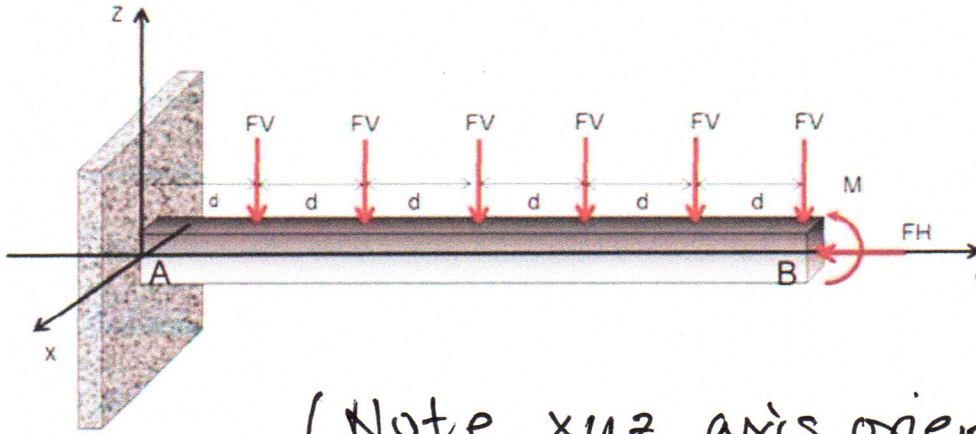


ip4STATICS Worksheet for U04_P07

A cantilever beam is loaded with six equal vertical forces of magnitude FV kips, spaced at equal intervals of d feet. The beam is also loaded with horizontal force FH and moment M at B .

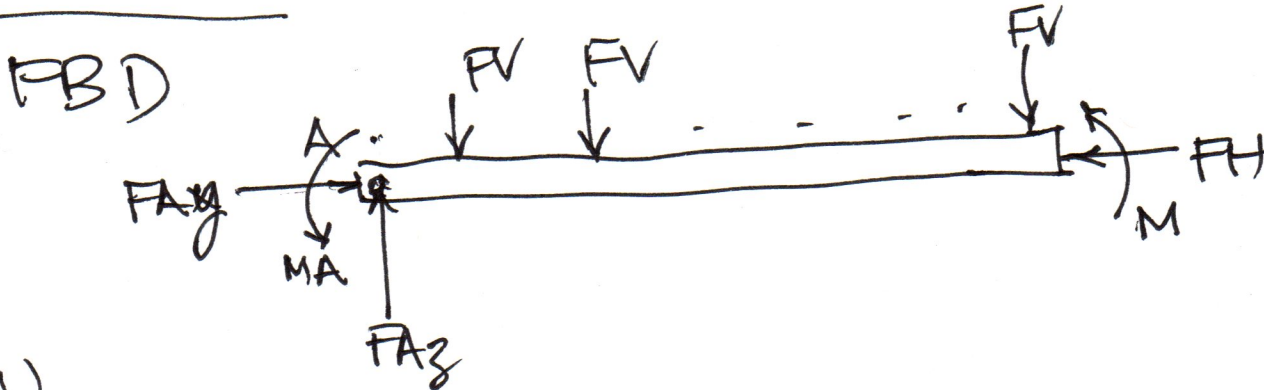
Instance variables: forces FV and FH in kips, moment M in kip-ft, and length d in ft.



(Note xyz axis orientation)

(1) What is the reaction force $FA(i,j,k)$ at A?

(2) What is the reaction moment $MA(i,j,k)$ at A?



(1)

$$\sum F_x = 0: FA_x = 0.$$

$$\sum F_y = 0: FA_y = FH.$$

$$\sum F_z = 0: FA_z = 6 \cdot FV$$

$$FA(i,j,k) = 0 \cdot \bar{i} + (FH) \cdot \bar{j} + (6 \cdot FV) \bar{k}$$

U04-P07 prob

SOLUTION (p.2)

$$(2) \quad \sum M_A = 0 : M_{AX} = d \cdot FV + 2d \cdot FV + 3d \cdot FV \\ + 4d \cdot FV + 5d \cdot FV + 6d \cdot FV - M$$

$$\text{or } M_{AX} = 21d \cdot FV - M \quad (*)$$

$$M_{AY} = 0.$$

$$M_{AZ} = 0.$$

$$\text{so } \boxed{M_A(ijk) = (21d \cdot FV - M) \vec{i} + 0 \cdot \vec{j} + 0 \cdot \vec{k}}$$