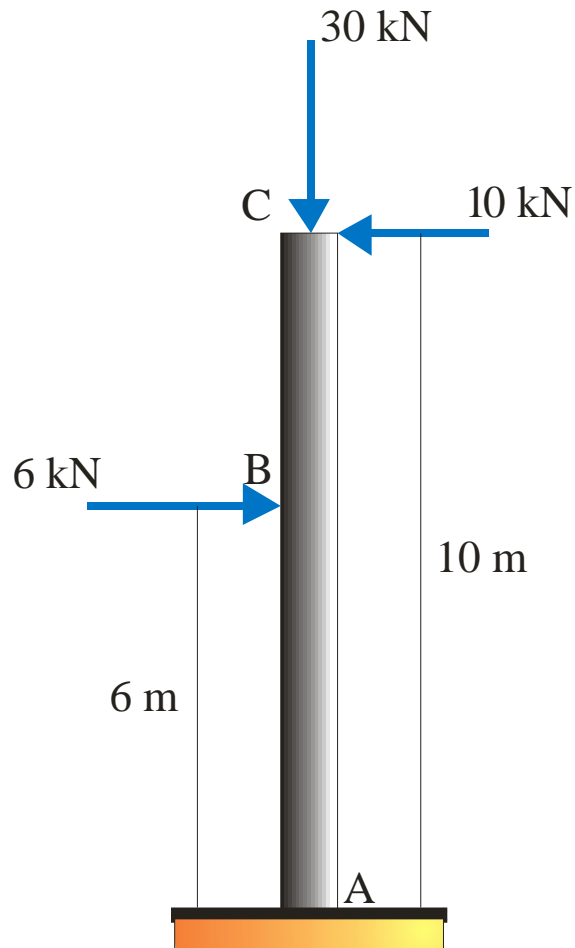


# Example 3.12

## Example 3.12:

Determine the reactions at A for the fixed column.



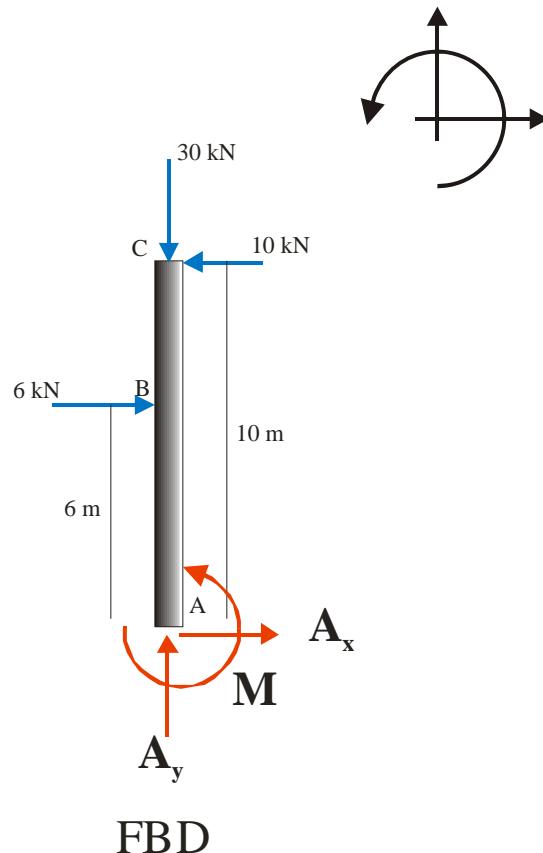
**DRAW THE FBD !!!!!!!!!!!!!!!**

The “**Fixed**” support at A resists both translation and rotation.

We therefore show:

1. a horizontal and vertical force reaction at A to resist the translation in the x and y direction, and
2. a couple (**couple moment**) acting at A to resist rotation when we draw the FBD of ABC.

