

FSU'S SCOPE OF SERVICES FOR FISCAL YEAR 2013-2015
THE FSU OF ORANGE COUNTY, FLORIDA

Name, Date, Hr/Per _____
Cellular Transport Worksheet
 Answer the following questions using your notes and your textbook.

OSMOSIS - Write the correct type of solution underneath (isotonic, hypertonic, or hypotonic)

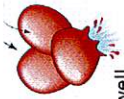
1. _____
 2. _____
 3. _____

there is a **GREATER** concentration of solute molecules **OUTSIDE** the cell than inside.

there is a **LOWER** concentration of solute molecules **OUTSIDE** the cell than inside.

there is the **SAME** concentration of solute molecules **OUTSIDE** the cell as inside.

7. The **SWELLING AND BURSTING** of animal cells when water enters happens when a cell is placed in a _____ tonic solution.
8. What organelle [that plants have that animals don't] keeps plant cells from bursting in this condition? _____
9. The **SHRINKING** of plant cells when water leaves so the cell membrane pulls away from the cell wall or **shrinking** of animal cells happens when a plant cell is placed into a _____ tonic solution.
10. Cells stay the same size when placed in an _____ tonic solution because the amount of water leaving the cell is the same and the amount of water entering.



Cells swell and burst



Cells shrink and shrivel

MULTIPLE CHOICE: Circle and/or fill-in the answer(s) that best complete(s) the sentence.

1. The substance that dissolves to make a solution is called the _____
 A. diffuser B. solvent C. solute D. concentrate
2. During diffusion molecules tend to move _____
 A. up / against the concentration gradient C. down / with the concentration gradient
 B. from an area of lower concentration to an area of higher concentration D. in a direction that doesn't depend on concentration

3. When the concentration of solute inside & outside a cell is the same, the cell has reached _____
 A. maximum concentration B. homeostasis
 C. osmotic pressure D. dynamic equilibrium
4. The diffusion of water across a selectively permeable membrane is called _____
 A. active transport B. facilitated diffusion
 C. osmosis D. phagocytosis
5. Energy for active transport comes from a cell's _____
 A. Golgi complex B. nucleus
 C. mitochondria D. lysosomes
6. _____ transport requires energy from ATP to move substances across membranes.
 A. Passive B. Active
7. All of the following are kinds of passive transport EXCEPT _____
 A. Diffusion B. facilitated diffusion
 C. Osmosis D. ion channels
8. When molecules move **DOWN** the concentration gradient it means they're moving from _____
 A. an area of low concentration to an area of higher concentration
 B. an area of high concentration to an area of lower concentration

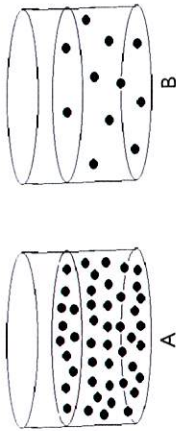
Fill-Ins - Complete the transport terms. Some of the letters have been filled in!

1. Active transport requires E _____ to move molecules across membranes.
2. A _____ is the molecule that provides the energy for active transport.
3. D _____ moves oxygen and carbon dioxide molecules from a high concentration to a low concentration across membranes.
4. The cell organelles that burn glucose and provides ATP for active transport are the M _____.
5. Water moves across membranes by O _____.
6. A small membrane sac used to transport substances during exocytosis & endocytosis = V _____.
7. P _____ transport does **NOT** REQUIRE energy.
8. A cell placed in an I _____ solution neither swells or shrinks because the concentration of molecules outside the cell is the same as inside.
9. A solution in which there is a **HIGHER** concentration of molecules **OUTSIDE** the cell than inside = H _____.
10. A **CONCENTRATION** G _____ forms whenever there is a difference in concentration between one place and another.
11. A solution in which the concentration of molecules outside the cell is **LOWER** than inside = L _____.
12. When molecules move from **high** to **low** along a concentration gradient we say they are moving "D _____" the gradient.

FSU'S SCOPE OF SERVICES FOR FISCAL YEAR 2013-2015
THE FSU OF ORANGE COUNTY, FLORIDA

13. pressure is caused by water inside a plant cell pushing against the cell wall.

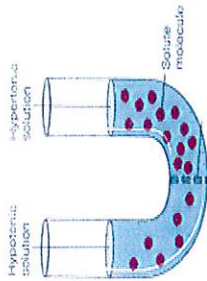
LOOK AT THE DIAGRAMS – The black dots represent solute molecules dissolved in water



1. In which beaker is the concentration of solute the greatest?
A or B

2. If the solute (dots) in this diagram is unable to pass through the dividing membrane, what will happen?

- A. the water level will rise on the right side of the tube
- B. the water level will rise on the left side of the tube
- C. the water level will stay equal on the two sides



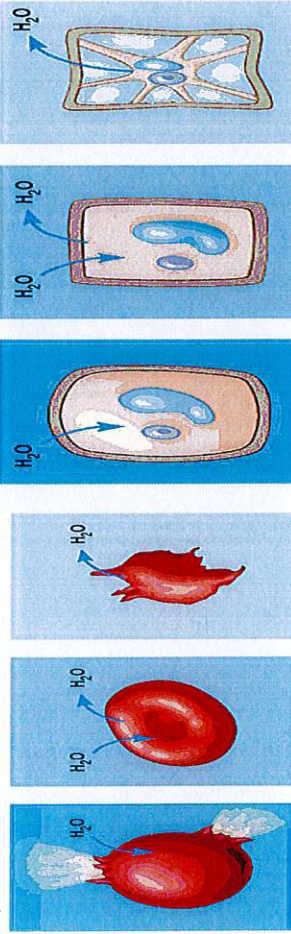
Match the description with the solution type:

1. <u> </u> solution with a lower solute concentration (more water)	
2. <u> </u> solution in which the solute concentration is the same	
3. <u> </u> condition plant cells require	
4. <u> </u> condition that animal cells require	
5. <u> </u> red blood cell bursts (cytolysis)	
6. <u> </u> plant cells shrink (plasmolysis)	
7. <u> </u> solution with a higher solute concentration (less water)	
8. <u> </u> solution with a high water concentration	

- A. Isotonic
- B. Hypertonic
- C. Hypotonic

Label the tonicity for each solution (isotonic, hypotonic, or hypertonic):

Pay close attention to the arrows!!!



Examine the pictures on the bottom of the left side of this page. What [if anything] is different about the plant and animal cells in each of these states?

State	Animal Cell	Plant Cell
Hypertonic		
Isotonic		
Hypotonic		

Matching – Match each term to its definition.

a. energy

b. facilitated diffusion

c. endocytosis

d. passive transport

e. active transport

f. exocytosis

g. protein ion pump

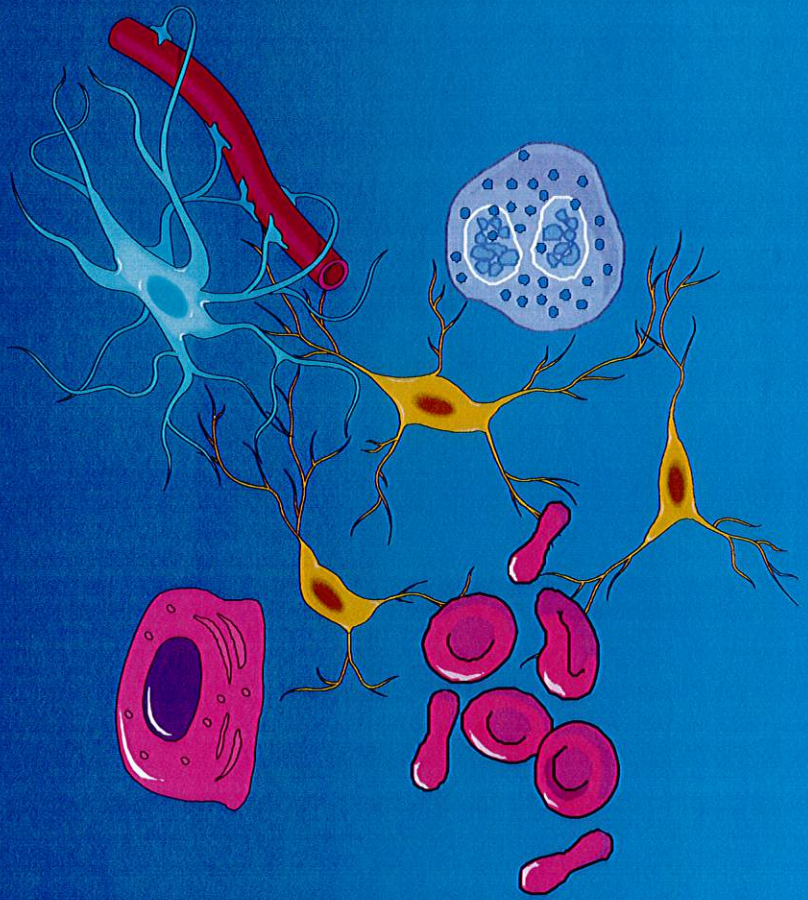
h. channel protein

Short Answer –

I. Name two factors that affect the rate of diffusion.

- 1. Transport protein that provides a tube-like opening in the plasma membrane through which particles can diffuse.
- 2. Is used during active transport but not passive transport.
- 3. Process by which a cell takes in material by forming a vacuole around it
- 4. Particle movement from an area of high concentration to an area of lower concentration.
- 5. Process by which a cell expels wastes from a vacuole
- 6. A form of passive transport that uses transport proteins
- 7. Particle movement from an area of lower concentration to an area of higher concentration
- 8. Transport protein that changes shape when a particle binds with it

Cell Theory Day 1



Bell Ringer

- What is the basic unit of all living things?
- What is one thing cells need to live?

