PHY1235: Physics for Engineers

Instruction

The objective of this problem set is to learn how to calculate pressure and using pressure to determine forces acting on a particular system.

Issued: 05/07/2020 --- **Due:**

Helpful readings for this homework: Lecture #3; Chapter 12, section 12.2-12.3 of University Physics

Problem Set #5: Static Mechanical Equilibrium

Problem 1:

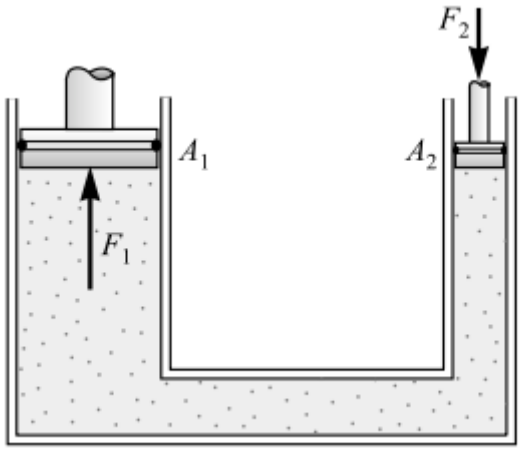
Atmospheric pressure is about 1.0×10^5 Pa. How large a force does the still air in a room exert on the inside of a window pane that is $40\ \text{cm} \times 80\ \text{cm}$?

Problem 2:

When a submarine dives to a depth of 120 m, to how large a total pressure is its exterior surface subjected? The density of seawater is about $1.03 g/cm^3$.

Problem 3:

In a hydraulic press such as the one shown in the figure below, the large piston has cross-sectional area $A_1 = 200 cm^2$ and the small piston has cross-sectional area $A_2 = 5.0 cm^2$. If a force of 250 N is applied to the small piston, find the force F_1 on the large piston.



Expected Answers

Problem 1:

a) $F = 3.2 \times 10^4$ N

Problem 2:

a) $P = 1.31$ MPa

Problem 3:

a) $F_1 = 10kN$