05-02 Pressure vs. Depth Lab *Name: _____*

Objective

- Determine the relationship between pressure and depth.

Materials

- Bucket or sink to catch water
- 20 oz. pop bottle with a hole near the bottom
- Water

Procedure

1. In this lab, you will let come out the hole in the bottle. Before doing so, create a hypothesis about what will happen. When will the water flow out the farthest: when the water is nearly full, half-full, or nearly empty? _____
2. Make sure the bottle is full of water. If it is not, go fill it.
3. Hold the bottle over the bucket so that the water will flow out the hole into the bucket and loosen the bottle cap. Observe the flow of water. PUT THE CAP BACK ON!
4. Describe how the distance the water flowed out changed as the depth of the water changed. _____ _____
5. The pressure of a fluid _____ (increases, decreases, stays the same) as depth increases. So pressure and depth are _____ (directly, inversely, not) proportional. This can be written as _____ ($P = kh$, $P = k/h$, none).
6. Consider taking an elevator down from the top floor of a tall building. Consider diving down under water. Which one makes your ears hurt more? _____
7. Your ears hurt because of the difference in pressure. Which affects pressure more, air or water? _____
8. Which is denser, water or air? _____
9. The pressure of a fluid _____ (increases, decreases, stays the same) as density increases. So pressure and density are _____ (directly, inversely, not) proportional. This can be written as _____ ($P = k\rho$, $P = k/\rho$, none).
10. Pressure is also directly proportional to the acceleration due to gravity, so $P = kg$. Put set 5, 9, and 10 together to write an equation relating pressure, depth, density, and gravity. Put all the variables that were directly related to pressure on the top of a fraction and all the variables that were inversely proportional on the bottom. (Let $k = 1$) _____
11. Why does the water not flow out of the bottle with the cap on tightly? _____