2.9 Review

- Pressure measurement — *absolute*, relative to a vacuum; *gage*, relative to local atmosphere; *vacuum/suction*, the negative of gage.

\[ P_{\text{down}} = P_{\text{up}} + \gamma|\Delta z| \]

- If the surface \( S \) is horizontal, \( P = \text{a constant} \) \( \Rightarrow \) \( F_R = PA \)

2.10 Pressure Prism

Consider the following example:

We can solve this directly as just shown, however, for many situations (or just for many people who prefer to think in a different manner!) a decomposition of the pressures into
a series of pressure prisms is often easier. Consider the decomposition such that

\[
F_{yR} = F_{1y1} + F_{2y2}
\]

\[
= \left( \gamma bh_2 h_1 \right) \left( h_1 + \frac{h_2}{2} \right) + \left( \gamma \sigma h_2^2 \right) \left( h_1 + \frac{2h_2}{3} \right)
\]

Therefore \( y_R \) is

\[
y_R = \frac{h_1 \left( h_1 + h_2 \right) + \frac{h_2}{2} \left( h_1 + \frac{2h_2}{3} \right)}{h_1 + \frac{h_2}{2}}
\]

\[
= h_1 + \frac{h_2}{2} \left( \frac{h_1 + \frac{2h_2}{3}}{h_1 + \frac{h_2}{2}} \right)
\]

\[
= 4 + 3 \left( \frac{4 + 4}{4 + 3} \right) = 7.43'\]