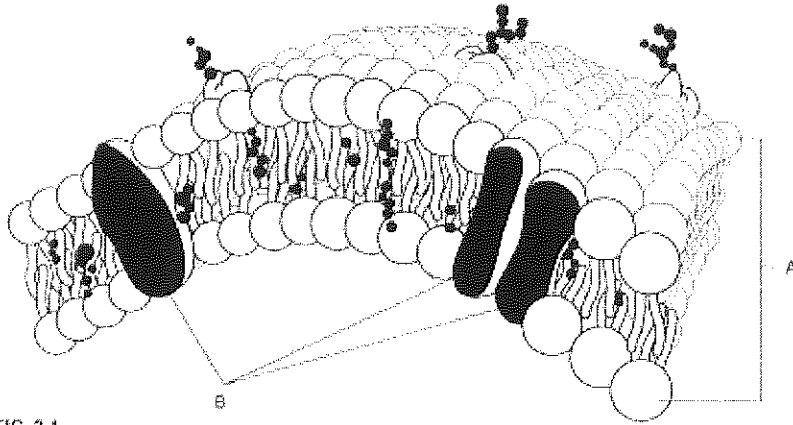


Cell Membrane Notes

Drawing and labeling of a cell membrane:



Fluid Mosaic Model:

Selectively permeable:

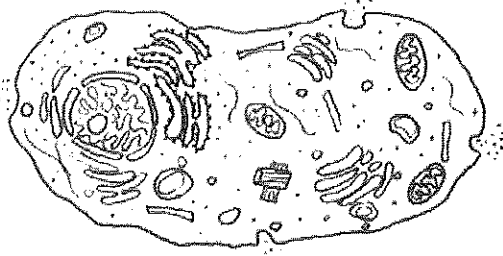
Phospholipids:

Proteins:

Functions of the Cell membrane:

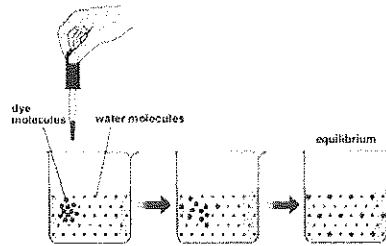
Reason for transport of materials:

WAYS MOLECULES MOVE



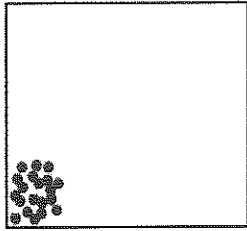
http://www.biology4kids.com/files/cell_main.html

Diffusion



http://hs.sps.org/staff/spuina/Biology/Cell/Diffusion_1.png

Animation from: <http://www.biologycorner.com/resources/diffusion-animatd.gif>



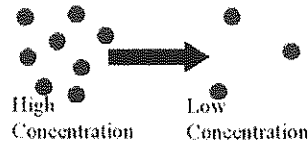
Molecules move

_____ "where there's _____"
 _____ "where there's _____"

DIFFUSION across a space

Happens anytime there is a _____ in concentration in one place compared to another

= _____



DIFFUSION across a SPACE

Molecules move automatically _____ the concentration gradient _____ an area of _____ concentration _____ an area of _____ concentration

• EXAMPLES

Blue dye in beaker demo,
 Someone making popcorn/grilling out
 Strong perfume,
 Bad smell in room

