Ain Shams University
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Mechanical Power Dept.

2014/2015
**ENGR 360/MEP 112**
Thermodynamics

SHEET (1)

1- Convert the following quantities into pressure in bar absolute:

    a- 20 kPa gage.

    b- 4 meter of water gage.

    c- 600 mm Hg vacuum.

    d- 30% vacuum.

2- A gas is contained in a vertical cylinder fitted with a piston as shown in figure. The atmospheric pressure outside is 1.0 bar and the piston area is 500 mm^2. What is the mass of the piston, if the gas pressure inside is 125 kPa?.
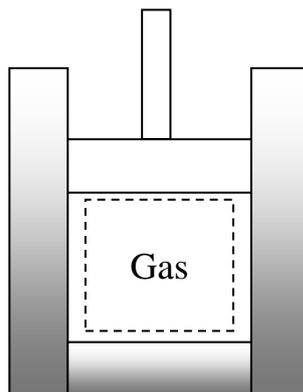
3- A simple U-tube manometer with one working fluid of density 810 kg/m^3. The difference in the fluid height of the two columns is 360 mm. What is the pressure difference measured in absolute and gage? Comment on result. What would be the height difference if the same pressure difference had been measured by a manometer with mercury as the working fluid?

4- An inclined manometer is used to measure the pressure of a gas. The liquid inside the manometer has a density of 800 kg/m^3, the manometer reading is shown in Figure 4. If the atmospheric pressure is 101 kPa and the gravitational acceleration is 9.81 m/s^2. What is the absolute pressure of the gas in kPa?
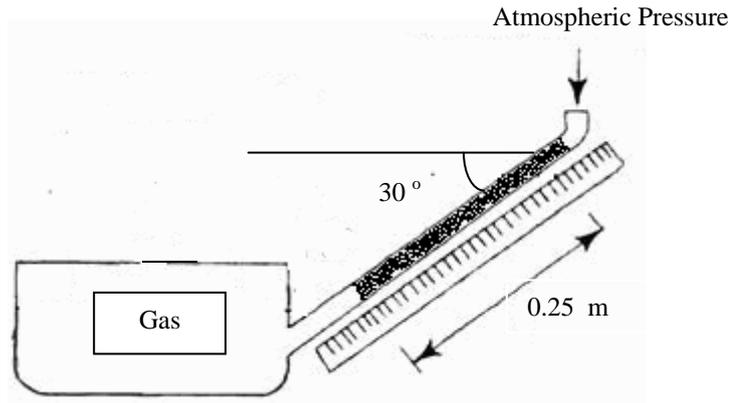
Figure 4

5- A vertical cylinder has a piston of 100 cm^2 area. The mass of the piston causes a pressure of 0.5 bar gauge inside the cylinder. Find the mass of the piston if g = 9.81 m/s^2. If the cylinder is placed horizontally and the piston is left free to move. What would be the direction of movement and the final pressure?

6- A) Convert the following temperatures from Celsius into Fahrenheit:

   a) -30   b) 0   c) 1050

   B) Convert the following temperatures from Fahrenheit into Celsius:

   a) -40   b) 100   c) 2070

7- The following numbers are given from measurements or calculations. You are asked to round-off these values to significant numbers following the 95% confidence-level rule. And determine how many significant figure in each case:

   a) 1.386188309 m   e) 0.836555663 ft

   b) 20.78567394 $^{\circ}$C   f) 0.023098465 s

   c) 33.80236457 Pa   g) 0.006465582 N

   d) 200.1877324 kg   h) 0.000478964 m