

CH.3 6-10, 11, 13

JORDAN DAVIS

6) EQ. : $P_{ABS} = P_{GAGE} + P_{ATM}$ → LECTURE NOTES

Will P_{ABS} always be greater than P_{GAGE} ?

ANS: TRUE. BECAUSE P_{ABS} IS A SUM OF P_{GAGE} + P_{ATM} . IN ADDITION, P_{GAGE} WILL (IF CALIBRATED) ALWAYS READ ZERO WITH NO LOAD. 14.7 PSIA IS FELT BY THE GAGE BUT THAT IS THE NULL POINT.

7) ANS. TRUE IF WE SAY THAT NOT GOING UNDERWATER IS THE EARTH'S SURFACE.

IN OTHER WORDS, AS LONG AS WE STAY DRY, WE WILL ONLY EXPERIENCE 14.7 PSIA.

IF WE MOVE UP, TOWARDS THE SKY, PRESSURE WILL DECREASE + IF WE GO UNDER WATER,

PRESSURE WILL INCREASE.

8) ASSUMPTIONS: TANK IS OR IS IN PROCESS OF BEING @ VACUUM.

ANS: TRUE IF THE TANK IS NOT AT VACUUM

+ OPEN TO ATMOSPHERE THEN THE LOWEST PRESSURE VALUE WOULD BE @ THE SURFACE,

14.7 PSIA OR 101.4 KPA OR 0 PSIV. ASSUMING

IT IS BEING MADE INTO A VACUUM, PRESSURE

CAN BE ANYWHERE BETWEEN 14.7 PSIA OR

AND 0 PSIA, 0 Pa, 14.7 PSIV (TRUE / PERFECT VACUUM).

9) EQS: $P_{GAGE} = P_{ABS} - P_{ATM}$, $\Delta P = \gamma h$
 ASSUMPTIONS: GAGE IS PLACED SOME DISTANCE,
 h , BELOW SURFACE OF FLUID IN TANK. (H_2O)

ANS: TRUE. DEPENDS ON THE FLUID
 AND PLACEMENT OF THE GAGE, A
 READING COULD BE SEEN IN PSIG.

FOR EXAMPLE, 0 PSIG SEEN AT SURFACE
 AND THEN IF THE GAGE WAS 2M
 BELOW SURFACE $\Delta P = 9.81 \text{ kN/m}^3 (2\text{M})$

$\Rightarrow \Delta P = 19.62 \text{ kN/m}^2$. IN OTHER

WORDS, PSIG GOES $\uparrow$ AS THE POINT
 IN WHICH WE TAKE THE MEASUREMENT
 GOES $\downarrow$ FROM ATM & SURFACE.

10) ASSUMPTIONS: @ SURFACE, $P = P_{ATM} = 14.7 \text{ PSIA}$
 & 0 PSIG. (101.4 kPa)

ANS: TRUE. IF THE GAGE READING WAS
 TAKEN LOW ENOUGH BELOW SURFACE
 OF FLUID THAN YOU WOULD SEE
 PSIG $\uparrow$. A FLUID'S γ + THE DISTANCE
 h BELOW SURFACE AFFECTS THE
 FINAL VALUE.

11.



$h = 4000'$

$\leftarrow$ EARTH SURFACE

60°F , $\gamma_{AIR} = 0.0764 \text{ lb/ft}^3$

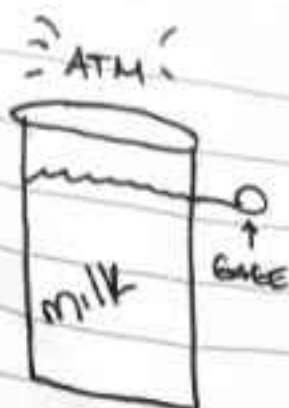
ASSUMPTIONS: @ SURFACE, 14.7 PSIA

EQS: $\Delta P = \gamma h$, $P_{ABS} = P_{GAGE} + P_{ATM}$

ANS: $\Delta P = 0.0764 \text{ lb/ft}^3 (4000') = 305.6 \text{ lb/ft}^2 \Rightarrow$
 $(305.6 \text{ lb/ft}^2) / 144 \text{ in}^2 = 2.12 \text{ PSIA}$

$\Rightarrow P_{ATM_F} = P_{ATM} - \Delta P = 14.7 \text{ PSIA} - 2.12 \text{ PSIA} = \boxed{12.58 \text{ PSIA}}$

13)



Jordan Davis

$$EQ: P_{ABS} = P_{GAGE} + P_{ATM}$$

ASSUMPTIONS: ON SURFACE OF EARTH.

WE ALL "FEEL" $P_{ATM} = 14.7 \text{ PSIA}$.

PRESSURE (ΔP) ONLY CHANGES

IN $+/-$ DIRECTION WHEN DISTANCE FROM SURFACE, h , CHANGES VERTICALLY.

NO CHANGES HORIZONTALLY.

ANS: THEREFORE, SINCE THERE IS NO COLUMN OF MILK ABOVE OR PRESSING DOWN ON GAGE, THE ONLY PRESSURE FELT IS P_{ATM} .

$\Rightarrow$ FOR $P_{ABS} = P_{ATM}$, P_{GAGE} MUST EQUAL 0.

$$\Rightarrow \underline{P_{GAGE} = 0 \text{ PSIG}}$$