

PHY 1350 EXAM #4

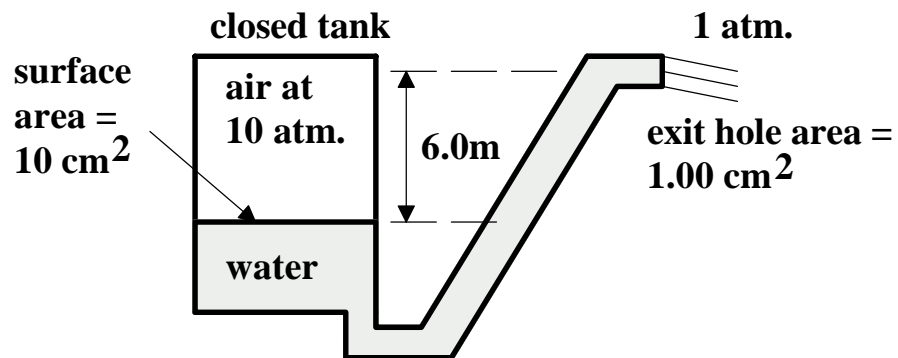
1. A 4.00 Kg block lies on a horizontal, frictionless surface. Attached to the block and lying parallel to the surface is a spring whose stiffness is 400 N/m and whose unstretched length is 80.0 cm. The other end of the spring is connected to a wall. Gravity is directed vertically downward; that is, perpendicular to the surface and toward it.
 - (a.) If the spring is compressed 20.0 cm, what is the magnitude and direction of the acceleration of the block?
 - (b.) If at some instant the spring is compressed 20.0 cm and at the same time the block has a speed of 100. cm/s, what is the amplitude of the blocks oscillatory motion? Use energy concepts.
 - (c.) If the information in part (b.) is true at time = 0 sec, what is the equation of motion, $x(t)$, for the block?

2. A 500 gram point mass is located at $(x = 1.33 \text{ cm}, y = 1.00 \text{ cm})$. A second mass of 100 grams is located at the origin. What are the x and y components of the gravitational force on the mass at the origin as produced by the first mass?

3. A bowling ball is very far away from the earth but is drifting toward it with almost imperceptible speed. Assuming that only the earth attracts the bowling ball, what will the speed of the ball be when it is one earth radius **above the surface** of the earth?

4. A point mass M_0 is located at $x=0$. A thin rod of length $3a$ lies along the x-axis from $x=2a$ to $x=5a$. The rod's mass per length is known to be λx^3 , where lambda is a constant and x is the x-axis position of the mass element within the rod. Determine the gravitational force on the point mass produced by the rod.

5. Find the exit speed of the water as it leaves the pipe.



6. A cube of wood 20 cm on a side has a density of 650 Kg/m³ and is floating in water. How much lead weight must be placed on top of the cube so that its top is just level with the water surface?