

# A STEM in the Park

## Take Home Activity

# STEM

in the **PARK**™

Science, Technology, Engineering, and Mathematics

## Diving Fish

### **Overview:**

Participants will explore the ability of fish to control their buoyancy by constructing and experimenting with plastic bottles, water and food sauce packets.



### **Background Information:**

The swim bladder, gas bladder, fish maw or air bladder is an internal gas-filled organ that contributes to the ability of many fish to control their buoyancy, and to stay at their current water depth without having to waste energy in swimming. Also, the dorsal position of the swim bladder means the center of mass is below the center of volume, allowing it to act as a stabilizing agent.

### **Objectives:**

After this activity students should be able to:

- Explain how fish swim bladders produce natural buoyancy.
- Explain how a change in atmospheric pressure influences buoyancy.
- Demonstrate how fish swim bladders work.

### **Materials Needed:**

- Clear plastic bottle without label
- Sauce packets, such as ketchup
- Hot glue gun
- Hot glue sticks
- Permanent markers
- Water

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## ***Directions:***

First test to see if your sauce packets float by placing them in a bowl of water, if they sink don't use them in the experiment.

Next turn your sauce packets into fish. Fold the two narrow corners of the packet inward as if you were making a paper airplane. Keep the folds small, because if you fold it too much, either your ketchup packet will explode or the packet will sink when it is in the bottle and the experiment won't work. Hot glue the tabs in place.

Squeeze the center of the packet and glue down the outer edges of the packet in just the very center. This will give the sauce packet the shape of a fish.

After gluing, color your fish with permanent markers.

Once the coloring is complete, gently push the "fish" into the plastic bottle and fill the bottle to the top with water.

## ***The Experiment:***

If the sauce packet sinks when you fill your bottle, then you will need to remove it and distribute the air inside the sauce packet. Experiment with this part until the sauce packet no longer sinks straight to the bottom. Put the lid on the bottle and squeeze the sides firmly. The fish will dive to the bottom of your bottle. Release the pressure and the fish will float to the top. The sauce packet floats because it has air trapped inside of the packet and air is lighter than water. When the bottle is squeezed, the air bubble is compressed into a smaller space because air compresses easier than water. This increases the density of the ketchup packet and makes it sink to the bottom of the bottle. When the pressure is released, the air inside the ketchup packet allows it to rise again.

**Modifications:** Use tape or small rubber bands in place of hot glue.

**STEM Standards:** Science of fish anatomy and physics and inquiry.

***This activity is brought to you by Metroparks Toledo***

