Name: _____

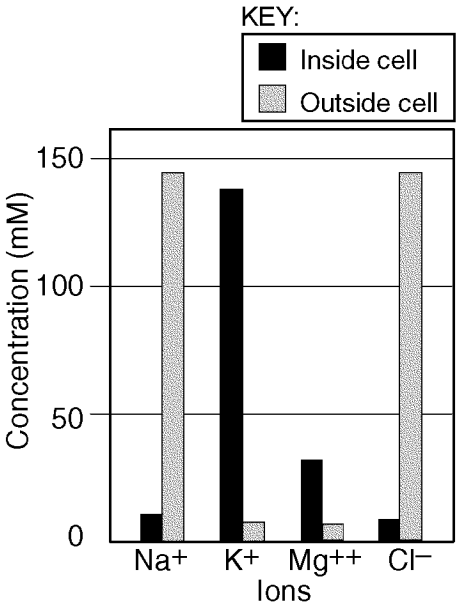
UNIT: DIFFUSION AND ACTIVE TRANSPORT

TOPIC: DIFFUSION VS. ACTIVE TRANSPORT

1) Damage to which structure will most directly disrupt water balance within a single-celled organism?

1) nucleus
2) chloroplast
3) ribosome
4) cell membrane

2) The graph below shows the relative concentrations of different ions inside and outside of an animal cell.



Which process is directly responsible for the net movement of K^+ and Mg^{++} into the animal cell?

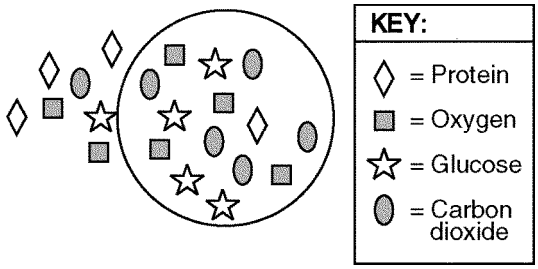
1) diffusion
2) active transport
3) electrophoresis
4) circulation

3) Which row in the chart below *best* describes the active transport of molecule *X* through a cell membrane?

Row	Movement of Molecule *X*	ATP
(1)	high concentration → low concentration	used
(2)	high concentration → low concentration	not used
(3)	low concentration → high concentration	used
(4)	low concentration → high concentration	not used

1) 1 2) 2 3) 3 4) 4

4) The diagram below shows the relative concentration of molecules inside and outside of a cell.



Which of the following statements *best* describes the general direction of diffusion across the membrane of this cell?

1) Glucose would diffuse into the cell.
2) Oxygen would diffuse into the cell.
3) Carbon dioxide would diffuse out of the cell.
4) Protein would diffuse out of the cell.

5) State *one* reason that most foods must be digested before they can enter a cell.

6) Molecule *X* moves across a cell membrane by diffusion.

Row	Movement of Molecule *X*	Use of ATP
(1)	high concentration → low concentration	used
(2)	high concentration → low concentration	not used
(3)	low concentration → high concentration	used
(4)	low concentration → high concentration	not used

Which row in the chart above *best* indicates the relationship between the relative concentrations of molecule *X* and the use of ATP for diffusion?

1) 1 2) 2 3) 3 4) 4

TOPIC: DIFFUSION THROUGH A MEMBRANE LAB

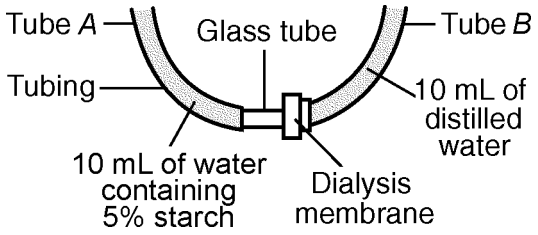
7) In the *Diffusion Through a Membrane* lab, the model cell membranes allowed certain substances to pass through based on which characteristic of the diffusing substance?

