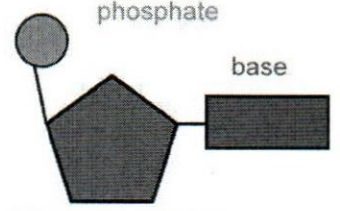


Label the following cell parts on the diagram to the left:

1. Cell membrane
2. Mitochondria
3. Nucleus
4. Nuclear membrane
5. Nucleolus
6. Rough ER
7. Smooth ER
8. Lysosomes
9. Vacuole
10. Golgi bodies
11. Centrioles
12. Cytoplasm
13. Ribosome

**\*\* Also Eukaryotic: Protists and Fungi**

8. Identify the pictures below and tell which macromolecule these monomers belong to:

<p>monosaccharide</p>  <p>carbohydrate</p>	<p>triglyceride</p>  <p>lipid</p>	<p>amino acid</p>  <p>protein</p>	<p>nucleotide phosphate</p>  <p>base</p> <p>deoxyribose sugar</p> <p>nucleic acid</p>
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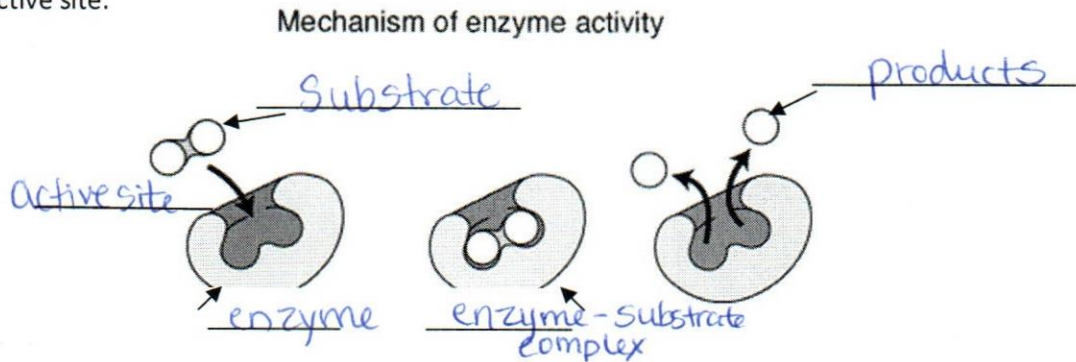
9. Chemical reactions change one set of chemicals into another. The reactants are chemicals that enter a reaction and the products are what are produced.

10. Enzymes are proteins that act as a Catalyst to speed up a reaction and reduce the amount of activation energy needed to complete the reaction. Substrates are the reactants in the reaction that bind to the active site on the enzyme where they are catalyzed. The substrate and active site fit together like a lock and key.

11. Enzymes are special proteins that speed up the rate of chemical reactions, by lowering activation energy (energy required to start a reaction).

12. The Substrate is the substance an enzyme acts upon. The enzyme and substrate fit together like a lock + key. This interlocking "fit" makes enzymes act only on specific substrates.

13. Label the diagram below with the following terms: Enzyme/substrate complex, substrate, enzyme, products, and active site.



