



## ANCHIALINE PONDS

### Concepts

Students will learn the properties of salt and freshwater and the concept of density, and will then be introduced to the anchialine pond ecosystem.

### HCPS III Benchmarks

SC.K.1.2

SC.K.1.3

### Duration

45 minutes

### Source Material

National Geographic  
PRISM  
Anchialine Ponds  
Detective Story

### Vocabulary

Anchialine pond  
Brackish  
Dense  
Float  
Freshwater  
Prediction  
Saltwater  
'opae 'ula

## Freshwater/Saltwater “Egg-periment”

### Summary

This experiment will demonstrate the properties of freshwater and saltwater. Students will be introduced to the scientific method and the concept of density. The properties learned will set the stage for the introduction of anchialine ponds, which contain both saltwater and freshwater (brackish).

### Objectives

- Students will be able to make **predictions** and test them using an experiment
- Students will be able to record their data in an organized manner
- Students will make a model of an anchialine pond using freshwater and saltwater

### Materials (per pair)

2 extra large plastic cups filled with water (clear cups)  
3 Tbsp. sea salt or kosher salt in a plastic bag  
1 hard-boiled egg  
1 plastic pipette or eyedropper  
One drop of food coloring  
2 “Egg-periment” worksheets

### Making Connections

Students may remember their own experiences in the water, both at freshwater ponds and saltwater bodies. Some may have been to anchialine ponds on the island. These activities will connect scientific concepts to these real locations and bodies of water in nature.

### Teacher Prep for Activity

Prepare materials and copy worksheets. Measure out salt and dye and place in separate bags or containers for the pairs. Label the cups “S” for Saltwater and “F” for Freshwater. Also choose student pairs according to student dynamics.

### Background

Anchialine ponds are unique ecosystems found on Hawai‘i Island and Maui. They are set back from the shoreline, and saltwater seeps into these ponds via crevices in lava rock. There is no direct connection between the pond and the ocean. Groundwater and **freshwater** runoff serve as freshwater inputs to the ecosystem. This creates a **brackish** pond containing both fresh and **saltwater**, where freshwater **floats** on the top layer because freshwater is less **dense**, or has less matter per unit volume in it than the saltwater. Several bacteria and a native



ponds consist of introduced fish species such as tilapia and gobies. Anchialine ponds are fragile to disturbances, and are greatly threatened by shoreline developments in Hawai'i and deserve protective status, which they currently lack.

## Procedure

### Pre-Assessment:

First, administer the pre-assessment. Encourage students to draw the environment or home where they think the animal (an 'opae'ula) would live in real life. Allow 10 minutes for this pre-assessment. Keep these pre-assessment drawings in a safe place so you may compare it to the post-assessment at the end of the unit.

### Part 1: Floating Egg

1. Go over new vocabulary with the class and write words on chart paper. HINT: Keep this chart paper as a running list of new vocabulary words for the ponds unit.
2. Put students in pairs and have them move to a workstation in the room. Pass out 2 clear plastic cups with 1 cup of water in each to each station.
3. Have the students add 3 Tablespoons of salt (pre-measured) into the cup labeled with an "S" and stir until dissolved. Explain the one cup should have salt in it and the other should **not** have any salt in it. The cup without salt will be have an "F" on it for freshwater.
4. Have each student make a prediction about whether an egg will float or sink in saltwater and freshwater. They will circle the drawing that matches their prediction on the worksheet. (*The egg should sink in the freshwater and float in the saltwater*).
5. Have students place the hard-boiled egg into the regular water and record observations on the worksheet by drawing what happens.
6. Have students place the hard-boiled egg into the saltwater cup and record observations on worksheet by drawing what happens.

### Part 2: Freshwater vs. Saltwater Density

1. Distribute 1 plastic pipette and 8-10 drops of dye to each station.
2. Tell the students they will be dyeing the freshwater and they may place about five drops of dye into the freshwater and stir it so the dye is even. Add more dye if the water is not dark enough. NO dye goes into the saltwater ("S") cup. (Hint: they may need a demonstration or help using the pipette for the first time – show them how to suck up and drop out liquid from the pipette)
3. Next, tell the students that they will be adding the dyed freshwater to the saltwater. Demonstrate how to use the pipette to suck up water in front of the whole class.
4. Have students make a prediction on their Egg-periment worksheet as to what will happen to the dyed water when it is added to the saltwater cup.
5. Have students suck up the dyed freshwater with the pipette and add it slowly along the side of the saltwater cup. (*The dyed freshwater should float on top*).
6. Students should record what happens on their worksheet by coloring it onto the template cups drawn on their worksheets.
7. Last, have students clean up their areas and wash their hands.