1) color
2) size
3) temperature
4) shape

8) A student fills a dialysis membrane bag with a mixture of red dye, yellow dye, and water. He soaks the bag in pure water for 24 hours and then observes that the water outside the bag turns yellow. Which statement *best* explains the results of this experiment?

1) The yellow dye molecules are smaller than the red dye molecules.
2) Water diffused into the membrane bag.
3) Only red dye diffused through the membrane.
4) The dialysis membrane actively transported yellow dye molecules.

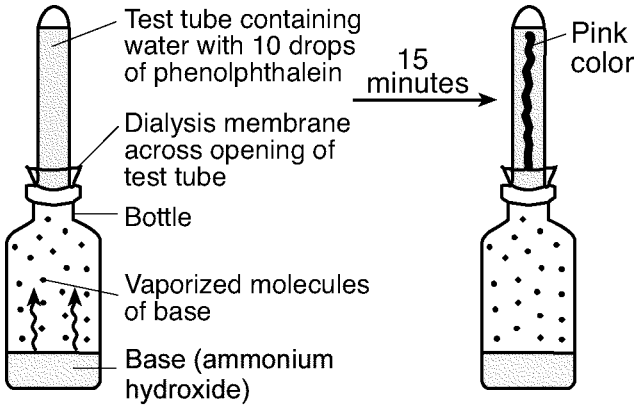
9) The diagram below represents a laboratory setup used by a student during an investigation of diffusion.



Which statement *best* explains why the liquid in tube *A* will rise over a period of time?

1) Water and starch volumes are the same in both tubes *A* and *B*.
2) The fluids in both tubes *A* and *B* will change from a higher temperature to a lower temperature.
3) The starch concentrations are equal on both sides of the membrane.
4) The water will pass from a region of lower starch concentration to one of higher starch concentration.

10) Phenolphthalein is a chemical that turns pink in the presence of a base. A student set up the demonstration shown in the diagram below.



The appearance of the pink color was due to the movement of

1) base molecules from high concentration through the membrane to low concentration
2) phenolphthalein molecules from low concentration to high concentration
3) phenolphthalein molecules in the water from high concentration to low concentration
4) water molecules through the membrane from high concentration to low concentration

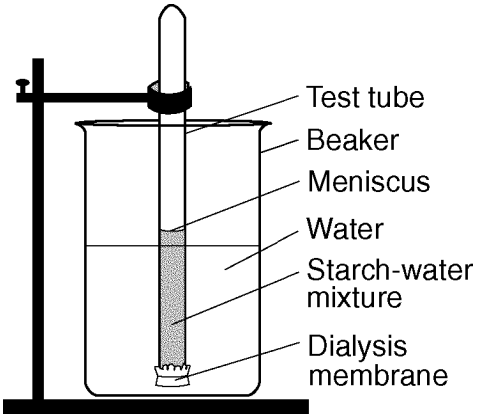
11) State *one* reason why some molecules can pass through a certain membrane, but other molecules can not.

12) Molecules *A* and *B* are both organic molecules found in many cells. When tested, it is found that molecule *A* cannot pass through a cell membrane, but molecule *B* easily passes through. State *one* way the two molecules could differ that would account for the difference in the ability to pass through the cell membrane.

13) State *one* factor that influences which molecules can pass through the cell membrane of a human cell.

14) If vegetables become wilted, they can often be made crisp again by soaking them in water. However, they may lose a few nutrients during this process. Using the concept of diffusion and concentration, state why some nutrients would leave the plant cell.

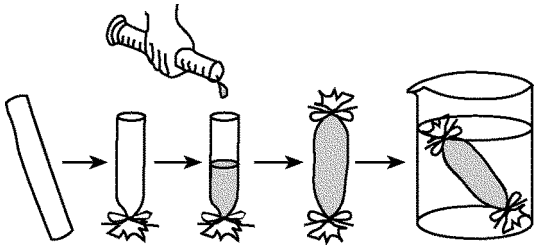
15) A laboratory setup for a demonstration is represented in the diagram below.