14. If you see a word that ends in -ase, it is probably an enzyme, and if a word ends in -ose it is a sugar.

15. The area in which a substrate molecule fits into an enzyme is known as the active site.

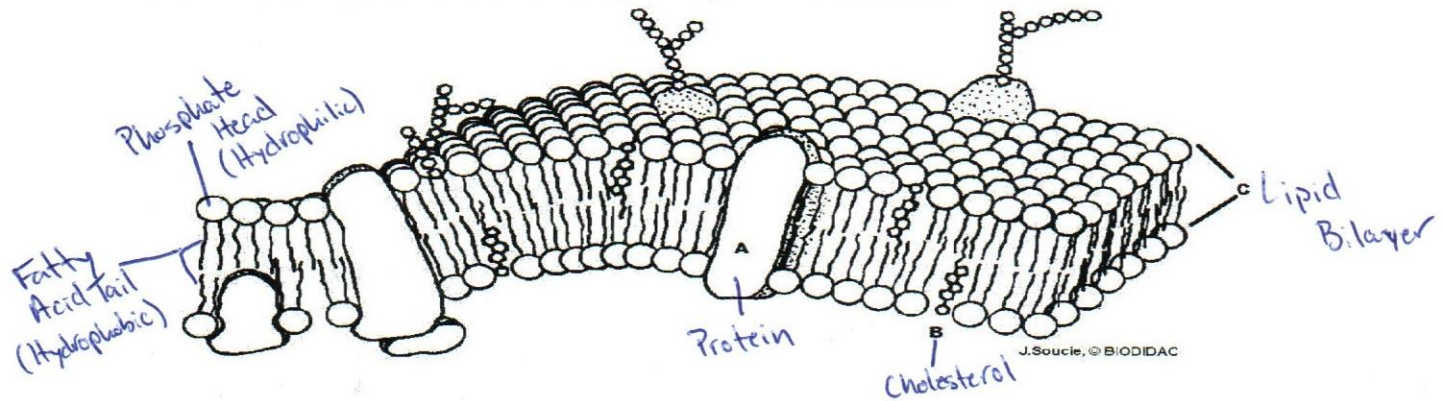
- If a cell has a nucleus and membrane bound organelles, it is said to be eukaryotic.
  - If a cell does not have a nucleus or membrane bound organelles, it is said to be prokaryotic.
- Both types of cells have DNA and ribosomes.

4. There are only 2 kingdoms whose members contain prokaryotic cells. They are eubacteria and archaeobacteria.

5. Organisms with prokaryotic cells are all single celled organisms where as eukaryotes can be either single celled or multi celled organisms.

6. The cell membrane is the outer boundary of the cell and it controls what enters and leaves the cell. The **regulation** of materials entering and leaving the cell helps the whole body of the organism maintain **homeostasis**.

7. Label the following structures in the cell (plasma) membrane below:

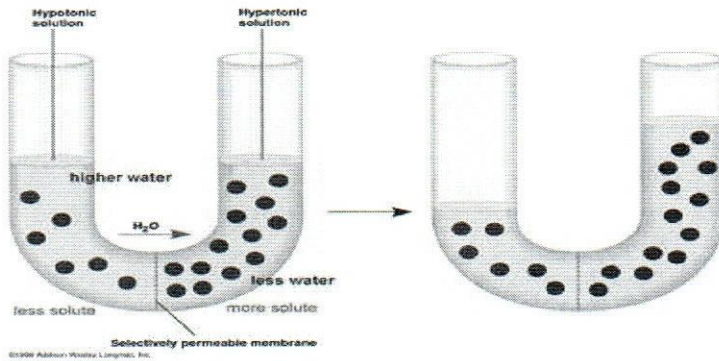


8. The parts inside of a cell which perform a specific function for the cell are known as organelles.

9. Fill out the table below on the Cell Parts.

Cell Part	Function
Mitochondria	Energy center or "powerhouse" of the cell. Turns food energy into useable chemical energy (ATP). This is the site for Cellular Respiration.
Ribosome	Site for making proteins
Golgi Body	Processes, packages and secretes proteins (cell's post office)
Lysosome	Contains digestive enzymes, breaks things down
E.R.	Transport, "intracellular highway"
Vacuole	Stores water or other substances (Plants- 1 large one; Animals-several small ones.
Chloroplast	Uses sunlight to create food, site of photosynthesis (only found in algae and plant cells)
Cell Wall	Provides additional support (plant, fungi, and bacteria cells)
Cytoplasm	Jelly-like fluid interior of the cell
Nucleus	the "control center" of the cell, contains the cell's DNA (chromosomes)

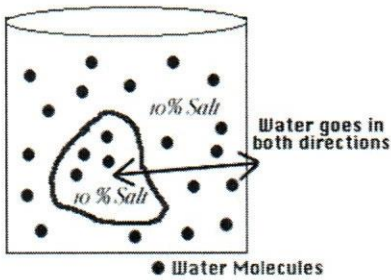
10. Living things maintain a balance between materials entering and exiting the cell. Their ability to maintain this balance is called homeostasis. (You can also apply this term to the whole organism when discussing maintenance and regulation of body temperature, hormone levels, sweating vs. shivering, etc...).
11. The movement of substances across the cell membrane from an area of high concentration to an area of low concentration is known as passive transport. The three types of passive transport are: diffusion, facilitated diffusion, and osmosis.
12. The diagram below is illustrating the process of osmosis.