Answer

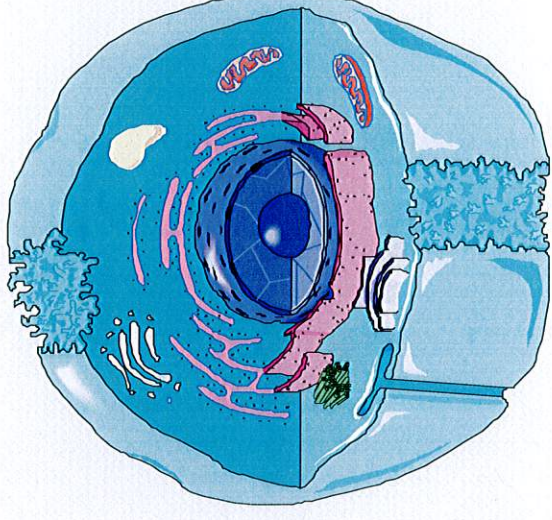
- The cell, and energy. (ex. Oxygen for humans, sunlight for plants)

The Cell Theory

- 1. The cell is the basic unit of structure of all living things.**
 - The smallest living things are one-celled or unicellular
 - Large organisms contain millions of cells. They are many-celled or multicellular.
- 2. The cell is the basic unit of function of all living things**
 - All of the organism's life functions are carried out by cells or parts of cells.
- 3. Cells arise (come) from other living cells - not from nonliving matter.**

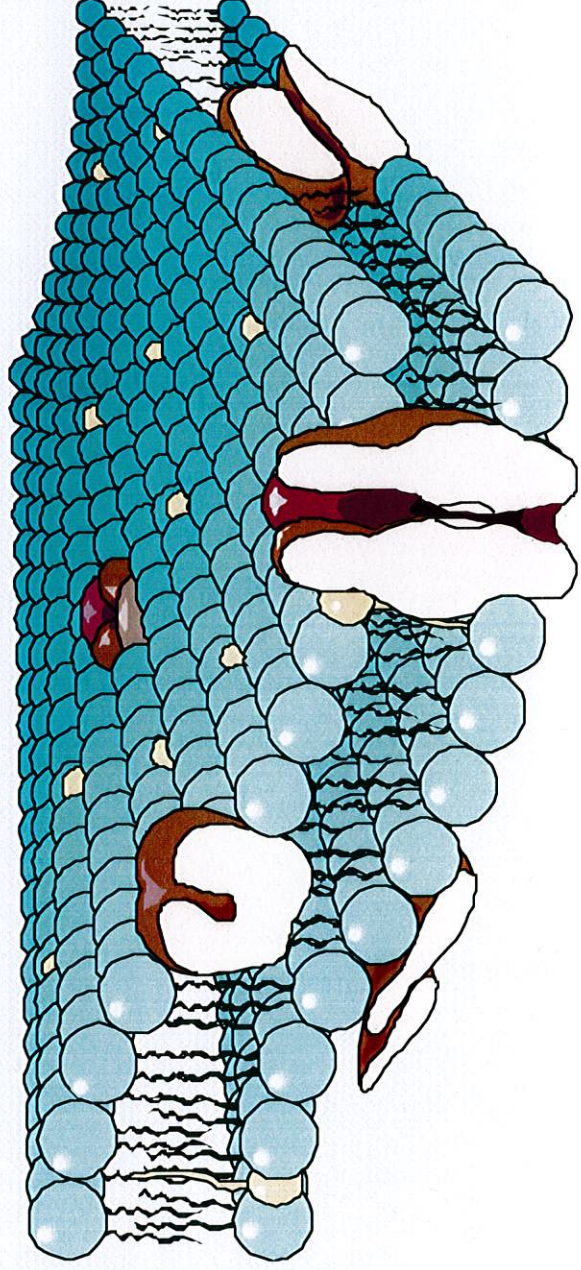
Organelles

- There are many small structures located inside the cell.
 - “little organs”
- These tiny structures perform certain functions that keep the cell (and the organism) alive.
- Some organelles are found only in animal cells and others are located only in plant cells.
 - Prokaryotes (bacteria) - No organelles!
 - Eukaryotes (Plants and animals) - organelles
- Most organelles are found in both plant and animal cells.



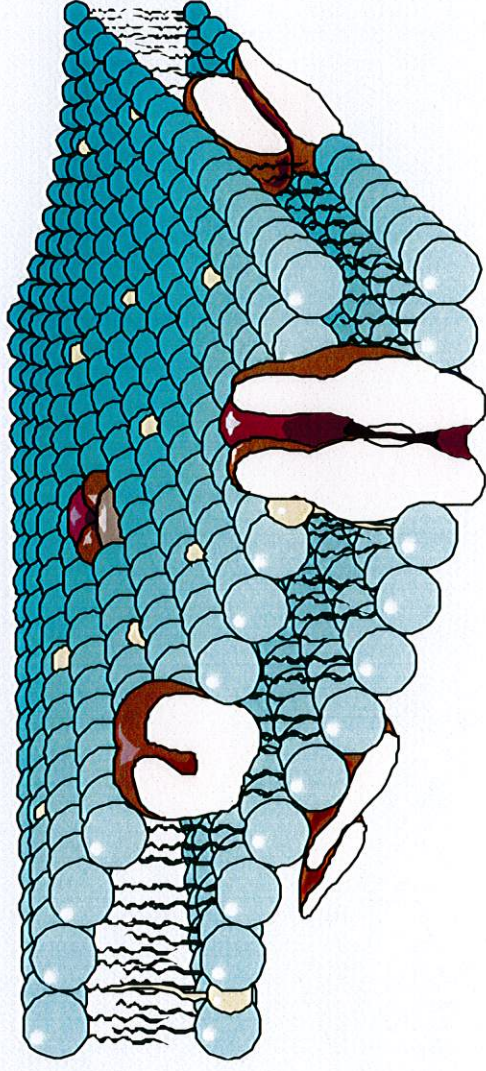
Cell (Plasma) Membrane

- A double-layered structure that surrounds the cell.
- Also called a **phospholipid bilayer**.
- **Provides a boundary** between the cell and its environment.



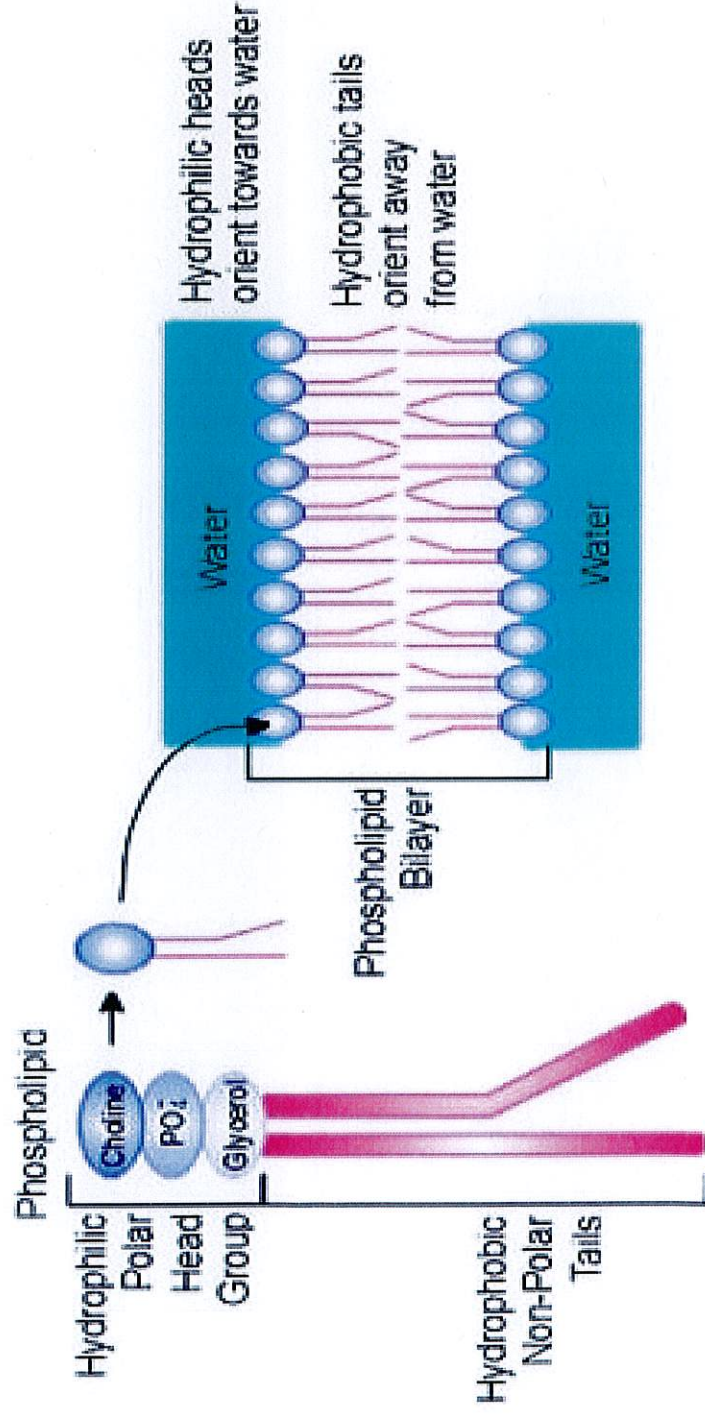
Cell (Plasma) Membrane

- The function (job) of the membrane is to **regulate or control** the passage of materials into and out of the cell and to help maintain cell shape.
- Cell membranes are **selectively permeable**, some substances can pass through it and others cannot.



Cell (Plasma) Membrane

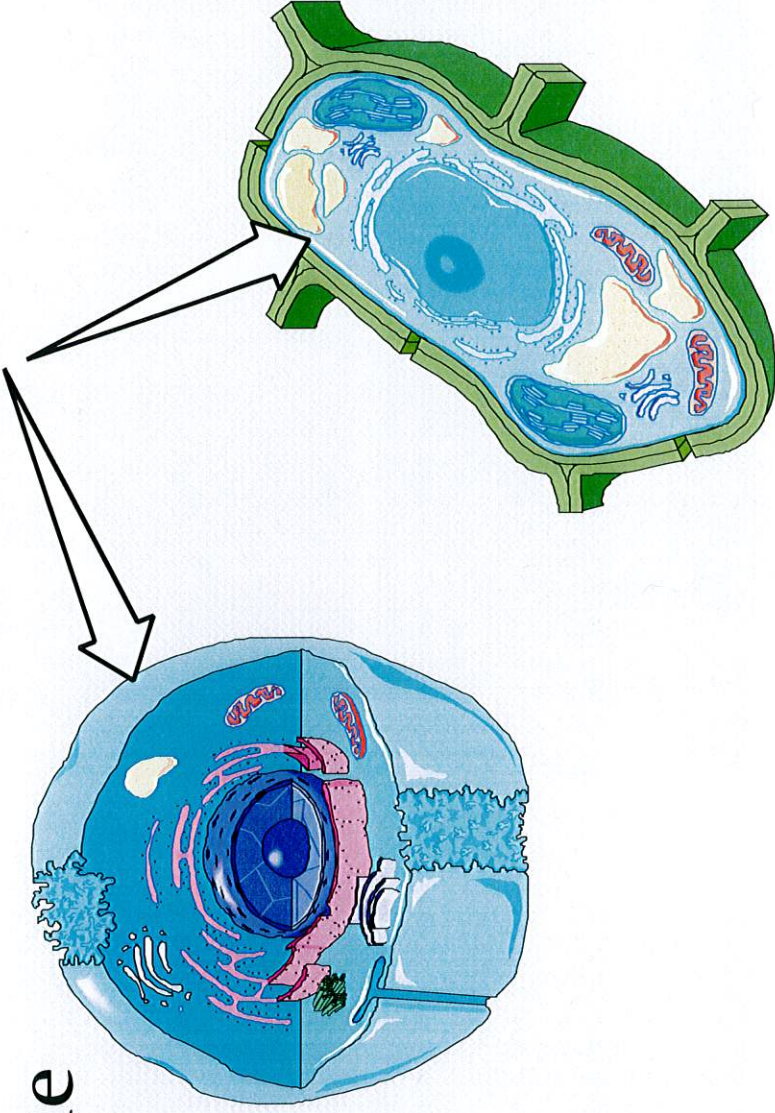
- Made of a phosphate head and 2 lipid tails



