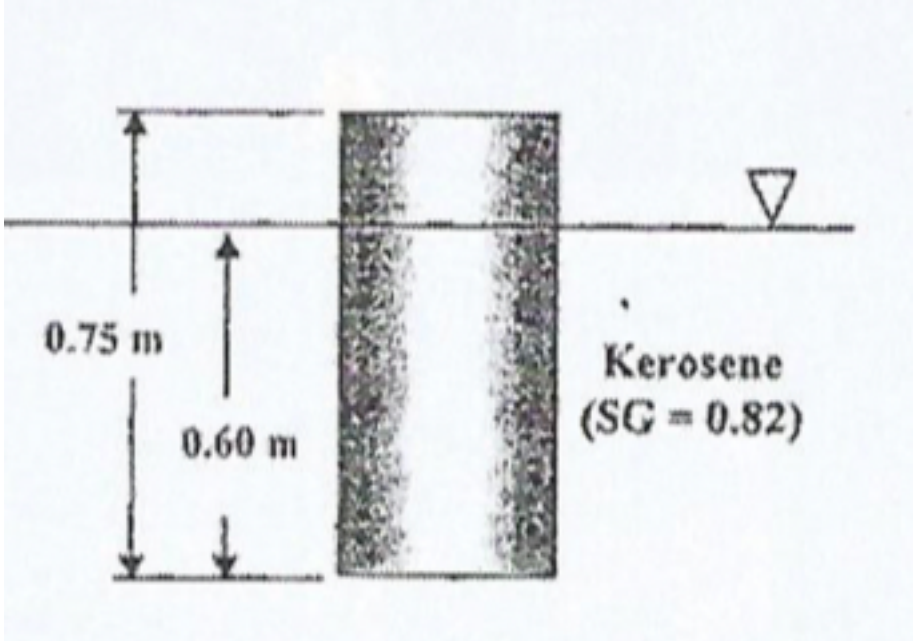
Tutorial 1

A barge is 18.3 m long, 6.1 m wide and 2.4 m deep.

When empty, it weighs 936.4 kN and its center of gravity is 0.5 m above the bottom.
Is it stable when floating in water ?

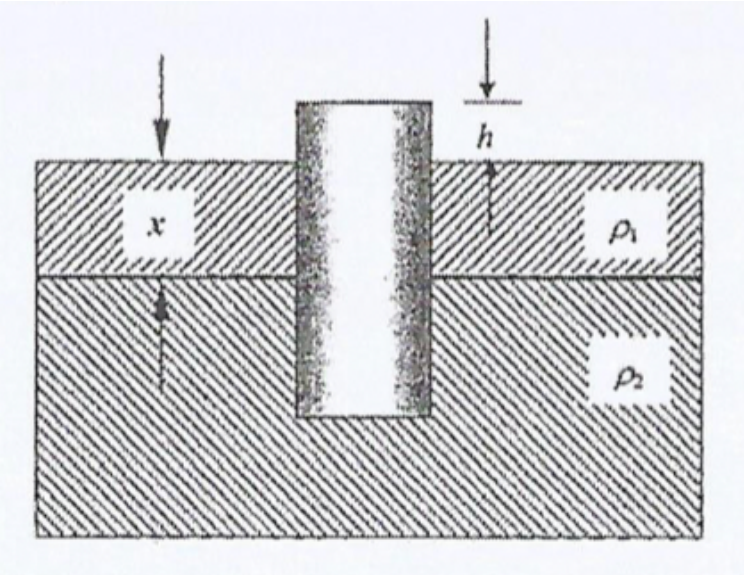
Tutorial 2

The cylinder shown is made of uniform material with diameter of 0.45 m.
What is its specific weight?
Will the cylinder be stable in the position shown?



Tutorial 3

There is a layer of thickness x of a liquid of density ρ_1 on top of a liquid of density ρ_2 . A uniform cylinder with length L, radius R and mass M floats in these liquids. At equilibrium, what is the magnitude of force exerted by the liquid on the lower face of the cylinder? Derive an expression for h, the length of the cylinder above the upper liquid, at equilibrium.



Tutorial 4

Show that the hollow closed cylinder in Figure Q1(a), weight 20 kN, floats with unstable equilibrium in water.

If the cylinder is now fill up with a liquid, density 2500 kg/m^3 to 0.5 m in height as shown in Figure Q1(b), check the stability for the cylinder in that position. Neglect a thickness of the wall.