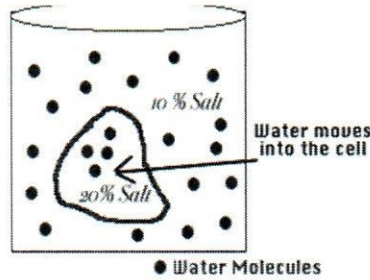
13. The following diagrams represent different solutions that can affect the rate of osmosis.

Label the solutions as being either hypotonic, hypertonic, or isotonic to the cells in the solutions.

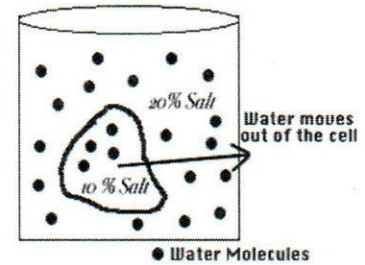
This solution is isotonic



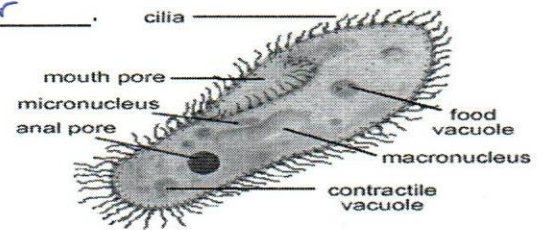
This solution is hypotonic



This solution is hypertonic

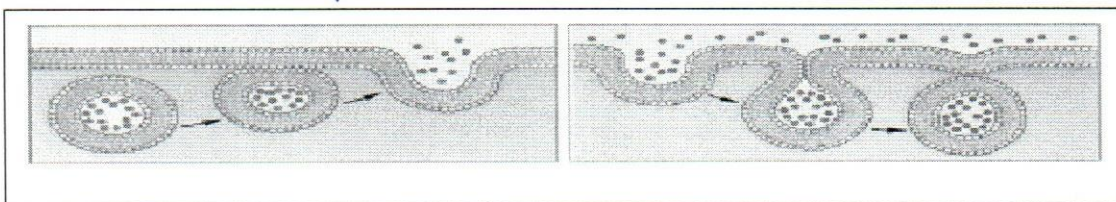


14. The contractile vacuole inside of some protists like the paramecium below maintains osmotic balance (amount of water inside the cell) by pumping out excess water.



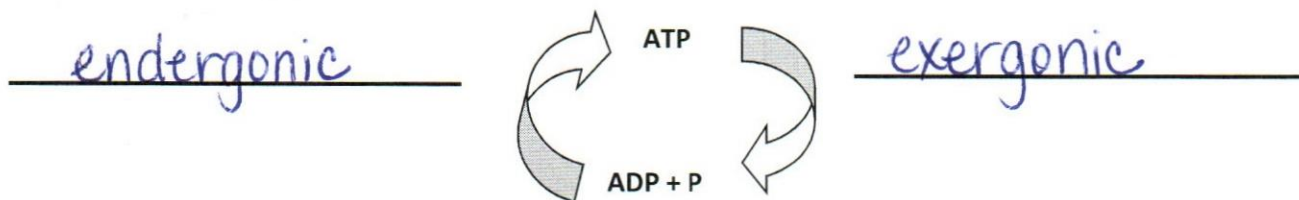
15. Active Transport is the type of membrane transport which requires energy.

16. Active transport into the cell is known as endocytosis, and active transport out of the cell is known as exocytosis. Label the diagrams below according to the type of active transport.

