

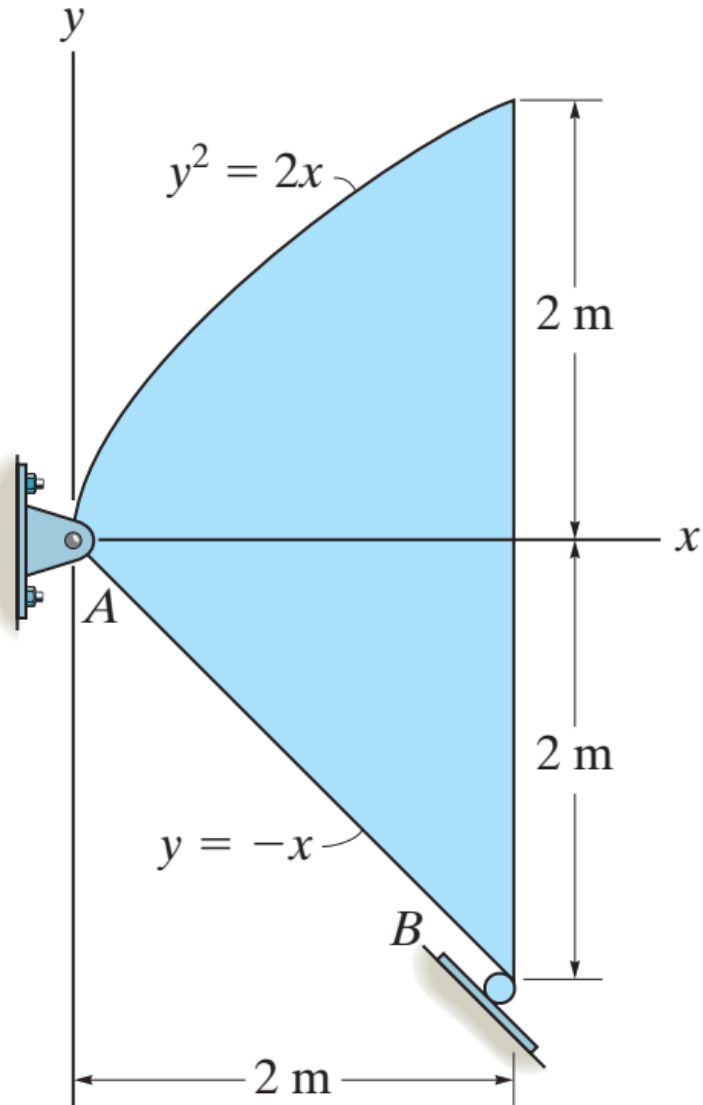
2025-2026 Spring AE104 PH-2

Res. Asst. Burak İFTCİOĐLU

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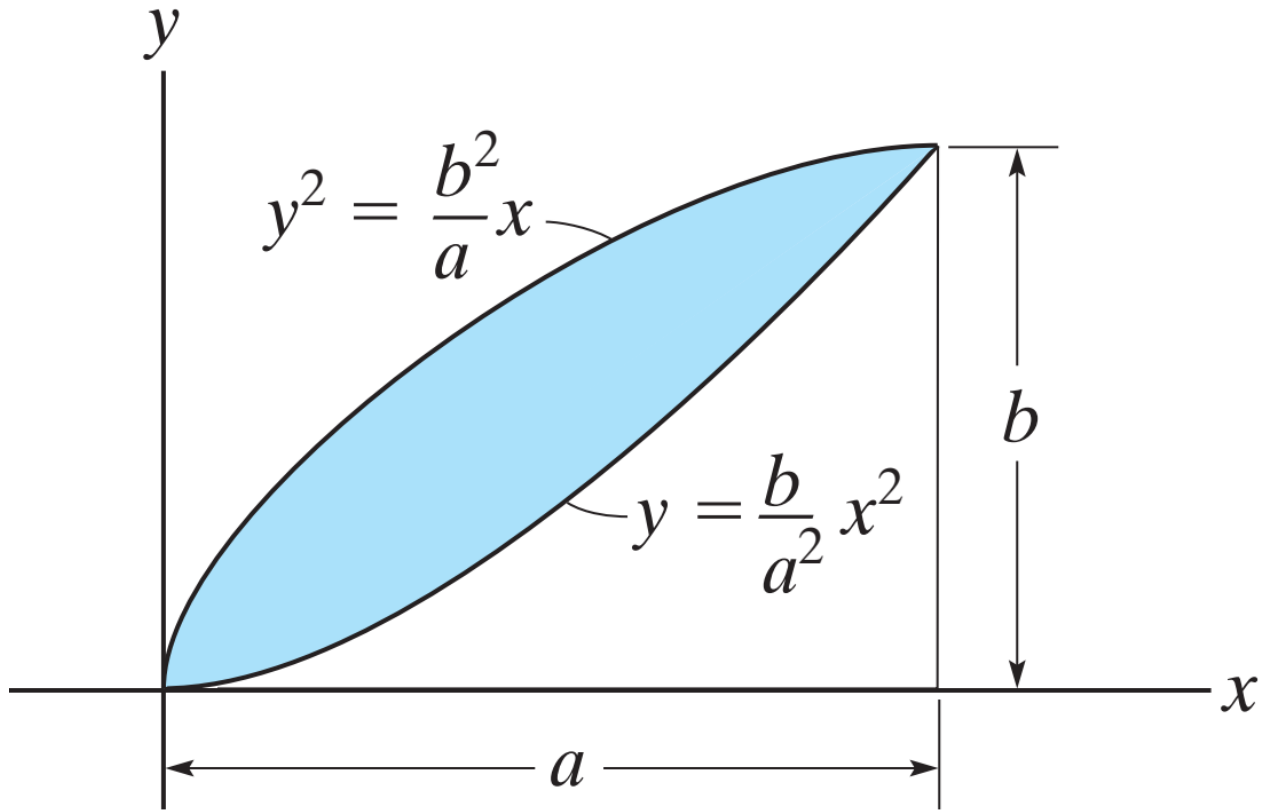
The steel plate is 0.3 m thick and has a density of 7850 kg/m^3 . Determine the location of its center of mass. Also find the reactions at the pin and roller support.

Ans. CG is located at (1.257, 0.143) m. $A_x = 33.88 \text{ kN}$, $A_y = 73.94 \text{ kN}$ and $N_B = 47.92 \text{ kN}$



Determine the moment of inertia for the shaded area about the x axis.

Ans. $I_{xx} = \frac{3ab^3}{35}$



Determine the moment of inertia for the shaded area about the y axis.

