

# Math Under Pressure



**Contact the Albacore Museum for Field Trip and School Visit Opportunities**

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## Lesson Plan

**OBJECTIVE:** Students calculate air and water pressure and discuss the effects of pressure on people and things underwater.

**MATERIALS:**

- Math Under Pressure activity sheet (Page: 3)
- Pressure graph (Page: 5)
- Calculators as desired

**PROCEDURE:**

1. Brainstorm with students about how air and water pressure affects their lives, such as in airplanes, while swimming/diving, blowing up a balloon, etc.
2. Pass out copies of "Math Under Pressure" activity sheet and pressure graph to students.
3. Review answers with students.
4. Break students into teams to develop other atmosphere problems for their classmates.

## Activity Sheet

### BACKGROUND:

Pressure is all around us. Although submarines are designed and tested to be safe underwater, the problems of increasing water pressure affect them as they submerge.

Pressure increases rapidly underwater. To help understand the effect of water and air pressure on our bodies, scientists have developed a measuring system . For every 33 feet of depth, pressure increases 14.7 pounds per square inch , or one "atmosphere." As a diver or submarine gets deeper, each atmosphere adds another 14.7 pounds per square inch to the pressure exerted on them. The weight of the air at the surface must also be added when figuring underwater pressure. At the surface of the water, air weighs 14.7 pounds per square inch (psi).

**Use the attached graph, and what you know about air and water pressure to answer these questions.**

1. John has dropped a quarter into a swimming pool. To get it back, he must dive to the bottom of the 11' section of the pool.

How many pounds per square inch of pressure will he be under before he dives into the water?\_\_\_\_\_.

How will that number change as he swims to the bottom of the pool? WHY?

\_\_\_\_\_.

2. A cliff diver in Acapulco dives from a 200-foot cliff into the ocean. He is moving so fast that his body plunges to a depth where the pressure on his body is just over 44 pounds per square inch.

How far underwater is he? \_\_\_\_\_.

How many atmospheres are pressing on him? \_\_\_\_\_.

3. A submarine is planning to make a test dive to a depth of 2,425 feet.

How many atmospheres is that? \_\_\_\_\_.

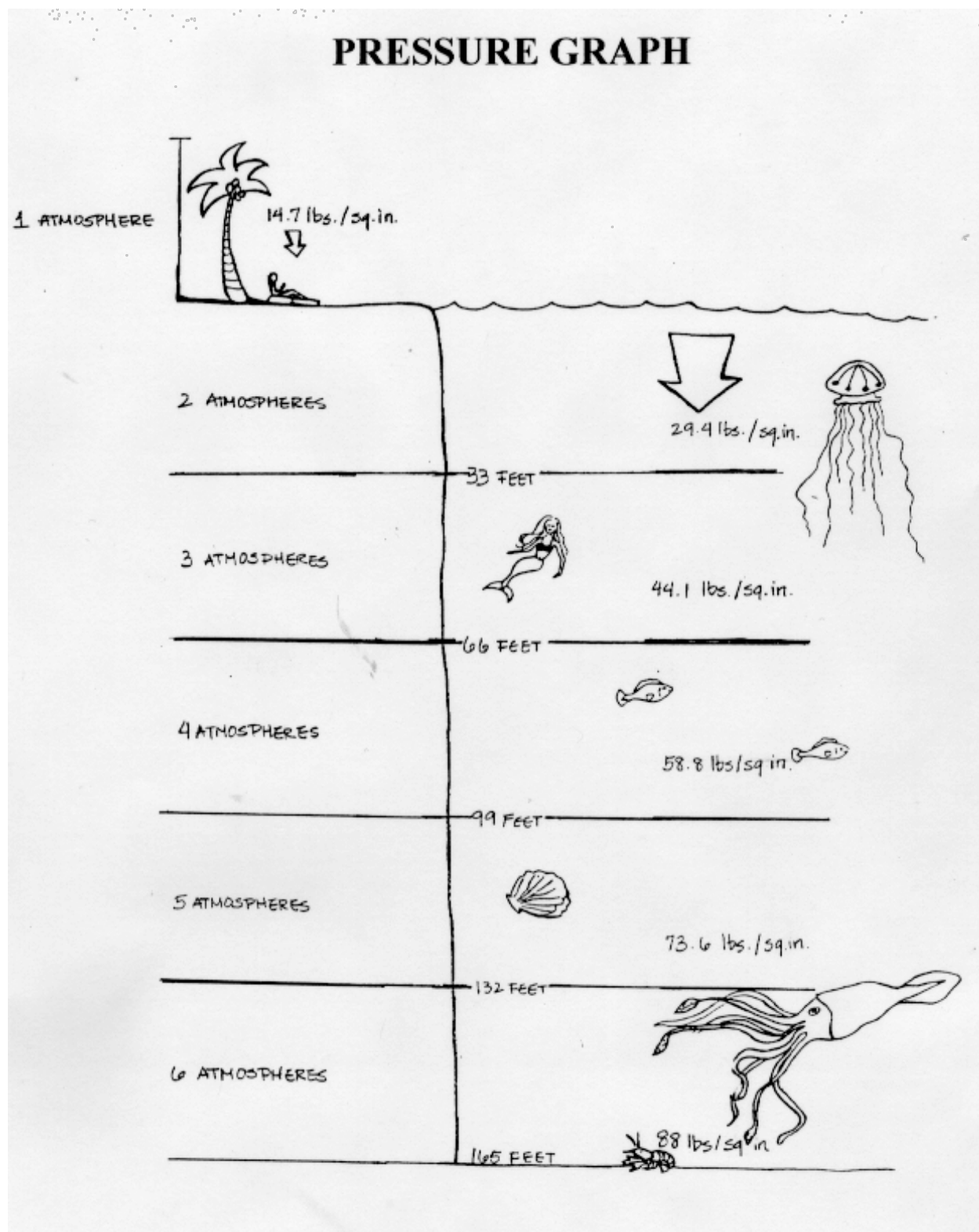
What do you think will happen to the sub if its construction can't take the pressure?  
\_\_\_\_\_.

4. During a U.S. Navy exercise at sea, two submarines are playing hide-and-seek to test their invisibility. At first, the subs dive as deep as they can go, but then each hides in the ocean. Sub #1 stops at a depth where it is affected by 88.3 lbs/sq.in. of pressure. Sub #2 is floating at a depth of 165 feet.

Which is deeper? \_\_\_\_\_.

**Follow Up:** Work in small groups to make up "atmosphere" problems to stump your classmates. Be creative!

## Water Pressure Graph



**Teacher Answer Sheet**

1. 14.7 psi
2. pressure will increase
3. the deeper he dives, the greater the pressure on him.
4. 66 feet
5. 3
6. 74.48 including 1 atmosphere of surface air pressure
7. It will implode or be crushed.
8. They are at the same depth.