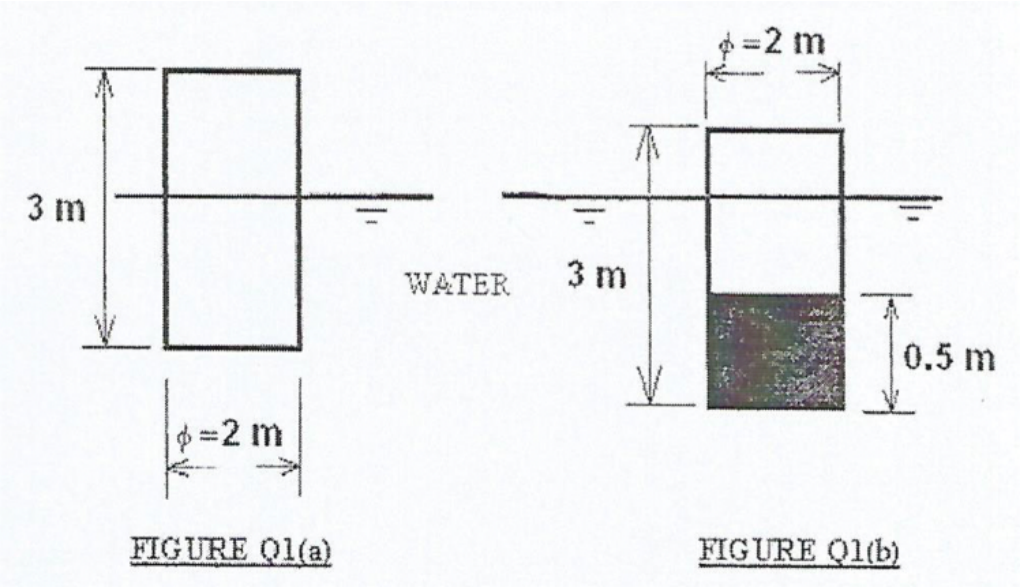
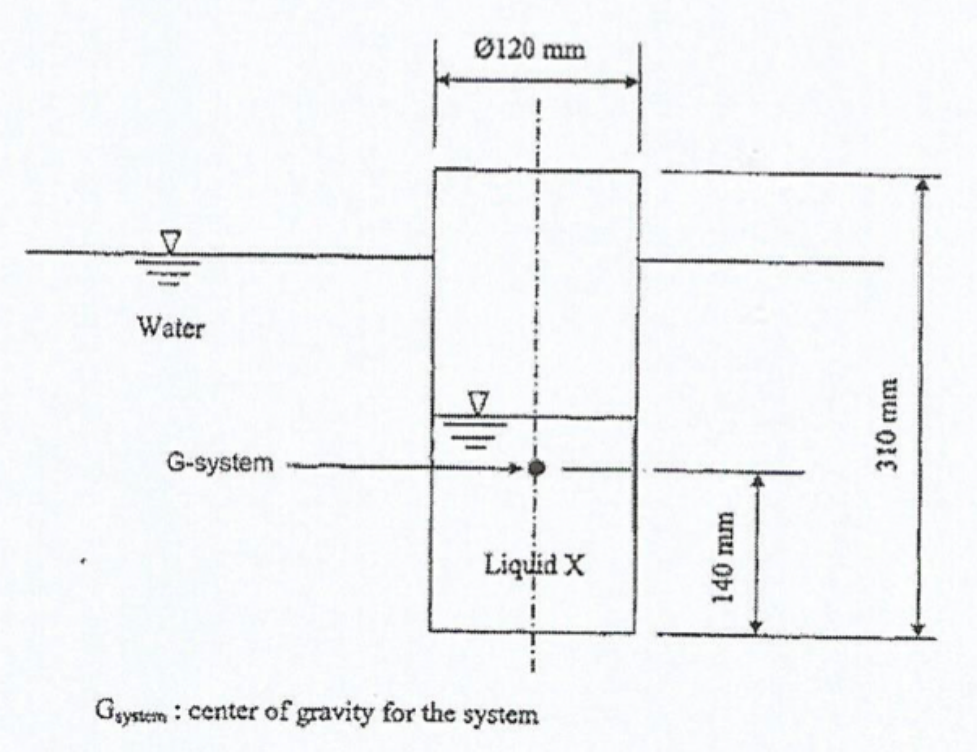


FIGURE Q1(a) FIGURE Q1(b)

