

November 11, 2015

NAME

Fluids-ID

Quiz 11. The drag,  $D$ , on a sphere moving in a fluid can be expressed as  $D = f(d, V, \rho, \mu)$  where  $d$  is the sphere diameter,  $V$  is the sphere velocity,  $\rho$  and  $\mu$  are respectively the density and viscosity of the fluid. (a) Develop a suitable set of pi terms by using the  $d$ ,  $V$ , and  $\rho$  as the repeating variables. (b) Drag  $D = 10$  N for a sphere, with a diameter  $d = 5$  cm, moving at  $V = 4$  m/s in water. For a balloon with  $d = 1$  m diameter rising in air, determine the velocity  $V$  and the drag  $D$ , if the pi terms in (a) are same for both the sphere and the balloon. (For water,  $\rho = 999$  kg/m<sup>3</sup> and  $\mu = 1.12 \times 10^{-3}$  N·s/m<sup>2</sup>; For air,  $\rho = 1.23$  kg/m<sup>3</sup> and  $\mu = 1.79 \times 10^{-5}$  N·s/m<sup>2</sup>)

Note: Attendance (+2 points), format (+1 point)