Ans. $I_{yy} = 522.3 \text{ in}^4$

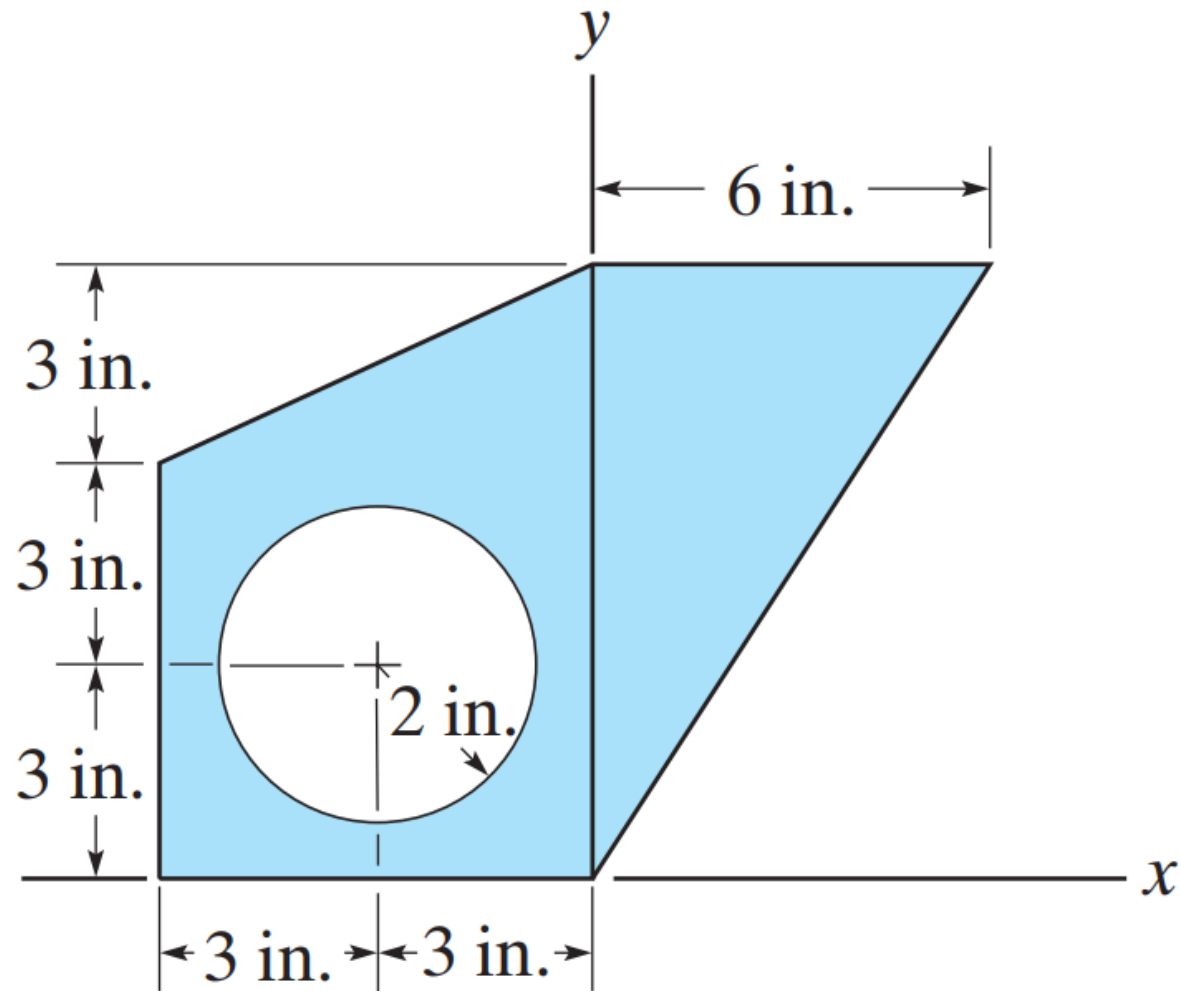


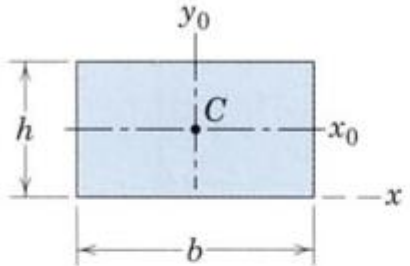
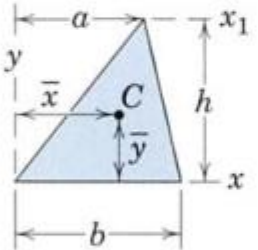
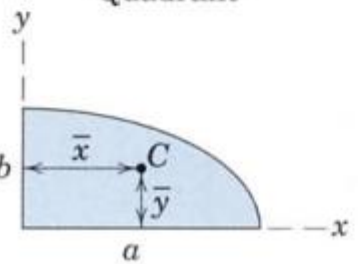
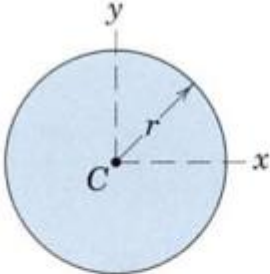
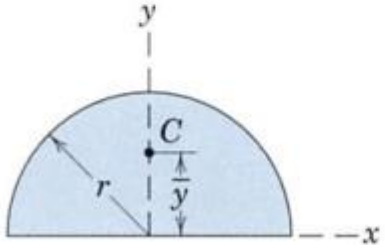
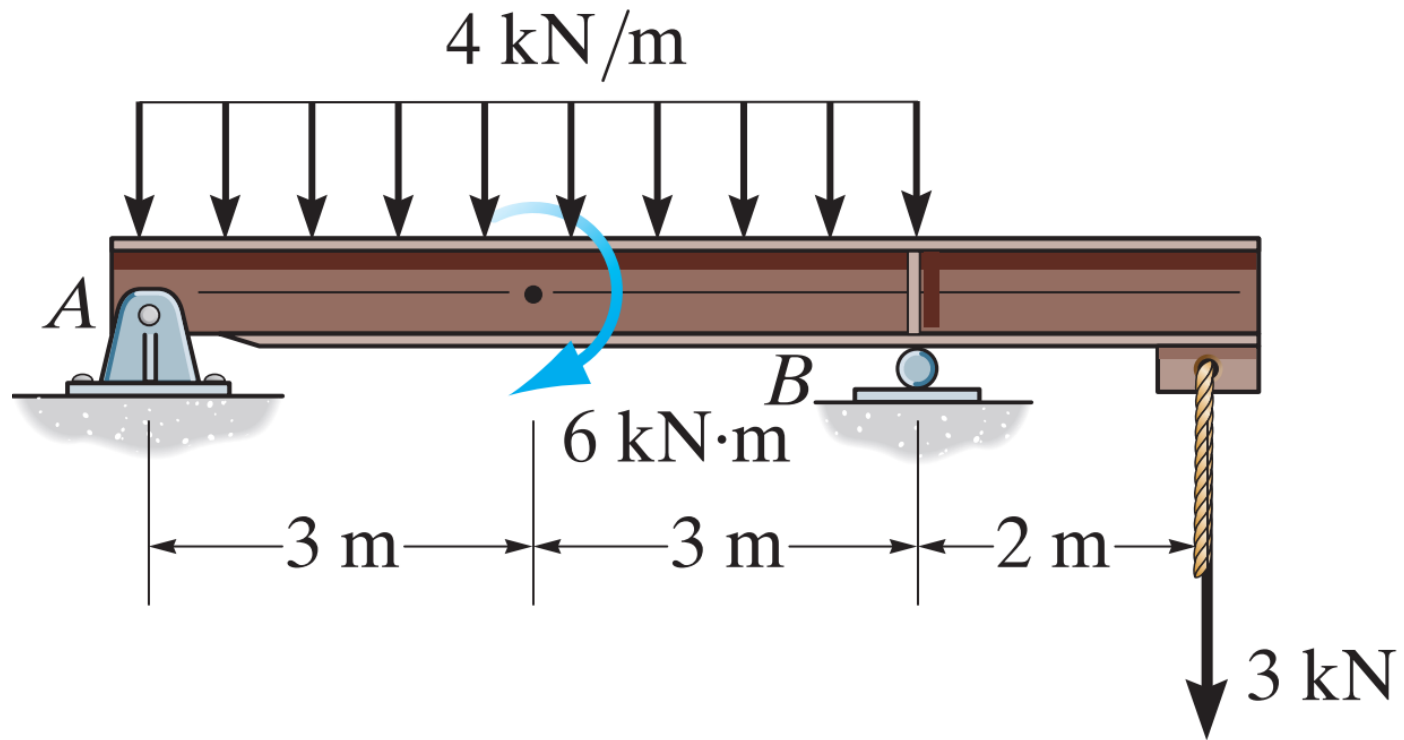
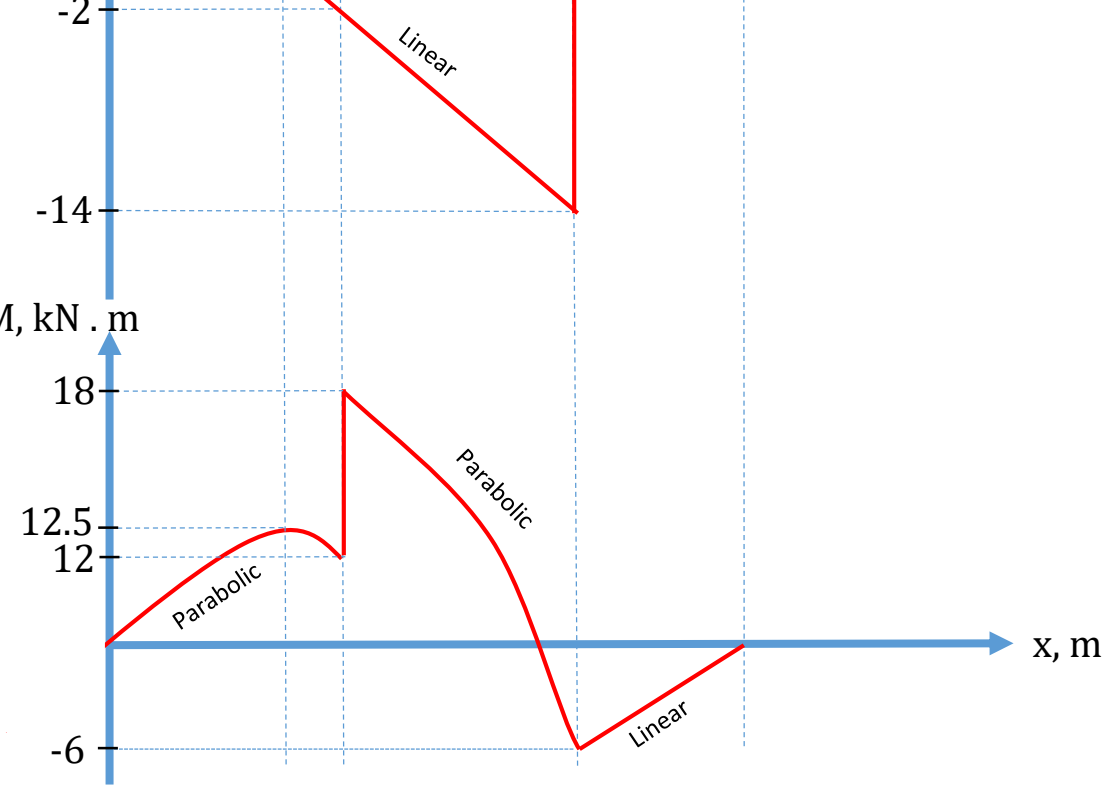
