

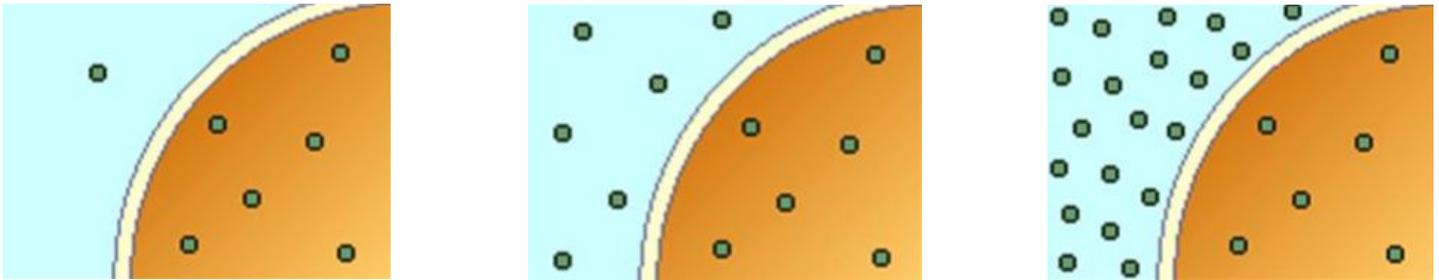
## Movement of Water in Red Onion Cells (40 point lab)

*Objective:* Students will create wet-mounted slides of red onion skin and observe the cells when placed in distilled/fresh water (a hypotonic solution) and in 10% salt solution (a hypertonic solution).

Compare your observations to that of others, then look at video captured results. ([Video](#))

### PART ONE. Introduction (Pre-lab) (5 points)

1. From our work the other day, (1) **label** the solutions both inside and outside of the cells in the diagrams below as **hypotonic, isotonic, or hypertonic**; (2) **label the cell membrane and solute** in any one of the three diagrams; and (3) draw an arrow(s) showing the direction you predict water will move in the situation.



### PART TWO. Osmosis in Red Onion Skin

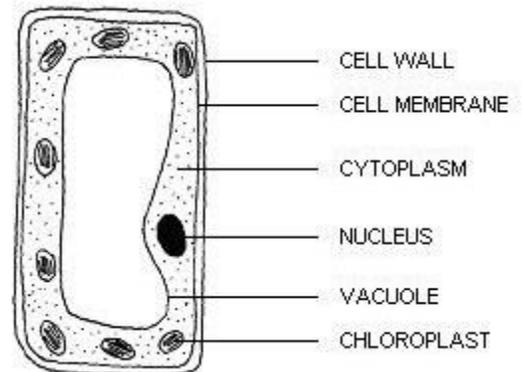
<i>Materials:</i>	<i>Red onion skin</i>	<i>forceps</i>	<i>glass microscope slide</i>
	<i>Slide coverslip</i>	<i>10% salt solution</i>	<i>distilled water dropper bottles</i>
	<i>Compound microscope</i>	<i>Paper towels</i>	<i>Lens cleaning paper</i>

*Procedure:*

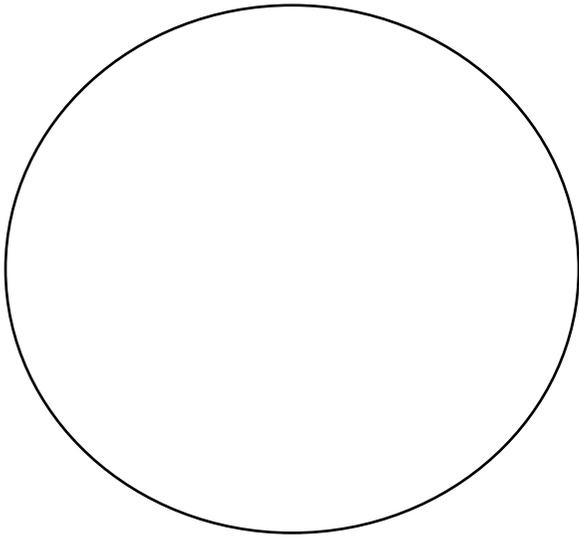
1. Take a small piece of red/purple onion, and peel off a little of its purple skin. This much → ● is perfect.
2. Make a wet mount of the onion skin with a drop of distilled (pure) water. Add a coverslip just like Mr. F showed you.
3. View the cells under the microscope using **low/scanning power (40x magnification)** to find your sample on the slide. Make sure your sample is in the center of your field of view before moving on. **Draw a patch of cells that you see in Diagram 1 below and fill in the information in the box below it.**

4. Now rotate your **revolving nosepiece/turret** so that the **medium (100X) power objective lens** is in place. Find an area where you can clearly see the purple (or reddish) coloration and use the fine focus knob to get a clear view.

