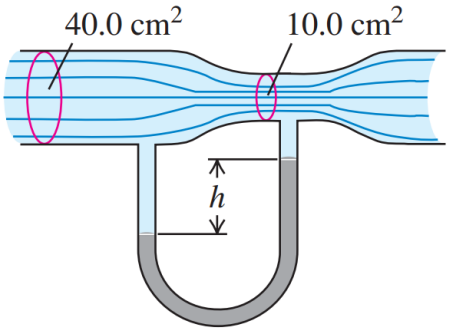
Names/SN: _____ Recit Teacher: _____ Section: _____

Physics 71 TWHFA, 2nd Semester AY 2016-2017 Recitation Quiz 13 (15/15)

Directions: Answer the following clearly and legibly. Show your complete solutions and box your final answer. Any act of dishonesty such as cheating shall be subject to disciplinary actions. You can open your notes.

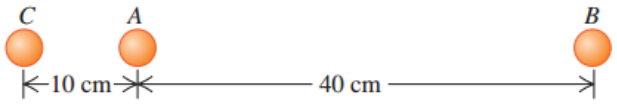
1. The horizontal pipe shown in the figure has a cross-sectional area of 40.0 cm^2 at the wider portions and 10.0 cm^2 at the constriction. Water is flowing in the pipe, and the discharge from the pipe is $6.00 \times 10^{-3}\ m^3/s$.



   (b) From the flow equation, find the flow speeds at the wide and narrow portions. (2 pt)

   (c) From Bernoulli's equation, find the pressure difference between these two portions. (2 pts)

2. An isolated system is composed of three spherical masses as shown in the diagram. What is the weight of A? A = 2.00 kg, B = 1.00 kg and C = 3.00 kg. (1 pt)



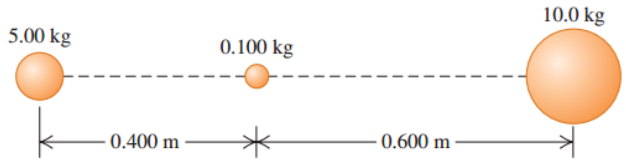
3. A particle of mass 3*m* is located 1.00 m from a particle of mass *m*. Where should you put a third mass *M* so that the net gravitational force on *M* due to the two masses is exactly zero? (1 pt)

4. Planet X has the same mass as the Earth $m_p = m_E$ and radius twice as large $R_P = 2R_E$.
   a. In terms of g on the surface of the Earth, calculate the gravitational acceleration in Planet X at a height twice its radius, $y = 2R_P$. (2 pts)

   b. What is the orbital velocity of a satellite that is put into circular orbit at this height? (1 pt)

c. Calculate the escape velocity in Planet X. (1 pt)

5. The 0.100-kg sphere in the figure is released from rest at the position shown in the sketch, with its center 0.400 m from the center of the 5.00-kg mass. Assume that the only forces on the 0.100-kg sphere are the gravitational forces exerted by the other two spheres and that the 5.00-kg and 10.0-kg spheres are held in place at their initial positions.



a. What is the gravitational potential energy of the 0.100-kg sphere at its initial position? (2 pts)

b. What is the gravitational potential energy of the 0.100-kg sphere after it has moved 0.400 m to the right from its initial position? (2 pts)

c. What is the speed of the 0.100-kg sphere when it has moved 0.400 m to the right from its initial position? (1 pt)