Name ____________________________ **Period** _________

Regents Biology **Date** ______________________

LAB _____. OSMOSIS THROUGH A MEMBRANE:

Using the principles you learned in the first exercise, we will now investigate the movement of water in and out of a model "cell". This passive transport of water across a cell membrane is called **osmosis**. Osmosis is a form of diffusion. It is just the special case of the diffusion of water across a membrane.

In osmosis, water moves from areas of **higher concentration of water** to a region of **lower water concentration**. Water is at its highest concentration as distilled water or pure water. The concentration of water decreases as material is dissolved in the water.

If a model cell (like our dialysis tubing) is filled with a salt solution and placed in a beaker of distilled water, water will diffuse into the cell until an equilibrium is reached. At that point, no **net** movement of water will occur between the cell and the beaker. If a model cell is filled with distilled water and placed in a beaker of salt solution, water will diffuse out of the cell until an equilibrium is reached. Once again, at that point, no **net** movement of water will occur between the cell and the beaker.

PROCEDURE: DAY 1

1. Take a 30cm piece of 2.5cm dialysis tubing that has been soaking in water. Tie off one end of the tubing to form a bag (like the way you tie a balloon). This will be your "cell". To open the other end, rub the end between your fingers until the edges separate.

2. Measure out 15mL of concentrated **sucrose solution** and pour it into the dialysis bag using a funnel. Tie off the other end of the bag, leaving space for expansion of the contents in the bag.

3. In case any solution spilled on the outside, rinse off the model "cell" you just made by holding it under running water.

4. Carefully blot the outside of the "cell" with a paper towel. Mass the sucrose solution "cell" (in grams) on a scale and record the **Initial Mass** in Table 1.

5. Place the "cell" in an empty 250mL beaker and label the beaker with tape. Now fill the beaker 2/3 full with **pure water**. Be sure to submerge the "cell" as best you can.

6. Take a second 30cm piece of 2.5cm dialysis tubing (that has been soaking in water) and tie it off to make another "cell". However, this time fill the bag with 15mL of **pure water**.

7. Carefully blot the outside of the bag with a paper towel. Mass the water "cell" (in grams) on a scale and record the **Initial Mass** in Table 1.

8. Place the "cell" in an empty 250mL beaker and label the beaker with tape. Now fill the beaker 2/3 full with **sucrose solution**. Be sure to completely submerge the "cell".

9. Set the beakers aside. Cover them and let them sit undisturbed overnight.

10. Think about what you expect to happen when you measure the "cells" tomorrow. Fill in the diagram in Figure 1 to illustrate your prediction.

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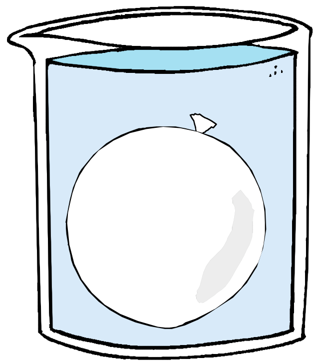
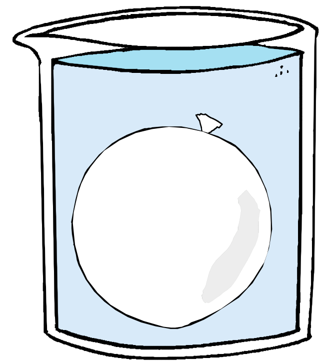
FIGURE 1. <u>PREDICTION</u> OF MOVEMENT OF WATER ACROSS A MEMBRANE

Label the diagrams below to identify the contents of the "cell" and the beaker. Clearly draw one **<u>arrow</u>** in each diagram to predict the movement of **<u>water</u>** (into or out of cell) that you think we will observe during the experiment.



Sucrose solution in cell;
Water in beaker



Water in cell;
Sucrose solution in beaker

PROCEDURE: DAY 2

1. Retrieve your Osmosis beakers with the "sucrose solution cell" and "water cell".
2. Carefully remove each cell from its beaker, rinse off each "cell" and gently blot the outside with a paper towel. Mass each "cell" and record the **<u>Final Mass</u>** in Table 1.
3. Calculate the **<u>Change in Mass</u>** for each "cell". Record in Table 1.

   Change in Mass = Final Mass – Initial Mass

   a. If the **<u>Change in Mass</u>** is a positive number, then the cell gained mass.

   b. If the **<u>Change in Mass</u>** is a negative number, then the cell lost mass.
4. Obtain data from the other lab groups in your class to complete Table 2. Calculate the class average.
5. <u>Complete</u> the diagrams in **<u>Figure 2</u>** to illustrate the movement of water in each beaker.
6. Complete the **<u>Summary Questions</u>**.

TABLE 1: OSMOSIS INDIVIDUAL DATA

Set Up		Initial Mass	Final Mass	Change in Mass (F – I = Change)
A	**Sucrose solution in cell; Water in beaker**			
B	**Water in cell; Sucrose solution in beaker**			

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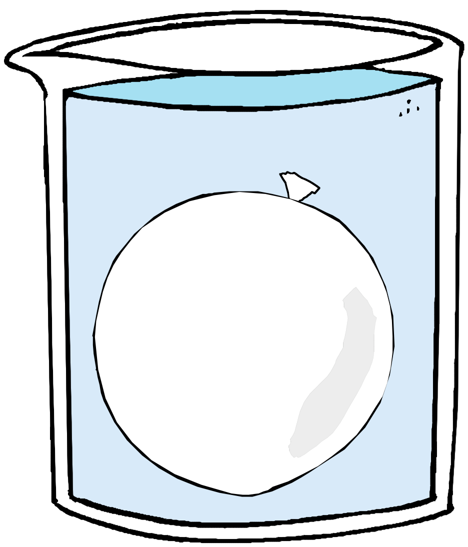
OSMOSIS DATA TABLE

TABLE 2: OSMOSIS CLASS DATA

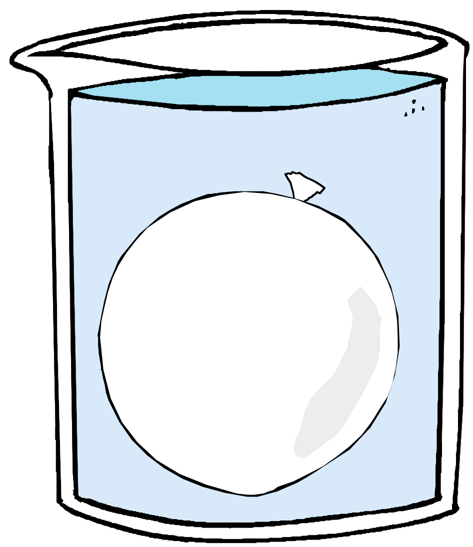
Set Up	Change in Mass of Model Cells						Total	Class Average
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6		
Sucrose solution in cell; Water in beaker								
Water in cell; Sucrose solution in beaker								

FIGURE 2. MOVEMENT OF WATER ACROSS A MEMBRANE

Label the diagrams below to identify the contents of the "cell" and the beaker. Clearly draw **arrows** to indicate the movement of **water** during the experiment.



SUCROSE SOLUTION IN CELL;
WATER IN BEAKER



WATER IN CELL;
SUCROSE SOLUTION IN BEAKER

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SUMMARY QUESTIONS

1. When the sucrose cell was placed in water did the water move **into the cell** or **out of the cell**? Explain how you can tell.

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2. Explain why this result occurred.

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3. When the water cell was placed in a sucrose solution did the water move **into the cell** or **out of the cell**? Explain how you can tell.

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4. Explain why this result occurred.

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5. Summarize the process of osmosis.

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