*NOTE: The cells get their color from a pigment that is stored in the vacuole (a water storage organelle in plant cells). Plant cells have large vacuoles, so don't be surprised if the whole cell looks purple. It may not be possible to see cytoplasm because of the deep coloration, but it's there. The figure to the right gives you a diagram of what a normal plant cell looks like.*



5. In your diagrams below of the epidermal (skin) cells in distilled water at low and medium power, using pencil and color in any features with colored pencils. Remember to **label** the: (1) **cell wall**, (2) **vacuole**, and (3) **nucleus**. If you can see the **cell membrane** at medium power, then label it as well. (6 points)



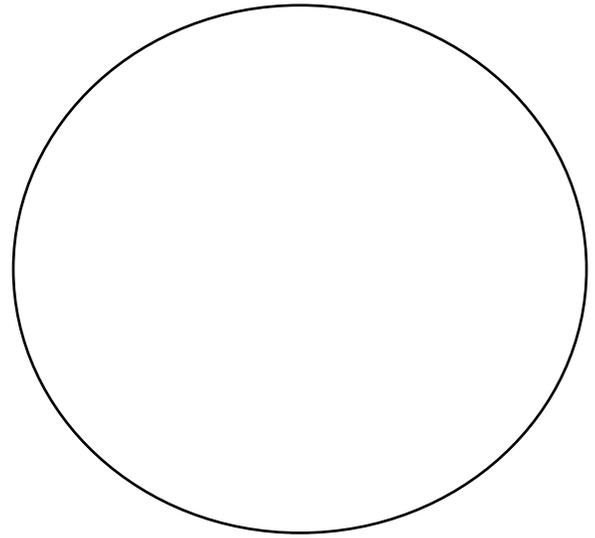
**Diagram 1.**

Specimen: \_\_\_\_\_  
\_\_\_\_\_

Solution: \_\_\_\_\_

Magnification: \_\_\_\_\_ x

Notes: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



**Diagram 2.**

Specimen: \_\_\_\_\_  
\_\_\_\_\_

Solution: \_\_\_\_\_

Magnification: \_\_\_\_\_ x

Notes: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

6. After drawing the onion cells in distilled water, remove the slide from your microscope and set it on top of a paper towel. Carefully take off the cover slip and add several drops of 10% salt water directly on the piece of onion. Wait 5 minutes and do not put the cover slip back. Work on steps 8a – 8j while you are waiting.

7. After 5 minutes, put the cover slip back on and locate your sample on low power. Once found, let the sample sit for another 3-5 minutes and continue working on steps 8a – 8j.

8. While waiting, **predict** what will happen to the cells by writing a valid hypothesis. (10 points)

a. What is your **hypothesis**: If \_\_\_\_\_ (distilled water or salt water solution) is placed on red onion cells under the microscope then the size of the pink vacuole will \_\_\_\_\_ (swell or shrink) because water has \_\_\_\_\_ (entered or exited) the cell.

b. What would be a good **scientific question** you could write for this investigation? \_\_\_\_\_  
\_\_\_\_\_

c. Your independent variable is \_\_\_\_\_

d. Your dependent variable is \_\_\_\_\_

Use this word bank for 8e – 8j: *hypertonic, solute, solution, isotonic, solvent, osmosis, solution*

