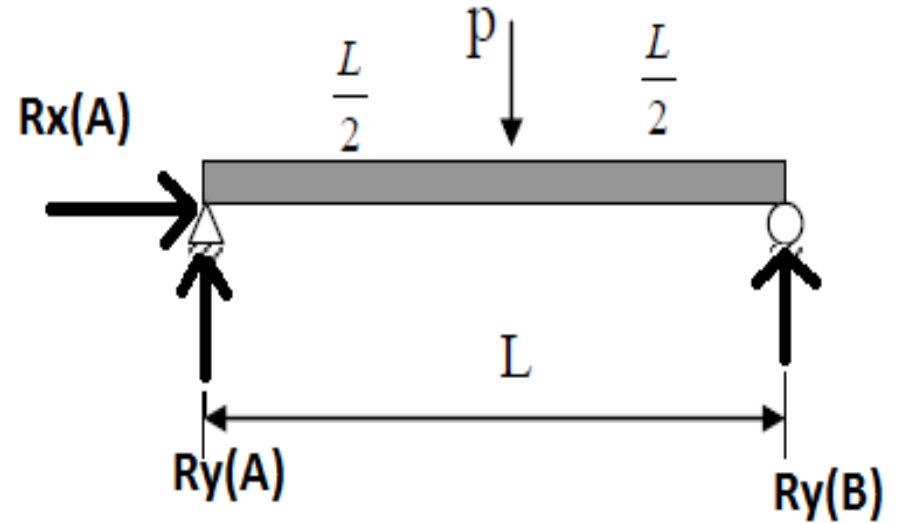
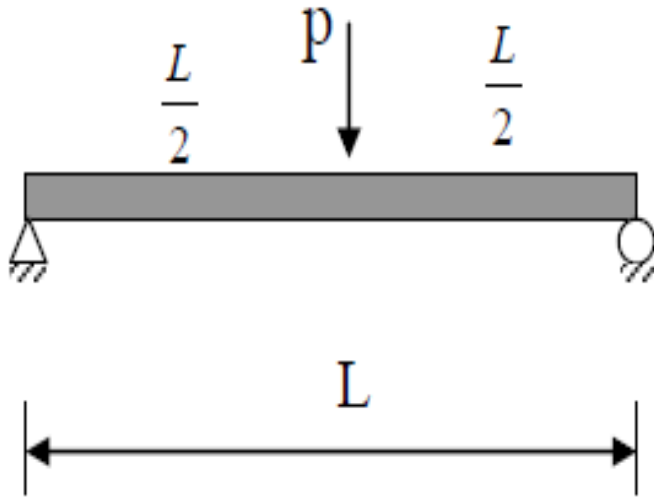


رسم دیاگرام برش و خمش در تیرها

- گام اول :تعیین نیروهای تکیه گاهی
- گام دوم : رسم دیاگرام برشی تیر
- گام سوم: رسم دیاگرام خمش تیر بر اساس تعیین مساحت زیر نمودار دیاگرام برش

