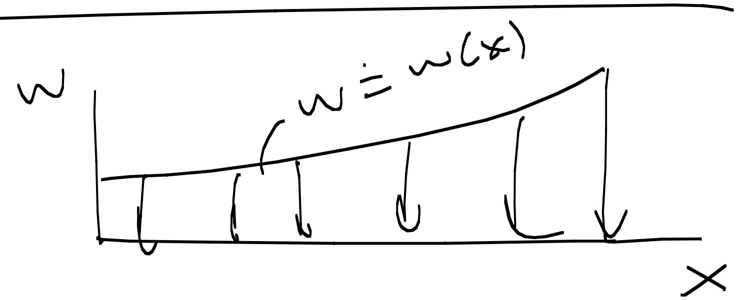
Distributed Loading

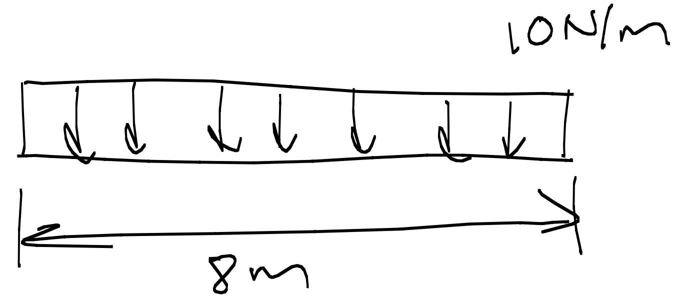


$$\vec{F}_R = \int w(x)\,dx$$

$$\bar{x} = \frac{\int x\,w(x)\,dx}{\int w(x)\,dx}$$

Inside back cover => Geometric properties of common shapes
=> If the area & centroid are known, then you don't need to integrate

$$F_R = \int w(x)\,dx$$
$$= \int_0^8 10\,dx$$
$$= 10x\Big]_0^8 = \boxed{80\ N}$$

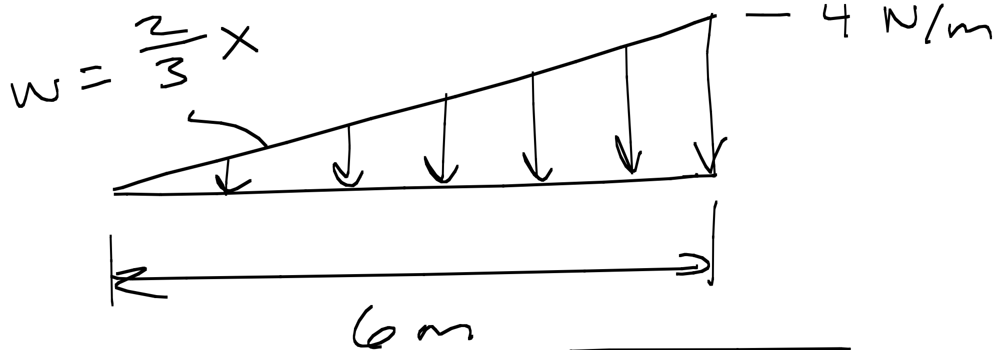


$$F_R = A = bh = (8m)(10\ N/m) = \underline{80N}$$

$$\bar{x} = \frac{\int x\,w(x)\,dx}{\int w(x)\,dx} = \frac{\int_0^8 10x\,dx}{80N} = \frac{5x^2\Big]_0^8}{80N}$$

$$= \frac{320\ N\cdot m}{80N} = \underline{4\ m}$$

$$\bar{x} = \text{Centroid} = \frac{1}{2}b = \frac{1}{2}(8m) = \boxed{4m}$$



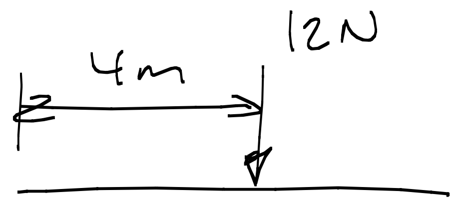
$$F_R = \int_0^6 \frac{2}{3}x\,dx = \frac{1}{3}x^2\Big]_0^6 = \boxed{12\text{ N}}$$

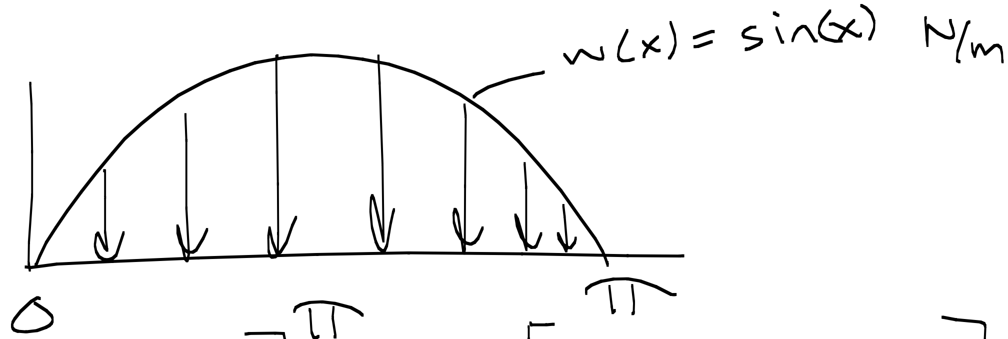
$$F_R = \frac{1}{2}bh = \frac{1}{2}(6)(4) = \boxed{12\text{ N}}$$

$$\bar{x} = \frac{\int x\,w(\cancel{x})\,dx}{12} = \frac{\int_0^6 \frac{2}{3}x^2\,dx}{12} = \frac{\frac{2}{9}x^3\Big]_0^6}{12}$$

$$= \frac{48}{12} = \boxed{4\text{ m}}$$

$$\bar{x} = \frac{2}{3}b = \frac{2}{3}(6\text{ m}) = \boxed{4\text{ m}}$$





$$F_R = \int_0^{\pi} \sin(x)\,dx = -\cos(x)\Big]_0^{\pi} = -\left[\cos\pi - \cos 0\right]$$

$$F_R = -\left[-1 - 1\right] = \boxed{2\,N}$$

$$\boxed{\bar{x} = \frac{\pi}{2}}$$