Cell (Plasma) Membrane

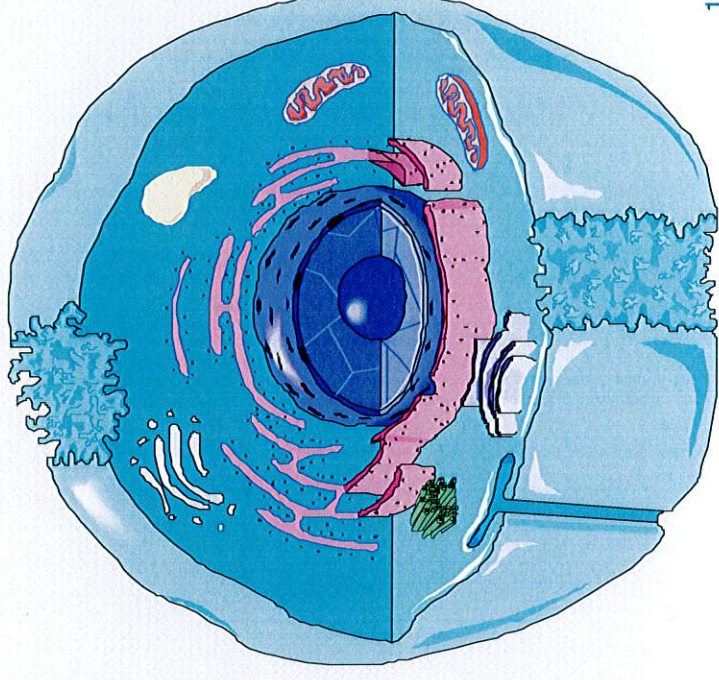
- In animal cells the membrane is located outside the cell border.
- In plant cells the membrane is located inside the cell wall.

Cell Membrane



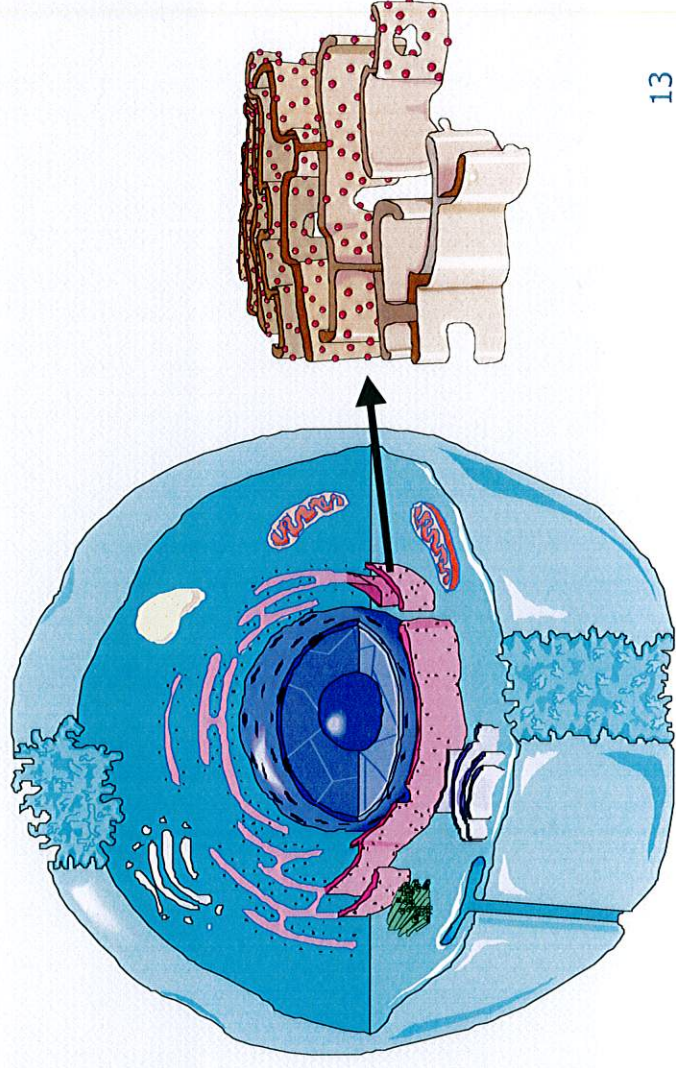
Cytoplasm

- The **watery cell fluid** (cytosol) that contains the cell organelles.
- The cytoplasm is located between the cell membrane and the nucleus.
- Many life processes take place in the cytoplasm.
- **Nutrients and minerals** spread through the cytoplasm to all parts of the cell.



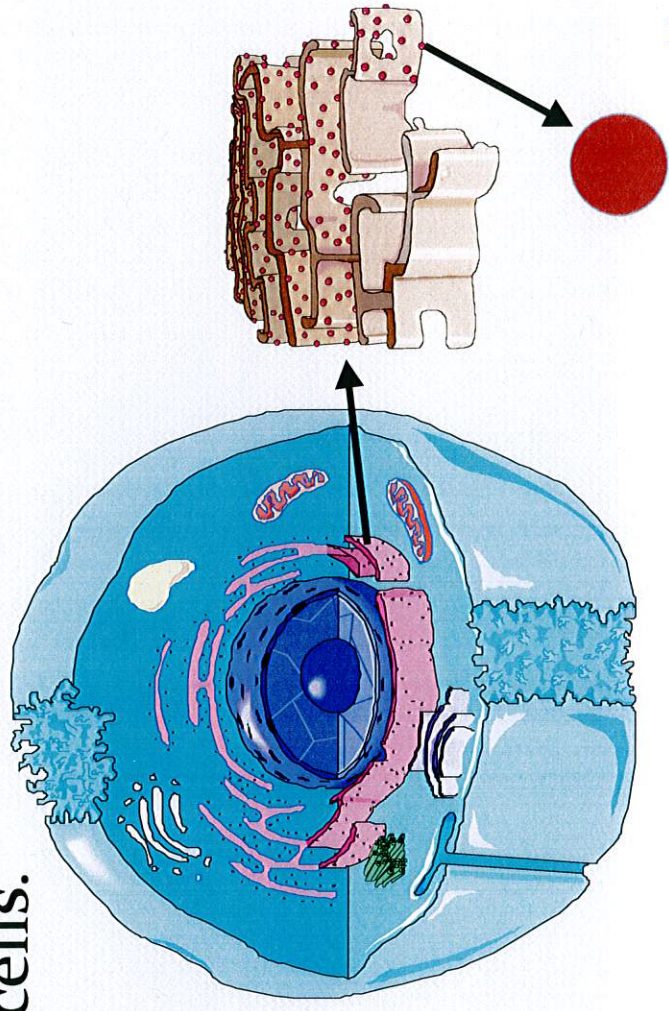
Endoplasmic Reticulum

- Materials are **transported** throughout the cell by a system of channels or canals called the ER.
- Chemical reactions take place on the surface of ER.
- In some places it has a **rough surface** and in other **places it is smooth**.
- The rough surface is due to the presence of ribosomes.
- Cells making proteins contain a large amount of rough ER.



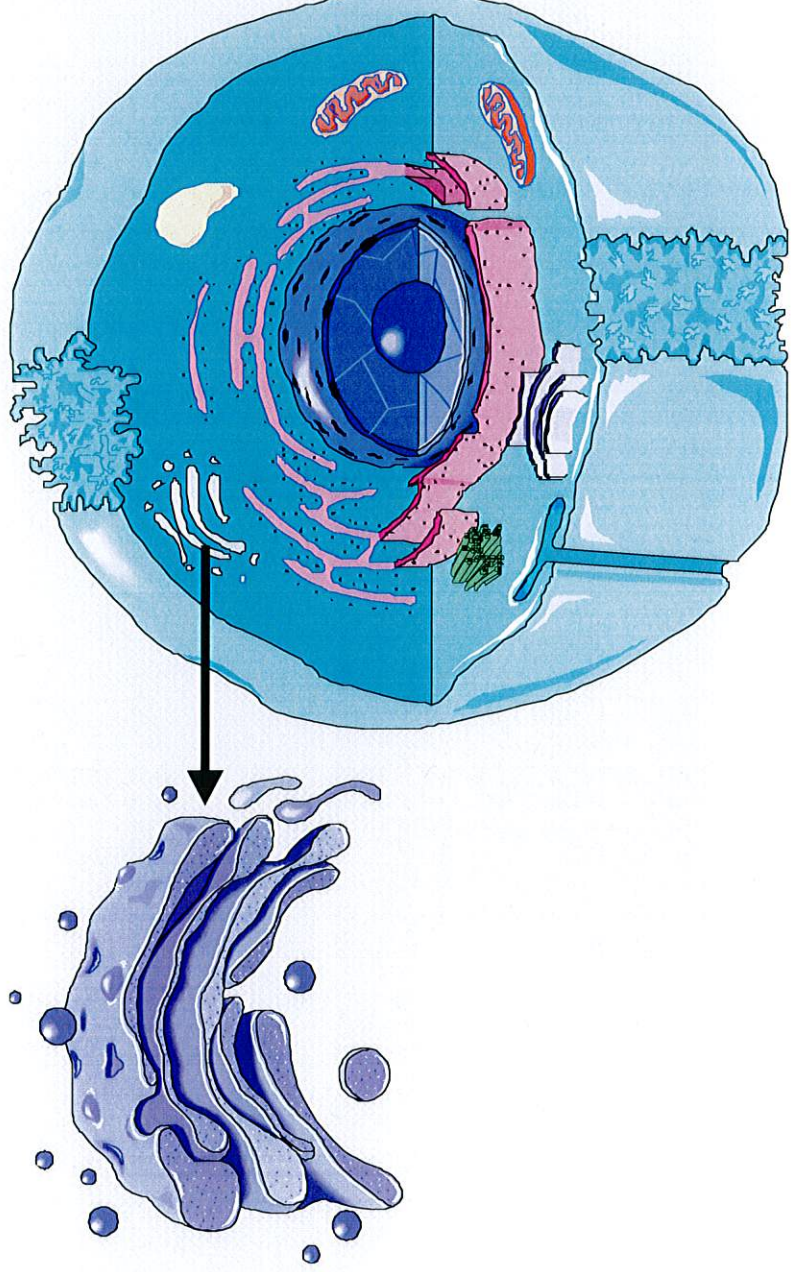
Ribosome

- **Proteins are synthesized**(made) at the ribosomes.
- They may be attached to the endoplasmic reticulum or free in the cytoplasm.
- These small, spherical structures are the most numerous organelles in almost all cells.