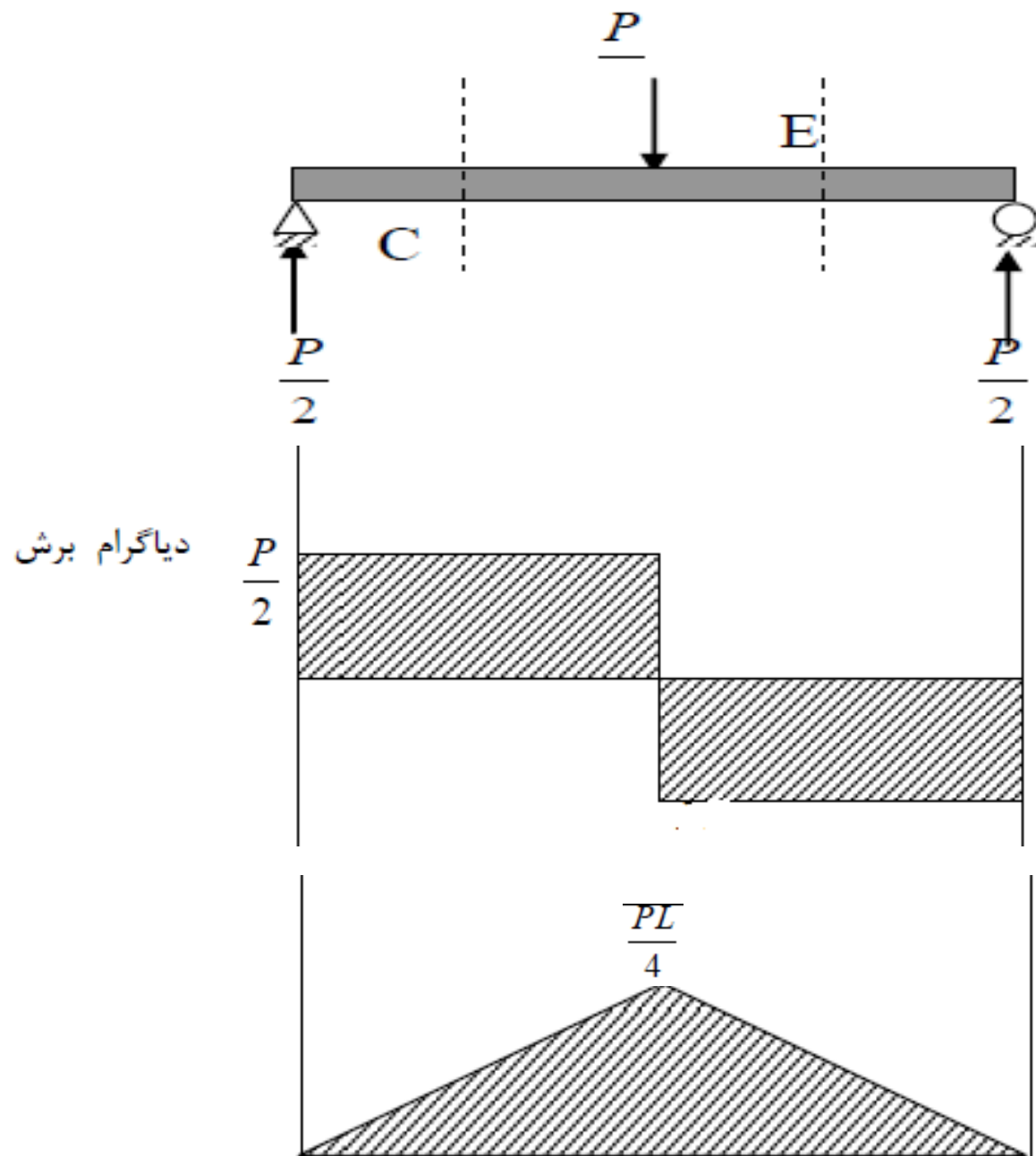


$$\rightarrow + \sum F_x = 0 \Rightarrow R_x(A) = 0$$

$$\uparrow + \sum F_y = 0 \Rightarrow R_y(A) + R_y(B) - P = 0$$

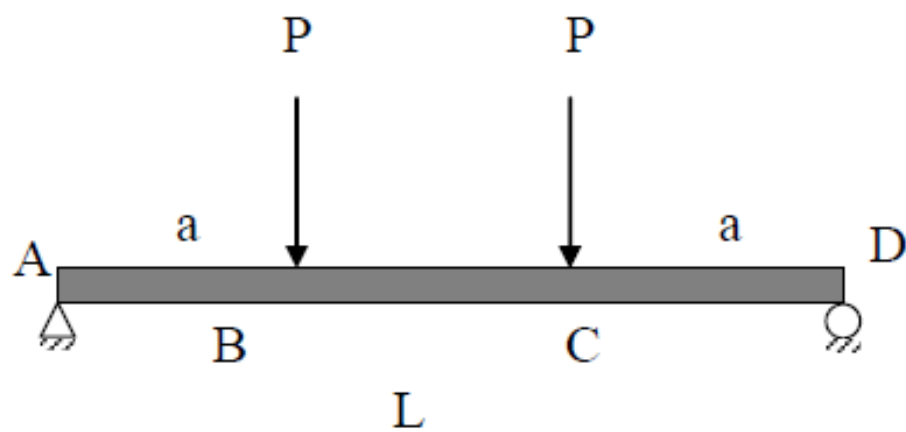
$$\curvearrowright + \sum M(A) = 0 \Rightarrow -(R_y(B) * L) + \left(P * \frac{L}{2}\right) = 0$$