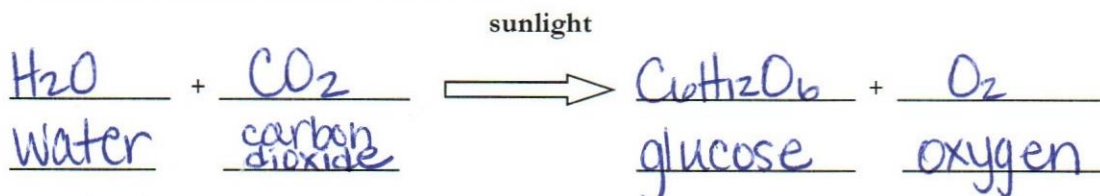


## Cell Energy: Photosynthesis and Cellular Respiration

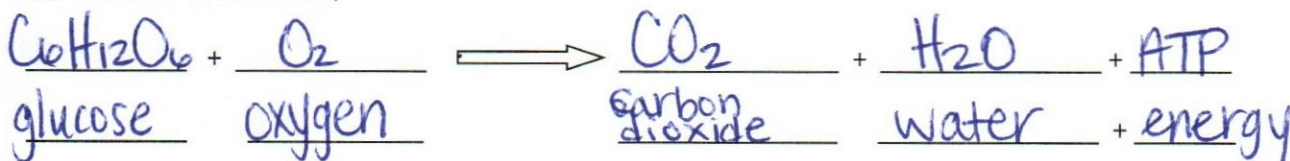
1. ATP-Adenosine Triphosphate is a special molecule that **stores and releases** the energy in its bonds for cellular work. Below is a diagram showing the ATP-ADP cycle. On the lines beside the diagram write either **exergonic** for chemical reactions or **endergonic** from chemical reactions.



2. The process in which plants transform sunlight energy into chemical energy in the bonds of glucose is called photosynthesis.
3. The process above takes place in the chloroplast of the plant cell.
4. Fill in the summary reaction for photosynthesis below with the correct reactants and products. Use the following terms: water, carbon dioxide, glucose, oxygen,  $\text{CO}_2$ ,  $\text{H}_2\text{O}$ ,  $\text{C}_6\text{H}_{12}\text{O}_6$ ,  $\text{O}_2$  (Place symbols on the top lines and words on the bottom.)



5. The process by which organisms break down glucose in order to release the energy in its bonds is known as cellular respiration.
6. This process takes place in the cytoplasm + mitochondria of the cell.
7. Fill in the summary reaction for cellular respiration below with the correct reactants and products. Use the following terms: water, carbon dioxide, glucose, oxygen, ATP,  $\text{CO}_2$ ,  $\text{H}_2\text{O}$ ,  $\text{C}_6\text{H}_{12}\text{O}_6$ ,  $\text{O}_2$  (Place symbols on the top lines and words on the bottom.)



PHOTOSYNTHESIS		CELLULAR RESPIRATION
Chloroplast	Occurs in what cell part?	Cytoplasm + mitochondria
Plants - autotrophs	What types of organisms do this process?	Plants + animals
$\text{H}_2\text{O}$ , $\text{CO}_2$	What are the reactants?	$\text{C}_6\text{H}_{12}\text{O}_6$ , $\text{O}_2$
$\text{C}_6\text{H}_{12}\text{O}_6$ , $\text{O}_2$	What are the products?	$\text{CO}_2$ , $\text{H}_2\text{O}$ , ATP
1. Light Reaction 2. Dark Reaction (Calvin Cycle)	What are the Stages?	1. Glycolysis 2. Krebs Cycle 3. ETC } aerobic
Requires energy ↳ endergonic	Require energy or Releases energy	Releases energy ↳ exergonic

8. Cell respiration occurring without oxygen is called anaerobic and can result in either of which two processes?

Step 1: Glycolysis    Step 2: Alcoholic Fermentation  
or Lactic Acid Fermentation

## Chapter 8 Classification

- Taxonomy is the branch of biology which deals with the grouping and naming of organisms.
- Carolus Linneaus developed the two word system to name organisms known as binomial nomenclature. (2 Words)
- The first word of a scientific name is the genus name and the second word is the species name.
- There are 8 taxa (classification categories) in Linneaus' system. List them in order from largest to smallest.
  1. Domain
  2. Kingdom
  3. Phylum
  4. class
  5. order
  6. family
  7. genus
  8. species
- In the modern day classification system there are \_\_\_\_\_ kingdoms and 3 domains.
- Correctly identify the kingdoms given the descriptions in the table below. Provide an example organism in each kingdom.

