Group 1: Dave Buonconsiglio, Richard Harrell, Devon Moore, Traveon Williams,

MET 330

Dr. Ayala

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HW #1.2

6-8.

State whether statements 3.6-3.10 are (or can be) true or false. For those that are false, explain why	
3.6	The value for the absolute pressure will always be greater than that for gage pressure
	TRUE
3.7	As long as you stay on the surface of the Earth, the atmospheric pressure will always be 14.7 psia
	False, the surface of the Earth is not all at the same elevation, 14.7 psia is the value for sea-level, it will lower as elevation rises
3.8	The pressure in a certain tank is -55.8 Pa (abs)
	False, absolute pressure cannot be negative

9.

3.9	False because you cannot have a negative Absolute pressure

10.

3.10	The pressure in a certain tank is -150 kPa (gage)
	Could be true, need more data

11.

If you were to ride in an open-cockpit airplane to an elevation of 4000 ft above sea level, what would the atmospheric pressure be if it conforms to the standard atmosphere?

Given: 4000 ft above sea level
standard atmosphere

Formulae: $\Delta p = \gamma h$

Data: h= 4000 ft given
γ=0.0764 lb/ft^3 at sea level Appendix E

Solve: γh= 305.6 lb/ft^2

lb/ft^2 to lb/in^2 divide by 144 2.12222222 psi

$\Delta p = p_{atm} - (\gamma h)$ 12.57777778 psi

Δp=12.7 psi

13.

Expressed as a gage pressure, what is the pressure at the surface of a glass of milk?

0 Pa_{gage}

41.

3.41 $P_{air} + (\gamma h)_{oil} = 180psi = 0.9 * {}^{62.43}/_{12^3} * (32 + (80 - 48))$= 177.92psi

62.

3.62 $P_{left} + P_{right}$

$P_{atm} = \rho_{Mercury} g h_{Mercury} + \rho_{water} g h_{water} + P_A = 0$

$0 = \big((sg)(\rho_w)\big) g h_{Mercury} + \rho_{water} g h_{water} + P_A$

$0 = \big(13.54(1000)\big)(9.81)(0.075) + 1000(9.81)(0.1) + P_A$

$P_A = -10943Pa = -10.9kPa$

83.

CH 3 # 83

A barometer indicates the atmospheric pressure to be 30.65 in of mercury. Calculate the atmospheric pressure in psia

Given: 30.65 in_{Hg}

Formulae: $p_{atm}=\gamma_{Hg}h$

Data: γ_{Hg} 848.7 lb/ft^3 Appendix K

Solve:
$$p_{atm}=\frac{848.7\ lb}{ft^3}*30.65*\frac{1ft^3}{1728in^3}$$

p_{atm}	15.05362	psia

90.

Ch 3 #90

The pressure in a vacuum chamber is -68.2 kPa. Express this pressure in mmHg

Given: (-)68.2 kPa

Formulae: kPa=7.50062 mmHg (kPa*7.50062)

Solve:

-511.542	mmHg

94.

3.94
$$P_1+\frac{1}{2}*V_1^2+P_g*h_1=P_2+\frac{1}{2}*V_2^2+P_g*h_2$$
$$P_{Atmosphpric}+\frac{1}{2}*0+P_g*16=P_2+\frac{1}{2}*0+P_g*0$$
$$P_{Atmosphpric}+16P_g=P_2$$
$$P_2=P_a+16P_g=P_a+1000*9.81*16=P_a+156960P_a$$
$$P_2=guage\ pressure=P_2-P_a=156960P_a=156.96kP_a$$