Describe how an indicator can be used to determine if starch diffuses through the membrane into the beaker. In your answer, be sure to include:

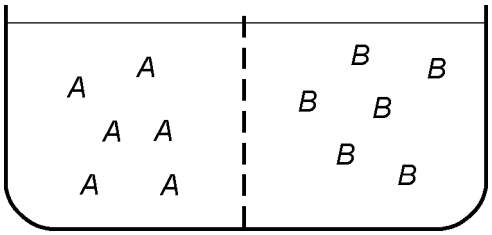
(1) the procedure used
(2) how to interpret the results

16) A solution containing both starch and glucose was placed inside the model cell represented below. The model cell was then placed in a beaker containing distilled water.

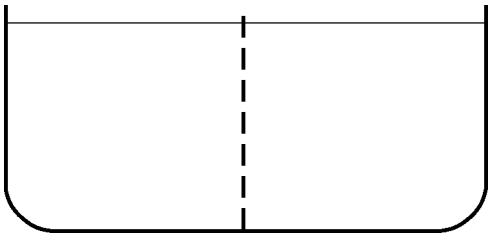


Identify *one* specific substance that should have been added to the distilled water so that observations regarding movement of starch could be made.

17) The diagram below represents a container of water and two different kinds of molecules, *A* and *B*, separated into two chambers by a membrane through which only water and molecule *A* can pass.

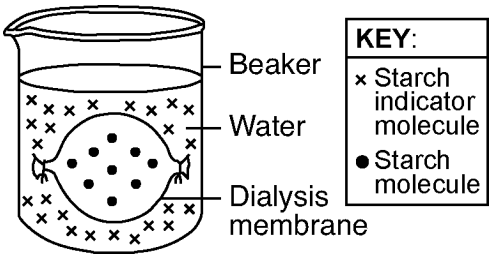


On the diagram of the container below, indicate the distribution of molecules *A* and *B* after the net movement of these molecules stops.

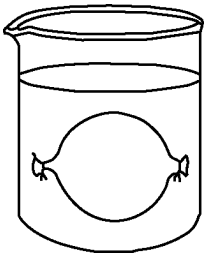


Questions 18 and 19 refer to the following:

The diagram below shows an experimental setup.



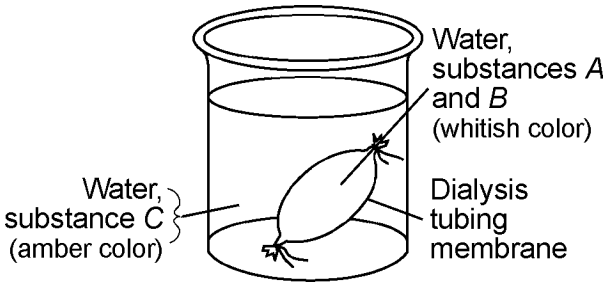
18) On the diagram below, draw in the expected locations of the molecules in the given experiment after a period of one hour.



19) When starch indicator is used in the given experiment, what observation would indicate the presence of starch?

Questions 20 and 21 refer to the following:

A model of a cell is prepared and placed in a beaker of fluid as shown in the diagram below. The letters *A*, *B*, and *C* represent substances in the initial experimental setup. The table below summarizes the content and appearance of the cell model and beaker after 20 minutes.



Results After 20 minutes

	Outside of Cell Model	Inside of Cell Model
Substances	Water, *A*, *C*	Water, *A*, *B*, *C*
Color	Amber	Blue black

20) Complete the table below to summarize a change in location of substance *C* in the experimental setup shown.

Name of Substance *C*	
Direction of Movement of Substance *C*	
Reason for Movement of Substance *C*	

21) Identify substance *B* in the experimental setup shown and explain why it did *not* move out of the model cell.

Questions 22 and 23 refer to the following:

Students prepared four models of cells by using dialysis tubing containing the same blue solution. Each of the model cells originally weighed 10 grams. They then placed each model cell in a beaker containing a different concentration of water. After 24 hours, they recorded the mass of the model cells as shown in the data table below.