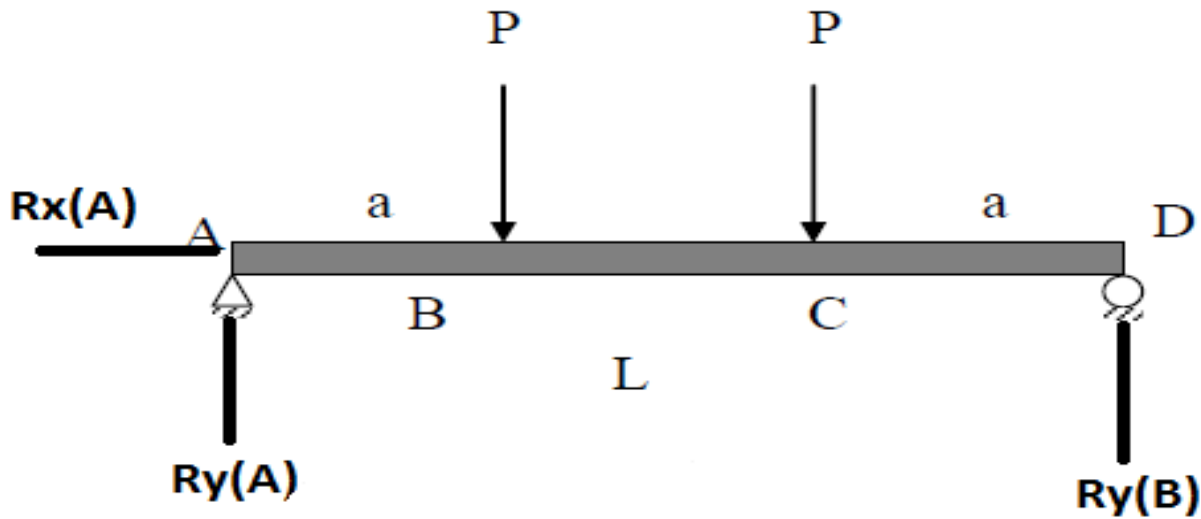
- $R_y(B) = P/2$, $R_y(A) = P/2$



مثال :

