Unit 3: PACKET
CELL TRANSPORT

This packet is designed to help you understand several concepts about **CELL TRANSPORT**.

As you practice the exercises on each handout, you will be able to:

SCIENTIFIC METHOD:

Understand science content using the following inquiry cycle: ask questions, design investigations, collect data, analyze data & draw conclusions, reflect on the process, pose new questions and then start the cycle again.

- ***HS10-PS1-5.2*** Students apply the scientific method to a real world problem**.**

***CELL TRANSPORT*:**

Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis

- ***HS10-LS1-3.1*** Differentiate Between Eukaryotic and Prokaryotic Cells (ex. cytoskeleton, nucleus, membrane-bound organelles).
- ***HS10-LS1-3.2*** Understand the components of the Cell Theory.
- ***HS10-LS1-3.3*** Describe the structure of the cell membrane as a phospholipid bilayer with intermembrane proteins that is semi-permeable.
- ***HS10-LS1-3.4*** Explain methods of passive transport (ex. diffusion, facilitated diffusion, osmosis) as a cell's attempt to reach dynamic equilibrium.
- ***HS10-LS1-3.5*** Explain how cells maintain homeostasis when placed in various solutions: hypertonic, hypotonic, isotonic.
- ***HS10-LS1-3.6*** Differentiate between active and passive transport (ex. concentration gradient, dynamic equilibrium, use of energy).

Record this packet in the Table of Contents for Unit 3.
This will be the first "HANDOUT."

Contained in this Packet:

1. Cell Questions
2. Prokaryote Eukaryote ID
3. Transport Across Membranes
4. Egg Experiment Practice

Unit 3:
Cell Questions

The questions below address will assist in mastery of the following Learning Targets:

- ***HS10-LS1-3.2*** Understand the components of the Cell Theory.
- ***HS10-LS1-3.1*** Differentiate Between Eukaryotic and Prokaryotic Cells (ex. cytoskeleton, nucleus, membrane-bound organelles).

---

1. What is the difference between a theory and a law?

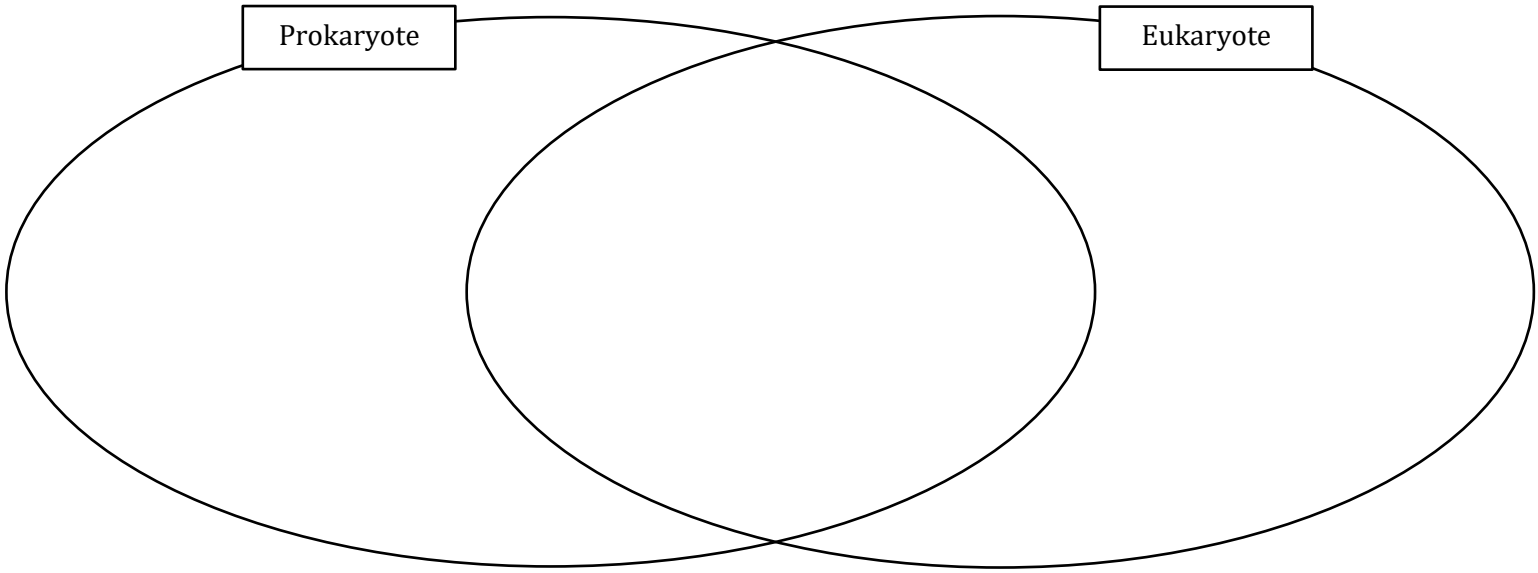
2. What are the 3 assumptions to the Cell Theory?

