Under Pressure

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Grade Level: Fifth Grade
S.C. Standards: II.B.4.a

Overview: Students will work in groups to conduct an investigation on pressure at depth. They will record the information on the data sheet.

Focus Question: Have you ever felt your ears begin to hurt when you dive in the deep end of a swimming pool? Why does this happen?

Materials/Resources:
1 Large coffee can or gallon milk jug for each group
1 nail to make holes in can
Duct tape
1 cm. ruler for each group
Paper towels
Data sheet for each student
Water
Newspaper

Time: One 1-hour class

Culminating Assessment: The student groups will complete the data sheet during the investigation. The teacher will score it using the following rubric. Prior to the activity the teacher should show the students (on the board or overhead) the rubric he will use to score the investigation. Emphasize the 2-point column of the rubric. Tell them the 2-point column is how to get an A on the investigation.
## UNDER PRESSURE

<table>
<thead>
<tr>
<th></th>
<th>2</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Materials</strong></td>
<td>Always used materials properly</td>
<td>Used materials properly most of the time</td>
<td>Did not use materials properly</td>
</tr>
<tr>
<td><strong>Cooperation</strong></td>
<td>Always cooperated with group</td>
<td>Cooperated with group most of the time</td>
<td>Did not cooperate with group</td>
</tr>
<tr>
<td><strong>Correct Answers</strong></td>
<td>#4, 5, 6 on Data Sheet Correct</td>
<td>2 of the 3 (#4,5,6) on Data Sheet correct</td>
<td>0-1 of the 3 on Data Sheet correct</td>
</tr>
<tr>
<td><strong>Inferences</strong></td>
<td>#3,7,8,9 all are reasonable inferences/predictions</td>
<td>2 out of the 3 (#3,7,8,9) are reasonable inferences/predictions</td>
<td>0-1 of the 3 are reasonable inferences/predictions</td>
</tr>
</tbody>
</table>

7-8 points = A  
5-6 points = B  
3-4 points = C  
1-2 points = D  
0 points = F

### Procedure:
Prior to day of activity, the teacher should have prepared coffee cans. Take the nail and poke 3 holes in the can, one on top of the other, so there will be 3 holes in a vertical line. You may want to number the holes as 1, 2, and 3 with 1 being at the top. Place a strip of duct tape over the holes. Only use one piece of tape so the students will pull it off all at once.

1. Ask the students if they've ever felt their ears hurt when they have dove in the deep end of the pool. Listen to a few examples. Tell them they are going to conduct an investigation that will help explain why this happens.
2. Pass out the materials to each group. Give each student a data sheet. Go over the instruction on the data sheet together. Make sure the students understand they are to fill the containers with the water so water covers every hole. Remind them not to pull the tape off until every member in the group is ready.
3. As students set up their investigation, go around the room and assist as needed. Make sure everyone has set the centimeter ruler so the can is at one end of it.

4. As students are working remind them to watch on the centimeter ruler how far the water from each hole goes. Also remind them to record the information.

5. Once they have conducted the investigation, have students work together to complete the data sheet and answer the questions. Assist as needed.

6. As an extension, have students look at these pictures. Have them explain what happened to the balloon and the water bottle in a paragraph.

PICTURES FOR UNDER PRESSURE

Empty plastic bottle and balloon at the surface:
Plastic bottle at 50 feet below the surface.
Balloon at 50 feet below the surface.
DATA SHEET: UNDER PRESSURE

Each group will need:
1 Large coffee can or gallon milk jug for each group
1 nail to make holes in can
Duct tape
1 cm. ruler for each group
Paper towels
Data sheet for each student
Water
Newspaper

1. Place newspaper on the table or work space. Set up the coffee can so it is at the edge of the centimeter ruler. Make sure the holes are facing the ruler. There should be duct tape over all the holes.
2. Pour water in the can so the water is above all of the holes.

3. Predict which hole will have the longest stream of water. Why do you think that?

4. Pull duct tape off the can quickly. Watch the streams of water. What happened when the tape was removed?

5. Which hole has the longest stream?

6. Which hole has the shortest stream?
7. Why is there a difference in streams?

8. How does this difference affect human SCUBA divers and the equipment they have to use?

9. How do you think this affects animals that live in the ocean at depth?