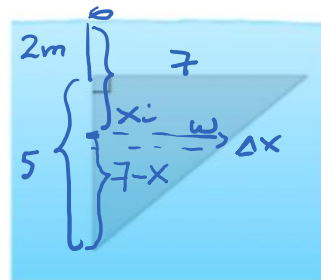


19. A triangular plate with height 5 m and a base of 7 m is submerged vertically in water (whose density is ρ) so that the top is 2 m below the surface. Find the hydrostatic force against one side of the plate.



$$\frac{7}{5} = \frac{w}{7-x}$$

- (a) $\frac{45}{6}\rho g$ (b) $\frac{385}{6}\rho g$ (c) $\frac{381}{6}\rho g$ (d) $\frac{163}{3}\rho g$ (e) $50\rho g$

Sol'n.

Cross sectional area is

$$w = \frac{7}{5}(7-x).$$

$$\begin{aligned} \text{Hydrostatic force} &= \int_2^7 \rho g \times \left(\frac{7}{5}(7-x) \right) dx \\ &= \rho g \left(\frac{7}{5} \right) \left(\frac{7x^2}{2} - \frac{x^3}{3} \right) \Big|_2^7 \\ &= \rho g \left(\frac{7}{5} \right) \left(\left(\frac{7^3}{2} - \frac{7^3}{3} \right) - \left(\frac{7(4)}{2} - \frac{8}{3} \right) \right) \\ &= \rho g \frac{385}{6} \end{aligned}$$