AIR PRESSURE

Can You put a piece of paper under water without getting it wet?

Question: Can you put a piece of paper under water without getting it wet?

Materials: Bowl, deep
Tap Water
Coke or Water bottle down to hold 8 ouncs
Piece of notebook paper

Experiment:

1) Fill the bowl about ¾ full of water.

2) Wad the paper up and stuff it as tightly as possible into the bottom of the bottle. Turn the bottle over to make sure the paper doesn't fall out.

3) Turn the bottle upside down and push it straight down into the bowl of water. Note that the water level in the bowl rises as the bottle is pushed down. Be sure you don't tilt the bottle as you push it down.

4) Lift the bottle straight up out of the water.

4) Did the paper get wet?

The Secrets: The paper in the bottom of the bottle is protected by the air trapped in the bottle. As you pushed the bottle deeper, the air in the bottle becomes compressed inside the bottle by the water pressure from the water that rises inside the bottle. The deeper you push the bottle down into the water, the higher the water will rise inside the bottle. However, as the trapped air is compressed, the air pressure rises and the air volume inside the glass shrinks. As long as the air pressure is greater than the water pressure, determined by the difference in the height of the water inside the bottle compared to the water level outside the bottle. A six inch column of water exerts a pressure of 0.2 PSI.

Boyle's law states that the pressure exerted by a gas is inversely proportional to the volume it occupies if the temperature and amount of gas remain unchanged.

Original air pressure (P1) = 14.7 psi
Compressed air pressure (P2) – 14.9 psi
Original air volume for an 8 ounce glass (V1) = 16.4 cubic inches

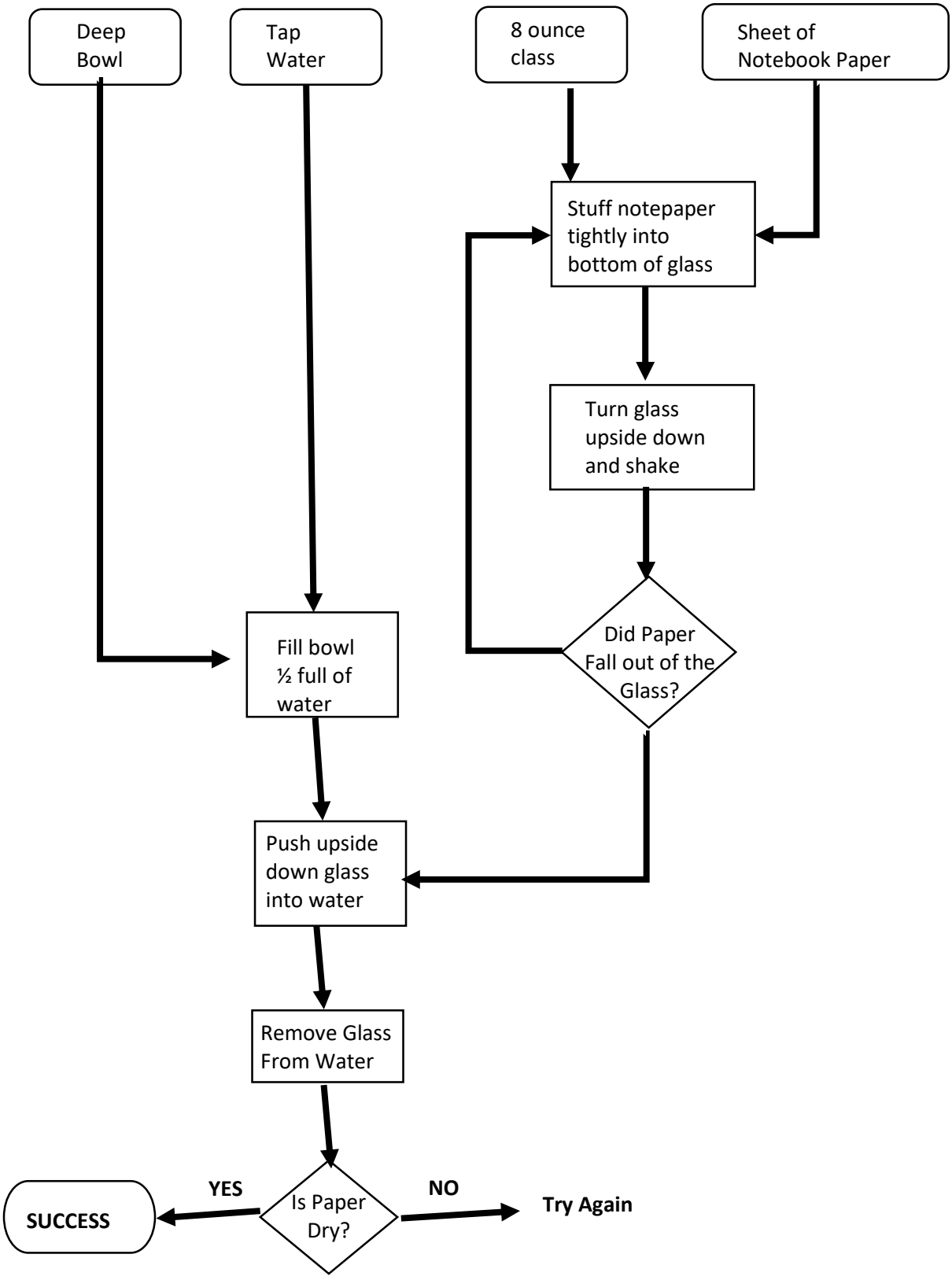
Boyle's Law $P1 \times V1 = P2 \times V2$

$(14.7 \text{ PSI}) \times (16.4 \text{ cu in}) = (14.9 \text{ PSI}) \times V2$

$V2 = (14.7 \text{ PSI}) \times (16.4 \text{ Cu in}) / (14.9 \text{ PSI})$

$= 16.2 \text{ Cu in}$

AIR PRESSURE **Can You put a piece of paper under water without getting it wet?**



Other References:
https://www.workman.com/products/pop-bottle-science Pages 2 -- 3
https://www. coolscienceexperimentshq.com/how-to-keep-a-paper-towel-dry-under-water/
https://www.steampoweredfamily.com/activities/keep-paper-dry-water/