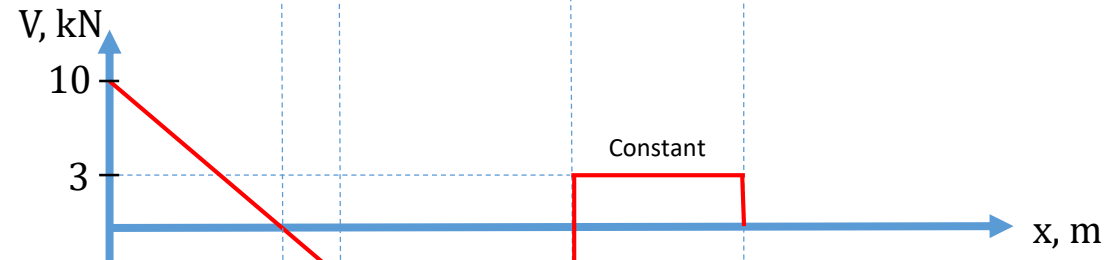
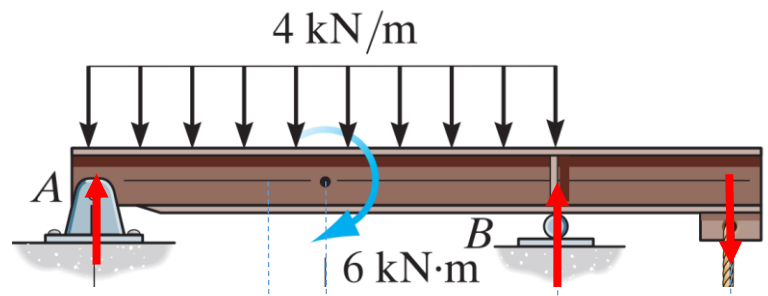
FIGURE	CENTROID	AREA MOMENTS OF INERTIA
<p>Rectangular Area</p> 	<p>—</p>	$I_x = \frac{bh^3}{3}$ $\bar{I}_x = \frac{bh^3}{12}$ $\bar{I}_z = \frac{bh}{12}(b^2 + h^2)$
<p>Triangular Area</p> 	$\bar{x} = \frac{a+b}{3}$ $\bar{y} = \frac{h}{3}$	$I_x = \frac{bh^3}{12}$ $\bar{I}_x = \frac{bh^3}{36}$ $I_{x_1} = \frac{bh^3}{4}$
<p>Area of Elliptical Quadrant</p> 	$\bar{x} = \frac{4a}{3\pi}$ $\bar{y} = \frac{4b}{3\pi}$	$I_x = \frac{\pi ab^3}{16}, \quad \bar{I}_x = \left(\frac{\pi}{16} - \frac{4}{9\pi}\right) ab^3$ $I_y = \frac{\pi a^3 b}{16}, \quad \bar{I}_y = \left(\frac{\pi}{16} - \frac{4}{9\pi}\right) a^3 b$ $I_z = \frac{\pi ab}{16}(a^2 + b^2)$

