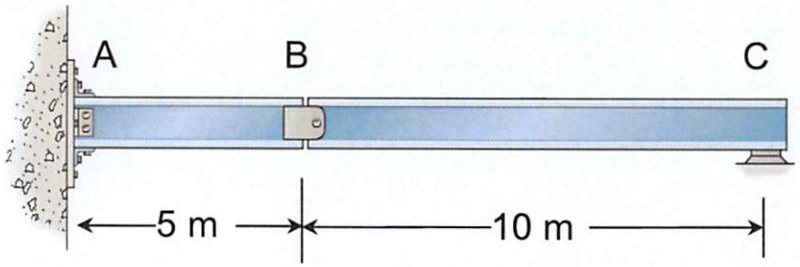
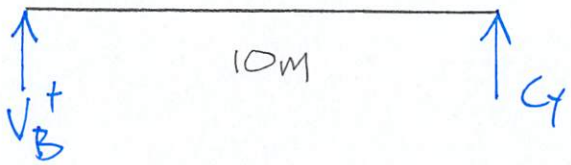
**Example 6a-4**: The beam below is subject to a dead load of 1.5 kN/m and a single live load of 10 kN. Determine the maximum ***negative*** moment these loads create at point A and the maximum ***positive*** shear at point B.




WHEN UNIT IS $0 \le x \le 5$

$$\curvearrowleft \sum M_C = 0 = -V_B(10\text{m}) \qquad V_B = 0$$

$0 \le x \le 5$

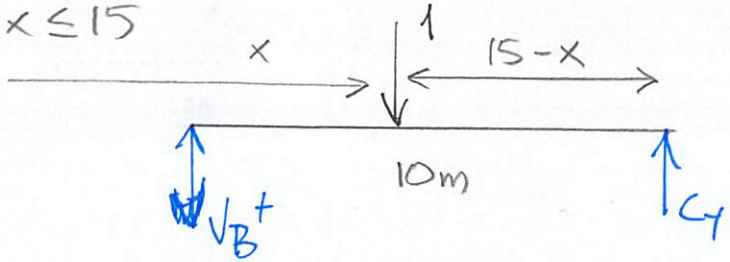



WHEN UNIT IS $5 \le x \le 15$

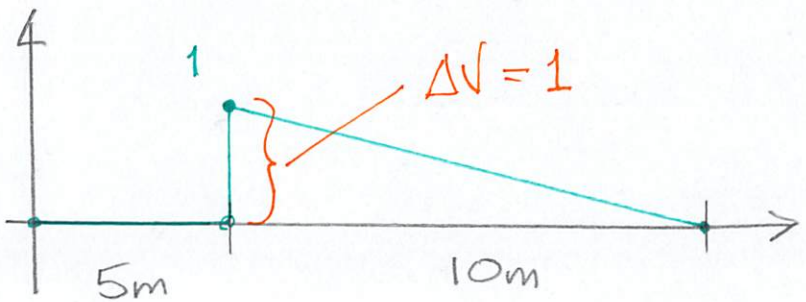
$$\curvearrowleft \sum M_C = 0 = 1(15-x) - V_B(10\text{m})$$

$$V_B = \frac{15-x}{10}$$

$5 \le x \le 15$




$V_B$



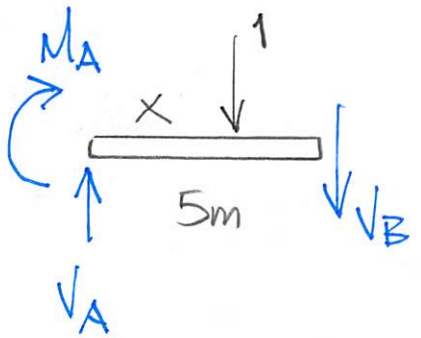

$$V_{B_{MAX}} = 10\text{kN}(1) + 1.5\text{kN/m}\left[\tfrac{1}{2}(10\text{m})1\right]$$

CONCENTRATED FORCE

UNIFORM LOAD

$$V_{B_{MAX}} = 17.5\text{kN}$$

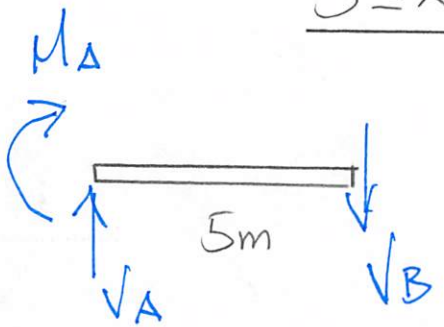
FBD AB $0 \le x \le 5$




$$\circlearrowleft + \sum M_A = 0 = -M_A - 1x - \cancel{V_B}^{\,0}(5m)$$

$$M_A = [-x]m \quad (15-x)$$

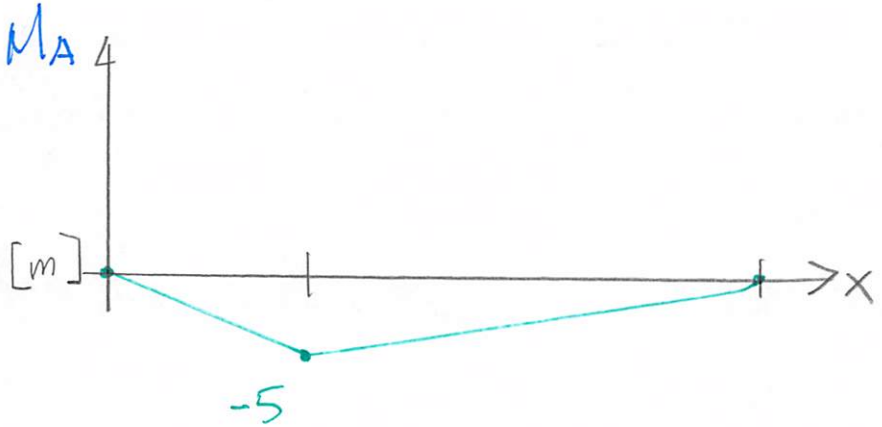
$5 \le x \le 15$




$$\circlearrowleft + \sum M_A = 0 = -M_A - V_B(5m)$$

$$M_A = -V_B(5m) = -\left(\frac{15-x}{2}\right)$$

CONCENTRATED FORCE




$$M_{A_{MAX}} = 10kN(-5m) + 1.5kN/m\left[\tfrac{1}{2}(15m)(-5m)\right]$$

$$= -106.25\,kNm$$