نمودار خمشی و برش تیر زیر را رسم کنید



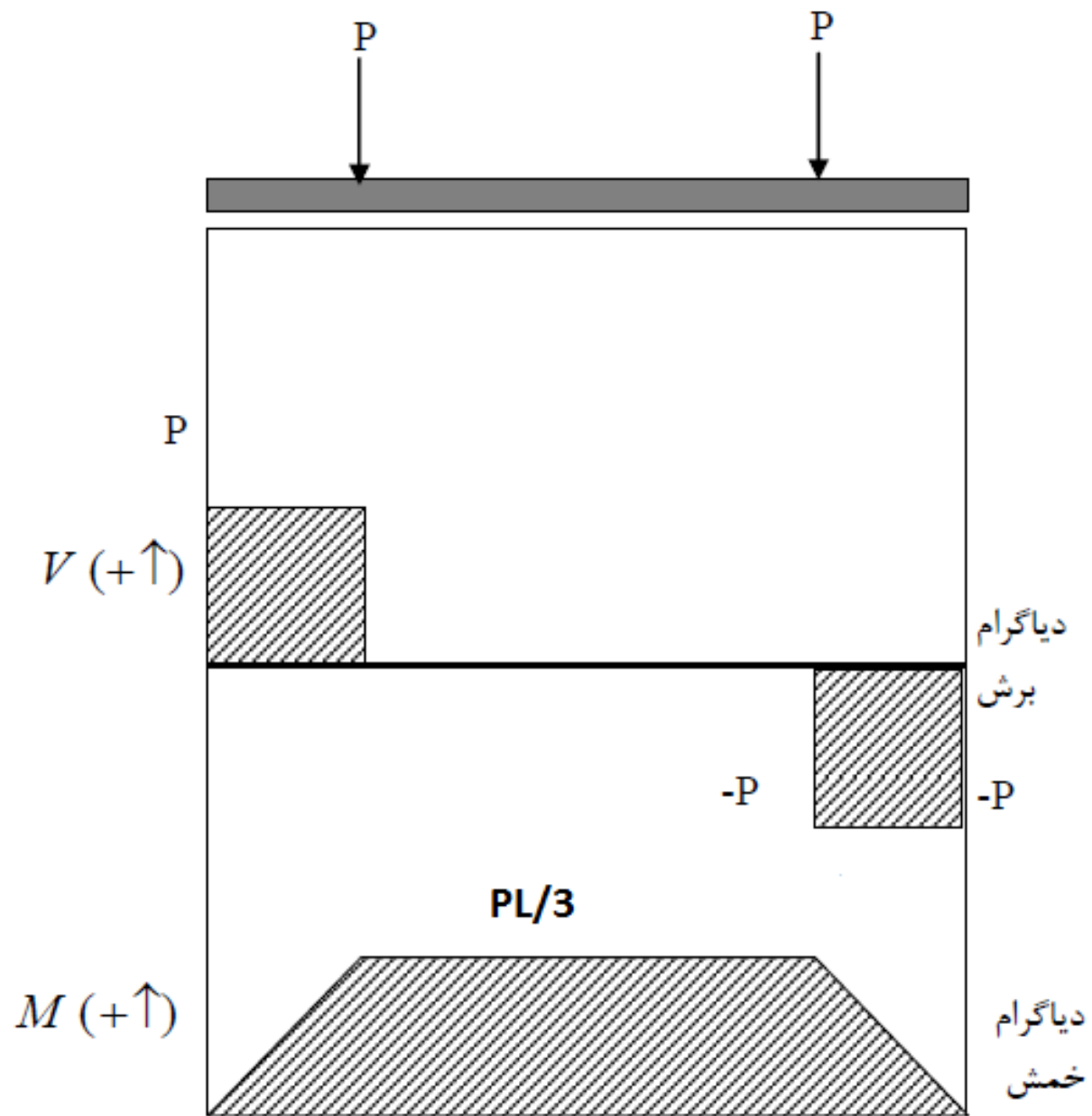


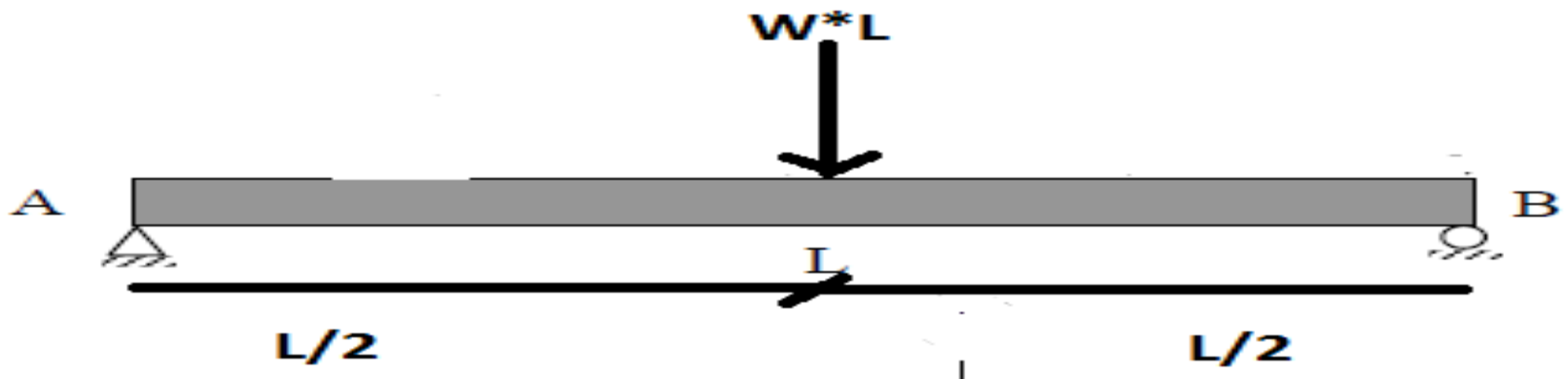
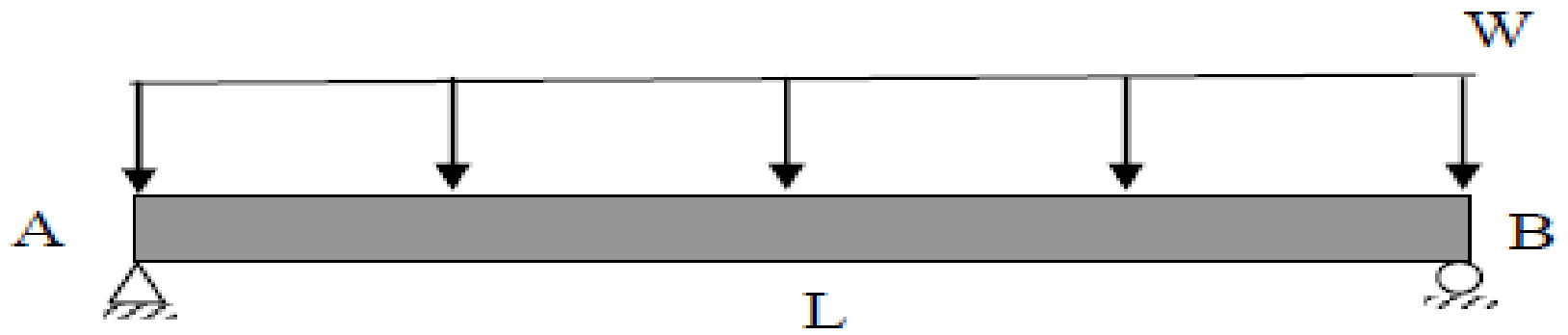
$$\rightarrow + \sum F_x = 0 \Rightarrow R_x(A) = 0$$