Kingdom	Description	Example Organism
Fungi	Consumers that stay put. They have eukaryotic cells. They may be unicellular or multicellular. They decompose dead organisms and waste from the environment.	mushrooms, yeast, mold
Plantae	Multicellular eukaryotes that photosynthesize. Have cellulose cell walls.	mosses, ferns, gymnosperms, angiosperms
Archaeobacteria	Mainly found in extreme environments. Some of these prokaryotic cells like extremely hot temperatures and areas of high salt content.	Thermophile
Animals	Multicellular consumers. They do not contain cell walls. Most have the ability to move.	sponges, starfish, mammals
Protista	Most diverse kingdom of organisms. They may be unicellular or multicellular. They live in moist environments. Some are plant-like, some animal-like, some fungus-like.	Euglena, Amoeba, Paramecium
Eubacteria	This group of prokaryotes can be both beneficial and harmful. Some cause diseases while others are used in the food industry and are decomposers.	streptococcus, E. coli



## Animals

7. Match the animal phylum characteristics with the correct phylum name:

- |   |                    |
|---|--------------------|
| <u>E</u> Contain no specialized tissue. Have many pores.                        | A. Platyhelminthes |
| <u>F</u> Bodies with radial symmetry. Stinging cells.                           | B. Chordata        |
| <u>A</u> Flat worms. Only one body opening for digestive tract                  | C. Nematoda        |
| <u>C</u> Round worms. First group with 2 body openings.                         | D. Arthropoda      |
| <u>G</u> Segmented worms. First group with complete Digestive system.           | E. Porifera        |
| <u>I</u> Snails, squid, clams, oysters, slugs. Soft-body and muscular foot.     | F. Cnidaria        |
| <u>D</u> Jointed appendages and exoskeletons. Contains insects and crustaceans. | G. Annelida        |
| <u>H</u> Spiny skin. Contains starfish, sea urchins.                            | H. Echinodermata   |
| <u>B</u> Notochord, gill slits, tail. Contains the subphylum vertebrata.        | I. Mollusa         |

8. In the table below, write in the correct Vertebrate class.

Class	Description
Amphibia	Must return to water to reproduce. Obtain oxygen with gills when young and with lungs and through skin as an adult.
Aves	Have hollow bones & feathers. Hagfish and lamprey are examples.
Agnatha	Are jawless fish with skeletons made of cartilage.
Chondrichthyes	Have skeletons of cartilage. Sharks, skates and rays are examples.
Reptilia	The first group to produce an amniotic egg. Have tough scaly skin.
Mammalia	Feed their young milk. Have hair as a body covering.
Osteichthyes	Bony fish.

9. Organisms that can maintain a constant body temperature regardless of external temperature are known as endothermic. (Also known as warm-blooded)

10. Organisms whose body temperature is similar to the temperature of the environment are known as ectothermic. (Also known as cold-blooded)

11. Give an example of an animal with radial symmetry? jelly fish, starfish With Asymmetrical symmetry? sponge

12. Which organisms are segmented? arthropods

## Plants

13. Phylum Bryophyta have no vascular tissue, no roots, stems, or leaves, and reproduce by spores.  
Ex. Mosses

14. Phylum Pterophyta have vascular tissue to transport food and water, but still reproduce by spores.  
Ex. Ferns

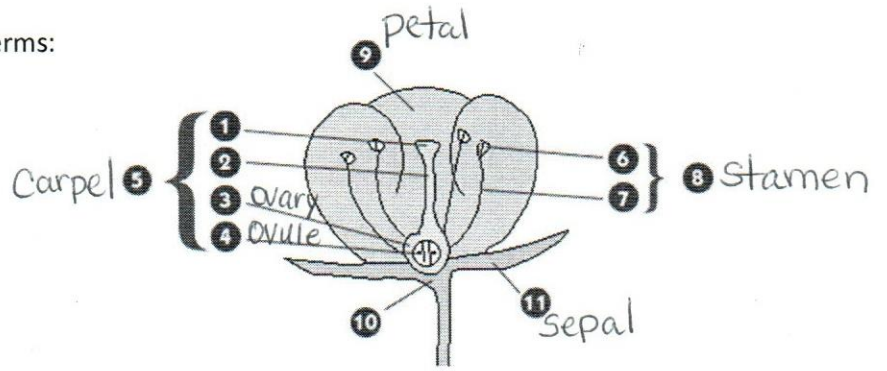
15. Phylum Coniferophyta have vascular tissue to transport food and water, and reproduce by seeds in cones. Ex. Gymnosperms like pine trees and spruce trees.