# DRAW THE FBD !!!!!!!

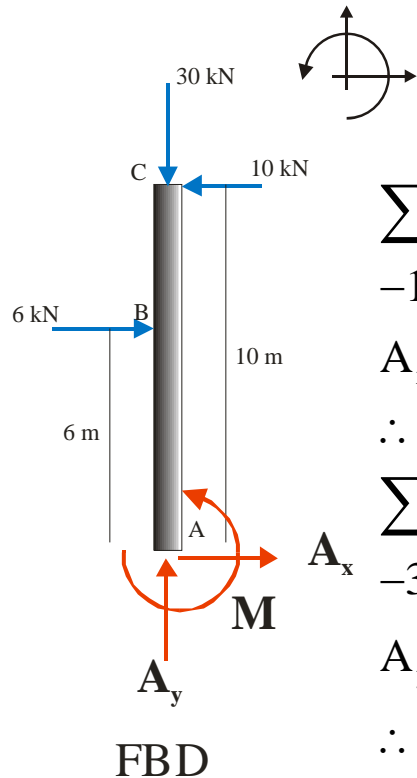


The senses of the unknown reaction forces and couple-moment are **assumed** in the FBD.

When the equilibrium equations are applied to the FBD and solved, a negative answer indicates that the sense assumed in the initial FBD was incorrect.

**HINT:** If you always assume unknown forces and couple moments to be in the positive direction in your FBD, a negative answer when applying the equilibrium equations indicates they are in fact in the negative direction.

# Apply the Equilibrium Equations to Your Free Body Diagram



$$\sum F_x = 0 \rightarrow$$

$$-10 + 6 + A_x = 0$$

$$A_x = +4 \text{ kN} \quad (+\text{sign indicates sense of } A_x \text{ was assumed correctly in the FBD})$$

$$\therefore A_x = 4 \text{ kN} \rightarrow$$

$$\sum F_y = 0 \rightarrow$$

$$-30 + A_y = 0$$

$$A_y = +30 \text{ kN} \quad (\text{sense assumed correctly})$$

$$\therefore A_y = 30 \text{ kN} \uparrow$$

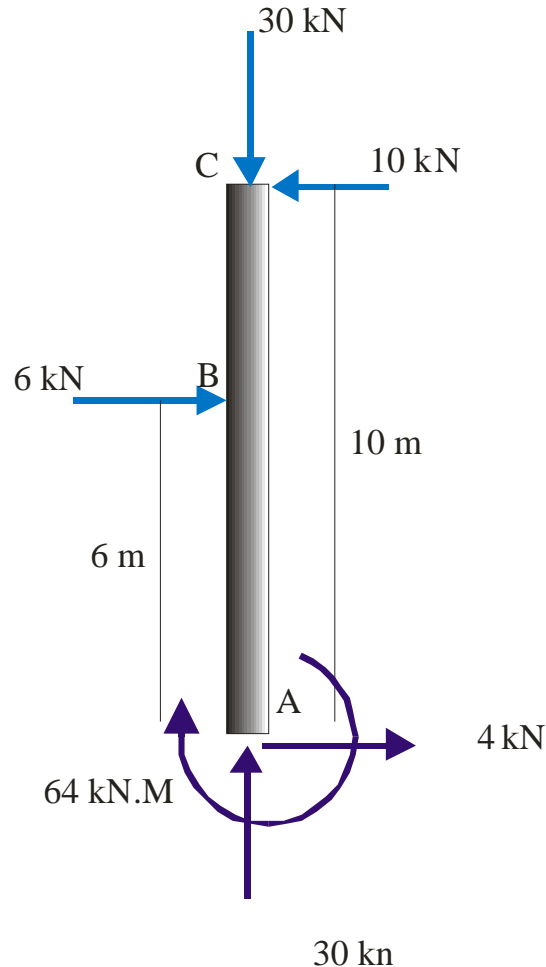
$$\sum M_A = 0 \quad \curvearrowright$$

$$10(10) - 6(6) + M = 0$$

$$M = -64 \text{ kN}\cdot\text{m} \quad (\text{sense assumed incorrectly})$$

$$\therefore M = 64 \text{ kN}\cdot\text{m} \quad \curvearrowleft$$

# Re-draw FBD and Check by taking Moments about a Different Point



**Taking moments about Point C:**

$$\sum M_C = 0$$

$$6(4) + 4(10) - 64 = 0$$

$$0 = 0$$

FBD