OSMOSIS EGGS-PERIMENT

OBJECTIVES/RATIONALE

The body relies on osmosis for many cellular processes. The student will learn the principles of osmosis.

TEKS	121.15 1A, 2B, 2C, 2D, 5A, 6B 121.3 1F	TAKS	ELA 1, 5 Science 1, 3, 4

KEY POINTS

I. Osmosis is the passage of water from a region of high water concentration through a semi-permeable membrane to a region of low water concentration.
   A. Semi-permeable membranes are very thin layers of material (cell membranes are semi-permeable) which allow some things to pass through them but prevent other things from passing through.
   B. A region of high concentration of water is either a very dilute solution of something like sucrose or pure water. In each case there is a high concentration of water.
   C. A region of low concentration of water is a concentrated solution of something like sucrose.

II. When you put a cell into liquid containing water one of three things will happen.
   A. Isotonic - If the concentration of solute is equal on both sides, the water will move back in forth but it won't have any result on the overall amount of water on either side."**ISO**" means the same.
   B. Hypotonic - The word "**HYPO**" means less, in this case there are less solute molecules outside the cell, water will move into the cell. The cell will gain water and grow larger. The cell may be in danger of bursting, organelles called contractile vacuoles will pump water out of the cell to prevent this.
   C. Hypertonic - The word "**HYPER**" means more, in this case there are more solute molecules outside the cell, which causes the water to be sucked in that direction. The cells shrink and may die.

III. **Fetal Alcohol Syndrome (FAS) -** If a woman drinks alcohol during her pregnancy, her baby can be born with FAS, a lifelong, physically and mentally disabling condition
   A. abnormal facial features
   B. growth deficiencies
   C. central nervous system (CNS) problems
   D. People with FAS may have problems with learning, memory, attention span, communication, vision, and/or hearing

E. FAS is a permanent condition

ACTIVITIES

I. Complete the **Osmosis Investigation**.

See **Teacher Notes**

MATERIALS NEEDED

Raw eggs, vinegar, salt water, syrup, coke, or rubbing alcohol, 16 oz. clear plastic cups, aluminum foil, graduated cylinders, and triple beam balance

http://www.cdc.gov/ncbddd/fas/
http://come-over.to/FAS/johnfasletter.htm
http://www.purchon.com/biology/osmosis.htm

ASSESSMENT

Successful completion of Osmosis Investigation.

ACCOMMODATIONS

For reinforcement, the student will

For enrichment, the student will

REFLECTIONS

Osmosis Procedure

Day One

1. Measure 150ml of vinegar and pour into three plastic cups.
2. Put the raw eggs into each of the cups. This will dissolve the calcium carbonate egg shell, exposing the differentially-permeable cell membrane.
3. Cover the plastic cup tightly with aluminum foil and let set overnight.

Day Two

1. Carefully remove the egg from the plastic cup.
2. Gently rub the calcium shell from the egg under running water and dry it.
3. Make observations and weigh the egg on the triple beam balance and record data in table one.
4. Measure the amount of vinegar remaining in the cup and record.
5. Discard the vinegar, rinse the cup, and choose three solutions from vinegar, salt water, syrup, coke, or rubbing alcohol to simulate hypertonic, isotonic, hypotonic solutions and the denaturalization of protein. Pour 150 ml of chosen solutions into cups.
6. Return the eggs to the cups and cover with foil and let set overnight.

Day Three

1. Carefully remove the eggs and gently rinse to remove solution. Dry the eggs.
2. Make observations, weigh the eggs, and record the data.
3. Measure the amount of solution remaining in the cups and record.
4. Dispose of the cups.

Results

Amount of Fluid before and after		Weight of Egg before and after		Solution	Observations

Teacher Notes

The EGG becomes a single cell in the human body.

(LOOK AT THE EGG WHICH IS HUGE) In the egg which is all swollen looks like a human cell that has edema, then the teacher can reinforce the concept to students of how this will make a difference in the type of IV solution they would give the patient. The Cells are in a HYPERTONIC stage so we would give a HYPOTONIC solution to the patient causing the cell to push fluid out by osmosis resulting in shrinking of the cell.

(LOOK AT THE EGG WHICH IS ALL SRIBBLED) This egg looks like a human cell which is dehydrated. The cell or egg is in a *hypotonic* state. So the physician would want to give a HYPERTONIC solution forcing the cell to accept fluid.

(LOOK AT THE EGG WHICH IS ALL WHITE) This egg looks like it has been cooked, but the alcohol has denaturized the protein (Explain that denaturized means to turn protein into a permanent state- in the human body proteins are normally able to change as needed to do the every day functions needed by the body and for growth) (BREAK OPEN EGG) However when fetal cells come in contact with alcohol they denaturize and can not change or grow. So if the alcohol hits the forming brain then the child will have brain damage. If the arms or legs are forming they may not be complete they may only have an arm bud. Babies born with problems like this have a condition commonly called Fetal Alcohol Syndrome.