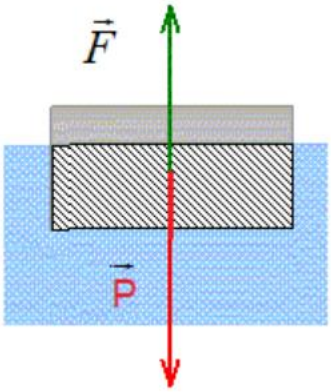
Sw 7

Exercise 1:

A ship with a mass of 8000 kg is stationary in a port.

1- We call F the resultant of the forces exerted by the water on the ship. Express the value F as a function of the volume V of the submerged part of the ship and the density of the sea water.

2- The density of sea water is 1030 $kg \,.\, m^{-3}$; calculate V.



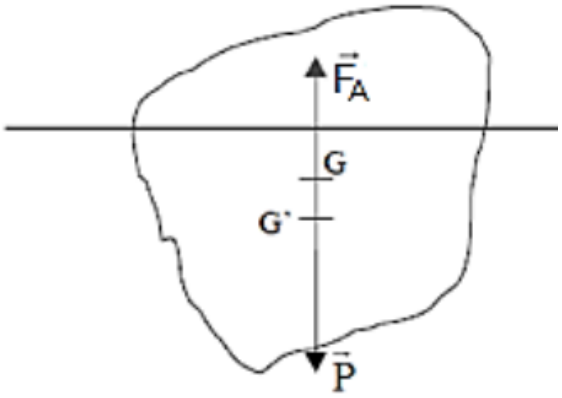
Exercise 2:

An iceberg of density ρ = 920 $kg \,.\, m^{-3}$ floats on sea water of density

ρ' = 1030 $kg \,.\, m^{-3}$.

1-Represent on a diagram and name the resultants of the distributed forces exerted on the iceberg.

2- Calculate the volume V' of its submerged part based on the volume V of the iceberg.



Exercise 3:

cork stopper . A cork stopper is held at the bottom of a container filled with water. It is released.

1) What will the cork do?

2) We study the cork system. It is subject to two forces. Which ones? You will give their name and their characteristics.

3) The cork has a volume of 0.250 dm 3 . The density of cork is 0.2 kg.L -1 . That of water is 1 kg.L -1 . Remember that 1 L = 1 dm 3 .

a) Calculate the mass of the cork.

b) Deduce its weight. We recall that g = 9.81 N.kg $^{-1}$.

c) Calculate the intensity of Archimedes' thrust.

d) Draw a diagram of a cork in water and the two forces that the cork is subjected to. Use a scale of 1 cm for 0.5 N.

4) Are the values found for the intensity of each force in agreement with the answer to question no. 1?

Exercise 4:

iceberg An iceberg floats in the sea. Salt water will be considered to have the same density as fresh water (1 kg.L $^{-1}$ = 1,000 kg.m $^{-3}$). We want to find the emerged volume of an iceberg.

1) We study the iceberg system. It is subject to two forces. Which ones? You will give their name and their characteristics.

2) The volume of the iceberg is 170 m3 · Knowing that the density of ice is 900 kg.m3 , what is the mass of this iceberg?

3) Deduce the intensity of its weight.

4) What is the intensity of Archimedes' thrust? Justify.

5) We note Pa, the Archimedes thrust. We show that the submerged volume (in m ^{3}) of the iceberg can be calculated by: V(submerged) = Pa $_{/}$ (ρ_{water} g) Calculate this volume.

6) Deduce the percentage of the iceberg's emerged volume that a boat can observe in relation to the total volume of the iceberg (($V_{iceberg} - V_{submerged}$)/ $V_{iceberg}$) $\times 100$.