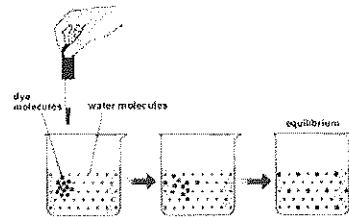


http://leighhouse.typepad.com/blog/images/kool_aid.jpg

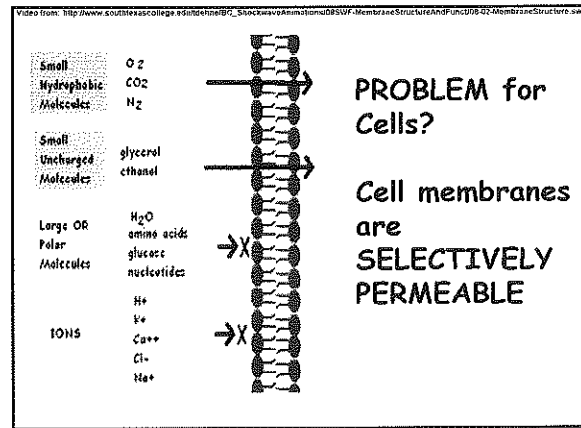
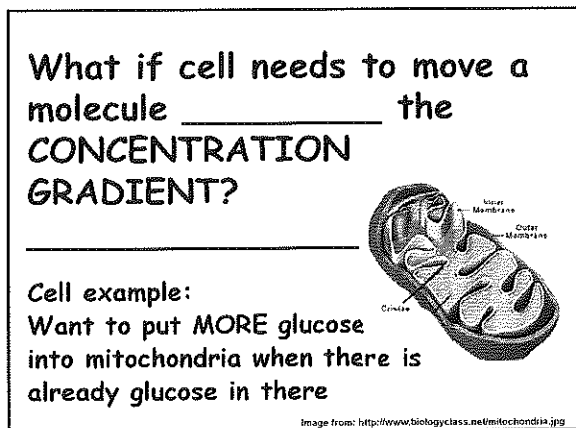
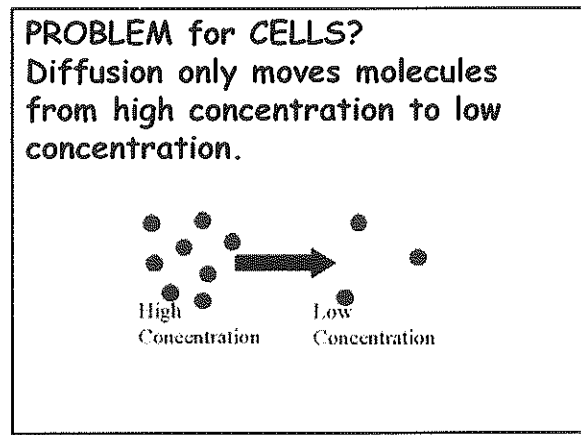
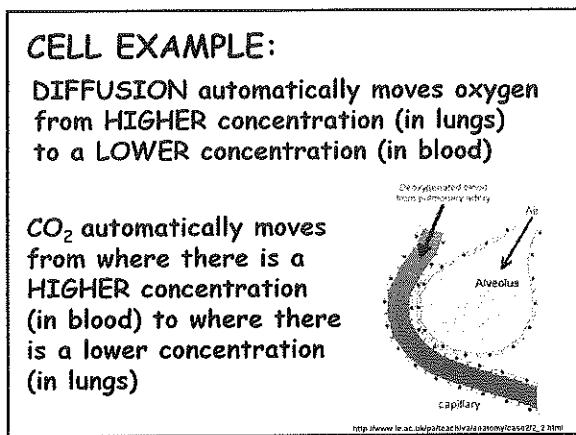
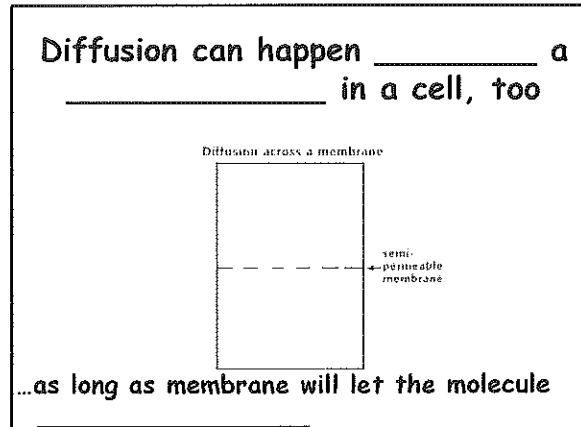
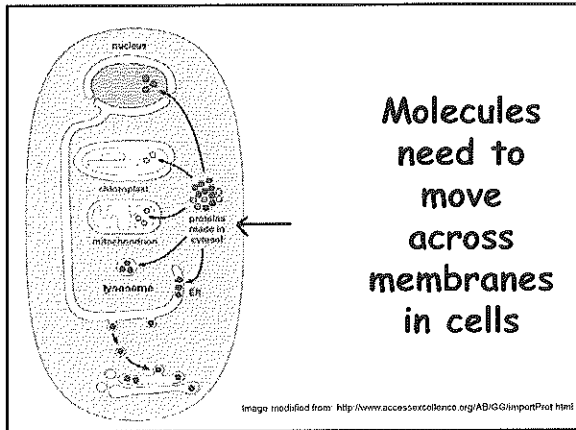
DIFFUSION across a space

Diffusion continues until the concentration is _____ in space

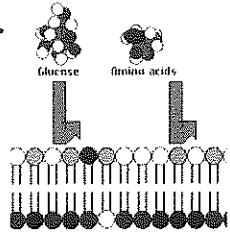
= _____



http://hs.sps.org/staff/spuina/Biology/Cell/Diffusion_1.png

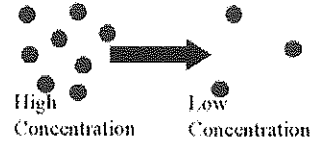


What if a cell needs to move _____ or _____ molecules that can't get through the membrane?



