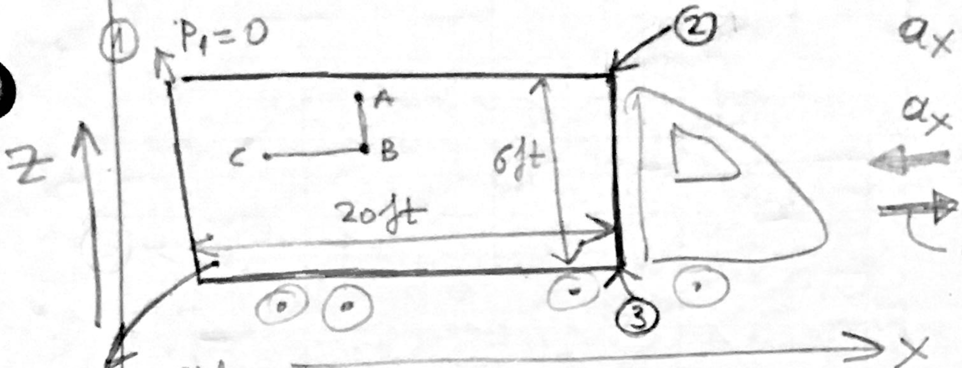
Ex. 4.3



$a_x = -10 \frac{ft}{s^2}$

a_x

$g_{v,x} = -a_x$

$P_2 = ?$

$P_{max} = ?$

$\gamma = 42 \frac{lbf}{ft^3}$

We proved in class:

- For points on the same vertical (i.e. $x_A = x_B$)

$$P_A + \rho g_{v,z} z_A = P_B + \rho g_{v,z} z_B \quad (1)$$

Where: $g_{v,z} = g + a_z$ (with a_z + when up)

in our case $a_z = 0$ so $g_{v,z} = g$

- For points on the same horizontal (i.e. $z_B = z_C$)

$$P_B + \rho a_x x_B = P_c + \rho a_x x_c \quad (2)$$

$g_{v,x}$ = horizontal component of virtual acceleration of gravity

$$g_{v,x} = -a_x = -(-10) = 10 \frac{ft}{s^2}$$

$$P_B - \rho \cdot 10 \cdot x_B = P_c - \rho \cdot 10 \cdot x_c \quad (2')$$

$$P_B = P_c - \rho \cdot 10 \cdot \underbrace{(x_c - x_B)}_{<0}$$

($P_B > P_c$) makes sense since $a_x \leftarrow$

$$\boxed{P_B = P_c + \rho g_{v,x} (BC)}$$

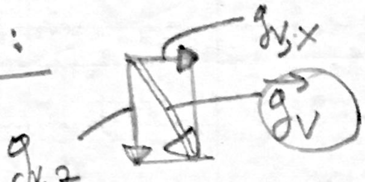
Apply equ. (2') to find P_2:

$$P_2 = \cancel{P_1}^{=0} - \rho \cdot 10 \cdot \overbrace{(-20\,ft)}^{(x_1-x_2)} = \boxed{261\ psfg}$$

need to find $\rho = \frac{\gamma}{g} = \frac{42}{32.2} = 1.304\ \frac{slugs}{ft^3}$

<u>Where</u> is <u>pressure</u> <u>going</u> to <u>be</u> <u>max</u> ?

<u>Way 1:</u>



$\Rightarrow$ point "3" is the "deepest" w.r.t. virtual acceleration of gravity $\vec{g}_v$

<u>Way 2:</u> Generalized hydrostatic law can be written as:

$$\boxed{p + \rho(g + a_z)z + \rho a_x x = const}$$

in our case $a_z = 0$, $a_x = -10\ ft/s^2$

$$\Rightarrow p = const - \rho g z + \rho \cdot 10 \cdot x$$

So for p <u>max</u> z <u>min</u> and x <u>max</u> $\Rightarrow$ point 3

$$P_{max} = P_3 = P_2 + \underbrace{\rho g}_{\gamma}(6\,ft) = 261 + 42.2 \times 6 = \boxed{513\ psfg}$$