### **Part 3: Discussion**

1. Have students join you on the floor for a discussion of the results. Ask questions that may lead to discussion about weight and density like:
  - Were the results the same or different from your prediction?
  - When does the egg sink? Why?
  - Does the dyed freshwater float? Why?
  - What is different about the saltwater as compared to the freshwater?
2. Finally, ask if they think there is a place in nature where freshwater and saltwater are in the same place, and the freshwater stays on top.
3. Show the class large photos (you can print them from online websites about anchialine ponds) of anchialine ponds. Tell them they will be learning about these special ponds over the next few lessons.

### **Assessments**

Completed worksheet

Class discussion

### **Resources**

National Geographic Kids website:

[http://www.nationalgeographic.com/ngkids/trythis/trythis\\_water/floating-egg.html](http://www.nationalgeographic.com/ngkids/trythis/trythis_water/floating-egg.html)



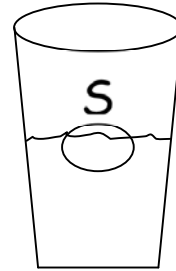
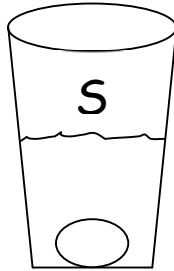
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## EGG-PERIMENT WORKSHEET

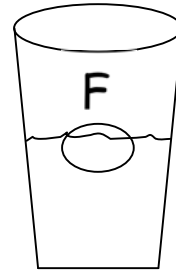
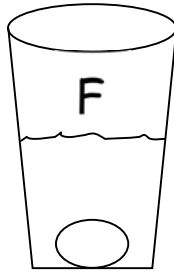
### PART 1: THE FLOATING EGG

#### 1. CIRCLE YOUR PREDICTION:

Saltwater



Freshwater

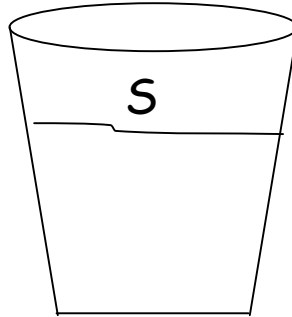




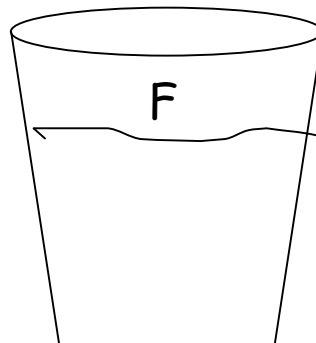
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**2. DRAW YOUR RESULT.**  
**WHAT HAPPENED TO THE EGG?**

Saltwater



Freshwater



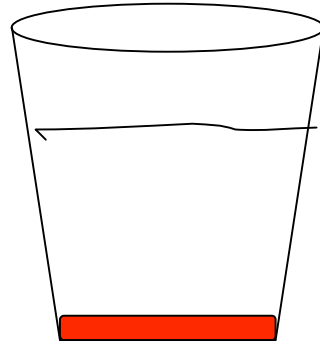


## PART 2. DYED WATER

### 1. CIRCLE YOUR PREDICTION:

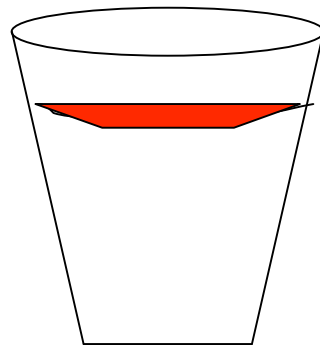
A.

The dyed freshwater sinks.



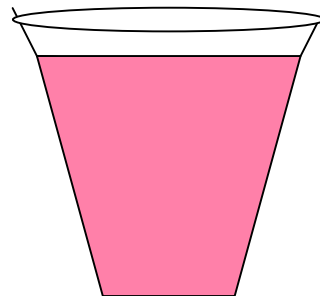
B.

The dyed freshwater floats.



C.

The dyed freshwater mixes with the salt water.





Name: \_\_\_\_\_

2. DRAW YOUR RESULT.

WHAT HAPPENED TO  
THE DYED FRESHWATER ?