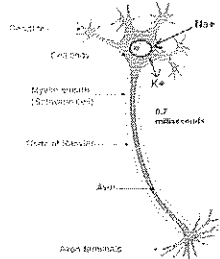
<http://www.dunn.edu/~stowmg/Membrance/membranetagespep/ptmagesdiffusionmedium.jpg>

PROBLEM for CELLS?
Diffusion happens very slowly



What if cell needs to move molecules really _____? (can't wait for it to diffuse)

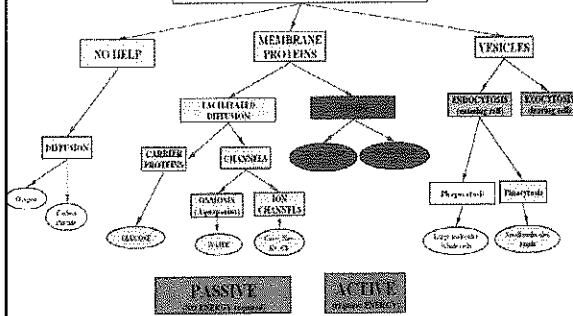
Cell example:
Movement of Na^+ & K^+ ions required to send nerve signals



<http://www.steve.gb.com/images/science/neuron.png>

Cells need a _____ to _____ molecules across cell membranes that _____ across by _____

KINDS OF TRANSPORT



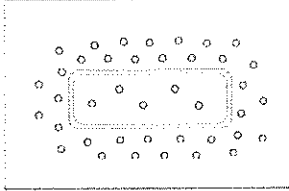
Kidspiration by: Riedell

Kinds of PASSIVE Transport

.....

DIFFUSION across a membrane

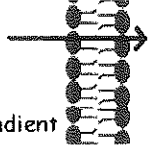
Happens anytime there is a _____
in _____ on one side of the
membrane compared to the other



http://student.cccmc.edu/~gkaiser/tutorial/05/05diffusion.htm

DIFFUSION

- No energy required = _____
- Moves _____ concentration gradient
from _____
- Works for any molecules that can pass through
the membrane
- Example of molecules that move this way in
cells:
_____ & _____




http://oweb.wvu.edu/courses/biol22000108/images/membrane.gif

FACILITATED DIFFUSION
uses _____ to help
molecules across

2 kinds of proteins help:



_____ & _____



Adapted from: http://bio.wilsons.edu/biol/ANIMTS/facdiffa.gif http://www2.roc.edu/~mylmat/channel.gif

Facilitated Diffusion with CARRIER PROTEINS

Carrier protein grabs molecule, changes shape, and flips across to other side like a revolving door

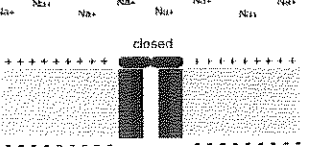



Animation from: http://bio.wilsons.edu/biol/ANIMTS/facdiffa.gif http://www.gutenberg.co.uk/delborough-stap-perf/eng/eng/index.htm

FACILITATED DIFFUSION with CHANNELS

Membrane proteins create a tunnel through which molecules can pass

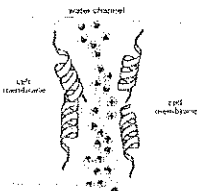
_____ allow _____ ions
to get past the _____ center



http://bio.wilsons.edu/biol/ANIMTS/facdiffa.htm

FACILITATED DIFFUSION with CHANNELS

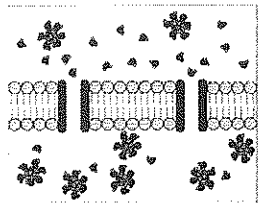
_____ proteins allow _____
_____ molecules to get past
the _____ middle of cell
membrane.



http://www.spsk.kvl.dk/news/0507Lund4.jpg

FACILITATED DIFFUSION with CHANNELS

The movement of water molecules across a cell membrane is called _____



http://istadeil.ccd.com/edu/gba/res/evolutoral/leu/struct/channelsam.html

ALL KINDS OF FACILITATED DIFFUSION

- No energy required = _____
- Moves _____ concentration gradient from _____
- _____ help molecules get across membrane