$$\uparrow + \sum F_y = 0 \Rightarrow R_y(A) + R_y(B) - P - P = 0$$

$$\curvearrow + \sum M(A) = 0 \Rightarrow -(R_y(B) * L) + \left(P * \frac{2l}{3}\right) + \left(P * \frac{l}{3}\right) = 0$$

$$R_y(B) = P, R_y(A) = P$$



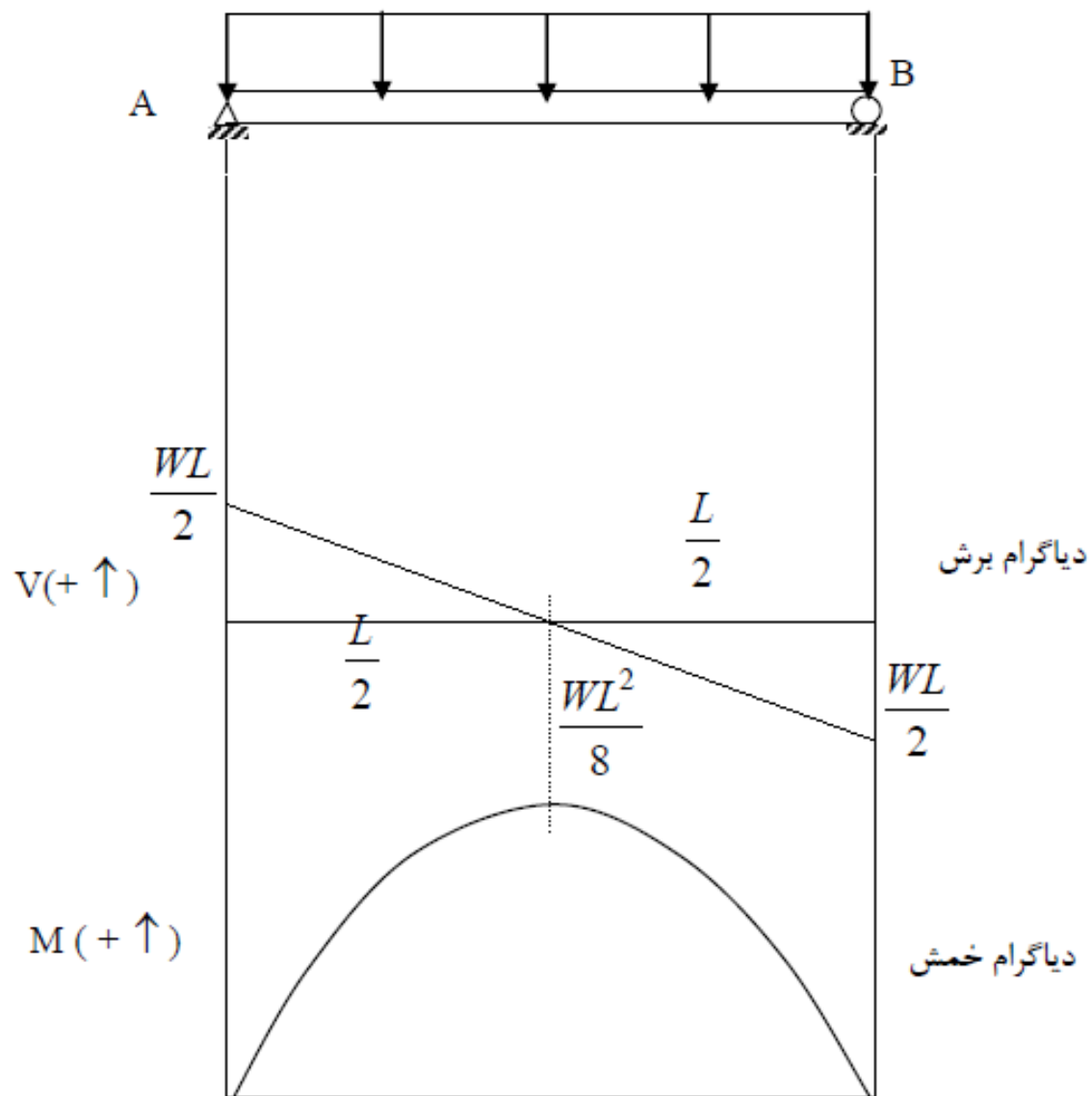