e. I am the liquid that does the dissolving. \_\_\_\_\_

f. I am what is being dissolved. \_\_\_\_\_

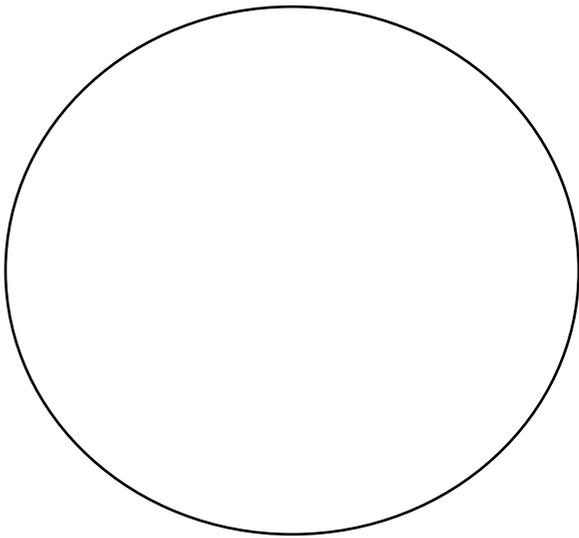
g. I am what results after the answers for (a) and (b) mix together. \_\_\_\_\_

h. I am the word that describes solution with more “stuff” (solute) dissolved in it than on the other side of a semi-permeable membrane. \_\_\_\_\_

i. I am the word that describes a solution with an equal amount of “stuff” (solute) dissolved in it compared to the solution on the other side of a semi-permeable membrane. \_\_\_\_\_

j. I am defined as the movement of water through a semi-permeable membrane so that the concentration of both water and solute is the same on both sides of the cell membrane. \_\_\_\_\_

9. After roughly 10 minutes, look at your sample again under low power and draw the same size patch of cells that you did with the distilled water in diagram 3 below. Do the same for medium power in diagram 4. (6 pts)



**Diagram 3.**

Specimen: \_\_\_\_\_

\_\_\_\_\_

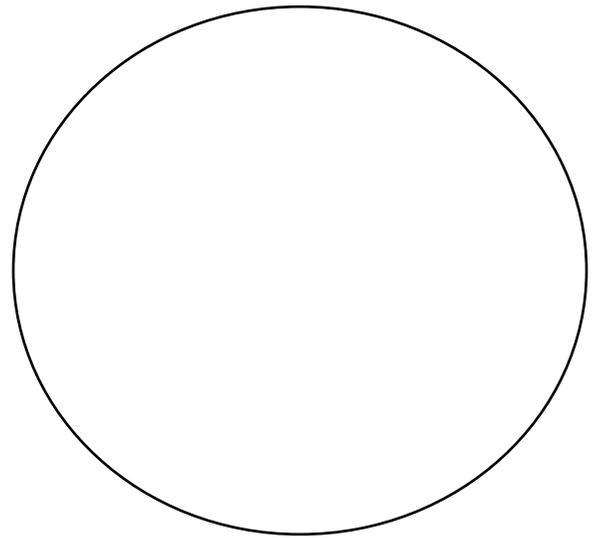
Solution: \_\_\_\_\_

Magnification: \_\_\_\_\_ x

Notes: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



**Diagram 4.**

Specimen: \_\_\_\_\_

\_\_\_\_\_

Solution: \_\_\_\_\_

Magnification: \_\_\_\_\_ x

Notes: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**PART THREE. Analysis and Conclusions.**

Question 1. What were 3 major observations you saw/recorded over the course of your investigation? (3 pts)

Obs 1. \_\_\_\_\_

\_\_\_\_\_

Obs 2. \_\_\_\_\_

\_\_\_\_\_

Obs 3. \_\_\_\_\_

\_\_\_\_\_

Question 2. Was the hypothesis supported or not? **Explain using observations from the lab.** (2 points)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Question 3. What was the solute in the experiment? Solvent? (2 pts) \_\_\_\_\_

\_\_\_\_\_

Question 4. What kind of solution were the onion cells placed in during step 6? (hypotonic, isotonic or hypertonic). Explain your reasoning. (3 pts) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Question 5. Which cell structure was expanding /shrinking in response to the different solutions? (1 point)

\_\_\_\_\_

Question 6. Explain what happened when the onion cells were soaked in distilled water. Be specific. (2 points)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Extension: If whole onion plants growing in the field were accidentally watered with salt water, how would the plants respond? Be specific; the drawing made may to help with the explanation. (3 points)