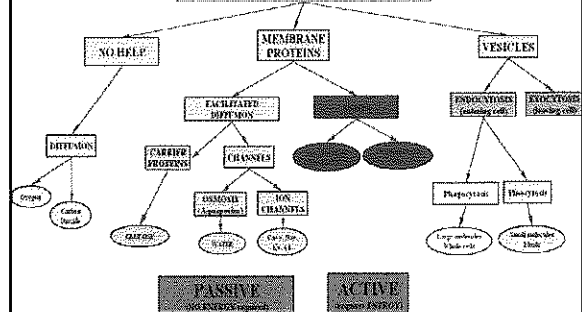
EXAMPLES OF FACILITATED DIFFUSION IN CELLS

- CARRIER PROTEINS

- ION CHANNELS

- AQUAPORINS (OSMOSIS)

KINDS OF TRANSPORT



Kidspiration by: Riedel

Kinds of ACTIVE Transport

SODIUM-POTASSIUM PUMP

- _____ transport (requires energy from _____)
- Can move molecules from _____ concentration to _____
- Special just for Na⁺ and K⁺ ions
- Uses _____ called _____ to move molecules
- Example: nerve cells
Na⁺ is pumped out of cells at same time
K⁺ is taken into cells

PROTON PUMP

Moves Protons across membrane = _____ ions

More on this in Chap 8 & 9

PROTON PUMP

- _____ transport (requires energy from _____)
- Can move molecules from _____ concentration to _____
- Special just for H^+ ions
- Uses integral _____ to move molecules

Examples:

- Lysosomes need acidic conditions for digestion
- Photosynthesis/Respiration (more on this to come in Ch 8 & 9)

ACTIVE TRANSPORT with VESICLES

_____ are small membrane sacs that pinch off of cell membranes used by cells for transporting molecules

Used for transporting molecules:
 If entering the cell = _____
 If exiting the cell = _____

http://academic.brooklyn.cuny.edu/biology/bio4/ivipap/cell-movement.html http://academic.brooklyn.cuny.edu/biology/bio4/ivipap/cell-movement.html

2 KINDS of ENDOCYTOSIS

for taking substances into cell

If taking in:
 fluid or small molecules = _____
 large particles or whole cells = _____

Animation from: http://academic.brooklyn.cuny.edu/biology/bio4/ivipap/encycy3.htm

ENDOCYTOSIS

Substances taken into cell

- _____ transport (requires _____)
- Uses _____ to carry substances
- Can move molecules from _____ concentration to _____

Examples in cells:

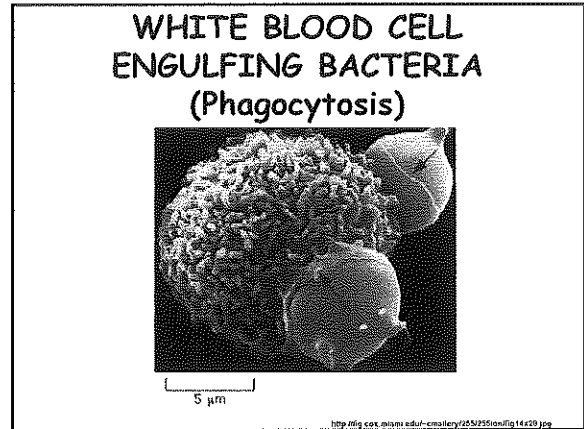
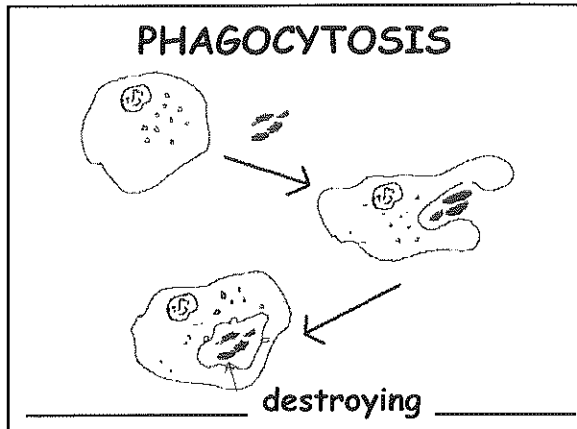
- one celled organisms eat this way
- white blood cells get rid of bacteria this way

ENDOCYTOSIS

Protist eating another

Animation from: http://academic.brooklyn.cuny.edu/biology/bio4/ivipap/cell-movement.html

