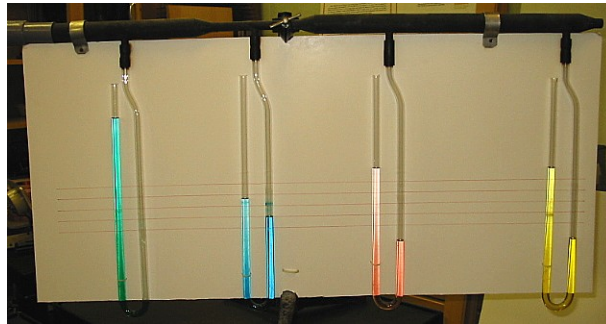


Venturi Effect



Air flow off



Air flow on

Purpose: Demonstrates the vacuum produced when air flows through a restriction.

This demo consists of an air blower, liquid manometer, and two 2-D Venturi “tubes.”

A) The first tube is for qualitative purposes: Plug the air hose into the back of the Venturi, and turn on the air. The manometer is connected to the various points in the tube to show relative pressure. This is done by inserting the copper end tubes into holes on the demo body.

You show that the air pressure is low at the restriction, relative to the pressure either before or after the restriction. As with all real-world Venturi tubes, there is also a pressure difference

between the before- and after-sections, even though they have the same cross-sectional area.

B) Should you wish to show some quantitative details, the second tube consists of a tapered throat with sample holes located where the throat is 1.00, 0.75, and 0.50 inches high.

Here is my suggested line of propaganda:

From Bernoulli's and the continuity equation (Air is assumed incompressible.) one derives the pressure difference between regions with cross sectional areas A and a :

$$DP = \frac{1}{2} \rho V^2 f,$$

where V is the air velocity at A , and the factor f is

$$f = (A/a)^2 - 1.$$

Measure the pressure at each of the positions in the throat relative to the "before" section (height 6.50 in.). Then see how these compare with the theory. Here are my results:

Throat Height (in.)	f	$f/20$	DP (in H ₂ O)
1.0	40	2.0	2
0.75	73	3.7	4
0.5	165	8.3	8

Important practical notes:

1) Make sure the long copper tube does not extend down into the throat region. This changes the area. The best technique is to insert the tube so that its end is just level with the throat wall. (In fact, if

you stick it too far into the $\frac{1}{2}$ inch region, you will suck the water out of the meter, making a messy carburetor demo.)

2) Do not attempt to compare pressures relative to any location also in the throat! If you do, the theory will not jibe with your experiment.

Note: When storing the manometer, please put some tape over the tube ends to prevent evaporation.

Extra Equipment: Air blower

Location: Shelves X1 and X2 (rear wall)