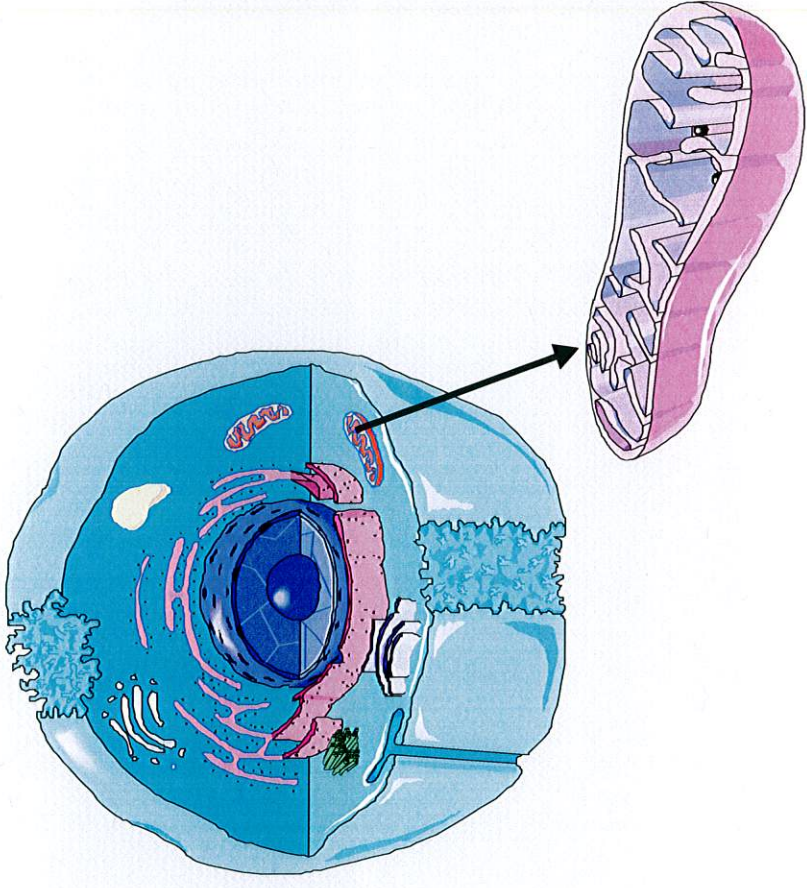
Golgi Complex

- A stack of membrane-bounded channels and vacuoles.
- They **synthesize, package, and secrete** cell products.



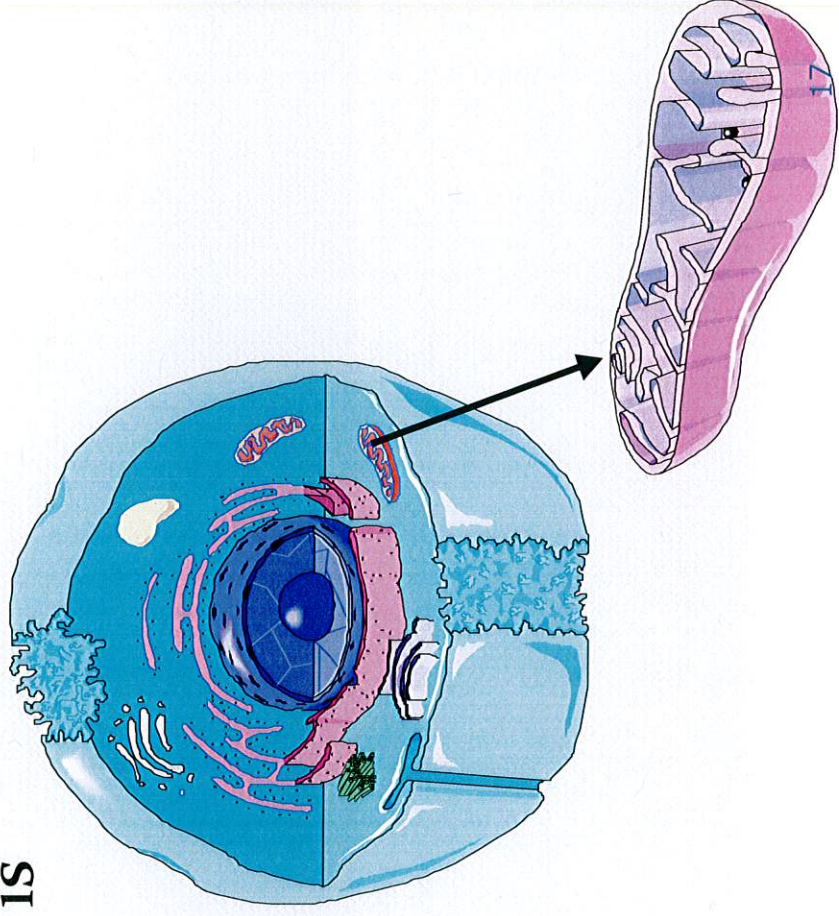
Mitochondria

- The organelle involved in cellular respiration.
- They are called the “**powerhouses**” of the cell.
- They are large organelles scattered through most cells.
- They are most numerous in cells that use a lot of energy.



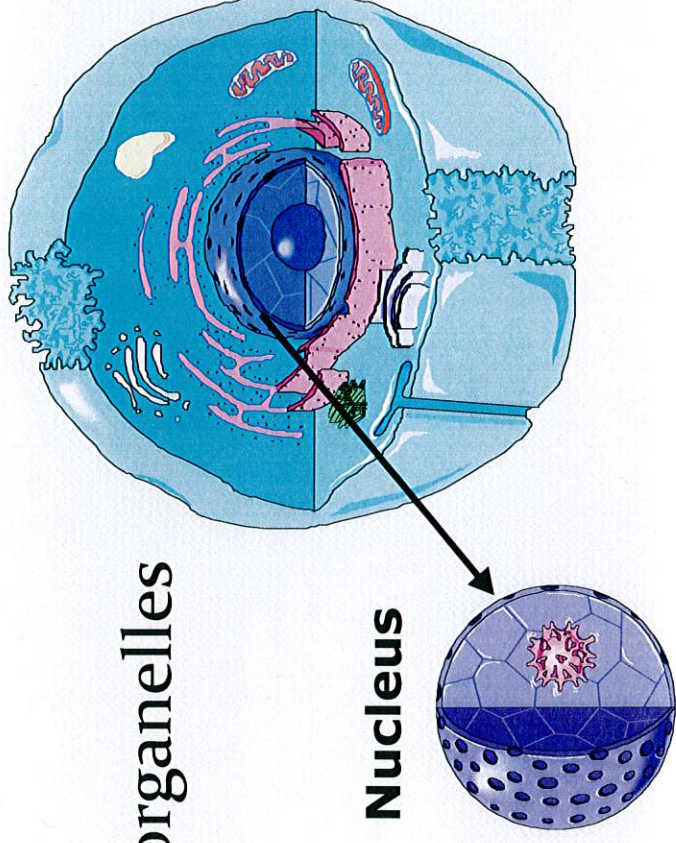
Mitochondria

- Mitochondria contain materials necessary for respiratory reactions.
- It is here that energy (**ATP**) is released from nutrients in the cell.
- Without the constant supply of energy (**ATP**) produced by respiration, the cell would die.



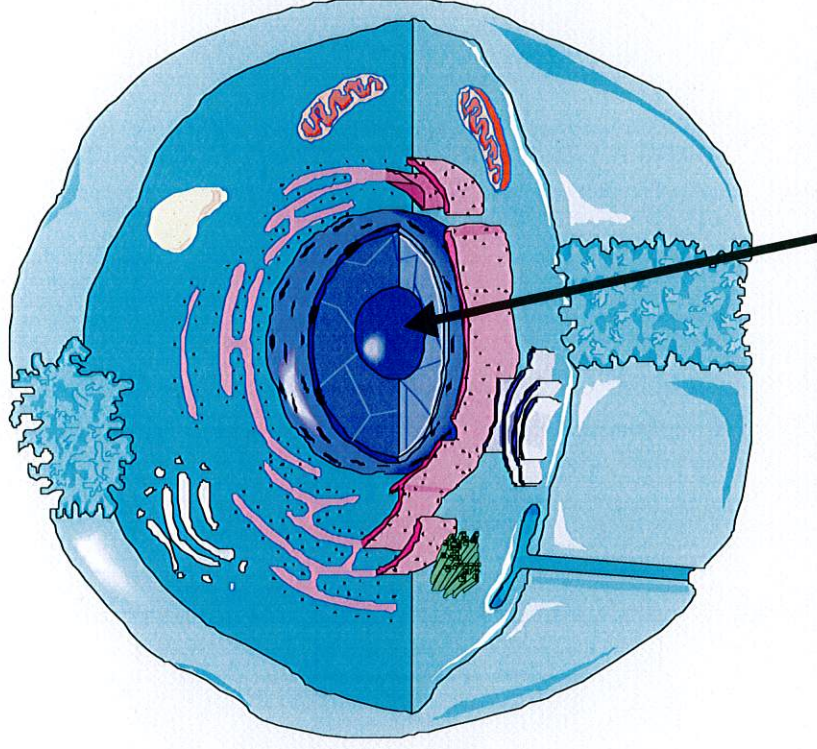
Nucleus

- A large round structure located inside the cytoplasm of the cell.
- The nucleus is surrounded by its own membrane, called the **nuclear membrane**.
- Contains **chromosomes**
- The nucleus contains other organelles (chromosomes - DNA and the nucleolus).
- **Cell activities are controlled by the nucleus**