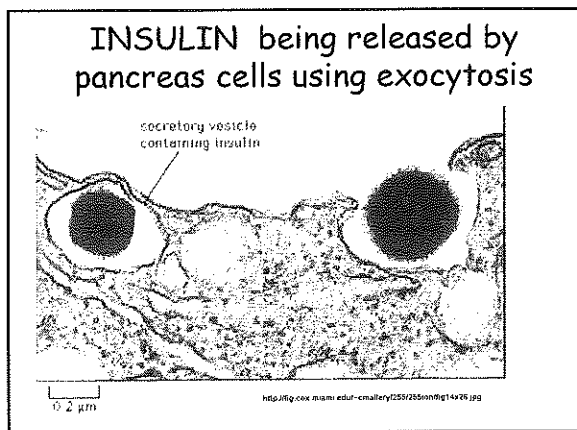
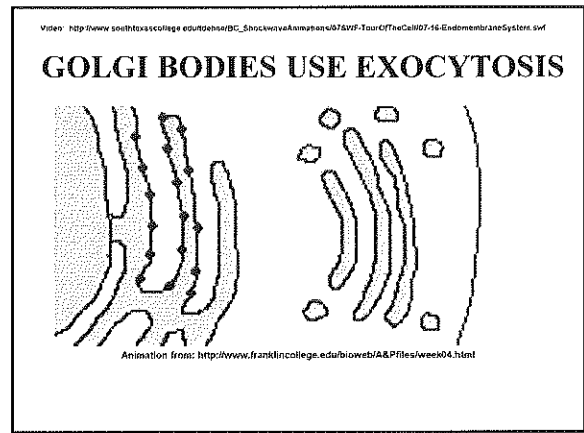
http://www.acca.edu/users/skretschapter/20.html



EXOCYTOSIS

Substances released outside of cell

- _____ transport (requires _____)
- Uses _____ to carry substances
- Can move molecules from _____ concentration to _____
- Examples in cells:
 - _____ release packaged proteins this way



VOCAB

_____ = substance that is dissolved in a solvent to make a solution

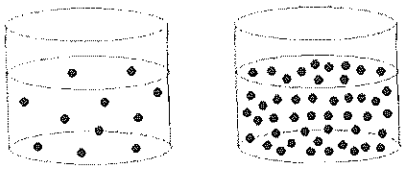
_____ = substance in which a solute is dissolved

A photograph of a glass beaker containing a liquid. A small amount of a white, granular substance is being added to the liquid, illustrating the concept of a solute being dissolved in a solvent.

http://www.makash.ac.uk_school/15th115161che/1hesch/1esolve.jpg

Images by Redell

_____ = mass of
a solute in a given volume of
solution



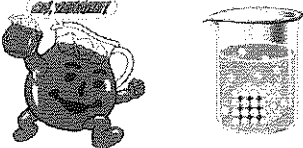
The _____ molecules there are in a given
volume the _____ the concentration

Use new vocab to make Koolaid

Solutes = _____ & _____

Solvent = _____


Koolaid drink = _____



<http://www.makash.ac.il/~schools/students/Chem/ussif/solvee.jpg>

What if there is a difference in
concentration but solute
molecules can't move across a
membrane?

Semipermeable
membrane

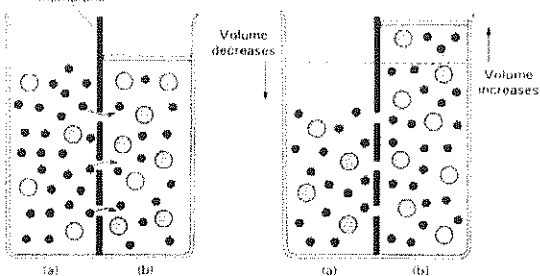


High Solute Low Solute

**WATER will move
until concentration
reaches equilibrium**

Animation: <http://www.ouhscphysio.org/humanphys/animations/osmosis1.swf>

Semipermeable
membrane

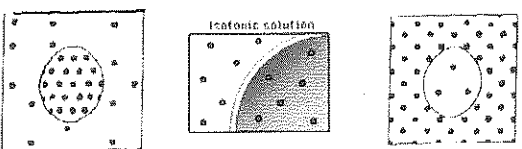


Volume decreases Volume increases

(a) (b) (a) (b)

<http://faculty.ecu.edu/cumel/images/osmosis1.swf>

Solute concentration




Lower outside than inside Equal outside and inside Greater outside than inside

_____ _____ _____

**What will happen to an animal cell
placed in different solutions?**

Remember:
Cells try to "maintain stable
internal conditions =

**So an animal cell in
ISOTONIC conditions
stays same size**



0.9 % NaCl

Water entering = water leaving

SO WHAT?



