

October 17, 2012

NAME _____

Fluids-ID _____

Quiz 7. Water at 20 °C flows through a 5 cm diameter pipe that has a 180 ° vertical bend, as in the figure. The total length of pipe between flanges 1 and 2 is 75 cm. When the weight flow rate is 230 N/s, gage pressure at section 1 and 2 is $p_1 = 64$ kPa and $p_2 = 33$ kPa. Neglecting pipe weight, determine the total force that the flanges must withstand for this flow.

Hint:

- 1) gravity, $g = 9.81 \text{ m/s}^2$
- 2) density, $\rho = 998 \text{ kg/m}^3$
- 3) mass flow rate, $\dot{m} = \rho Q = (\text{weight flow rate})/(\text{gravity})$
- 4) volume flow rate, $Q = (\text{mass flow rate})/(\text{density})$

