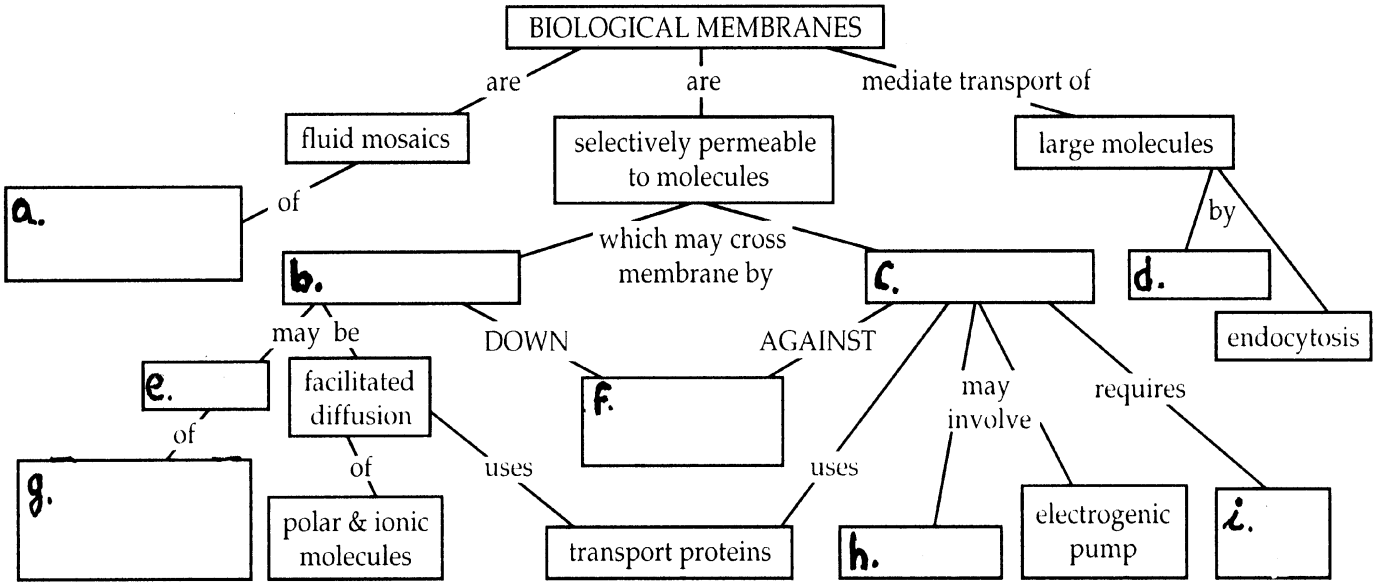
MEMBRANES

Reminder: One of the main purposes of the Workshops is to allow free exchange of information by **having each member of a Learning Community in turn answer one part** of a discussion question. As each student explains a term or gives a definition in <u>their own</u> words, it should allow for free verbal EXCHANGE and promote LEARNING BY INTERACTION. **Please insure that everyone does a question or two and the purpose of this exercise is to <u>EXPLAIN THEIR ANSWERS</u> to the rest of the community.**

1. CONCEPT MAP

Have each member of your Learning Community, in turn, fill in one of the blank boxes in the Concept Map below on the structure and function of membranes. As a group, help each other answer any questions concerning any portion of the concept Map that any person does not understand before proceeding further.



2. THOUGHT QUESTIONS:

Every member of the Learning Community should attempt to answer these questions by themselves, for a few moments, then one member, in turn for each question, shall volunteer an answer to the whole group.

A. Animal cells are enclosed in a cell membrane. According to the fluid mosaic model, this membrane is held together by hydrophobic interactions. Considering the shear forces that may be involved, why does the membrane not break apart every time an animal moves?

