



# Dive Right In

Grades 2-3



## Overview

The students will observe how water pressure increases in deeper water. They will make a submarine out of a 2 liter bottle, pen cap & clay.

## Objective

- To help students have a better understanding of water pressure.

## Materials

*For the presenter:*

- access to sink
- large plastic tub filled with water
- empty tub - used for water pressure experiment to catch water
- Two - 2 liter clear plastic pop bottles with lids
- 1 plastic lid to a ball point pen
- modeling clay
- glass of water
- scissors

*For each student:*

- 2 liter clear plastic pop bottle with a lid (students could each bring one from home)
- 1 plastic lid to a ball point pen; check with the school office, they may be able to take them off pens in the supply room
- a small ball of modeling clay
- blue food coloring-1 squeeze bottle for each group of 6
- One - 8 oz plastic glass for each pair of students
- 1 tub full of water that students can fill their glasses from

## Getting Ready

Make three holes along the side of one plastic bottle, using the sharp point of a pair of scissors. Fill a pitcher with blue water. It will be used later to fill the bottle for the experiment. Have an empty tub ready to catch the water from the experiment. Fill each of the students' 2 liter bottles full of water, leaving about 2 inches at the top. Screw on the lids. Put bottles, pen lids, balls of clay, plastic glasses and the tub of water on a table that has an easy access by students.



24



pitcher of  
blue water

## **Procedures**

### **Activity 1: The Pressure's On**

Begin by discussing water pressure. Use the questions below to get the students interested and help you find out what they already know about water pressure.

#### **Questions**

“Have you ever tried to touch the bottom of a swimming pool? Have you ever felt the water pressing on your ears? Do you know why it does this? (*Water has weight. The weight of the water in the pool is the water pressure that pushes on your ear drums.*) Do you think the pressure is the same on top of the water as it would be down deep? Did you know that when seals dive deeply, they close up their nostrils to keep out the water? Can you think of any other examples of water pressure affecting people or animals? (*scuba diving, etc.*)”

Tell the students that you are going to demonstrate a water experiment. Ask them to think about what they know about water pressure. “As you watch, see if this experiment proves anything about water pressure to you.” Show the class the bottle with the three holes. Tell them that you will choose two volunteers to cover up the holes while you fill the bottle. After the bottle is filled, before you have the students let go of the holes, ask the students the following questions. “What do you think will happen when we let go of the holes? Do you think the water will spurt out of all three holes? Will they look the same?” Let go of the holes. Let the students observe what is happening (*water from the bottom hole should be spurting out the farthest*). Ask the students: “What is happening? Why? What does this prove about water pressure?”

Put away the tub of water and bottle.

### **Activity 2: Making a Submarine**

#### **Questions**

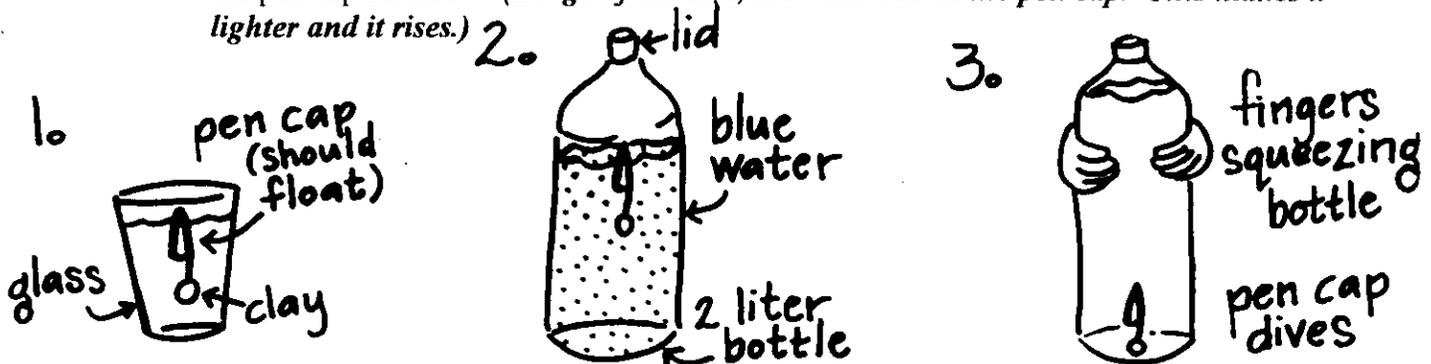
“What is a submarine? Do you know what makes a submarine dive? What keeps it from being squashed by the enormous pressure from the water in the ocean? How can a submarine surface?”

#### **Discussion**

Submarines and underwater vessels are special boats that can travel under water and explore the ocean depths. These boats have to be strong to be able to withstand the tremendous pressure deep under the ocean. They contain special tanks that are flooded with water to help make them dive. When they are ready to surface, machines pump air into the tanks to remove the water and make the boats lighter. Because they are lighter, they are able to rise to the surface.

Before handing out any materials, demonstrate for the students how they will make their own submarine.

1. Take a glass and fill it half full of water.
2. Weight the long, thin end of the pen cap with a small blob of clay.
3. Float your cap in the glass of water. Remove or add clay until the cap floats upright.
4. Put two drops of blue food coloring into your 2 liter bottle that is already filled with water.
5. Drop the weighted end of the pen cap into the bottle first. The cap should float at the surface of the water. Then screw on the lid as tight as you can get it.
6. Now to make it dive: Squeeze the sides of the bottle with your fingers. The cap goes down. Ask the students: "Why did the cap go down? (*The water is forced into the pen cap, just like a submarine. This makes it heavy and it sinks.*) What can I do to make the pen cap surface?" (*Let go of the side, the water leaves the pen cap. This makes it lighter and it rises.*)



Hand out the clay, pen caps and glasses with water to the students. Tell them when they get the pen caps to float upright, they may come up and get a bottle already filled with water. They may add two drops of blue food coloring to make their ocean blue. Then take the bottles back to their desk to finish the experiment. Remind them to screw the lids on tight.

Have students experiment controlling the depth of the pen cap by squeezing the bottle different ways.

Ask the students: "Can you make your cap go down faster or slower; stay part way down; go down and stay down; or go down and go right back up?"

### Closure

As you move around the classroom, ask the children what they have discovered about submarines.

### Clean Up

Ask the students to return the glasses and water to the sink and wipe off their tables. They can take the submarines home to share with their families.