Nucleolus

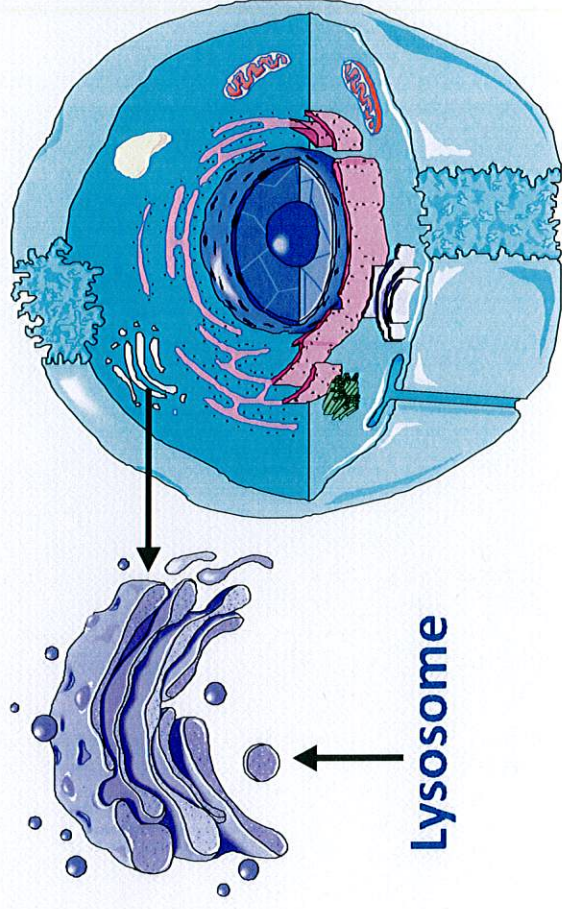
- Located in the nucleus.
- Is involved in the **production of ribosomes.**



Nucleolus

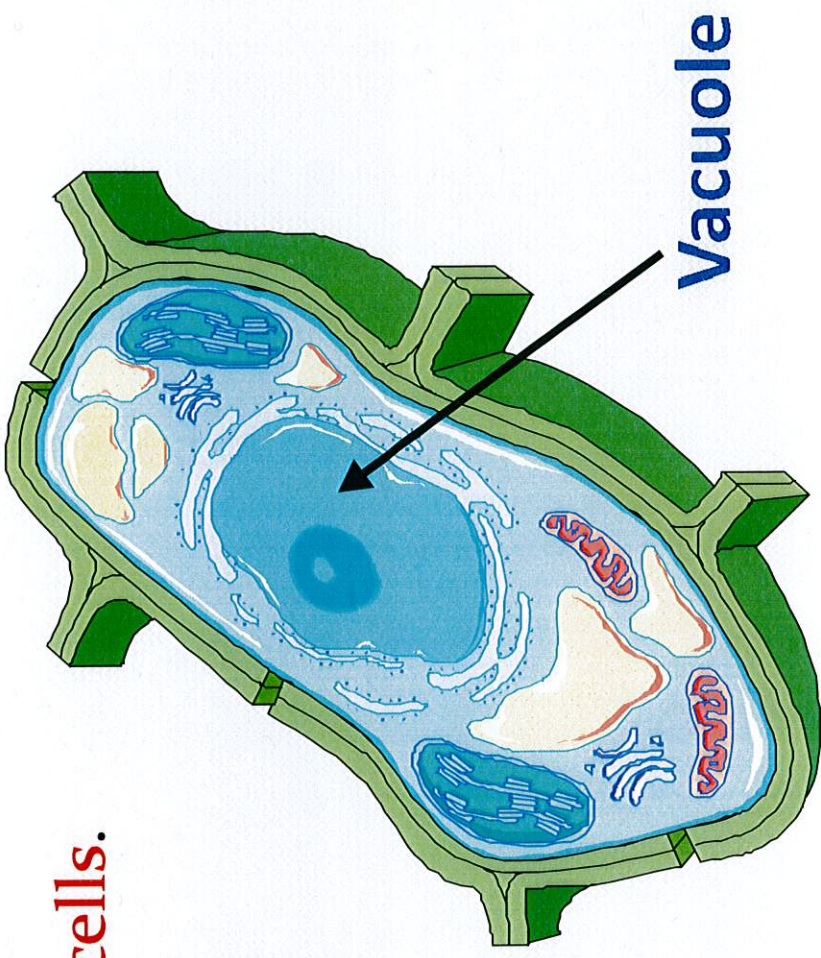
Lysosome

- Membrane-bound sac that contains **digestive enzymes**.
- They are involved in food digestion in one-celled animals.
- Lysosomes **destroy damaged or old cell parts** or cells in multicellular animals.
- Seen **primarily in animals cells**



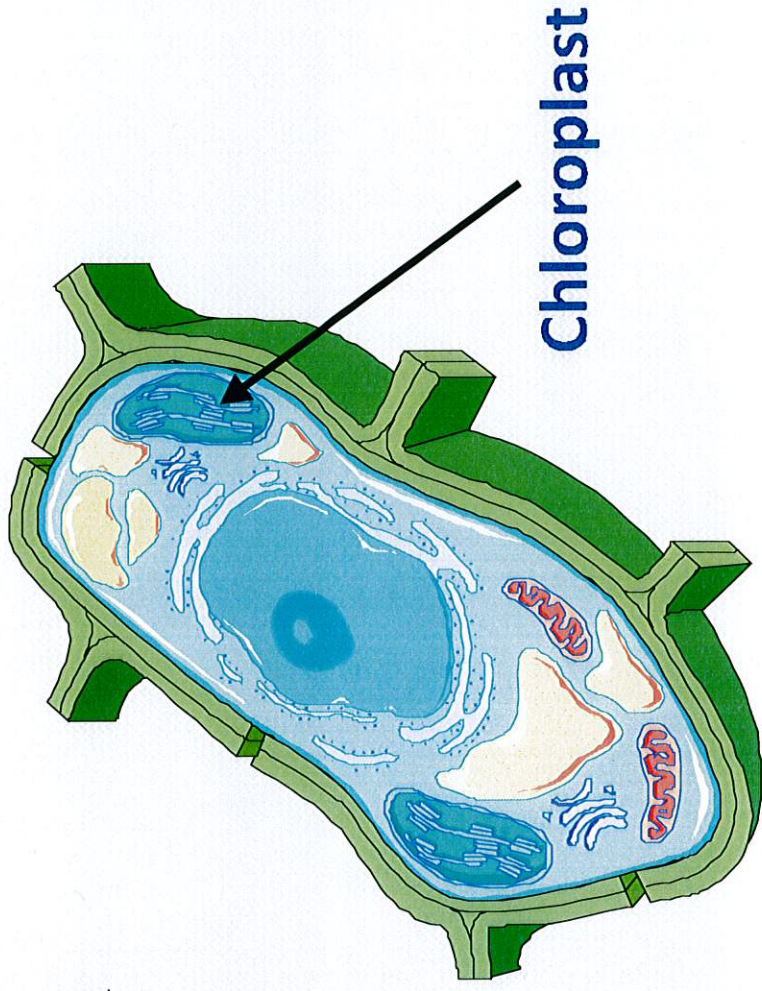
Vacuole

- Membrane bound, sac-like structures used by the cell to **store various materials**, including food and water.
- Located in the cytoplasm.
- Found **primarily in plant cells**.
- In plants, their pressure is involved in enabling the plant to stand upright.



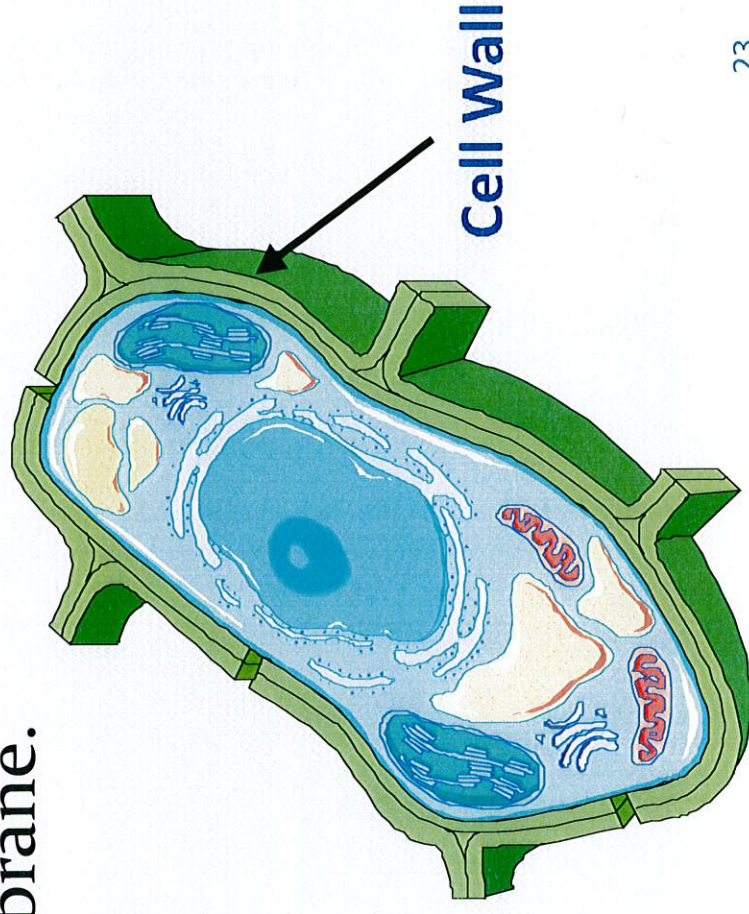
Chloroplast

- The organelle involved in **the manufacture of food in plants (photosynthesis)**.
- They are located in the cytoplasm and contain the green pigment **chlorophyll**.
- Chloroplasts are found in green plants and one-celled organisms called **algae**.



Cell Wall

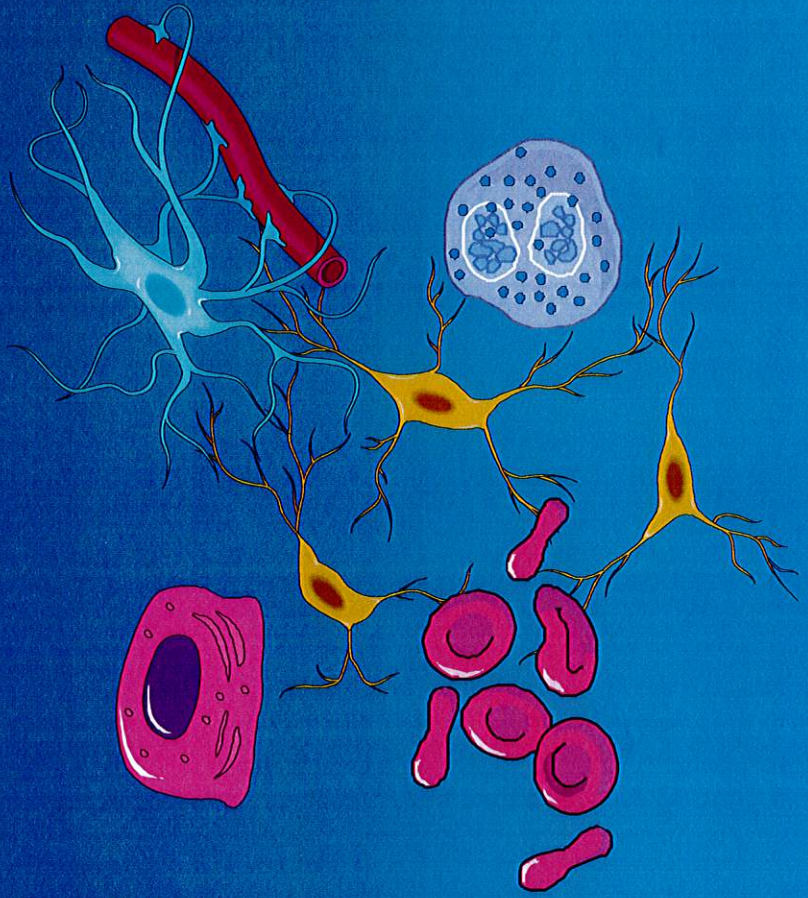
- The stiff outer layer of **plant cells**.
- It **surrounds the cell membrane** and its contents.
- Pores in the cell wall allow substances to come in contact with the cell membrane.
- Composed of a nonliving material called **cellulose**.
- The stiffness of the cell wall limits the plants growth and movement.
- The cell wall gives the plant its shape.



