Science 8 Name: _____

LAB #08: PASCAL'S PRINCIPLE Date: _____

Pascal's Principle Lab #08

Discussion: Pascal's principle has to do with pressure being the same in all parts of a confined fluid. This principle is used to make hydraulic lifts and machinery.

Purpose: To construct and observe a Cartesian diver.

Hypothesis: If force is added to a plastic bottle containing a Cartesian diver, the air space in the diver will become smaller and the density of the diver will increase causing the diver to sink.

Theory: According to Boyle's Law, if the pressure on a gas is increased, the volume of the gas will decrease. This will allow more water to enter the bell of a Cartesian diver increasing the weight and density of the diver.

Materials: water plastic bottle small test tube

Method:

1. Add water to fill a 2-liter plastic bottle all the way to the top.
2. Add water to fill a small test-tube all the way to the top.
3. Place a finger over the top of the test-tube and turn it upside-down.
4. Put the filled 2-liter bottle in a large sink and then place the upside-down test-tube in the water in the mouth of the bottle. Try not to lose too much water from the tube.
5. Adjust the air gap in the test-tube until it just floats in the water. (It is easier to practice and determine the right amount of water in a large beaker in the sink.)
6. Place the cap on the 2-liter bottle and fasten tightly. Do not allow air bubbles in the bottle.
7. Place one hand around the bottom of the 2-liter bottle and place the other hand lightly around the top of the 2-liter bottle. Squeeze the bottle with the hand near the top of the bottle.
8. Observe what you feel with the hand that is not squeezing the bottle. Record your observations.
9. Repeat steps 7 and 8 but squeeze the bottle with the hand near the bottom and record what the hand at the top of the bottle feels.
10. Squeeze the bottle and observe what happens to the Cartesian diver. Record your observations.

Data Collection and Processing:

1. Record what the hand at the bottom of the bottle feels when you squeeze with the hand at the top.

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2. Record what the hand at the top of the bottle feels when you squeeze with the hand at the bottom.

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3. Record what happens to the little Cartesian diver when you squeeze the bottle. Be sure to include what happens to the air bubble in the diver and what happens to the diver itself.

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Analysis:

1. What happens to the amount and weight of the water inside the diver when you squeeze the bottle?

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Conclusion:

1. In terms of pressure in a confined liquid, why does the air bubble in the diver become smaller?

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2. What happens to the density of the Cartesian diver when you squeeze the bottle? (Refer to your answer to Analysis question #1.)

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3. State Pascal's Principle for fluid pressure.

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4. Restate your conclusion about the diver's behavior in terms of Pascal's Principle.

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Expanding Understanding:

In terms of Pascal's Principle, explain how a hydraulic lift works.

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