Name:_____	Class Period:___
Date:__/__/__	Lab #: _____

Lab Title:

Crush the Can – WITH AIR!!!!
Defy Gravity – WITH AIR!!!!

Intro: Air pressure is very powerful, it holds up your school bus, car or bike as you ride to school. Air holds up a 300 ton airliner as it slams onto the runway at 200-300 mph! Air pressure differences also hold that same 300 ton airliner in the air as it flies at 35,000 feet.

Air pressure and temperature differences drive weather patterns from a small breeze to a

TORNADO or HURRICANE!

- Air pushes on this sheet of paper with a weight of over 1,393 pounds (633 kg).
- This weight is called AIR PRESSURE and it exerts a pressure of 14.9 pounds per square inch.
- You don't feel this weight because it is equally distributed all around the paper and pushes evenly on all surfaces even the bottom.
- If you took away the air pressure from the bottom of this sheet of paper you would feel the paper suddenly weigh over 1300 pounds. *Even Vin Diesel (!) could not* pick up this much weight *but you can* with the power of air pressure.
- It is difficult to remove the air pressure from one side of a piece of paper
- We ARE able to reduce the pressure inside of an aluminum can.

Our hypothesis - If we *reduce the internal air pressure* of a pop can enough, the *external air pressure will be greater than the internal pressure – it will create a partial vacuum and crush the can*. It may also do something else… defy the pull of gravity on water - let's see what happens.

Can you do it? Let's find out how to CRUSH THE CAN & DEFY GRAVITY…..WITH AIR!!!!

Procedure:

First gather what you need:

- 1 soda can
- heat source (hot plate works well with Bunsen burner keep can upright – step 4 below)
- 600 or 1000ml beaker
- water
- 2 folded paper towels – moist with water or tongs (with Bunsen burner use tongs)

Then:

1. Fill your beaker with water up to 500 ml & put 5 mls in a soda can
2. Prepare your paper towels – fold into _ size and moisten with water

READ THIS

IF IT'S WORTH DOING…IT'S WORTH DOING WELL

3. Remove the pop top ring from your can - Carefully these are sharp!
4. Using your paper towel as an insulator to protect your hand, place the pop can on the heating element **(DO NOT TOUCH THE ELEMENT – IT IS VERY VERY HOT!).**
5. Let it heat for 1 minute OR until you see steam rising from the top of the can.
6. Using your paper towel as an insulator to protect your hand, pick up the can by the side (CAREFUL NOT TO TOUCH THE BURNER!) *& quickly* place the pop can UPSIDE DOWN into the water in the beaker.
7. Observe what happens.
8. Using your paper towel as an insulator to protect your hand, slowly pull the pop can straight up from the water in the beaker.
9. Write down everything that you observe also include the following:
   - Level of water in the beaker before AND after the experiment
   - Condition of your pop can before AND after the experiment
   - Is there any water in the pop can after the experiment
   - Any thing else you think is important
10. Each member of your group should do this experiment with a new can. After that you can repeat the experiment if you have another can.

Observations:

_____

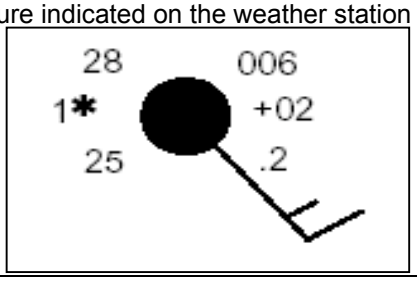
_____

_____

Analysis:

♦ Did the can deform? Yes or No (circle one) ♦ Why or why not?	♦ The pressure inside the can was **higher** or **lower** than outside the can. (circle one) ♦ What caused the water to be sucked into the can?
♦ Are low pressure systems warmer or cooler than high pressure systems?	♦ The flow will go from_____ to _____ ♦ Was this observed in your experiment? Yes or No

Regents Review Questions (circle answer)

On a certain day, the isobars on a weather map are very close together over eastern New York State. To make the people of this area aware of possible risk to life and property in this situation, the National Weather Service should issue (1) a dense-fog warning (3) a heat-index warning (2) a high-wind advisory (4) an air-pollution advisory	What is the air pressure indicated on the weather station model shown? (1) 900.6 mb (2) 960.0 mb (3) 1000.6 mb (4) 1006.0 mb 
What is the dewpoint temperature when the dry-bulb temperature is 16°C and the wet-bulb temperature is 11°C? (1) 5°C (3) 9°C (2) 7°C (4) –17°C	What is the dewpoint when the dry-bulb temperature is 24°C and the wet-bulb temperature is 15°C? (1) 8°C (3) 36°C (2) –18°C (4) 4°C
During which process does heat transfer occur because of density differences? (1) conduction (3) radiation (2) convection (4) reflection	A student using a sling psychrometer obtained a dry-bulb reading of 20°C and a wet bulb reading of 16°C for a parcel of air outside the classroom. What is the relative humidity? (1) 51% (3) 100% (2) 62% (4) 66%

Teacher section:

Tips:

- Make this a competition about who has the most ‘crushed can’.
- Have students bring in rinsed out pop cans – 2 per student

Analysis – Did the can deform? Yes or No – usually yes, sometimes no, if no it could be because the can was placed unevenly into the water, not hot enough or was a strong can. In either case the can should be almost full of water.
Are low pressure systems warmer or cooler than high pressure systems? Warmer
Was pressure higher or lower inside the can? Lower
What caused the water to be sucked into the can? Lower pressure inside, flow goes from high to low
The flow will go from HIGH to LOW
Was this observed in your experiment? Yes

Regents Review Questions:
On a certain day… (2) a high wind advisory
What is the dewpoint….(2) 7°C
During which process…(2) convection
What is the air…. (3) 1000.6 mb
What is the dewpoint…(1) 8°C
A student using… (4) 66%

Warning labels for heat source

HOT - DANGER - HOT

HOT - DANGER - HOT