Class work

- Worksheet A (Cross section of plant and animal cell)

Cell Theory Day 2



Bell Ringer

- Where are proteins synthesized for export or insertion into the cell membrane? What processes and packages protein?

Answer

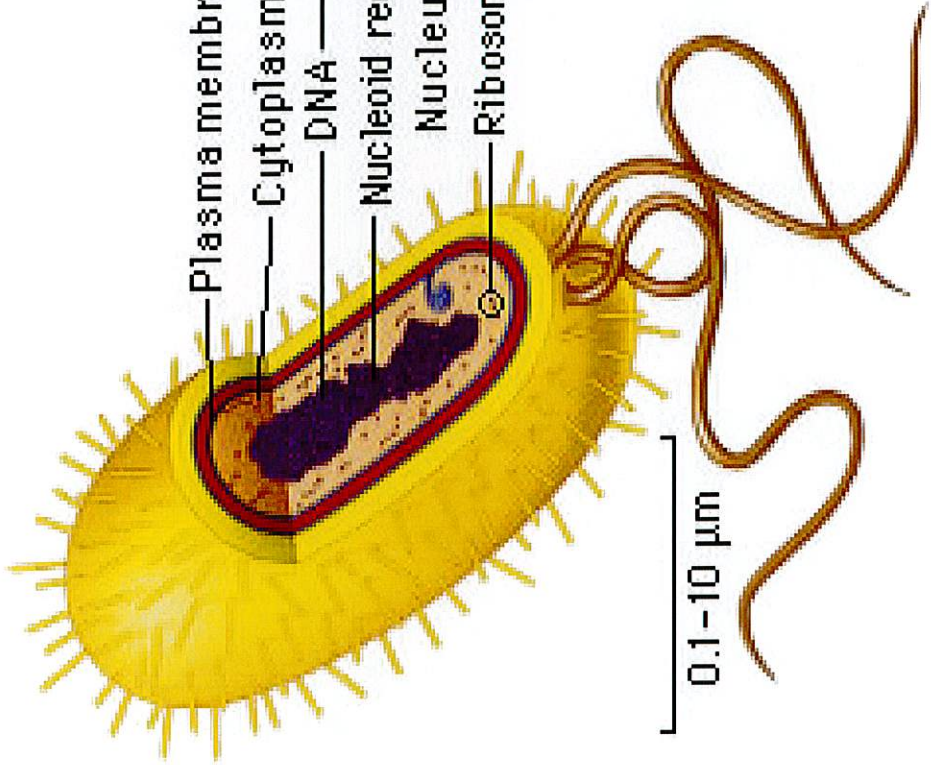
- ER (endoplasmic reticulum), the Golgi Body

The Cell Theory

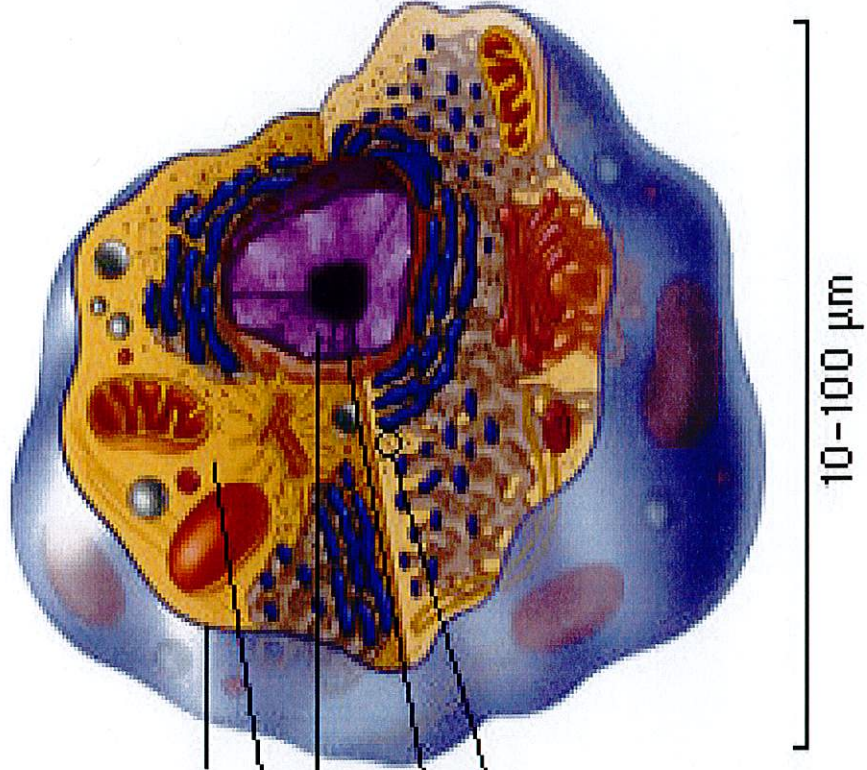
1. **All living organisms are composed of cells.**
2. **The cell is the basic unit of life.**
3. **Cells arise from pre-existing cells.**

Prokaryotic vs. Eukaryotic

Prokaryotic cell



Eukaryotic cell



Eukaryotes vs. Prokaryotes

Characteristic	Prokaryotes	Eukaryotes
Diameter of cell	0.2 – 2.0 micrometers	10-100 micrometers
Nucleus	No nuclear membrane or nucleoli	True nucleus with nuclear membrane & nucleoli
Membrane-enclosed organelles	Absent	Present: includes lysosomes, Golgi, etc.
Flagella	Consist of two protein building blocks	Complex: consists of multiple microtubules
Cell wall	Usually present; chemically complex	When present, chemically simple
Plasma membrane	No carbohydrates and lacks sterols	Sterols and carbohydrates present that serve as receptors
Cytoplasm	No cytoskeleton	Cytoskeleton with cytoplasmic streaming
Ribosomes	Smaller size	Larger size except in organelles when smaller
DNA arrangement	Single circular chromosome without histones	Multiple linear chromosomes with histones
Cell division	Binary fission	Mitosis
Sexual reproduction	Transfer of DNA fragments only	Involves meiosis

Animal vs. Plant

• ANIMAL CELLS

- 1. Eukaryote
- 2. NO cell wall
- 3. A few small vacuoles
- 3. NO chloroplasts
- 4. Lysosomes
- 5. Roundish
- 6. Respiration (O_2)
- 7. Carbs -> Glycogen

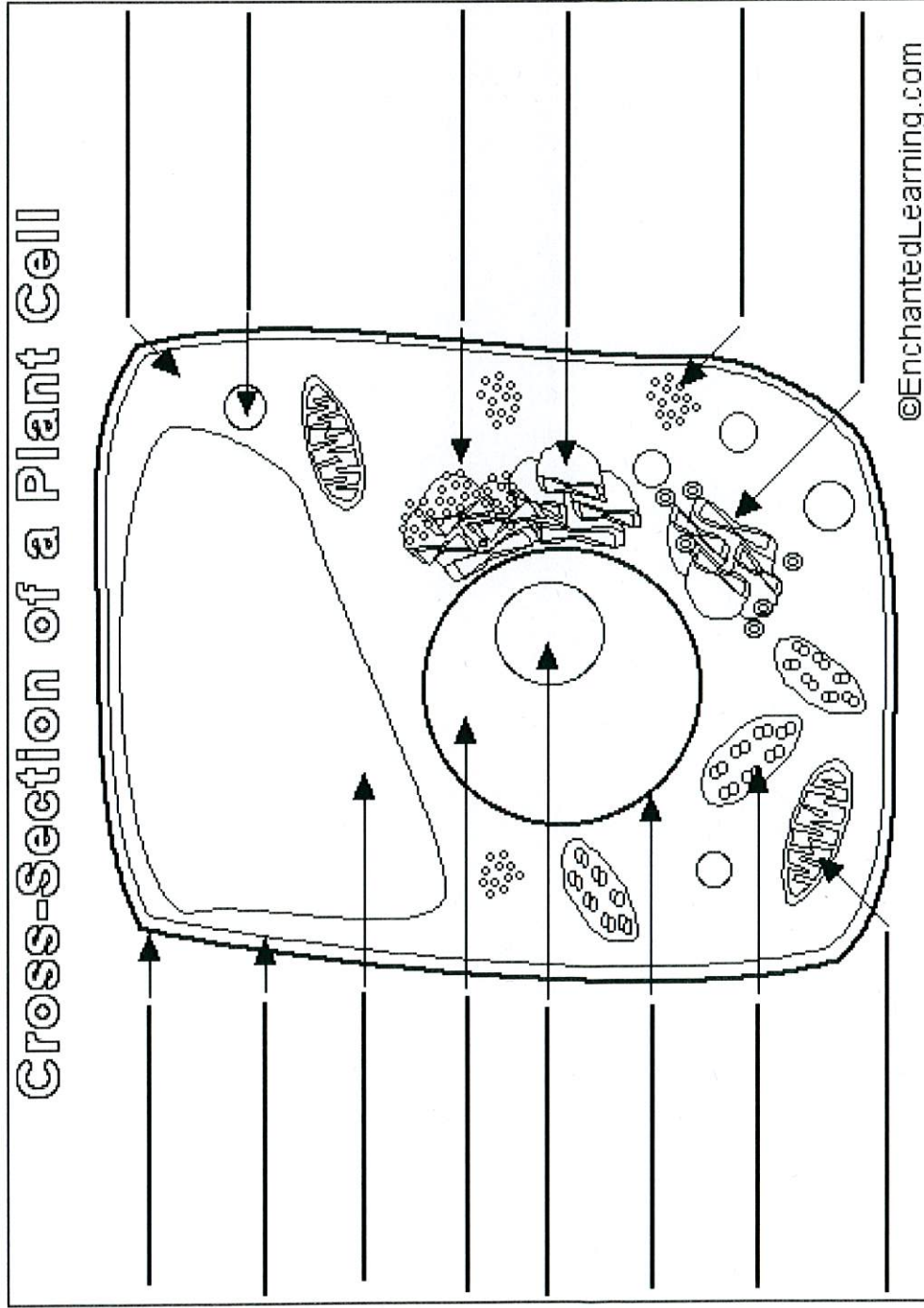
• PLANT CELLS

- 1. Eukaryote
- 2. Cell wall (cellulose)
- 2. One large vacuole
- 3. Chloroplasts
- 4. A few lysosomes
- 5. Rectangular
- 6. Photosynthesis (CO_2)
- 7. Carbs -> Starch

