

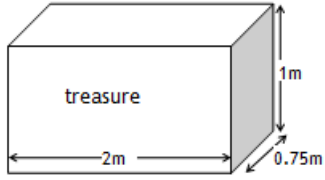


A fountain with an opening of radius 0.025 m shoots a stream of water vertically from ground level at 5.0 m/s . The density of water is 1000 kg/m^3 .

(a) Calculate the volume rate of flow of water.

(b) The fountain is fed by a pipe that at one point has a radius of 0.035 m and is 2.5 m below the fountain's opening. Calculate the absolute pressure in the pipe at this point.

(c) The fountain owner wants to launch the water 6.0 m into the air with the same volume flow rate. A nozzle can be attached to change the size of the opening. Calculate the radius needed on this new nozzle.



A treasure chest of mass 5000kg and dimensions, 2 m x 0.75 m x 1m, rests 2000 m below the sea floor. The density of sea water is 1100 kg/m^3 .

a) What is the average pressure on the chest while on the sea floor? (you can ignore the height of the chest)

b) What is the ratio the force on front of the chest, to the force on the right side of the chest?

c) What is the normal force acting on the chest as it sits on the ground?

d) As a crane lifts the chest and reaches a depth of 1000m, the cable snaps. What is the acceleration of the chest immediately after the cable snaps?