Data Table

Concentration of Water Surrounding the Model Cell	Mass of Model Cell
100%	12 grams
90%	11 grams
80%	10 grams
70%	9 grams

22) Based on the given information, why did the model cell that was placed in 100% water increase in mass?

23) Based on the data shown, what was the concentration of water in the original blue solution? [*State evidence in support of your answer*.]

Questions 24 and 25 refer to the following:

A student cut three identical slices from a potato. She determined the mass of each slice. She then placed them in labeled beakers and added a different solution to each beaker. After 30 minutes, she removed each potato slice from its solution, removed the excess liquid with a paper towel, and determined the mass of each slice. The change in mass was calculated and the results are shown in the data table below.

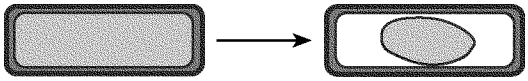
Change in Mass of Potato in Different Solutions

Beaker	Solution	Change in Mass
1	distilled water	gained 4.0 grams
2	6% salt solution	lost 0.4 gram
3	16% salt solution	lost 4.7 grams

24) Identify the process that is responsible for the change in mass of each of the three potato slices in the experiment shown.

25) In the given experiment, explain why the potato slice in beaker 1 increased in mass.

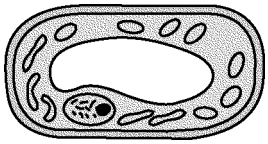
26) A red onion cell has undergone a change, as represented in the diagram below.



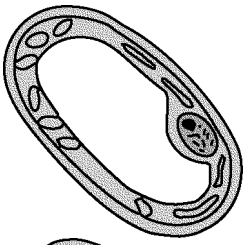
This change is most likely due to the cell being placed in

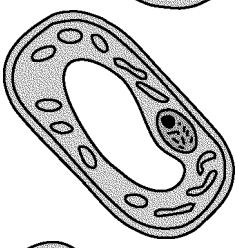
1) light
2) darkness
3) distilled water
4) salt water

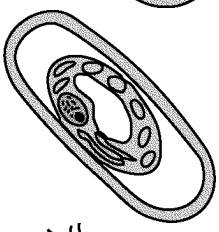
27) The diagram below represents a plant cell in tap water as seen with a compound light microscope.

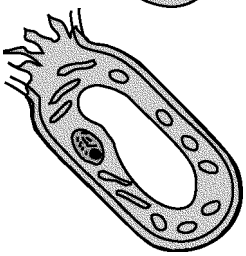


Which diagram *best* represents the appearance of the cell after it has been placed in a 15% salt solution for two minutes?

1) 

2) 

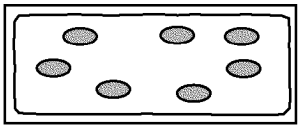
3) 

4) 

28) If frog eggs taken from a freshwater pond are placed in a saltwater aquarium, what will most likely happen?

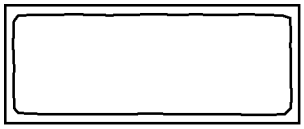
1) Salt will leave the eggs.
2) The eggs will burst.
3) Water will neither enter nor leave the eggs.
4) Water will leave the eggs.

29) *Elodea* is a plant that lives in freshwater. The diagram below represents one *Elodea* leaf cell in its normal freshwater environment.



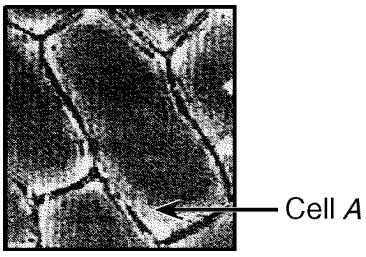
Elodea cell in freshwater

Predict how the contents of the *Elodea* cell would change if the cell was placed in saltwater for several minutes by completing the diagram below, "*Elodea* cell in saltwater." Label the location of the cell membrane.