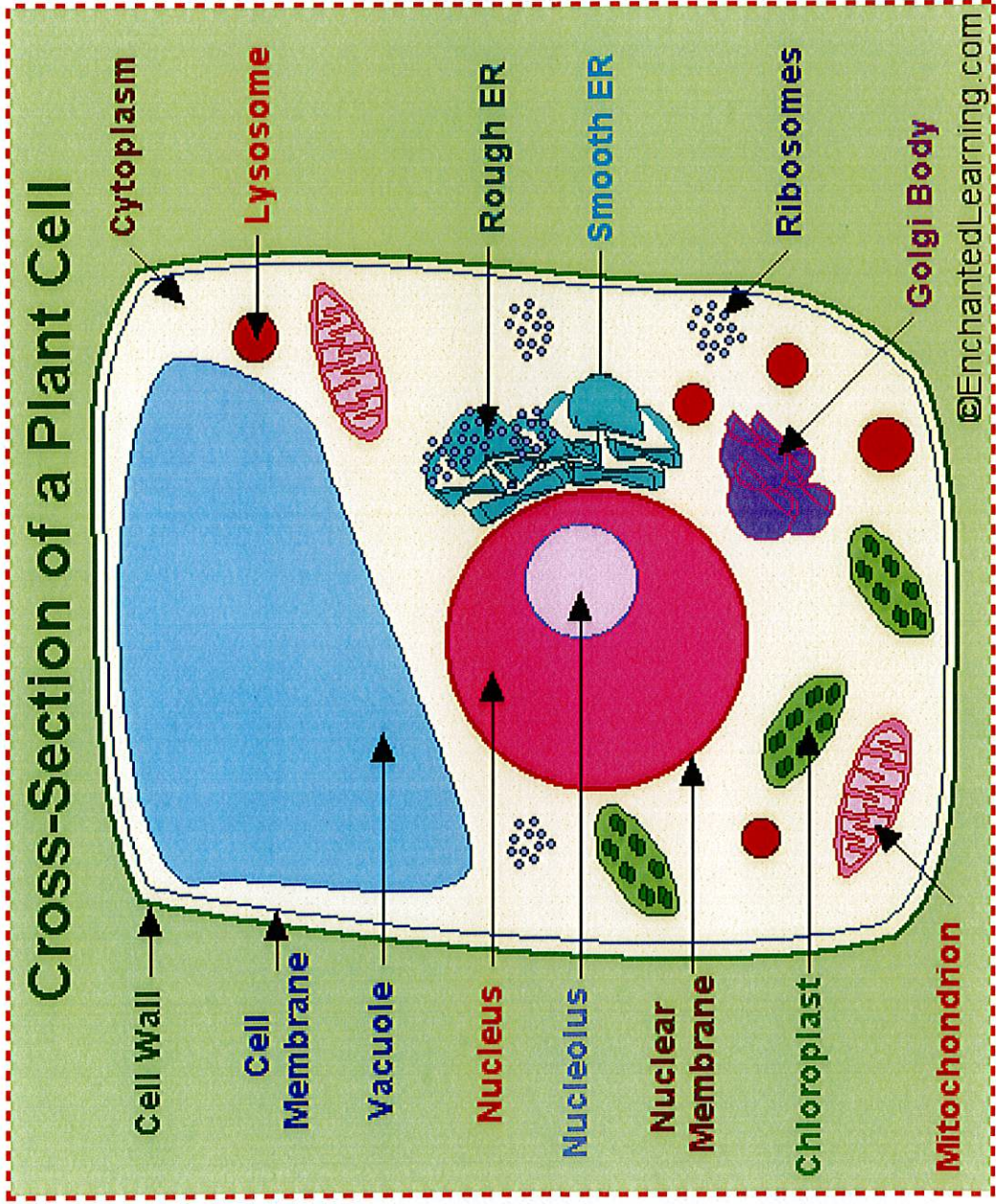
Classwork

- Students will switch homework with other students and check their answers from the power point.

