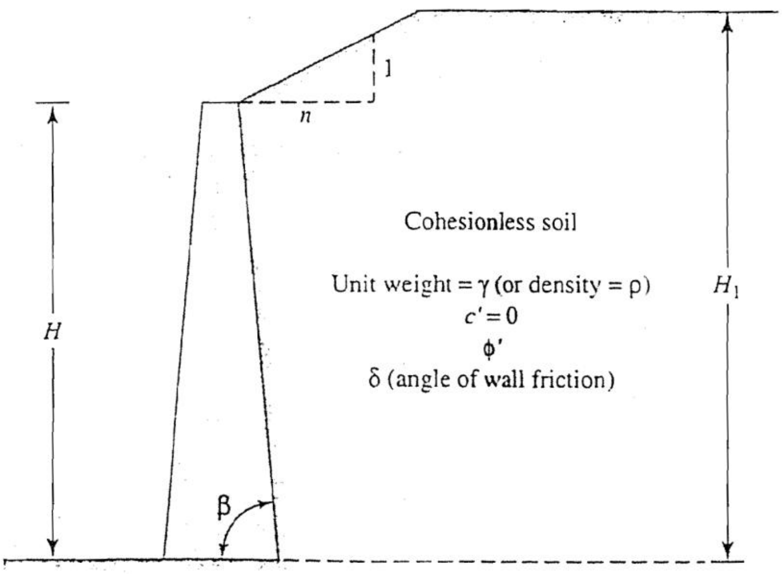
8.14

Referring to the figure below, determine the Coulomb's active force, P_a, per unit length of the wall for the following case.

H=5.5m,$\beta = 80°$, n=1, H_1=6.5m, $\rho = 1680\ kg/m^3$, $\phi' = 30°$, $\delta' = 30°$.



$$\gamma = \frac{(1680)(9.81)}{1000} = 16.48\ \text{kN / m}^3;\ \phi' = 30°;\ \psi = 90 - 10 - 30 = 50°$$

$$\text{Weight of wedge } ABC = \frac{1}{2}(5.25)(2.5)(16.48) = 108.15\ \text{kN / m}$$

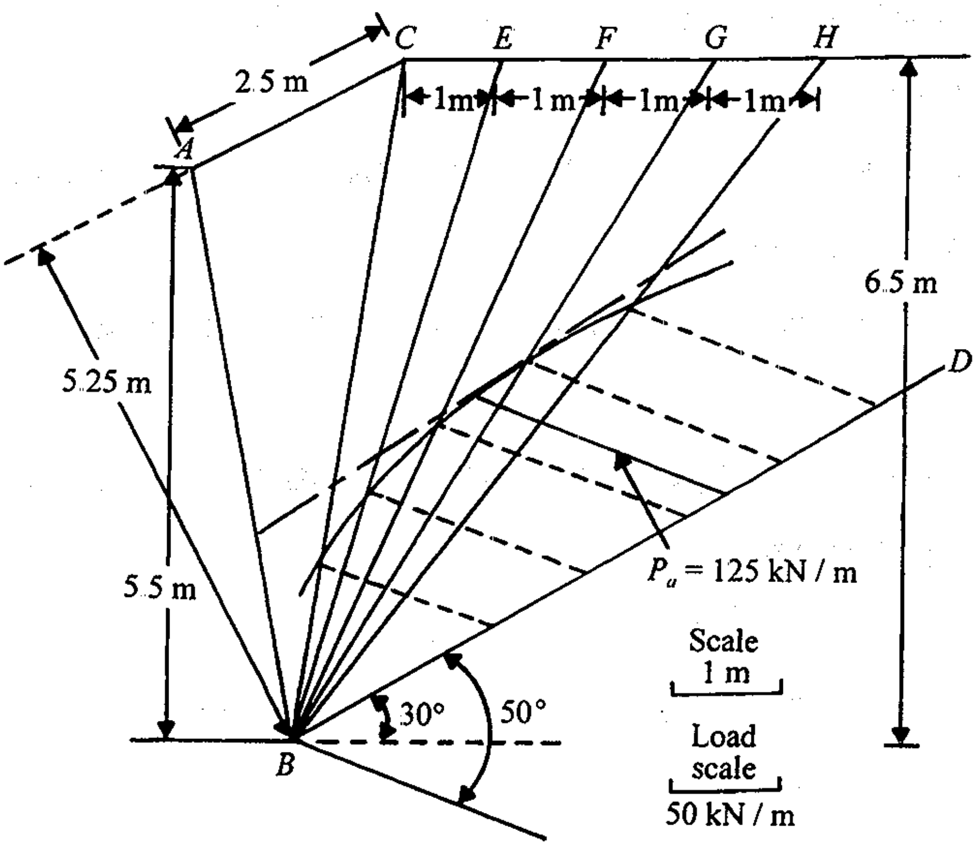
The weight of each of the wedges *CBE*, *EBF*, *FBG*, *GBH* =

$$\left(\frac{1}{2}\right)(1)(6.5)(16.48) = 53.46\ \text{kN / m}$$

Wedge	Weight (kN / m)
ABC	108.15
ABE	108.15 + 53.56 = 161.71
ABF	161.71 + 53.56 = 215.27
ABG	215.27 + 53.56 = 268.83
ABH	268.83 + 53.56 = 322.39

The graphical construction is shown.

P_a = 125 kN / m.



8.10

Given: H=5m, $\gamma = 17.9kN/m^3$,$\theta = 5°$,$\emptyset' = 38°$,$\delta' = 0°$, $\alpha = 0$

Determine: P_a using coulomb's eqn.

Sol.

Active Case:

$$K_a = \frac{\cos^2(\phi' - \theta)}{\cos^2\theta\cos(\delta + \theta)\left[1 + \sqrt{\frac{\sin(\delta + \phi')\sin(\phi' - \alpha)}{\cos(\delta + \theta)\cos(\theta - \alpha)}}\right]^2}$$

$$K_a = \frac{\cos^2(38 - 5)}{cos^2 5\cos(0+5)\left[1 + \sqrt{\frac{\sin(0+38)\sin(38-0)}{\cos(0+5)\cos(5-0)}}\right]^2} = 0.2717$$

$$P_a = \frac{1}{2}\gamma H^2 K_a = \frac{1}{2} \times 17.9 \times 5^2 \times 0.2717 = 60.8kN/m$$