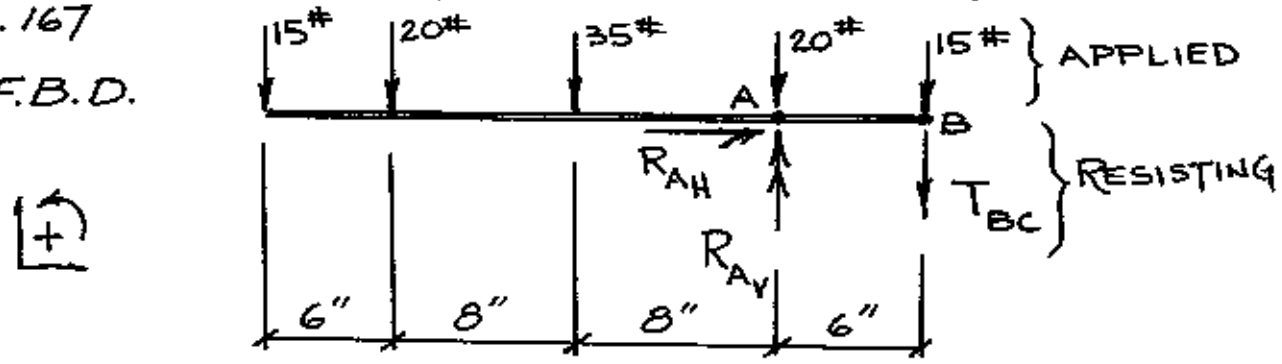
MILANO | MECH 234 + 235 | PROB. 4-4

EQUILIBRIUM, ACTION = REACTION, $\Sigma F = 0$

p. 167

F.B.D.



$\Sigma F_x = 0 = R_{AH}$ ∴ there will be No Horiz. Component

$\Sigma F_Y = 0 = -15^{lb} - 20^{lb} - 35^{lb} - 20^{lb} - 15^{lb} - T_{BC} + R_{AV}$

$105^{lb} = -T_{BC} + R_{AV}$

$\Sigma M_A = 0$, Eliminates R_{AV}, Solve for T_{BC}

$(15^{lb})(22") \quad (20^{lb})(16") \quad (35^{lb})(8") \quad (15^{lb})(6") \quad (T_{BC})(6") = 0$

$+ \quad + \quad + \quad - \quad -$

$+330 \quad +320 \quad +280 \quad -90 = 6\,T_{BC}$

$+840$ "lb. $= \boxed{T_{BC} = 140^{lb.}}$ ↓

POSITIVE ANSWER MEANS ASSUMED DIRECTION IS CORRECT

SUB. IN $\Sigma F_Y = 0$

$105^{lb} = -T_{BC} + R_{AV}$

$105^{lb} + 140^{lb.} = \boxed{R_{AV} = 245^{lb}}$ ↑

ASSUMED DIR. IS CORRECT.

CHECK THIS ANS.

$\Sigma M_B = 0$, THIS ELIMINATES T_{BC}, SOLVES for R_{AV}

$(15^{lb})(28") \quad (20^{lb})(22") \quad (35^{lb})(14") \quad (20^{lb})(6") \quad (R_{AV})(6") = 0$

$+ \quad + \quad + \quad + \quad -$

$420 + 440 + 490 + 120 = 6\,R_{AV}$

1470 "lb. $= \boxed{R_{AV} = 245^{lb.}}$ ↑

ASSUMED DIR. CORRECT

ANS. CHECKS. ✓