16. Phylum Anthophyta have vascular tissue to transport food and water, and reproduce by seeds in flowers and fruits. Ex. Angiosperms like sunflowers and apple trees.

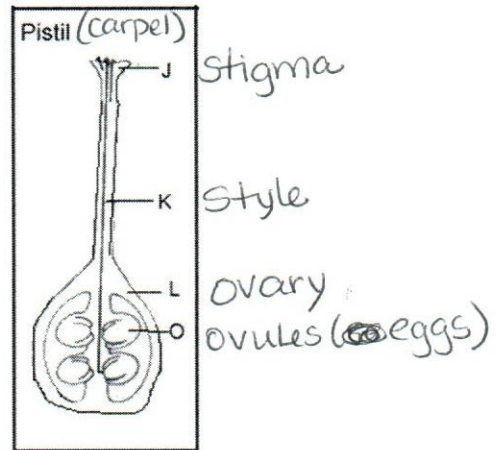
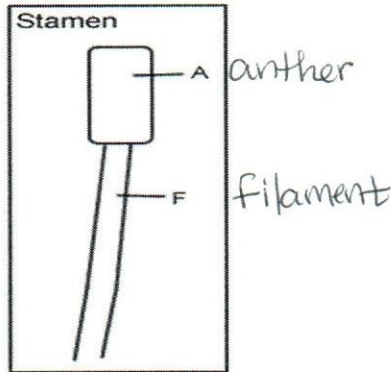
17. The type of vascular tissue that conducts water from the roots to the leaves is known as xylem.

18. The type of vascular tissue that conducts sugar from the leaves to the roots is known as phloem.

19. Label the flower below using the following terms:  
Petal, Carpel, stamen, ovary, ovule, sepal



20. Label the 3 parts of the pistil, and the 2 parts of the stamen in the drawings below.

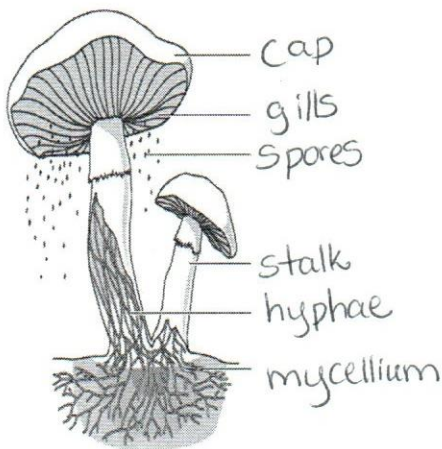


**Fungi**

Match the Fungi Phyla with their proper description.

- |  |                  |
|--|------------------|
| <u>D</u> 21. Bread mold; reproduces with zygospores.   | A. Basidiomycota |
| <u>C</u> 22. Yeast and mildew; sac fungi; reproduces with ascospores.                                | B. Deuteromycota |
| <u>A</u> 23. Mushrooms; club fungi; reproduces with basidiospores.                                   | C. Ascomycota    |
| <u>B</u> 24. Orange mold <i>Penicillium</i> ; only group to reproduce asexually only without spores. | D. Zygomycota    |