Bath water is

_____ compared to you

Sitting in the bathtub causes your fingers and toes to wrinkle up when water _____ your skin cells by osmosis

Passive transport vs active transport

1. substances move from a higher concentration to a lower concentration

2. needs ATP

3. the sodium-potassium pump is an example

4. movement is **against** the concentration gradient

5. substances cross over the cell's membrane

6. endocytosis and exocytosis are examples

7. creates energy

8. doesn't use energy to move substances over the cell membrane

9. movement of solute is **uphill**

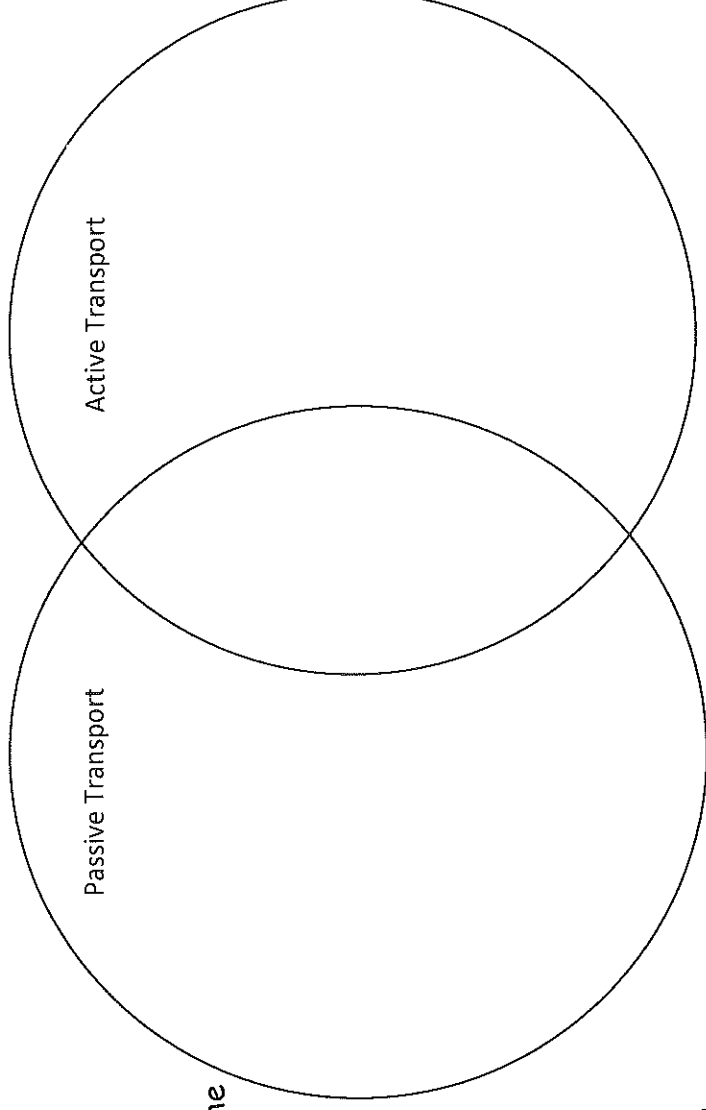
10. requires energy

11. substances move from a lower concentration to a higher concentration

12. movement can involve a "carrier" protein

13. movement is **down** the concentration gradient

14. diffusion and osmosis are examples



COMPARE/CONTRAST the kinds of transport	Active or Passive	What does it use to help? Membrane proteins? Vesicles? Needs no help?	Example of substances that use this kind of transport in cells
DIFFUSION			
FACILITATED DIFFUSION CARRIER PROTEINS			
FACILITATED DIFFUSION AQUAPORINS (OSMOSIS)			
FACILITATED DIFFUSION ION CHANNELS			
Na ⁺ - K ⁺ PUMP			
PROTON PUMP			
ENDOCYTOSIS (phagocytosis)			
ENDOCYTOSIS (pinocytosis)			
Exocytosis			