Tutorial 5

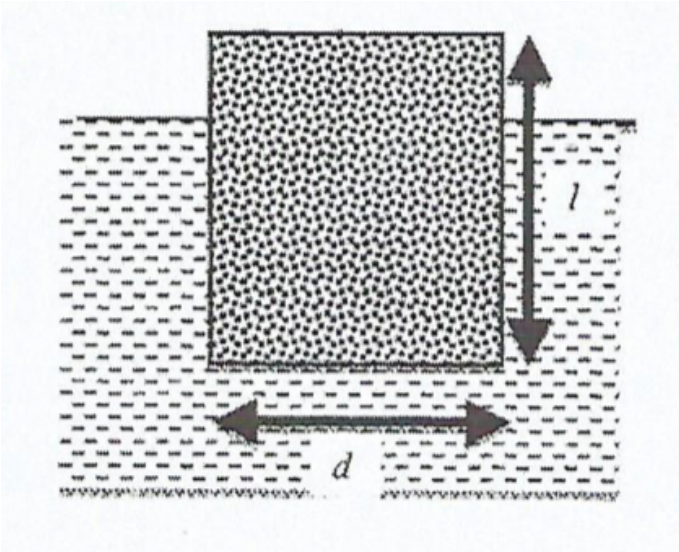
A cup weigh 5 N was filled with one litre of liquid X. They float in water as shown below. Determine density of liquid X for the system to become neutral equilibrium. Note that liquid X has higher density compare to water.



Tutorial 6

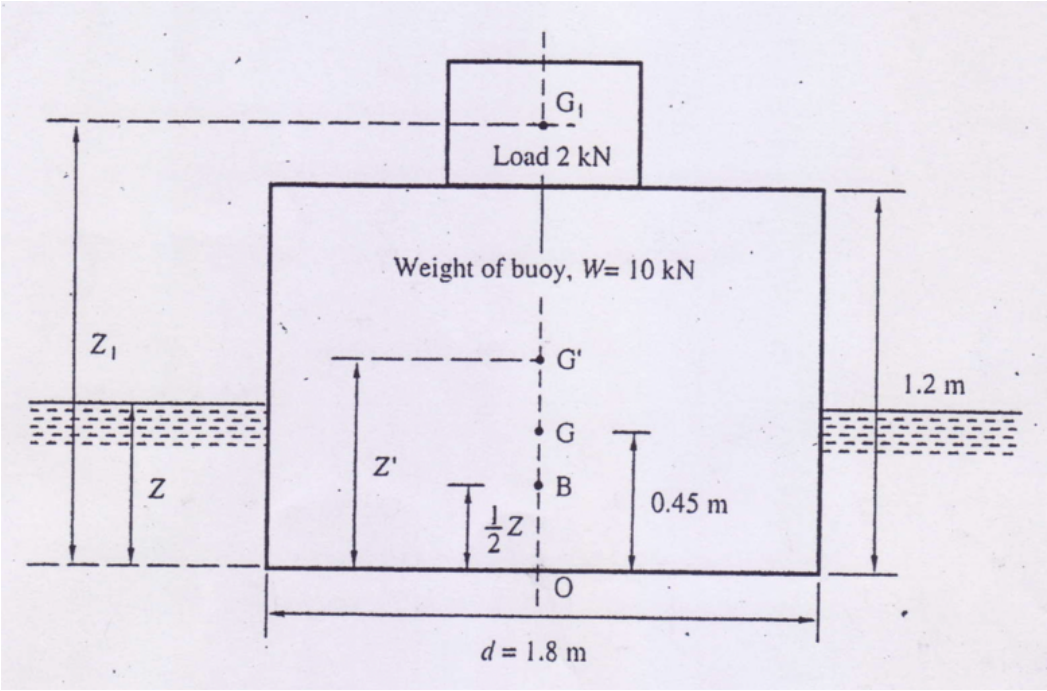
An iceberg (specific gravity 0.917) floats in the ocean (specific gravity 1.025). What percent of the volume of the iceberg in under water.

A wooden cylinder (specific gravity 0.54) of diameter d and length L is required to float in oil (specific gravity 0.81). Find the ratio L to d for the cylinder to float with its longitudinal axis vertical in oil.



Tutorial 7

A cylindrical buoy, 1.8 m in diameter, 1.2 high and weighing 10 kN floats in salt water density 1025 kg/m3. Its centre of gravity is 0.45 m from the bottom. If a load of 2 kN is placed on the top, find the maximum height of the centre of gravity of this load above the bottom if the buoy is to remain in stable equilibrium (or neutral equilibrium).



Tutorial 8

Sebuah silinder A dengan ketinggian 1.2 m dan diameter 2.4 m, terendam di dalam air laut berketumpatan 1025 kg/m3, lalu menyesarkan 1050 kg air laut. Kemudian satu kiub B yang mempunyai sisi-sisi yang sama Panjang, seberat 3.5 kN diletakkan di tengah-tengah silinder tersebut dan kedalaman silinder A bertambah. Pusat graviti keseluruhan sistem bertambah 0.3 m dari pusat graviti silinder A. Tentukan kestabilan sistem ini dan kirakan isipadu kiub B.