$$\rightarrow + \sum F_x = 0 \Rightarrow R_x(A) = 0$$

$$\uparrow + \sum F_y = 0 \Rightarrow R_y(A) + R_y(B) - (W * L) = 0$$

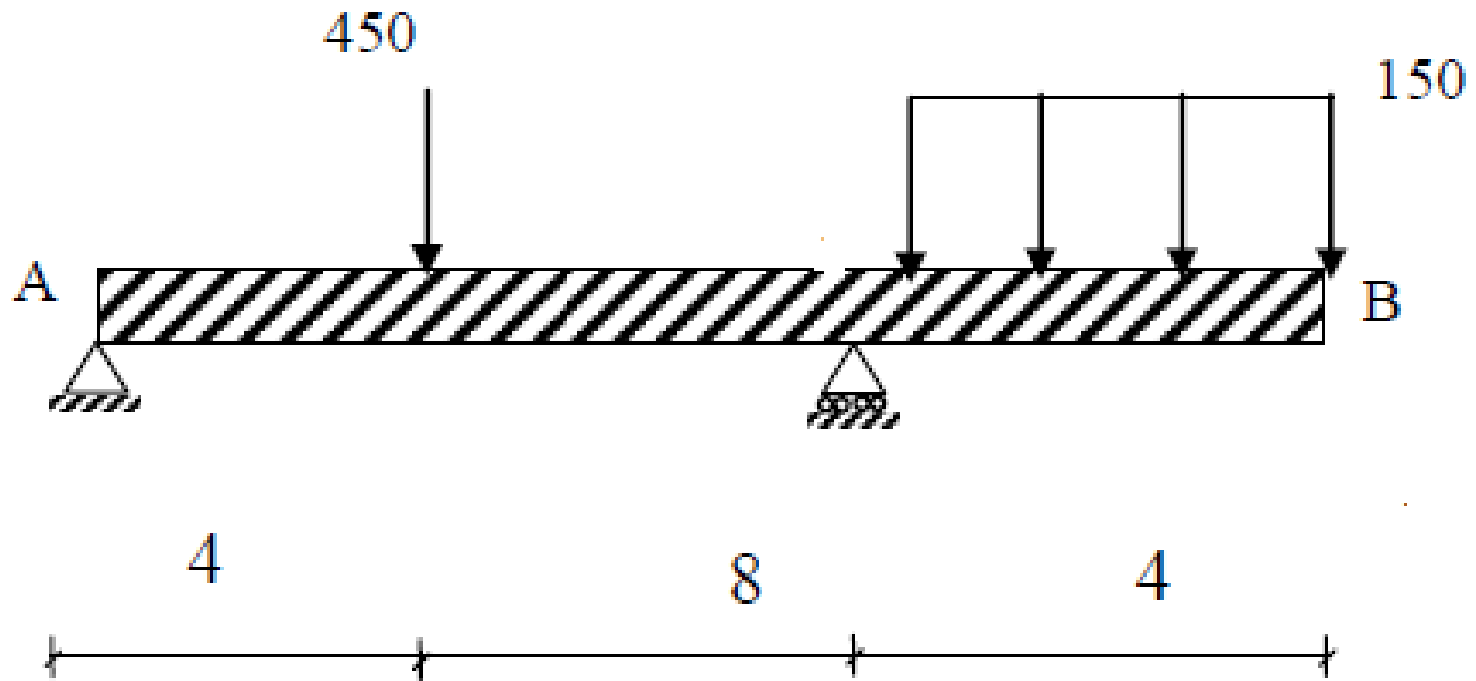
$$\curvearrowright + \sum M(A) = 0 \Rightarrow - (R_y(B) * L) + \left((W * L) * \frac{L}{2} \right) = 0$$

