

# Weighing Air

## Instructions:

1. Attach a pressure pumper to a 1-liter bottle.
2. Measure the mass of the bottle to the nearest 0.1 gram. Record the mass in the table.
3. Pump the pressure pumper 15 times.
4. Repeat step 2.
5. Pump the pressure pumper another 15 times.
6. Repeat step 2.
7. Repeat steps 5 and 6 until you have a total of 225 pumps, recording the mass of the bottle each time.
8. Release the pressure by slowly removing the pressure pumper and find the mass a final time.
9. Calculate the mass gained (or lost) during each step.

Pumps	Mass (g)	Change in Mass (g)
0		
15		
30		
45		
60		
75		
90		
105		
120		
135		
150		
165		
180		
195		
210		
225		
Release		

10. Does air have mass? \_\_\_\_\_

# Pressure and Temperature

## Instructions:

1. Put a temperature strip in a clean, dry bottle.
  2. Record the temperature in the bottle: \_\_\_\_\_° \_\_\_\_\_
  3. Put the pressure pumper on top of the bottle.
  4. Pump the pressure pumper 225 times. What is happening to the pressure in the bottle?
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5. Record the temperature in the bottle: \_\_\_\_\_° \_\_\_\_\_
  6. What happened to the temperature in the bottle?
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7. While watching the temperature strip, unscrew the pressure pumper. What happens to the temperature as the pressure is released?
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8. State the relationship between the pressure of a gas and its temperature.
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9. A student got a large balloon at the store. She walked home with the balloon on a very cold day. What do you think happened to the balloon as she walked? Explain your reasoning.
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10. Record the *unpressurized* temperature of the bottle: \_\_\_\_\_° \_\_\_\_\_
  12. Put the pressure pumper on top of the bottle.
  13. Pump the pressure pumper 225 times.
  14. Record the *pressurized* temperature of the bottle: \_\_\_\_\_° \_\_\_\_\_
  15. Let the pressurized bottle sit until it returns to the unpressurized temperature. What is happening to the heat energy that was in the bottle?
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16. When the bottle has returned to the previous temperature, release the pressure. Record the new temperature.

\_\_\_\_\_° \_\_\_\_\_

17. What weather event, caused by changes in temperature and pressure in the real world, do you experience every time you release the bottle's pressure?
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