25. Label the following typical mushroom. What is the difference between hyphae and mycellium?



a single thread-like filament

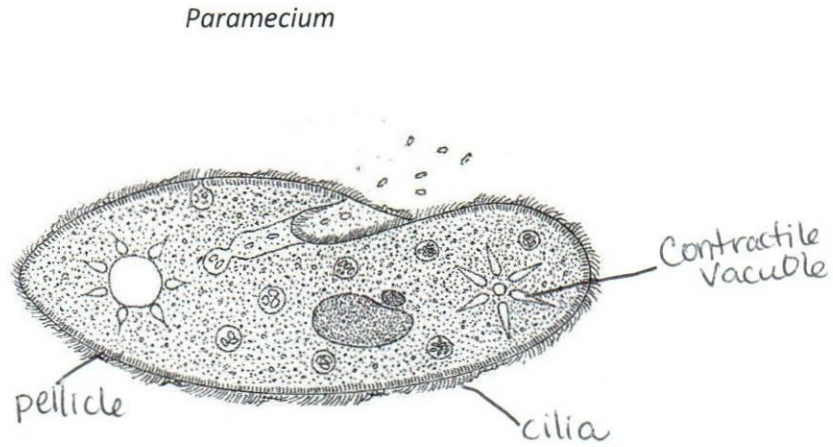
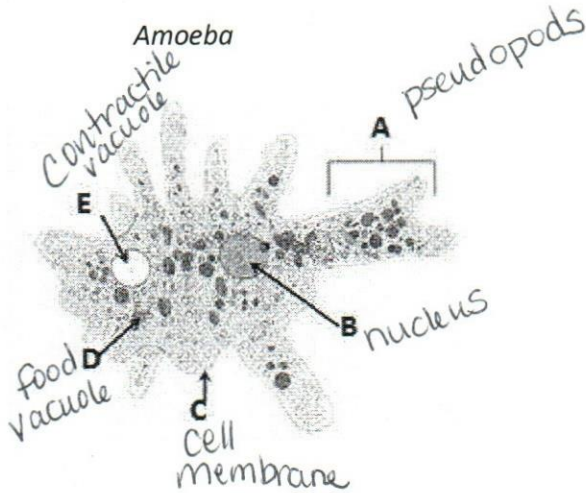
mass of underground hyphae

FIGURE 9.3. Parts of a Fungus

**Protista**

26. Organisms from Kingdom Protista can be animal-like because they are heterotrophs and do not have cell walls, plant-like because they are autotrophs and have cell walls of cellulose, or fungus-like because they are decomposers.

27. Label the structures on the typical animal-like protists below.



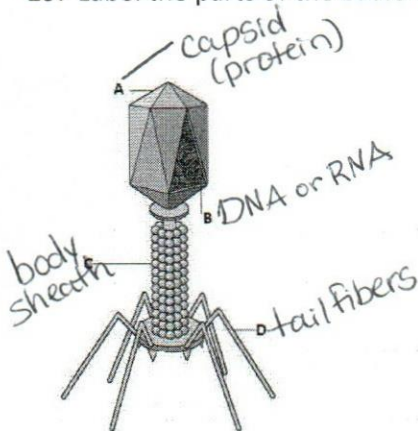
**Eubacteria and Archaeobacteria**

28. Write three differences between Kingdoms Eubacteria and Archaeobacteria based on the table below.

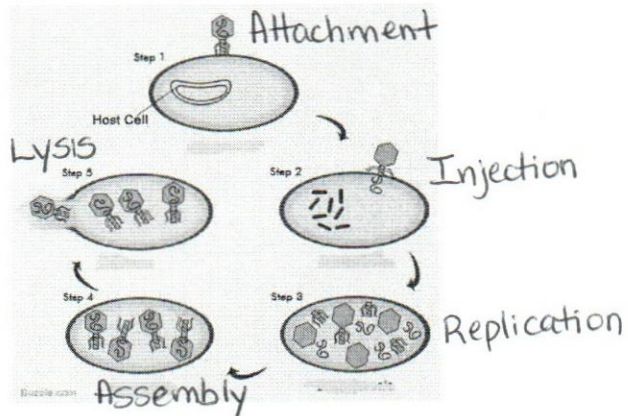
	Eubacteria (modern bacteria)	Archaeobacteria (ancient bacteria)
Cell Wall Components	peptidoglycan	no peptidoglycan
Where Found	everywhere	extreme environments
Examples	Streptococcus, E. coli	thermophiles, acidophiles

**Viruses (Not Found in Any Kingdom Because They Are NOT living!)**

29. Label the parts of the bacteriophage below.



30. Label the parts of the Lytic cycle below.



31. How is the lytic cycle above different from the lysogenic cycle?

- virus takes over host cell DNA to make new virus

- virus forms a prophage and embeds into host DNA, host divides before something triggers virus to come out and take over.