

Amazing Marshmallow's Lab (Boyle's Law) (T.Trimpe, Havana Junior High, Havana, IL)
Illinois Learning Standard: 12.C.3b

NOTE: A worksheet that combines Boyle's law and Charles' law is available - [Gas Laws Lab \(pdf\)](#)

Materials: Syringe & fresh small marshmallows

Procedure: To demonstrate Boyle's Law, give students a syringe and 3 small marshmallows. Instruct them to place the marshmallows in the syringe and replace the plunger. Push the plunger as far down as possible without squashing the marshmallows. Place one finger on the end of the syringe and pull the plunger out to the end of the syringe. Observe the marshmallows. Students will notice that they get larger, or expand. As the plunger is pulled out, the volume of air inside the syringe increases causing a drop in pressure. This can be seen by the expansion of the marshmallow.

Next leave the plunger at the end of the syringe and place a finger on the other end. Push the plunger into the syringe and observe the marshmallows. Students will notice that they "shrink". As the plunger is pushed into the syringe, the volume of air inside the syringe decreases, causing an increase in pressure. This can be seen by the compression, or shrinkage, of the marshmallows.

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Bursting Balloons (Charles' Law) - Best done on a cold day! (T.Trimpe, Havana Junior High, Havana, IL)
Illinois Learning Standard: 12.C.3b

Materials: Helium balloons (mylar type) & tissue paper strips

Procedure: To demonstrate Charles' Law, obtain two helium balloons of about the same size. Cut tissue paper into strips and wrap tightly around each balloon. Place one balloon in a warm spot, such as in a car on a warm day or near a heater. Leave for several minutes. Students should be able to observe the balloon increasing in size (or volume). If you are lucky, the tissue paper will tear! As the temperature of the gas increases, the volume also increases as the gas expands. A good reason not to leave helium balloons inside a car on a hot day! Place the other balloon in a cold spot, outside on a winter day or in a freezer. Leave for several minutes. Students should be able to observe the tissue paper becoming loose on the balloon - it may even fall off or slide off easily. As the temperature of the gas decreases, the volume also decreases. Many places that sell helium balloons in the winter time will warn you that your balloons may shrink when they are in the cold, but will return to normal size once they are back at room temperature. Charles' Law should help explain this phenomenon.