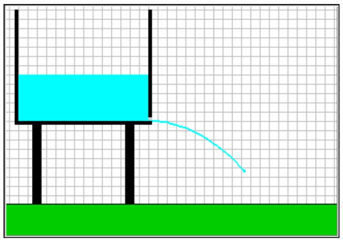
Worksheet for Exploration 15.3: Application of Bernoulli's Equation



Adjust the height of the water in the reservoir and notice what happens to the water flow out of the opening. Assume an ideal fluid **(position is given in meters)**. We can use Bernoulli's equation (i.e., conservation of energy for fluids) to understand what happens, $P + 1/2\rho v^2 + \rho gy$ = constant, where P is the pressure, ρ is the density of the fluid, v is the speed of the fluid flow, and y is the height of the fluid (you can, of course, pick any point to be y = 0 m). Restart.

The amount of water leaking out is small during the animation. So the height effectively stays constant during the time this animation is running (to a good approximation).

a. Use Bernoulli's equation to find the pressure at the bottom of the reservoir. Pick a height of water in the reservoir. The pressure above the water is atmospheric pressure (1.0×10^5 Pa). What is the pressure of the water at the bottom of the reservoir? (Note that for both of these cases, v = 0 m/s).

height=_______

P_{bottom}=________

b. Use Bernoulli's equation at the bottom of the reservoir to find the speed of water flow out of the reservoir. Equate Bernoulli's equation somewhere in the middle of the bottom of the reservoir (where v = 0 m/s) to the water flowing out of the opening (where P is atmospheric pressure) and note that the value of y is the same for both cases.

v_{bottom}=________

c. Using this value for the initial x velocity of the water, calculate where the water will land and verify that it does land at the proper spot. Repeat this procedure for another value of the reservoir height.

First height=__________

Landing Coordinates=________________

Second height=__________

Landing Coordinates=________________