Name: _____ Date: _____ Period: _____

Osmotic Balance

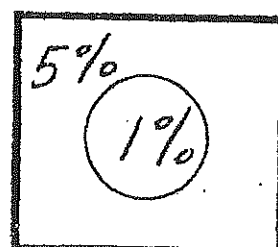
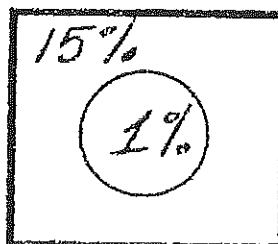
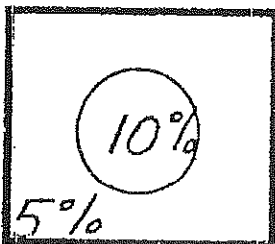
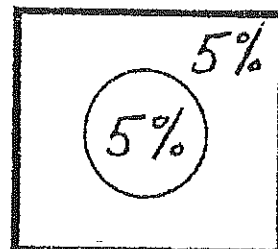
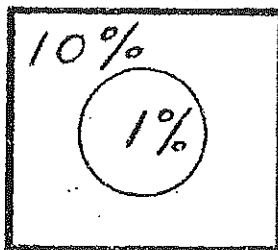
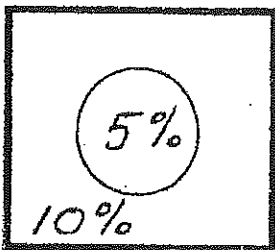
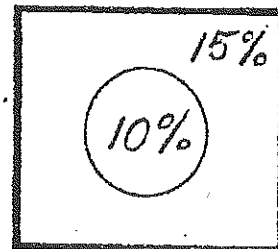
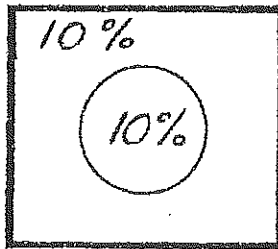
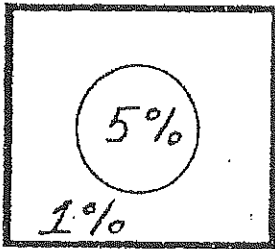
- Determine if the solution is **HYPOTONIC**, **HYPERTONIC**, OR **ISOTONIC** based on the concentration of solutes.

If the solution is hypotonic, water moves _____ the cell and the cell _____.

If the solution is hypertonic, water moves _____ the cell and the cell _____.

If the solution is isotonic, water _____ and the cell _____.

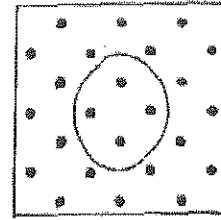
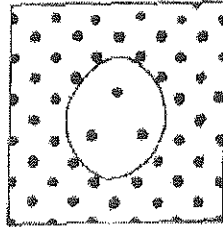
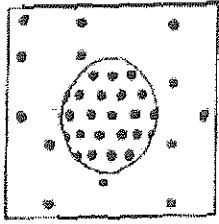
- Use an arrow to show if water is moving into or out of the cell.



OSMOSIS STUDY GUIDE

NAME _____

Label the pictures below (isotonic, hypertonic, or hypotonic)

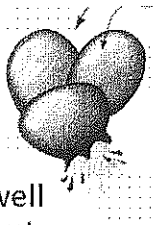


_____ tonic means there is a **GREATER** concentration of solute molecules **OUTSIDE** the cell than inside.

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

_____ tonic means there is the **SAME** concentration of solute molecules outside the cell as inside.

The pressure inside a plant cell caused by water pushing against the cell wall is called _____ pressure.



Cells swell and burst

The **SWELLING AND BURSTING** of animal cells when water enters is called _____.

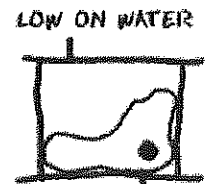
This happens when an animal cell is placed in a _____ tonic solution.



Placing plant cells in a **HYPOTONIC** solution causes the osmotic pressure to _____
 increase decrease (Circle ONE)

The **SHRINKING** of plant cells when water leaves so the cell membrane pulls away from the cell wall is called _____.

It happens when a plant cell is placed into _____ tonic solution.



When water leaves a plant cell, the osmotic pressure will _____
 increase decrease (Circle ONE)



Cells shrink and shrivel

The shrinking of **ANIMAL** cells that are placed in a **HYPERTONIC** solution is called _____.

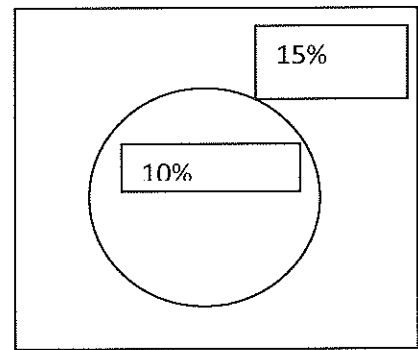
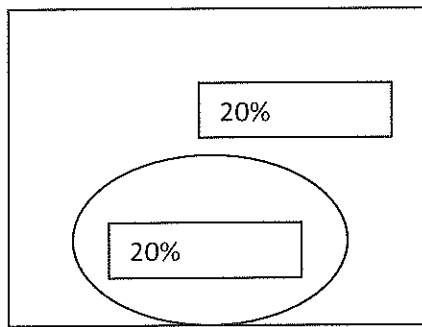
Cells stay the same size when placed in an _____ tonic solution because the amount of water leaving the cell is the same as the amount of water entering.

