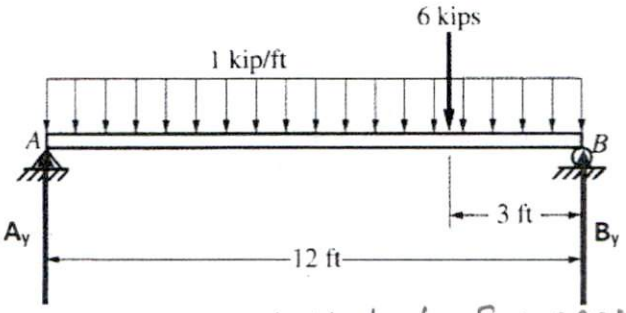
CMGT 350	Quiz #10	Fall 2022

SHOW ALL WORK FOR FULL CREDIT. DO YOUR OWN WORK.

Name: Solution

1. Find the reactions at the supports A and B, the maximum shear force, and the maximum bending moment in the beam due to the loading shown using the formulas in Table 13-1.



Solution.

Table 13-1, Case 2 and Case 4. use Method of Superposition.

Case 2

$a = 9$ ft
$b = 3$ ft
$L = 12$ ft
$P = 6$ kips

$$A_y = \frac{Pb}{L} = \frac{6 \text{ kips } (3 \text{ ft})}{12 \text{ ft}} = 1.5 \text{ kips } \uparrow$$

$$B_y = \frac{Pa}{L} = \frac{6 \text{ kips } (9 \text{ ft})}{12 \text{ ft}} = 4.5 \text{ kips } \uparrow$$

$$V = +\frac{PL}{L} = 1.5 \text{ kips} \quad \text{and} \quad V = -\frac{Pa}{L} = -4.5 \text{ kips}$$

$$M = +\frac{Pab}{L} = \frac{6 \text{ kips } (9 \text{ ft})(3 \text{ ft})}{12 \text{ ft}} = +13.5 \text{ kip} \cdot \text{ft}$$

Case 4

$w = 1$ kip/ft
$L = 12$ ft

$$A_y = B_y = \frac{wL}{2} = \frac{1 \text{ kip/ft } (12 \text{ ft})}{2} = 6 \text{ kips } \uparrow$$

$$V = +\frac{wL}{2} = +6 \text{ kips} \quad \text{and} \quad V = -\frac{wL}{2} = -6 \text{ kips}$$

$$M = \frac{wL^2}{8} = \frac{1 \text{ kip/ft } (12 \text{ ft})^2}{8} = +18 \text{ kip} \cdot \text{ft}$$

By Superposition,

$$A_y = 1.5 \text{ kips} + 6 \text{ kips} = 7.5 \text{ kips } \uparrow$$

$$B_y = 4.5 \text{ kips} + 6 \text{ kips} = 10.5 \text{ kips } \uparrow$$

$$V_{MAX} = -4.5 \text{ kips} - 6 \text{ kips} = -10.5 \text{ kips} = 10.5 \text{ kips (c)}$$

$$M_{MAX} = 13.5 \text{ kip} \cdot \text{ft} + 18 \text{ kip} \cdot \text{ft} = +31.5 \text{ kip} \cdot \text{ft}$$