3. What does assumption #1 mean?

4. What does assumption #2 mean?

5. What does assumption #3 mean?

6. Compare and Contrast prokaryotes and eukaryotes.



7. What is a membrane-bound organelle?

8. What are some examples of membrane bound organelles?

Unit 3:

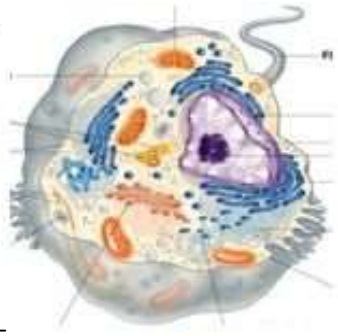
Prokaryote & Eukaryote Identification

The questions below address will assist in mastery of the following Learning Targets:

- ***HS10-LS1-3.1*** Differentiate Between Eukaryotic and Prokaryotic Cells (ex. cytoskeleton, nucleus, membrane-bound organelles).

***DIRECTIONS*: Identify the following cells as prokaryotic or eukaryotic *AND* answer the question that follows.**

A.



_____

_____

_____

B.

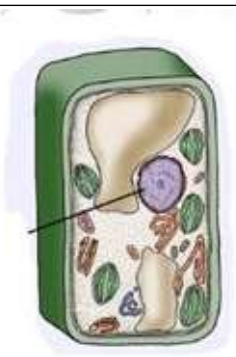
_____

_____

C.

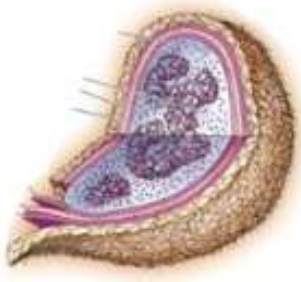
_____

D.



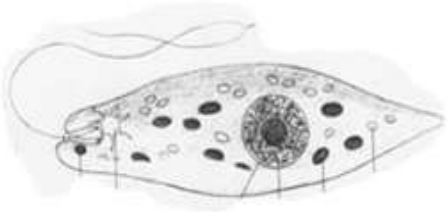
_____

E.



_____

F.



_____

What are some characteristics about each of these cells that identify it as either a prokaryotic or eukaryotic cell?	
Prokaryote	**Eukaryote**

UNIT 3:
Transport Across Membranes

The questions below address will assist in mastery of the following Learning Targets:

- ***HS10-LS1-3.4*** Explain methods of passive transport (ex. diffusion, facilitated diffusion, osmosis) as a cell's attempt to reach dynamic equilibrium.
- ***HS10-LS1-3.5*** Explain how cells maintain homeostasis when placed in various solutions: hypertonic, hypotonic, isotonic.
- ***HS10-LS1-3.6*** Differentiate between active and passive transport (ex. concentration gradient, dynamic equilibrium, use of energy).

DIRECTIONS: ***Place the letter "P" in the space for passive transport. Place an "A" in the space for active transport.***

_____ 1. Movement from an area of high [ ] to an area of low [ ].

_____ 2. Diffusion and osmosis are good examples.

_____ 3. Requires the use of energy to move materials against the concentration gradient.

_____ 4. Materials move from an area of high [ ] to an area of low [ ] without help from proteins or energy from the cell.

_____ 5. Allows the cell to obtain glucose and amino acids.

_____ 6. The process of engulfing/taking in particles for use in the cell (endocytosis)

_____ 7. The process of releasing materials out of the cell. (exocytosis)

8. Compare & contrast active and passive transport. (list 4 characteristics that distinguish each type of transport).

Active Transport	**Passive Transport**

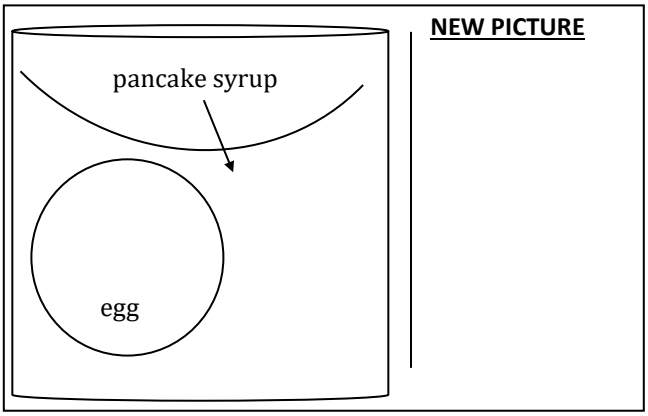
9. Circle the answer that best represents the reaction of a cell in each situation