	Hypotonic solution	Hypertonic solution	Isotonic solution
Will cause a cell to take in water			
Causes turgor pressure			
Cause animal cells to shrink in size			
Distilled water is an example			
A very salty solution is an example			
Animal cells prefer this type of environment			
An IV is an example			
Plant cells prefer this type of environment			
Caused the elodea leaf in the lab to undergo plasmolysis			
Will cause a red blood cell to lyse			
Is in a state of equilibrium			
egg to lose water			
Celery to be firm			
Greater concentration of solute outside cell than inside the cell			

Basic active transport Facilitated diffusion Exocytosis

Diffusion endocytosis osmosis

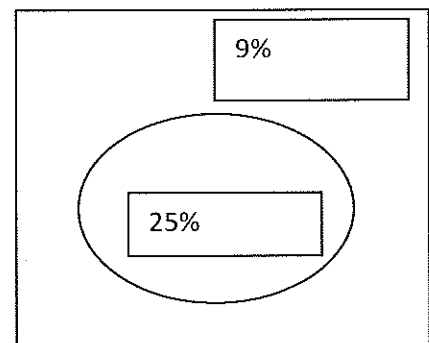
1. The reason a cup of coffee turns sweet when sugar is added to it.
2. Pinocytosis is an example.
3. Solute moves from an area of low concentration to an area of high concentration.
4. Water moves over a cell membrane.
5. "Cellular eating"
6. Movement of oxygen into the cell and carbon dioxide out of the cell
7. Pumping glucose from a high concentration to a low concentration is an example
8. Phagocytosis is an example
9. A white blood cell engulfing bacteria would be an example
10. Uses carrier proteins and no ATP
11. The reason why the "sugar" eggs lost mass in the lab
12. "cellular drinking"
13. Sodium-potassium pump is an example
14. Transports proteins and wastes out of the cell
15. Solute moves through the cell membrane from an area of high conc to an area of low
16. An amoeba taking in food is an example
17. Uses carrier proteins and ATP



What type of solution is the cell in?

Which way does the water move?

What happens to the cell?



Cell Transport Study Guide

Cell Membrane Concepts:

What is it made up of?

A.k.a.?

Which part is hydrophobic?

What is hydrophilic?

Explain the fluid mosaic model. (Why fluid? and Why mosaic?)

What is the special property of all cell membranes?

What holds it around the cytoplasm?

What is the purpose of proteins in membrane?

Passive Transport Concepts:

What is it?

Does it require energy?

Which way do substances move?

What is a concentration gradient?

3 types:

1. Diffusion

- What is moving?
- How is it moving?
- When does it stop?
- What can affect the rate of it?
- Give an example in the cell.

2. Osmosis

- What are 2 requirements for it to take place?
- What moves?
- What determines movement?

a. Isotonic:

Which way does water move?

What does the cell do?

Give an example of an isotonic solution.

b. Hypotonic

Which way does water move?

What does the cell do?

Give an example of a hypotonic solution.

c. Hypertonic

Which way does water move?

What does the cell do?

Give an example of a hypertonic solution.

Which type of solution do plant cells prefer?

Which type of solution do animal cells prefer?

What is turgor pressure?

How do plants get it?

What is plasmolysis?

When does it occur?

3. Facilitated Diffusion

- What is it?
- When is it used by the cell?
- Name a molecule that is too big to diffuse through the cell?

Active Transport Concepts:

What is it?

Does it require energy?

What is the name of the energy molecule?

Which way do substances move?

What are 3 types?

1. Basic Active Transport

What is it?

Give an example in which it is used in the cell.

2. Endocytosis

What is it?

2 Types:

1. Phagocytosis

What is it?

Give an example.

2. Pinocytosis

What is it?

Give an example.

3. Exocytosis

What is it?

Give at least two examples of substances that can leave this way.

**** Be sure to review lab questions/procedures.**

****Vocabulary to know:**

selectively permeable

phospholipid bilayer

hydrophilic

hydrophobic

fluid mosaic

active transport

ATP

Exocytosis

Endocytosis

Phagocytosis

Pinocytosis

Receptor-mediated endocytosis

Passive transport

Concentration gradient

Diffusion

Equilibrium

Osmosis

Isotonic

Hypotonic

Lyse

Hypertonic

Plasmolysis

Osmoregulation

Facilitated diffusion