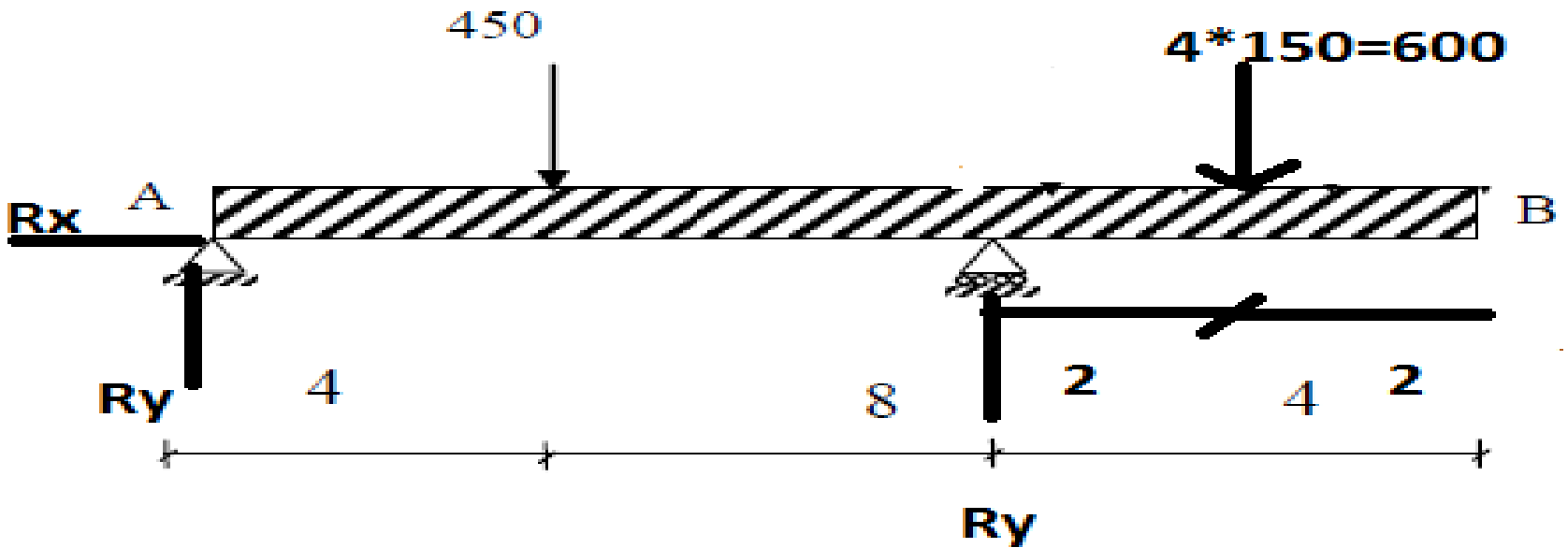
- $R_y(A) = (W * L) / 2$, $R_y(B) = (W * L) / 2$



لنگر خمشی از برش یک درجه بیشتر است .

همواره جایی که برش صفر است ماکزیمم لنگر خمشی داریم .



