

Physics Quiz – Chapter 13: Fluids – Winter 2026 – Monadi – CP SLO

Full Name: _____

$$1/2\rho v_1^2 + \rho gy_1 + P_1 = 1/2\rho v_2^2 + \rho gy_2 + P_2 = \text{Constant}$$

$$P = P_0 + \rho gh$$

$$\rho = m/V$$

$$Q = A_1v_1 = A_2v_2$$

Note: Please show your complete work, write organized and clearly, draw a diagram, explain your reasoning, and write an equation before plugging in numbers for the full credit. A simple calculator is allowed. ☺

Problem: (20 points)

A horizontal water pipe narrows from a diameter of 2m to a diameter of 1m. The speed of water flow is 3 m/s in the wider section. At each section of the pipe, a vertical tube open to the atmosphere is attached, forming two water columns that indicate the local pressure. The height of the water column above the narrower section is 10 m. Assume steady, incompressible, non-viscous flow. Air pressure is 100.0 kPa. Water density is 1000 kg/m^3 . $g = 10 \text{ m/s}^2$ and $\pi = 3.14$

- (a) (5 points) Find the velocity of water in the narrower section.
- (b) (5 points) What is the pressure of water in the narrower section?
- (c) (5 points) Calculate the height of water column in the narrower section.
- (d) (5 points) Explain how the height of water columns would have changed, if there was a less input water volume rate into the pipe.