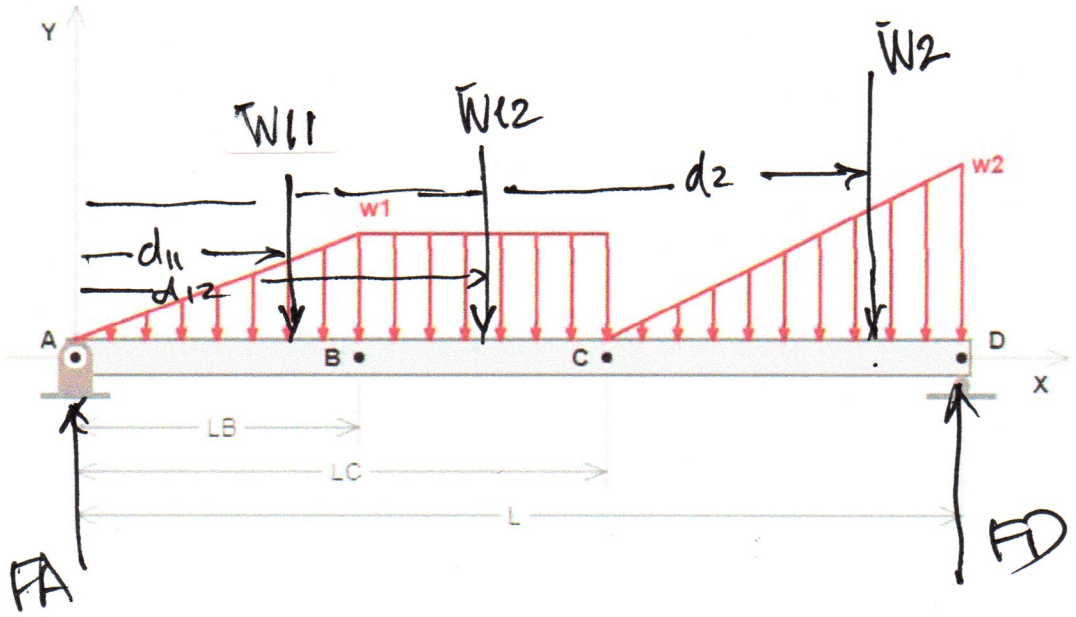
SOLUTION

ip4STATICS Worksheet for U04_P10

A beam carries a complex distributed load, as shown below.

Instance variables: loads w1 and w2 in N/m, lengths LB, LC and L in m.



(1) What is force FA at A? (mag,deg)

(2) What is force FD at D? (mag,deg)

$$W_{11} = \left(\frac{w_1}{2}\right) \cdot LB$$

$$W_{12} = w_1 \cdot (LC - LB)$$

$$W_2 = \left(\frac{w_2}{2}\right)(L - LC)$$

$$\Sigma F_y = 0: \quad FA + FD = W_{11} + W_{12} + W_2$$

$$\Sigma M_A = 0: \quad d_{11} \cdot W_{11} + d_{12} \cdot W_{12} + d_2 \cdot W_2 = L \cdot FD$$

where $d_{11} = \frac{2 \cdot LB}{3}$, $d_{12} = LB + \left(\frac{LC - LB}{2}\right)$, $d_2 = LC + \frac{2}{3}(L - LC)$

(2) $|FD| = \left(\frac{1}{L}\right)\left[\left(\frac{2}{3}\cdot LB\right)W11 + \left(\frac{LB+LC}{2}\right)W12 + \left(\frac{2\cdot L+LC}{3}\right)W2\right]$

$\angle FD = 90^\circ$

(1) $|FA| = W11 + W12 + W2 - FD$.

$\angle FA = 90^\circ$.