	If the [water] outside of the cell is …	**Then the outside fluid is considered to be …**	**Water will diffuse…**	**What happens to the size of the cell?**
Situation #1	**The same as the cytoplasm**	*hypertonic / hypotonic / isotonic*	*into the cell / out of the cell / same amount in as out*	*stays the same size / shrinks / swells*
Situation #2	**Lower than the cytoplasm**	*hypertonic / hypotonic / isotonic*	*into the cell / out of the cell / same amount in as out*	*stays the same size / shrinks / swells*
Situation #3	**Higher than the cytoplasm**	*hypertonic / hypotonic / isotonic*	*into the cell / out of the cell / same amount in as out*	*stays the same size / shrinks / swells*

10. In the boxes provided, draw an example of each situation demonstrated in question #9.

Situation #1	Situation #2	Situation #3

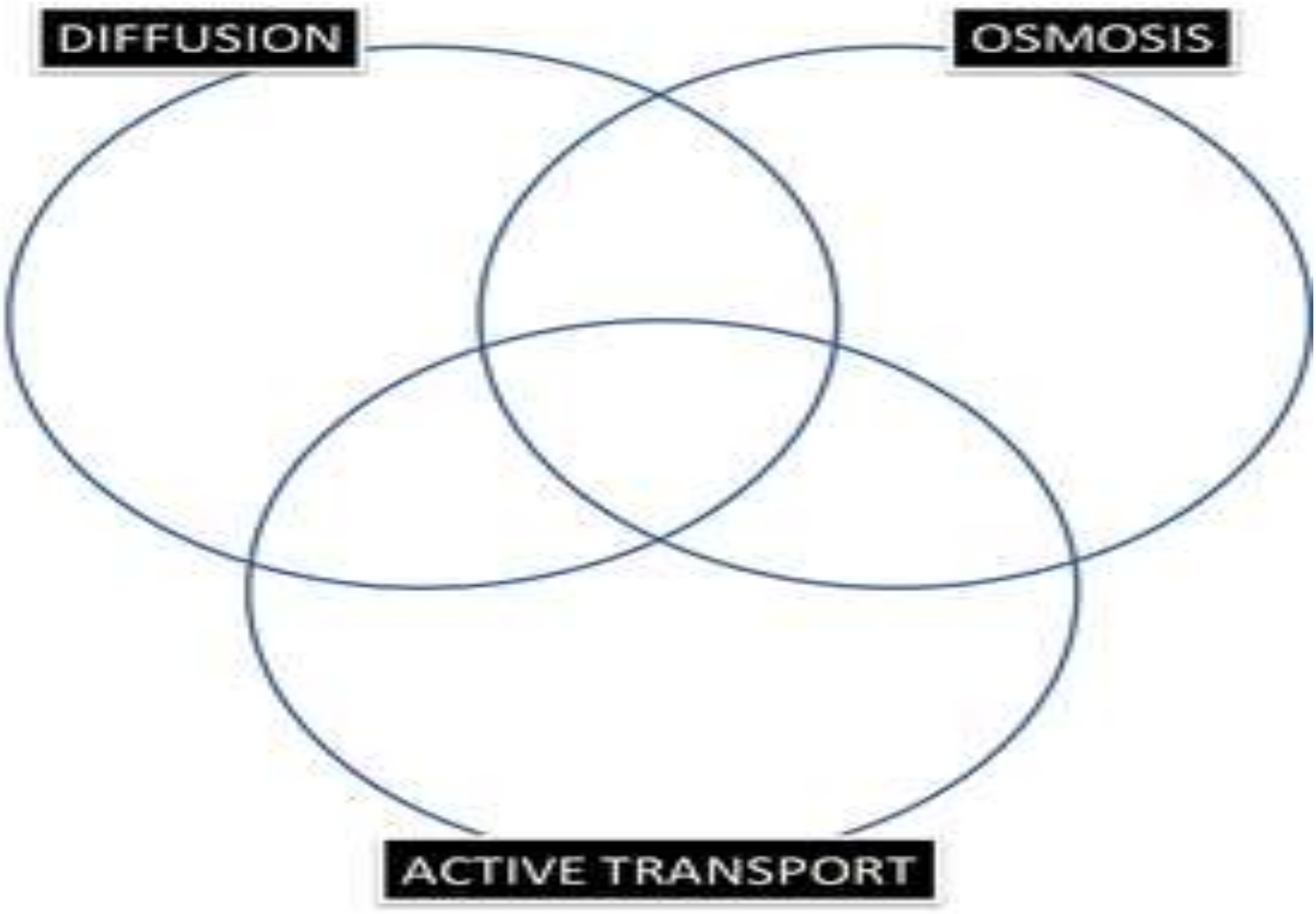
11. A shelless, raw egg has been placed in pancake syrup overnight. Label the following items to show the changes in the egg:
    - [solute] & [water] (for the egg & the solution)
    - draw AND label an arrow that shows movement of water
    - draw a new picture of the egg after the **movement of water** has taken place indicating any size differences
    - Does the new picture demonstrate lysis or wilting? **EXPLAIN**



Set up a Venn Diagram that compares, osmosis, diffusion, and active transport.

