

ME 2120 Recitation 5

Questions Taken from 9th Edition

Useful Equations

$$\sum \vec{F} = 0 \quad \sum \vec{F}_x = 0 \quad \sum \vec{F}_y = 0 \quad \sum \vec{F}_z = 0$$

$$\sum \vec{M} = 0$$

Shape		\bar{x}	\bar{y}	Area
Triangular area			$\frac{h}{3}$	$\frac{bh}{2}$
Quarter-circular area		$\frac{4r}{3\pi}$	$\frac{4r}{3\pi}$	$\frac{\pi r^2}{4}$
Semicircular area		0	$\frac{4r}{3\pi}$	$\frac{\pi r^2}{2}$
Quarter-elliptical area		$\frac{4a}{3\pi}$	$\frac{4b}{3\pi}$	$\frac{\pi ab}{4}$
Semielliptical area		0	$\frac{4b}{3\pi}$	$\frac{\pi ab}{2}$
Semiparabolic area		$\frac{3a}{8}$	$\frac{3h}{5}$	$\frac{2ah}{3}$
Parabolic area		0	$\frac{3h}{5}$	$\frac{4ah}{3}$
Parabolic spandrel		$\frac{3a}{4}$	$\frac{3h}{10}$	$\frac{ah}{3}$
General spandrel		$\frac{n+1}{n+2} a$	$\frac{n+1}{4n+2} h$	$\frac{ah}{n+1}$
Circular sector		$\frac{2r \sin \alpha}{3\alpha}$	0	αr^2

Fig. 5.8A Centroids of common shapes of areas.

Shape		\bar{x}	\bar{y}	Length
Quarter-circular arc		$\frac{2r}{\pi}$	$\frac{2r}{\pi}$	$\frac{\pi r}{2}$
Semicircular arc		0	$\frac{2r}{\pi}$	πr
Arc of circle		$\frac{r \sin \alpha}{\alpha}$	0	$2\alpha r$

Fig. 5.8B Centroids of common shapes of lines.

$$\bar{X}\Sigma W = \Sigma \bar{x}W \quad \bar{Y}\Sigma W = \Sigma \bar{y}W \quad (5.7)$$

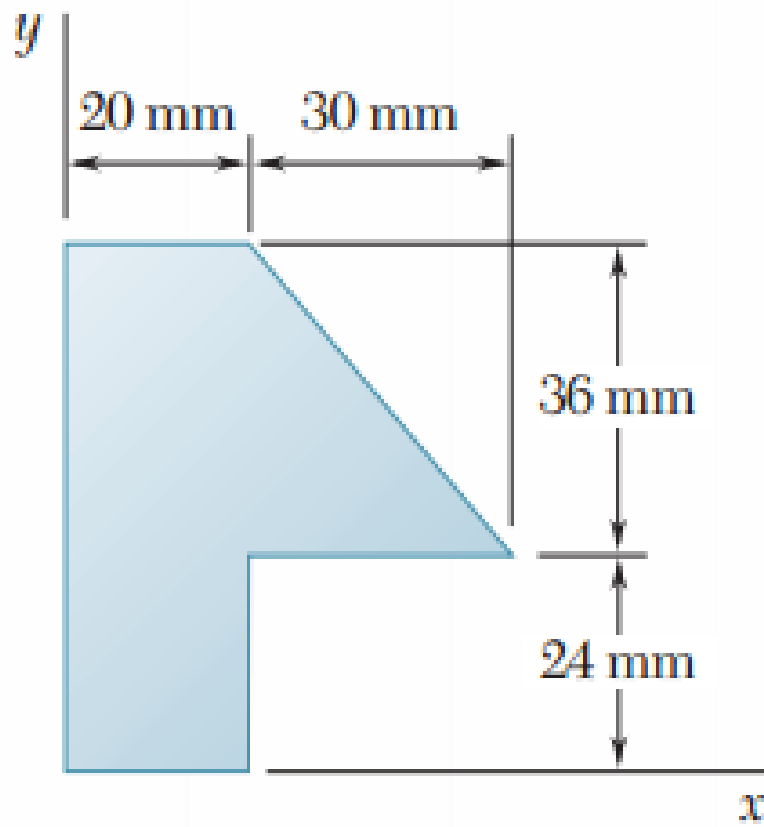


Fig. P5.2

5.68 through 5.73 Determine the reactions at the beam supports for the given loading.

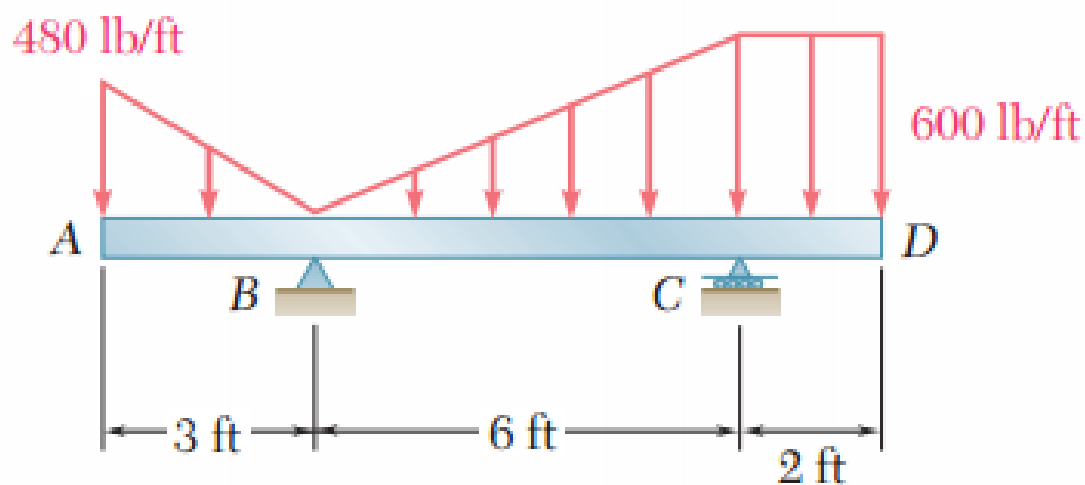


Fig. P5.69

- 5.111** A window awning is fabricated from sheet metal of uniform thickness. Locate the center of gravity of the awning.

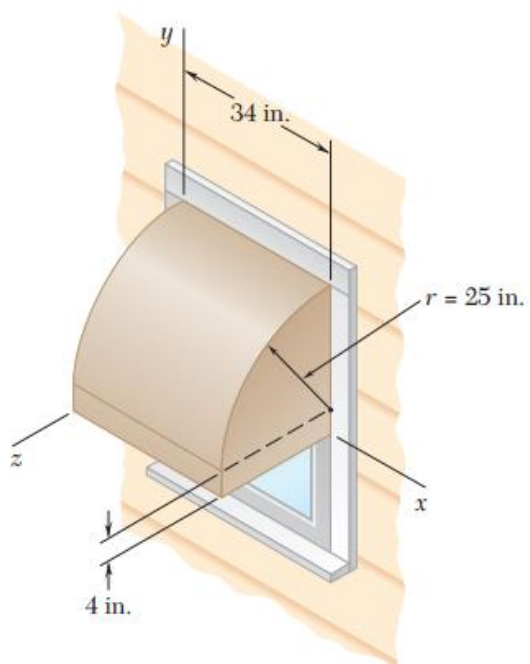


Fig. P5.111