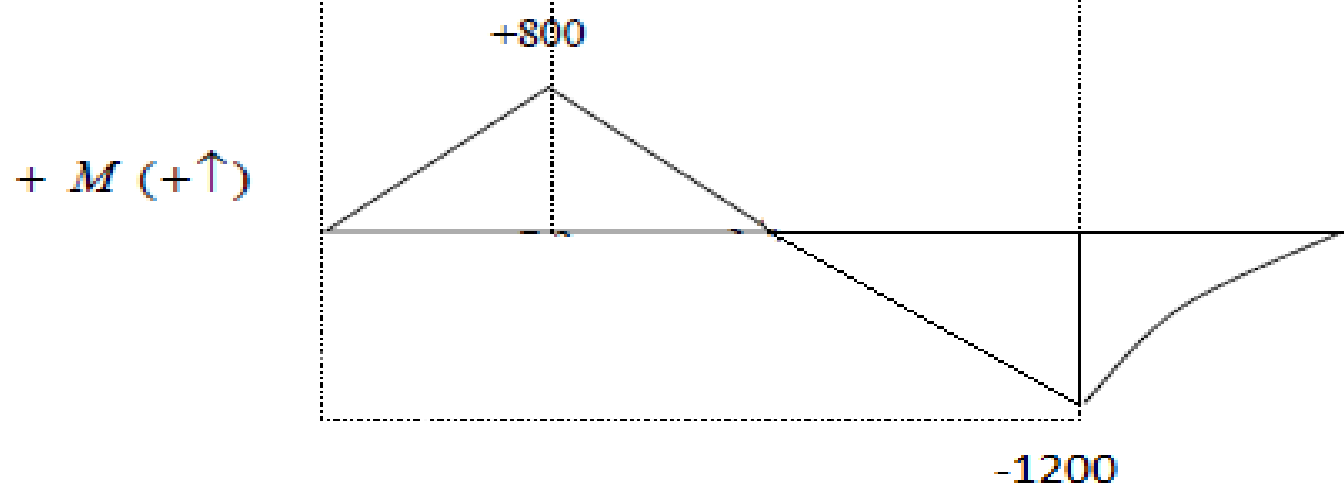
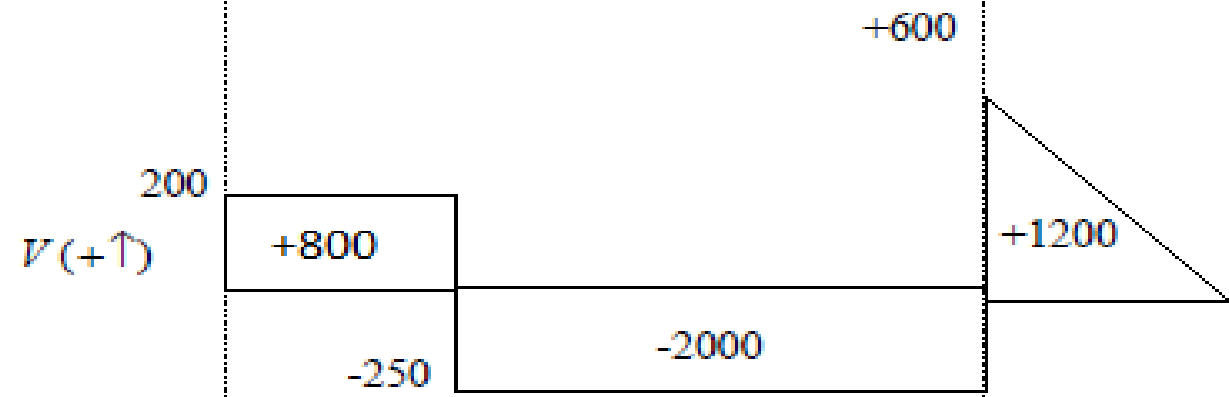
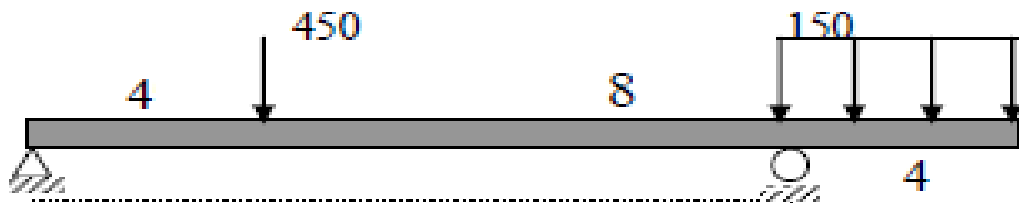


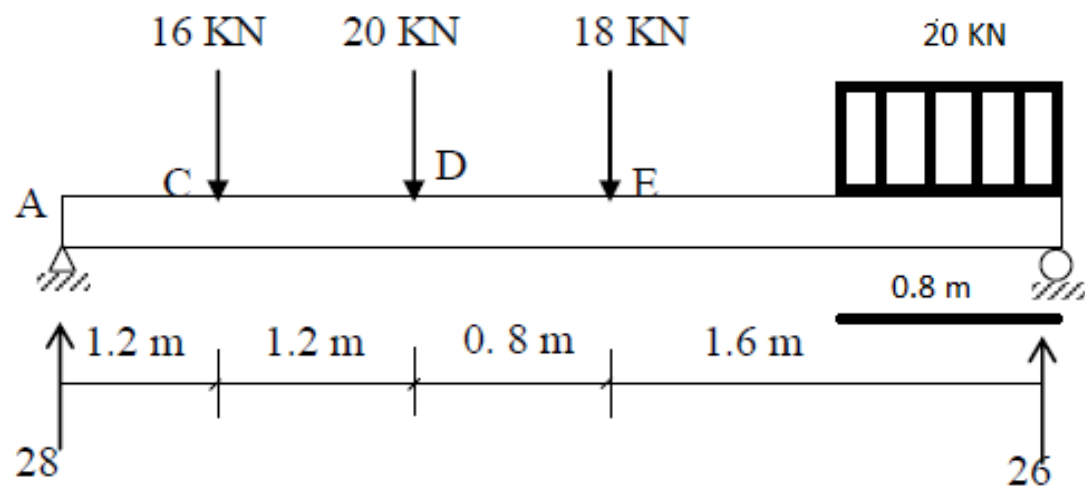
$$\rightarrow + \sum F_x = 0 \Rightarrow R_x(A) = 0$$

$$\uparrow + \sum F_y = 0 \Rightarrow R_y(A) + R_y(B) - 600 - 450 = 0$$

$$+ \sum M(A) = 0 \Rightarrow (600 * 14) - (R_y(B) * 12) + (450 * 4) = 0$$

$$R_y(B) = 850 \quad , \quad R_y(A) = 200$$





مثال