Plant Cells

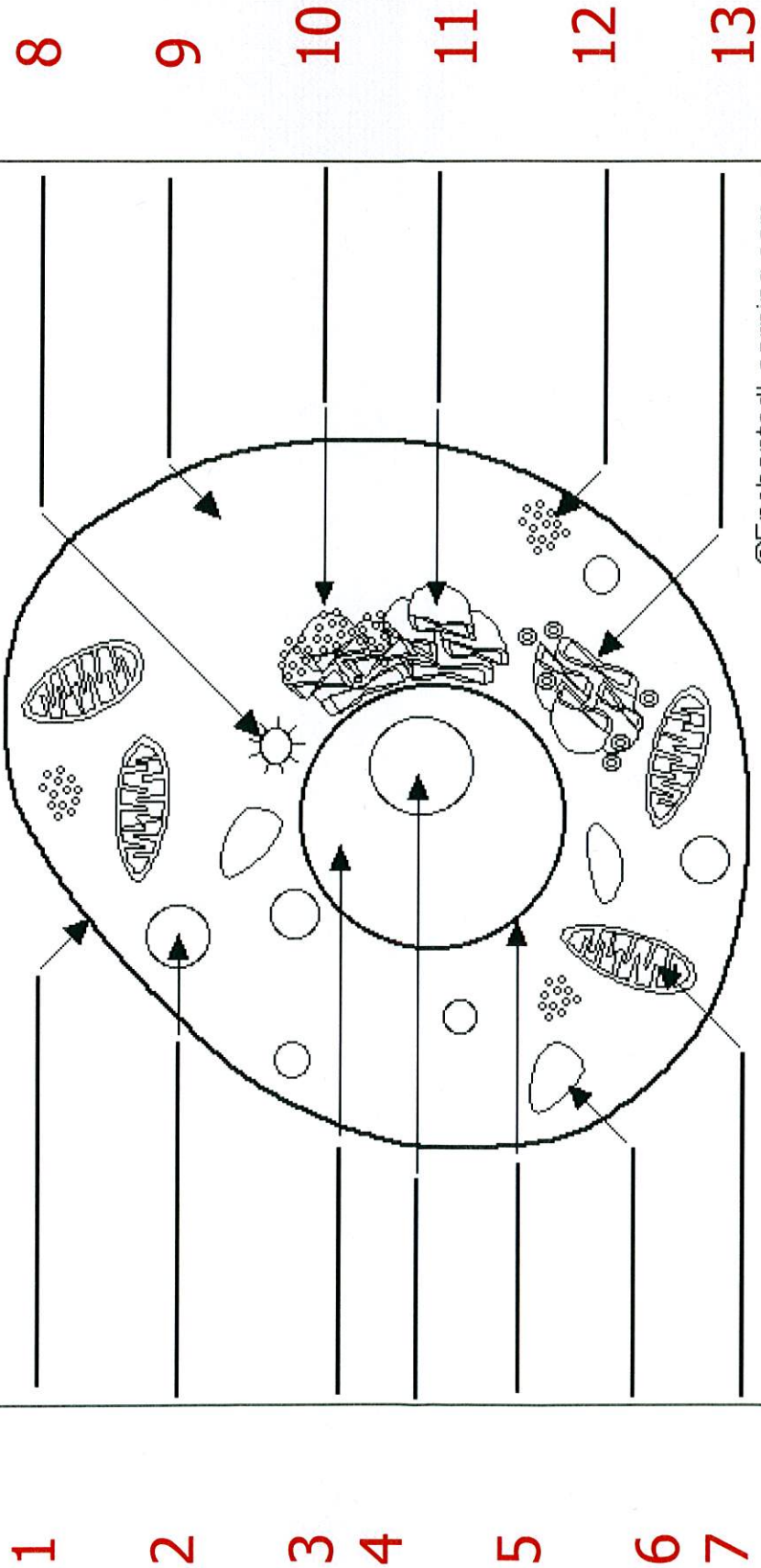


Plant Cells



Animal Cells

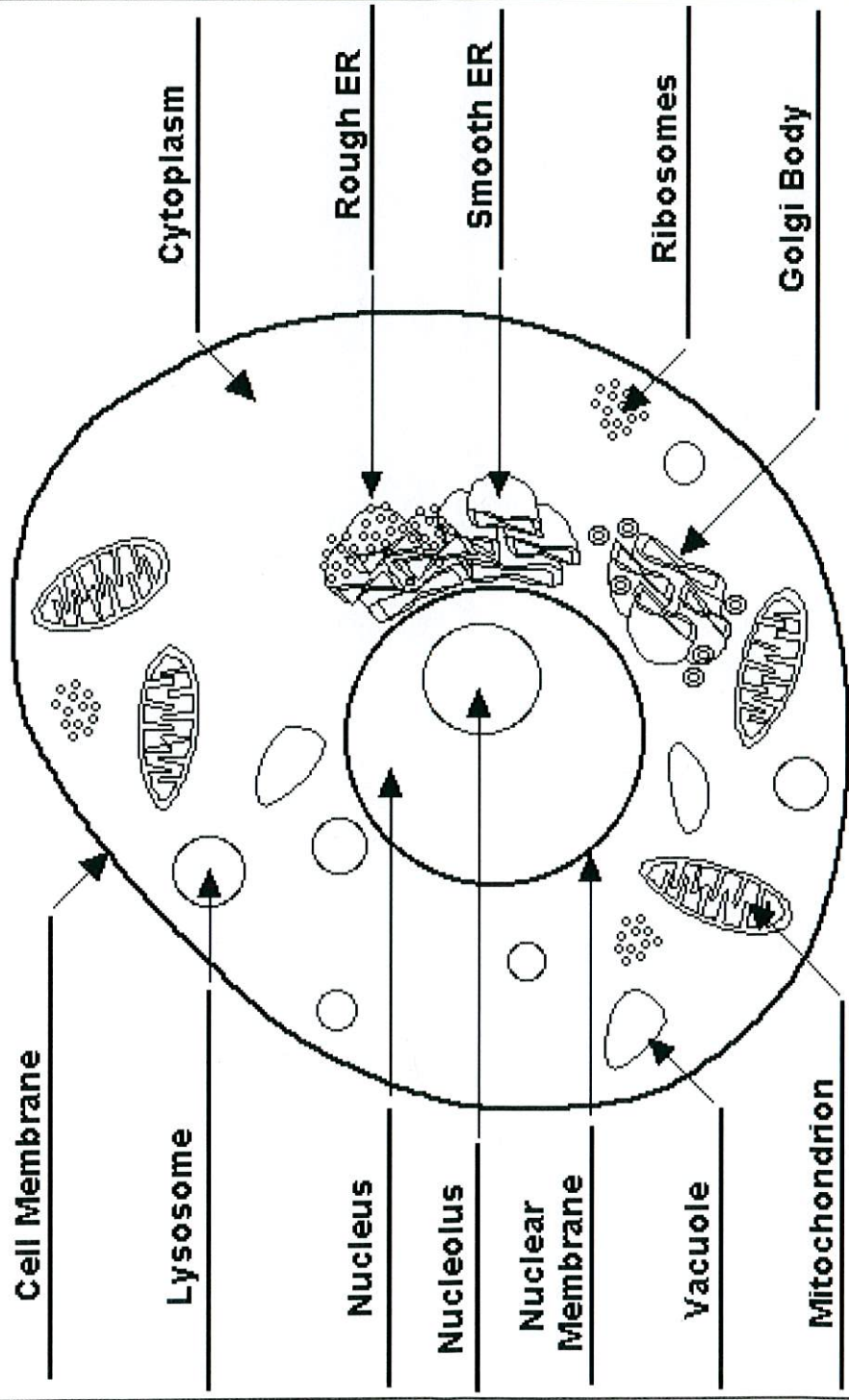
Cross-Section of an Animal Cell



©EnchantedLearning.com

Animal Cells

Cross-Section of an Animal Cell



Cell Trivia

- 1) **False**
 - Vacuoles STORE
 - Lysosomes DIGEST
- 2) **True**
- 3) **True**
- 4) **False**
 - Rough ER is responsible for synthesizing proteins
- 5) **True**
- 6) **False**
 - Cell walls are only found in PLANTS and FUNGI
- 7) **True**
- 8) **True**
- 9) **True**
- 10) **False**
 - Mitochondria = "Powerhouse" – Makes A LOT of ATP

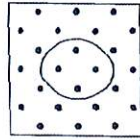
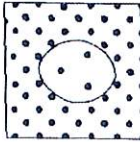
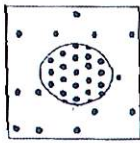
FSU'S SCOPE OF SERVICES FOR FISCAL YEAR 2013-2015
THE FSU OF ORANGE COUNTY, FLORIDA

Name, Date, Hr/Per _____ **KEY**

Cellular Transport Worksheet

Answer the following questions using your notes and your textbook.

OSMOSIS - Write the correct type of solution underneath (isotonic, hypertonic, or hypotonic)

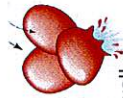


1. hypotonic 2. hypertonic 3. isotonic (same concentration/distribution)

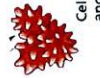
there is a GREATER concentration of solute molecules OUTSIDE the cell than inside.

there is a LOWER concentration of solute molecules OUTSIDE the cell than inside.

there is the SAME concentration of solute molecules outside the cell as inside.



Cells swell and burst



Cells shrink and shrivel

9. The SHRINKING of plant cells when water leaves so the cell membrane pulls away from the cell wall or shrinking of animal cells happens when a plant cell is placed into a hyper tonic solution.

10. Cells stay the same size when placed in an iso tonic solution because the amount of water leaving the cell is the same and the amount of water entering.

MULTIPLE CHOICE Circle and/or fill in the answer(s) that best complete(s) the sentence.

1. The substance that dissolves to make a solution is called the _____
A. diffuser B. solvent **C. solute** D. concentrate

2. During diffusion molecules tend to move _____
A. up / against the concentration gradient **C. down / with the concentration gradient**
B. from an area of lower concentration to an area of higher concentration D. in a direction that doesn't depend on concentration

3. When the concentration of solute inside & outside a cell is the same, the cell has reached _____
A. maximum concentration B. homeostasis
C. osmotic pressure **D. dynamic equilibrium**

4. The diffusion of water across a selectively permeable membrane is called _____
A. active transport B. facilitated diffusion
C. osmosis D. phagocytosis

5. Energy for active transport comes from a cell's _____
A. Golgi complex B. nucleus
C. mitochondria D. lysosomes

6. _____ transport requires energy from ATP to move substances across membranes.
A. Passive **B. Active**

7. All of the following are kinds of passive transport EXCEPT _____
A. Diffusion B. facilitated diffusion
C. Osmosis **D. ionchannels**

8. When molecules move DOWN the concentration gradient it means they're moving from _____
A. an area of low concentration to an area of higher concentration
B. an area of high concentration to an area of lower concentration

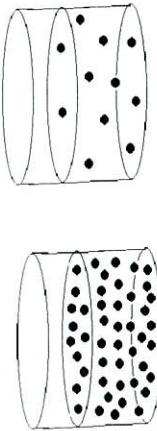
Fill-Ins - Complete the transport terms. Some of the letters have been filled in!

- Active transport requires E_N_E_R_G_Y to move molecules across membranes.
- A_T_P is the molecule that provides the energy for active transport.
- D_I_F_F_U_S_I_O_N moves oxygen and carbon dioxide molecules from a high concentration to a low concentration across membranes.
M_I_T_O_C_H_O_N_D_R_I_A
- The cell organelles that burn glucose and provides ATP for active transport are the M_I_T_O_C_H_O_N_D_R_I_A.
- Water moves across membranes by O_S_M_O_S_I_S.
- A small membrane sac used to transport substances during exocytosis & endocytosis = V_A_C_U_O_L_E (vesicle would also work - but didn't fit in the spaces)
- P_A_S_S_I_V_E transport does NOT REQUIRE energy.
- A cell placed in an H_Y_P_E_R_T_O_N_I_C solution neither swells or shrinks because the concentration of molecules outside the cell is the same as inside.
- A solution in which there is a HIGHER concentration of molecules OUTSIDE the cell than inside = H_Y_P_E_R_T_O_N_I_C.
- A CONCENTRATION G_R_A_D_I_E_N_T forms whenever there is a difference in concentration between one place and another.
- A solution in which the concentration of molecules outside the cell is LOWER than inside = H_Y_P_O_T_O_N_I_C.
- When molecules move from high to low along a concentration gradient we say they are moving "D_O_W_N" the gradient.

FSU'S SCOPE OF SERVICES FOR FISCAL YEAR 2013-2015
THE FSU OF ORANGE COUNTY, FLORIDA

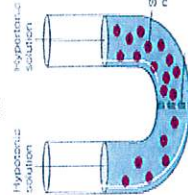
13. O **SMOTIC** pressure is caused by water inside a plant cell pushing against the cell wall.

LOOK AT THE DIAGRAMS – The black dots represent solute molecules dissolved in water.



1. In which beaker is the concentration of solute the greatest? **A** or **B**

A



2. If the solute (dots) in this diagram is unable to pass through the dividing membrane, what will happen?
A. the water level will rise on the right side of the tube

- B. the water level will rise on the left side of the tube
- C. the water level will stay equal on the two sides

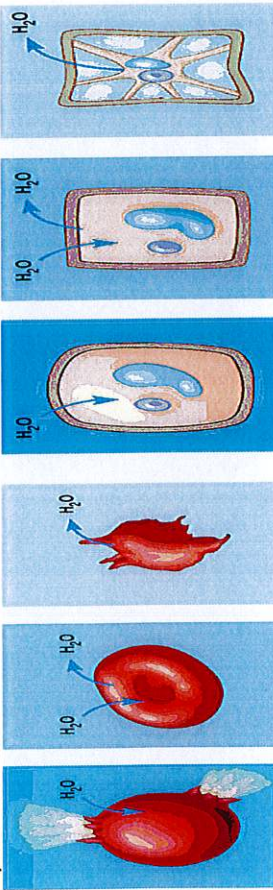
Match the description with the solution type:

1. <u>C</u> solution with a lower solute concentration (more water)
2. <u>A</u> solution in which the solute concentration is the same
3. <u>C</u> condition plant cells require [otherwise the cell shrinks away from the membrane and the plant wilts]
4. <u>A</u> condition that animal cells require
5. <u>C</u> red blood cell bursts (cytolysis)
6. <u>B</u> plant cells shrink (plasmolysis)
7. <u>B</u> solution with a higher solute concentration (less water)
8. <u>C</u> solution with a high water concentration [which means <input type="checkbox"/> solute conc.]

- A. Isotonic
- B. Hypertonic
- C. Hypotonic

Label the tonicity for each solution (isotonic, hypotonic, or hypertonic):

Pay close attention to the arrows!!!



hypotonic isotonic hypertonic hypotonic hypertonic hypertonic

Examine the pictures on the bottom of the left side of this page. What [if anything] is different about the plant and animal cells in each of these states?

<u>State</u>	<u>Animal Cell</u>	<u>Plant Cell</u>
Hypertonic	cell shrinks	cell shrinks away from the cell wall
Isotonic	cell remains the same size	cell remains the same size
Hypotonic	cell swells & bursts	cell swells against the cell wall

Matching – Match each term to its definition.

- a. energy H 1. Transport protein that provides a tube-like opening in the plasma membrane through which particles can diffuse
- b. facilitated diffusion A 2. Is used during active transport but not passive transport
- c. endocytosis C 3. Process by which a cell takes in material by forming a vacuole around it
- d. passive transport D 4. Particle movement from an area of higher concentration to an area of lower concentration
- e. active transport F 5. Process by which a cell expels wastes from a vacuole
- f. exocytosis B 6. A form of passive transport that uses transport proteins
- g. protein ion pump E 7. Particle movement from an area of lower concentration to an area of higher concentration
- h. channel protein G 8. Transport protein that changes shape when a particle binds with it

Short Answer –

1. Name two factors that affect the rate of diffusion.
 - temperature [increase temp, increase diffusion bc particles speed up]
 - shape [some particles can move by simple diffusion, some can move through protein channels, and some have to move by ion carriers or by endo/exo-cytosis]
 - concentration [increase concentration, increase diffusion]
 - charge [no charge diffuses easily, charged particles do not]
 - solubility [if a substance not soluble...it often won't diffuse in certain solvent]