

Bernoulli Problems

(Hints: Don't forget the density of air; and lift is a force.)

1. Water flowing through a level pipe has a pressure of 2.50×10^6 Pa when its speed is 1.00 m/s. The water flows through a constriction into a smaller pipe. What is its pressure when its speed increases to 3.00 m/s? 2.50×10^5 Pa
2. If water flows at 1.00 m/s in a 2.54 cm diameter garden hose, approximately how fast is it moving when it exits the 0.25 cm diameter orifice at the end of the hose nozzle? 1.0×10^2 m/s
3. Assume that water pressure supplied to your house is 4.14×10^5 Pa. If the second floor bathroom shower fixture is 5.0 m above the water supply connection to the house, what is the water pressure at the shower head? 3.6×10^5 Pa
4. Assume that your parents' shower is on the opposite side of the wall from the shower you use. Using Bernoulli's equation, explain what happens to your shower pressure if your father turns on his shower and doubles the flow rate of water in the pipe supplying both shower fixtures.
5. The pressure in a tightly closed building is the same as outside, 988 mbars. The windows in this building are 1.2 m by 2.15 m. If a 23 m/s gust suddenly blows across the face of this building, what pressure difference across these windows does the wind create? (1 barr = 1×10^5 Pa)
 -341 Pa
6. Air pressure is 1×10^5 N/m², air density is 1.3 kg/m³. How fast must air be blown across the top of a straw rising 0.10 m above the water in a glass, to make the water rise half way up the straw?
 1 m/s
7. What lift does Bernoulli's principle predict for a wing of area 78 m² if the air passes over the top surface at 260 m/s and the bottom surface at 150 m/s? 2.3×10^6 N
8. The average velocity of flow in a river is 1.1 m/s where it is 0.5 m deep and 5 m wide. (A) What is its flow rate? (B) Another part of the river it is 2 m wide and 1 m deep. What are the flow rate and the average velocity? 2.75 m³/s, 1.4 m/s