Place these features in the correct part of the Venn Diagram

- involves water only
- requires energy
- is passive
- movement of particles
- needs a semi-permeable membrane
- high [ ] to low [ ]
- how water gets into and outside the cell
- involves the transport of solutes
- endocytosis
- exocytosis
- uses intermembrane proteins
- against the [ ] gradient
- with the [ ] gradient



Unit 3:
EGG EXPERIMENT PRACTICE

The questions below address will assist in mastery of the following Learning Targets:

- ***HS10-LS1-3.4*** Explain methods of passive transport (ex. diffusion, facilitated diffusion, osmosis) as a cell's attempt to reach dynamic equilibrium.
- ***HS10-LS1-3.5*** Explain how cells maintain homeostasis when placed in various solutions: hypertonic, hypotonic, isotonic.
- ***HS10-LS1-3.6*** Differentiate between active and passive transport (ex. concentration gradient, dynamic equilibrium, use of energy).

An experiment was set up to measure the diffusion of water across a semi-permeable membrane. To set up this experiment, raw eggs were placed into a solution of vinegar and left for a few days. The vinegar reacts with the calcium in the egg shell and causes the egg shell to dissolve. These shelless, raw eggs were then placed in different solutions to see what would happen: Solution #1: Distilled Water & Solution #2: Corn Syrup. Control groups were also set up for each solution (egg with shell on).

The results of this experiment are recorded below:

Table 1 & 2: Change in Egg Mass in Distilled Water

Day	Mass of Egg (Shell OFF)
1	50 g
2	55 g
3	60 g
4	70 g

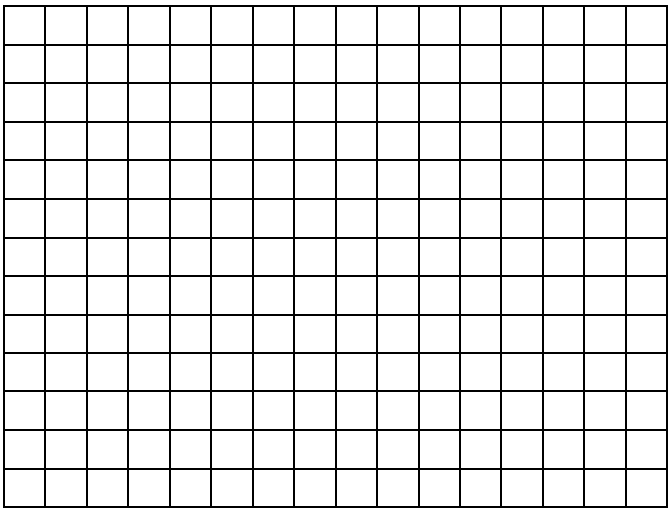
Day	Mass of Egg (Shell ON)
1	50 g
2	50 g
3	50 g
4	50 g

Table 3 & 4: Change in Egg Mass in Corn Syrup

Day	Mass of Egg (Shell OFF)
1	50 g
2	45 g
3	40 g
4	30 g

Day	Mass of Egg (Shell ON)
1	50 g
2	50 g
3	50 g
4	50 g

1. Construct a graph that shows how the mass of the egg changed in each solution.



***DIRECTIONS*: Using the information from the Egg Experiment, answer the questions that follow.**

2. Describe the conditions in the experimental group and the control group. (be specific)

Experimental Group	Control Group

3. What is the independent variable?

4. What is the dependent variable?

5. In the space provided:
   a) **EXPLAIN** what caused the change in mass for solution #1.
   b) **DRAW** and **LABEL** a picture of this situation.

In the explanation and drawing, use the following "sciency" words:

- high [solute]
- low [solute]
- high [water]
- low [water]
- direction of water movement
- hypertonic/hypotonic/isotonic

Explanation	Drawing

6. In the space provided:
   a) **EXPLAIN** what caused the change in mass for solution #2.
   b) **DRAW** and **LABEL** a picture of this situation.

In the explanation and drawing, use the following "sciency" words:

- high [solute]
- low [solute]
- high [water]
- low [water]
- direction of water movement
- hypertonic/hypotonic/isotonic

Explanation	Drawing

***DIRECTIONS*: For the graph, label the following areas:**

- "+" percent change in mass
- "-" percent change in mass
- "0" percent change in mass
- [solute] that results in a hypertonic solution with a reason why
- [solute] that results in a hypotonic solution with a reason why
- [solute] that results in an isotonic solution with a reason why