Lesson Plan
Egg Osmosis Lab

PURPOSE:
The purpose of this experiment is to observe an egg as a model to understand the concept of osmosis.

OBJECTIVE(S): Students will be able to:
- Describe the effect of different liquids on a shell-less egg.

STANDARD(S) & INDICATOR(S):
5-PS1-3. Make observations and measurements to identify materials based on their properties.

MATERIALS:
1. Vegetable Oil/Water/Maple Syrup/Corn Syrup, Cardboard Slope/Ramp, Hot water bath/Cold water bath/Beakers at room temperature, Thermometer, Stop watch.
2. Raw egg, 300 ml vinegar, tap water, salt water, and a liquid of your choice, metric tape, balance, plastic container to hold egg, beaker, marker, masking tape

BACKGROUND INFORMATION:
In this lab students will be using an egg with the shell removed. The shell-less egg will represent a cell and its selectively permeable membrane. You will remove the shell of the egg by soaking the egg in vinegar. The egg shell is made up of the mineral calcium carbonate. Calcium carbonate dissolves in acids such as vinegar. During this process it releases the gas carbon dioxide. After the shell has been dissolved, only the membrane will remain around the egg.

CLASSROOM ACTIVITY DESCRIPTION (LABORATORY/EXERCISES/PROBLEMS) including detailed procedures:

Procedure 1:
In groups of 3-4, you will time how long it takes for 2-3 different liquids at 2-3 different temperatures to flow from the start line to the finish line on the cardboard ramp. You will record your observations and results in the table below.

Step 1: Each group member should play one of the following roles during the activity. Assign these roles:
- Referee (in charge of acquiring the liquids and pouring them down the ramp)
- Timer (in charge of the stop watch and timing each liquid)
- Recorder (in charge of recording the temperatures and times)

Step 2: Make sure that your cardboard ramp is steady and ready to go. Choose one liquid to test, and bring it to your table. Fill the spoon with the liquid.

Step 3: Make sure that everyone is ready to start. On the count of "three", the referee will pour the spoon onto the top of the cardboard. The Timer will start the stop watch when the liquid crosses the start line. Then, stop the stop watch when the liquid crosses the finish line. Record your results (in minutes and seconds). Bring the liquid back to its original spot, and repeat these steps with another liquid.

Procedure 2:

Step 1: Soaking egg in vinegar

1. Label your container with your section and table number.
2. In the data table, make a drawing and observation of the egg in the appropriate space.
3. To Measure Your Egg, use a flexible tape measure, measure the circumference of the egg (along the "equator"). Record circumference to closest millimeter
4. Weigh the egg in grams. Record mass
5. Pour 300 ml of vinegar into the container.
6. Carefully place an egg into the container and allow it to soak 2 days. Loosely place lid on top; if placed too tight it may break!
7. Put your container in the designated space.
8. Clean up materials and wash your hands.

Step 2: Soaking egg in tap water

1. Carefully remove egg from the container of vinegar.
2. Remove any remaining bits of shell by gently running egg under water. Blot it dry with a paper towel.
3. Measure and mass your egg and record observations in data table.
4. Pour used vinegar down the drain. Rinse container.
5. Refill container with 300 ml of liquid that you have been assigned.
6. Carefully place an egg into the container and allow it to soak 2 days.
7. Put container in designated space, clean up materials and wash your hands.
8. Repeat steps 1-7 above, using a liquid of your choice.

SAMPLE QUESTIONS TO ELICIT CLASS DISCUSSION:

1. What liquids caused the egg to swell?
2. What liquids caused the egg to shrink?
3. What process caused the egg to swell or shrink? Be SPECIFIC; discuss each liquid.
4. Which column(s) will you use to create your graph?

Graph Preparation and Directions:

1. The name of your independent variable is _____ and will be placed on the _____axis. The name of the dependent variable is _____ and will be placed on the _____ axis.

PARAMETERS TO EVALUATE STUDENT WORK PRODUCTS:

Students write a report that describes the process of osmosis in terms of the results of the experiments. It will also include the answers to the following questions.

1. What do you think would happen to a shell-less egg if water passed into the egg through the membrane?
2. What do you think would happen to a shell-less egg if water passed out of the egg through the membrane?
3. What substance must pass through the shell and membrane in order for a chick to develop correctly?

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