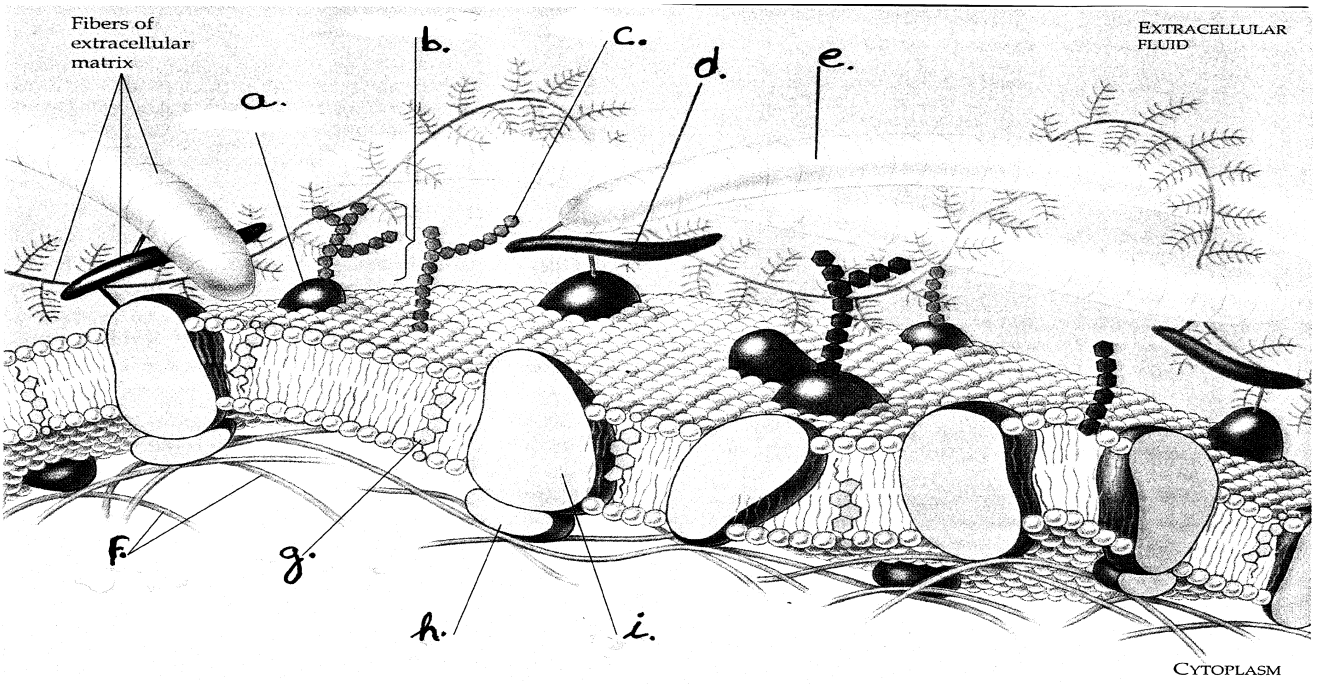
B. Explain why spontaneous phospholipid translocation (the movement of a phospholipid molecule from one side of a membrane bilayer to the other side of the membrane bilayer) is so slow or rarely occurs.

C. The fluid mosaic model of membrane structure has been quite useful in explaining membrane behavior and properties. However, the description of the membrane as proteins floating in a phospholipid sea is very oversimplified. Describe some components of the membrane that are restricted in their lateral motion and why? (Hint - the cytoskeleton)

D. What types of molecules have difficulty crossing a plasma membrane? Why so?

3. STRUCTURE OF MEMBRANES

In the diagram below have one member each, in turn, from your Learning Community identify a labeled item and tell the rest of the group the **functional role** of this item.



4. OSMOLARITY

Using the figure to the right have a different member, each answer the following questions concerning osmosis and diffusion. Five dialysis bags, all impermeable to sucrose, were filled with various concentrations of sucrose solution and then placed into separate beakers containing an initial concentration of 0.6 M sucrose solution. At 10 minute intervals, the bags were weighed and the percent change in weight of each bag was graphed.

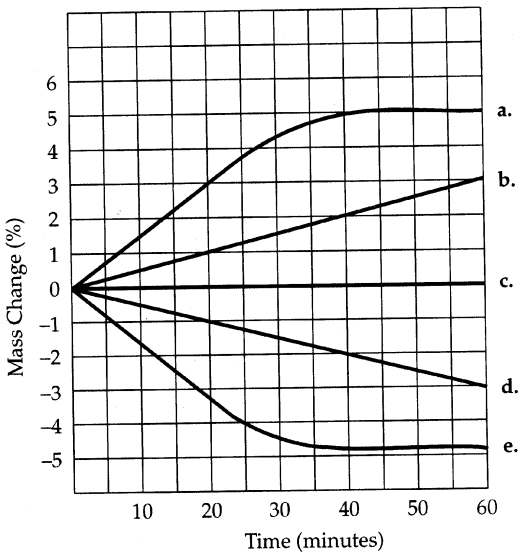
1. Which line represents the dialysis bag that contained a solution isotonic to the 0.6 M solution at the beginning of the experiment. _____