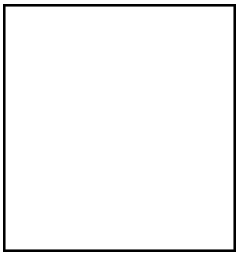


Elodea cell in saltwater

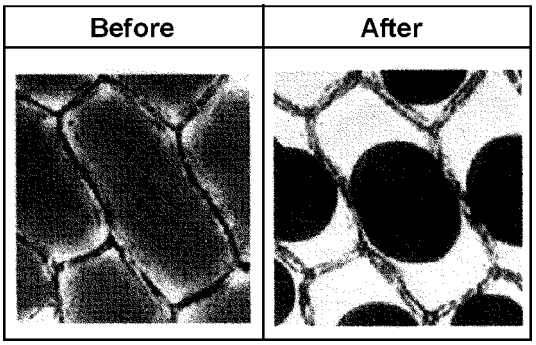
30) Cell *A* shown below is a typical red onion cell in water on a slide viewed with a compound light microscope.



Draw a diagram of how cell *A* would most likely look after salt water has been added to the slide and label the cell membrane in your diagram.



31) The diagram below represents some cells on a microscope slide before and after a substance was added to the slide.

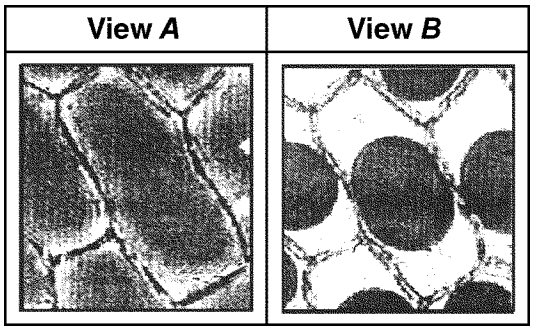


(a) Identify a substance that was most likely added to the slide to cause the change observed.

(b) Outline a procedure that could be used to add the substance mentioned in *part (a)* to the cells on the slide without removing the coverslip.

Questions 32 through 34 refer to the following:

A student prepared a wet-mount slide of red onion skin and observed it under high power of a compound light microscope (view *A*). After adding a substance to the slide and waiting one minute, the student observed that there were changes in the cells (view *B*).



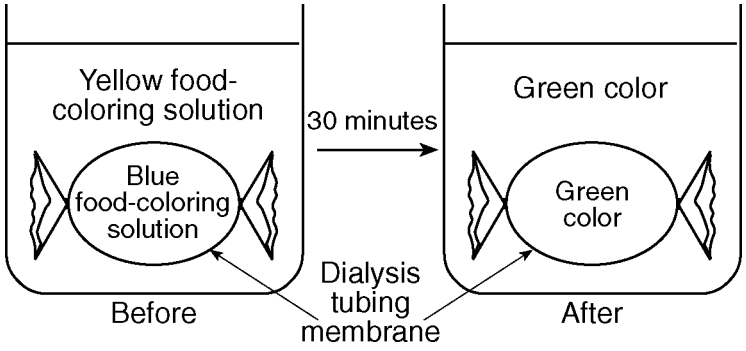
32) Identify *one* substance that could have been added to the cells on the slide in view *A* that would make them resemble the cells observed in view *B*.

33) Identify the specific substance that diffused to cause the change in appearance from view *A* to view *B* in the diagram.

34) In the box below, sketch how view *B* would appear when viewed under lower power of the same compound light microscope used in the experiment described.

Questions 35 and 36 refer to the following:

The diagram below shows the changes that occurred in a beaker after 30 minutes. The beaker contained water, food coloring, and a bag made from dialysis tubing membrane.



35) When the colors yellow and blue are combined, they produce a green color. Which of the following statements most likely describes the relative sizes of the yellow and blue food-coloring molecules in the diagram?

