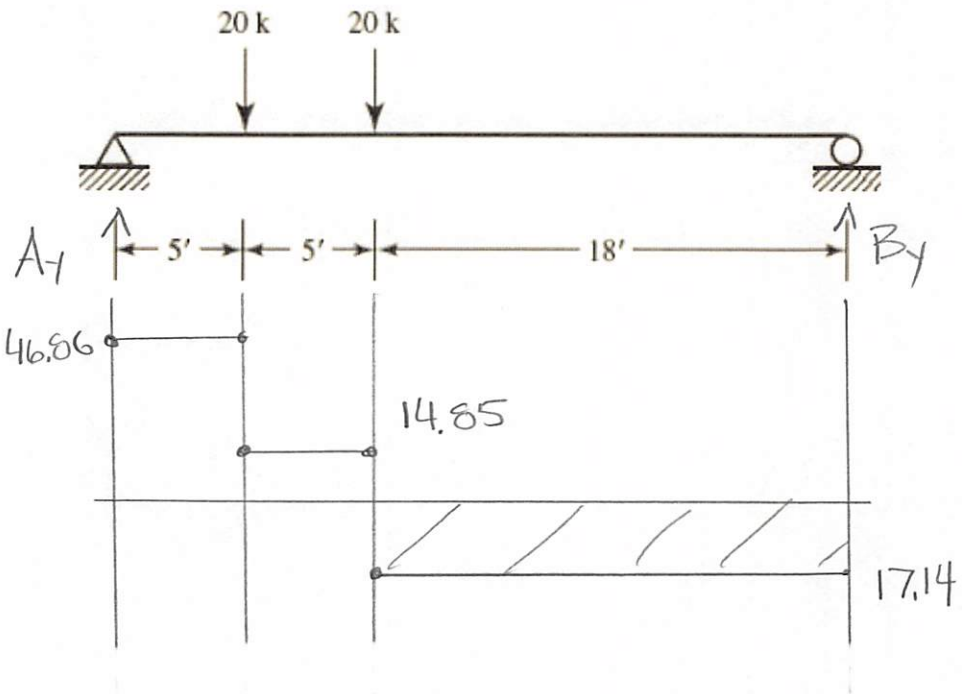
5.10-6 The beam shown in Figure P5.10-6 has lateral support at the ends only. The concentrated loads are live loads. Use A992 steel $(F_y = 50\ \text{ksi})$ and select a shape. Do not check deflections. Use $C_b = 1.0$ (this is conservative).



$L_b = 28\text{ ft}$

$P_U = 1.6(20^k) = 32^k$

$\curvearrowright +\sum M_B = 0 = P_U(15' + 23') - A_y(28')$

$A_y = 46.86^k$

$B_y = 17.14^k$

$M_{MAX} = 17.14^k(18') = 308.6\text{ k ft}$

FROM TABLE 3-10 (3-119) WITH $L_b = 28\text{ft}$ & $M_U = 309\text{ k-ft}$

TRY W14 x 74 $\quad \phi_b M_n = 318\text{ kft} > M_U$ O.K.

*CHECK BEAM WT $\quad M_U = 308.6\text{ kft} + \frac{1.2(0.074\text{ k/ft})(28\text{ ft})^2}{8}$

317.3 kft O.K.

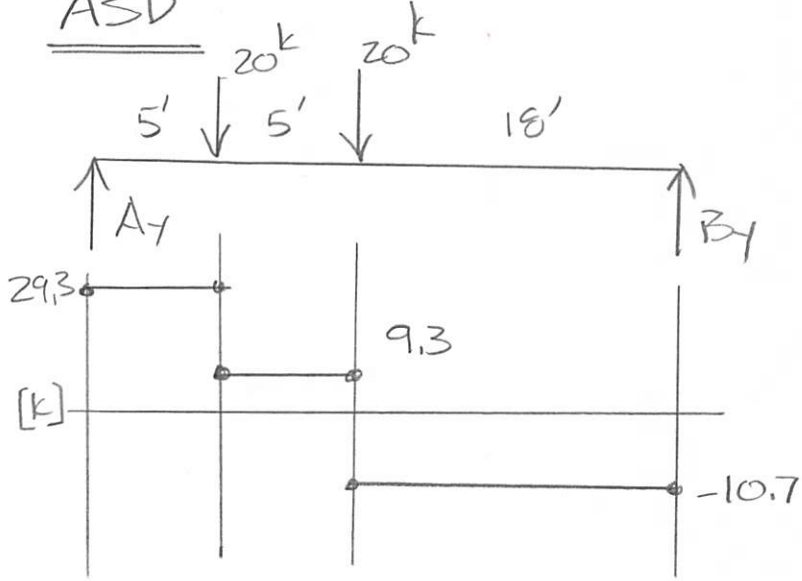
*CHECK SHEAR FROM Z_x TABLE

$\phi_v V_n = 192^k > 46.86$ O.K.

USE W14 x 74

5.10-6

ASD



$L_b = 28\,ft$

$+\circlearrowleft \sum M_B = 0 = 20^k(18' + 23') - A_1(28')$

$A_y = 29.3^k$

$B_y = 10.7^k$

$M_{MAX} = 10.7k(18\,Ft) = 192.6\,k\,ft$

FROM TABLE 3-10 (3-21) WITH $L_b = 28'$ & M_U

W14 x 74 $\quad \frac{M_n}{\Omega_b} = 212\,k\,ft > M_U$ O.K.

*CHECK BEAM WT $\quad M_U = 192.6 + \frac{(0.074k/ft)(28ft)^2}{8}$

$= 199.9\,k\,ft$ O.K.

*CHECK SHEAR FROM Z_x TABLE (3-25)

$\frac{V_n}{\Omega_v} = 128^k > 29.3^k$ O.K.

USE W 14 x 74