2. Which line represent the bag with the highest initial concentration of sucrose? _____

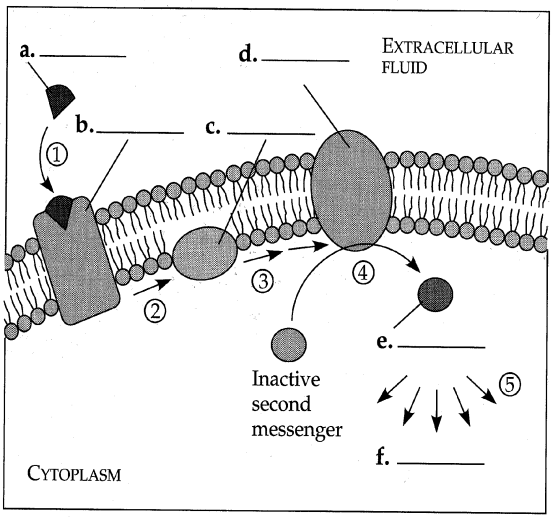
3. What is the best explanation for the shape of line **e**. after 40 minutes? _____

4. Which line(s) represent dialysis bags that contain a solution that is hypertonic at the end of 60 minutes?

5. One member each of the Learning Community in turn shall define the term *isotonic, diffusion,* and *osmosis* and explain the term to the group as a whole.



5. SIGNAL TRANSDUCTION



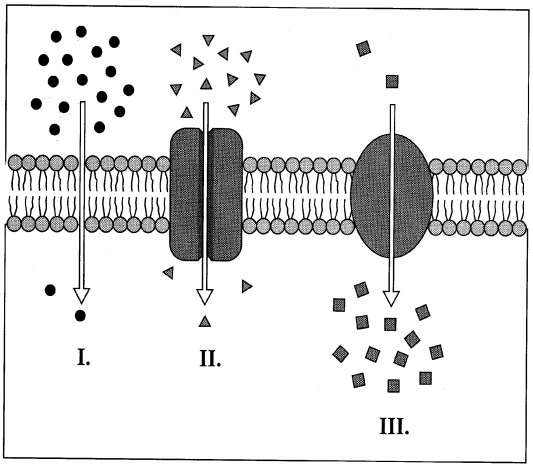
Specialized membrane bound proteins transmit an extracellular molecule's information signal to the interior of a cell. The binding of an extracellular molecule to a membrane receptor protein initiates a signal-transduction pathway allowing a cell to receive and respond to specific environmental signals.

A different member each of your Learning Community should identify one of the components in the diagram (a to f and steps 1 to 4) of the signal transduction pathway depicted to the left.

The workshop group should discuss the events that occur at each step.

6. MEMBRANE PHYSIOLOGY

Refer to the following diagram and 4 different members shall each answer the following four questions.



a. Which portion of the diagram (I, II, or III) represents facilitated diffusion? How can you tell? Does a cell use energy for this form of molecular transport? Why or Why not?

b. Which portion of the figure (I, II, or III) represents active transport? How can you tell? Does a cell use energy for this form of molecular transport? Why or Why not?

c. Which portion (I, II, or III) reveals simple diffusion? What type of solute molecules may be moved by this type of molecular transport?

d. Which portion(s) (I, II, or III) are considered passive transport?

7. Some THOUGHT QUESTIONS

A. Glucose (glu) and glucose-6-phosphate (g6p) do move across artificial membranes (made of phospholipids but lacking proteins). To better understand membrane transport you conduct an experiment on the transport of glu and g6p into living muscle and plant root cells. At the start of the experiment, the concentration of both glu and g6p outside the cells was 1 molar (1M). The original concentration of glu and g6p inside the cells was 0.1M. After 2 hours, you measure the concentration of each molecule inside the cells. The table below shows the results of your experiment. What is the best explanation of the data for experiment #1 in the table.

Concentrations of Glucose & Glucose-6-phosphate in Muscle & Root Cells

Experiment #1 : after 2 hours		
	Muscle Cells	**Plant Root Cells**
Glucose	0.5 M	0.1 M
glucose-6-phosphate	0.1 M	0.1 M
Experiment #2 : after 2 hours and with cyanide treatment		
Glucose	1.0 M	0.1 M
glucose-6-phosphate	0.1 M	01. M

B. As a follow up you add cyanide to the cells while continuing the experiment. Cyanide stops all ATP production inside of cells. Two hours later (a total of 4 hours), you again measure the level of glu and g6p inside the cells. What is the best explanation of the results of experiment #2.

8. An **alphabet** of important transport conceptual terms.

Each member of your Learning Community, in turn, should define one of the following membrane transport concept terms, out loud to the group. Do not go to another term until every member of your learning community is sure they understand the term.

a. active transport
b. Na-pump
c. facilitated diffusion
d. exocytosis
e. membrane potential
f. electrochemical gradient
g. plasmolysis
h. electrogenic pump
i. cotransport
j. cell recognition

cm – 2017