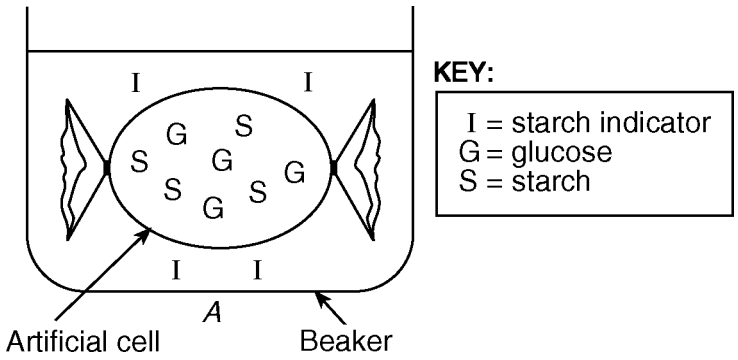
1) The yellow food-coloring molecules are large, while the blue food-coloring molecules are small.
2) Both the yellow food-coloring molecules and the blue food-coloring molecules are small.
3) The yellow food-coloring molecules are small, while the blue food-coloring molecules are large.
4) Both the yellow food-coloring molecules and the blue food-coloring molecules are large.

36) Which of the following statements *best* explains the changes shown in the diagram?

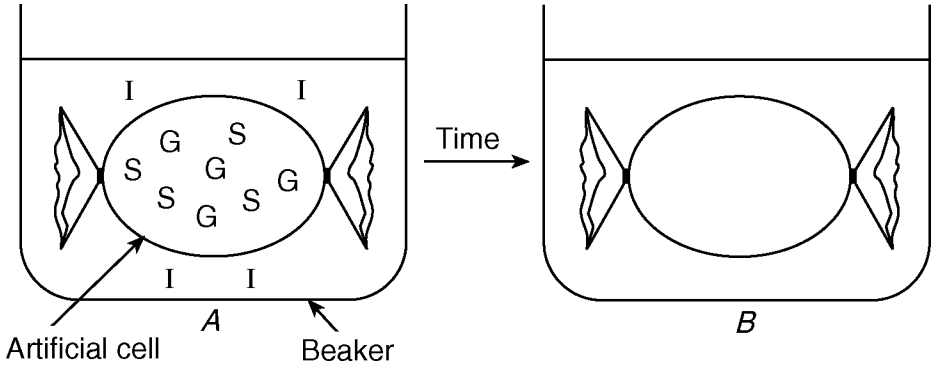
1) Molecules moved across the membrane only when additional energy was supplied.
2) Molecules moved across the membrane without additional energy being supplied.
3) Molecular movement was aided by the presence of specific carbohydrate molecules on the surface of the membrane.
4) Molecular movement was aided by the presence of specific enzyme molecules on the surface of the membrane.

Questions 37 and 38 refer to the following:

The diagram below illustrates an investigation carried out in a laboratory activity on diffusion. The beaker and the artificial cell also contain water.



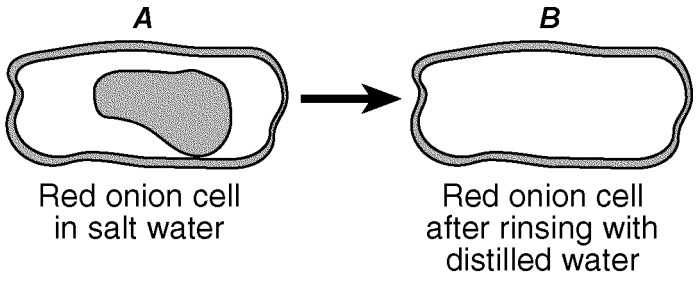
37) Predict what would happen over time in the investigation illustrated by showing the location of molecules *I*, *G*, and *S* in diagram *B* below.



38) State what is observed in the investigation illustrated when there is a positive test for starch using the starch indicator.

39) A student prepared a wet-mount slide of some red onion cells and then added some salt water to the slide. The student observed the slide using a compound light microscope. Diagram *A* is typical of what the student observed after adding salt water.

Complete diagram *B* to show how the contents of the red onion cells should appear if the cell were then rinsed with distilled water for several minutes.



40) The photos below show two red onion cells viewed with the high power of a compound light microscope. Describe the steps that could be used to make cell *A* resemble cell *B* using a piece of paper towel and an eyedropper or a pipette without removing the coverslip.