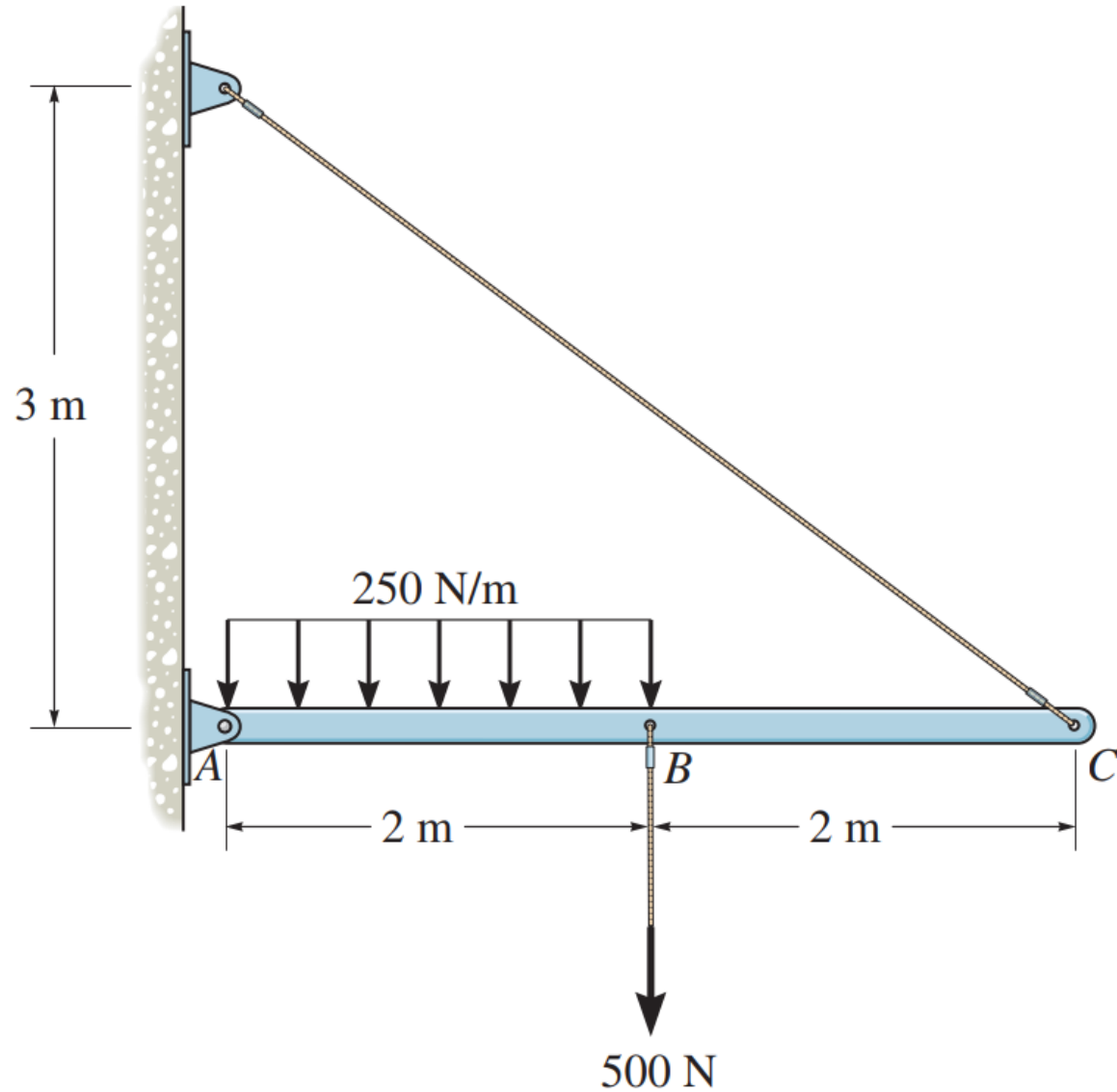
FIGURE	CENTROID	AREA MOMENTS OF INERTIA
<p data-bbox="152 364 356 392">Circular Area</p> 	<p data-bbox="828 335 866 357">—</p>	$I_x = I_y = \frac{\pi r^4}{4}$ $I_z = \frac{\pi r^4}{2}$
<p data-bbox="101 749 293 806">Semicircular Area</p> 	$\bar{y} = \frac{4r}{3\pi}$	$I_x = I_y = \frac{\pi r^4}{8}$ $\bar{I}_x = \left(\frac{\pi}{8} - \frac{8}{9\pi} \right) r^4$ $I_z = \frac{\pi r^4}{4}$

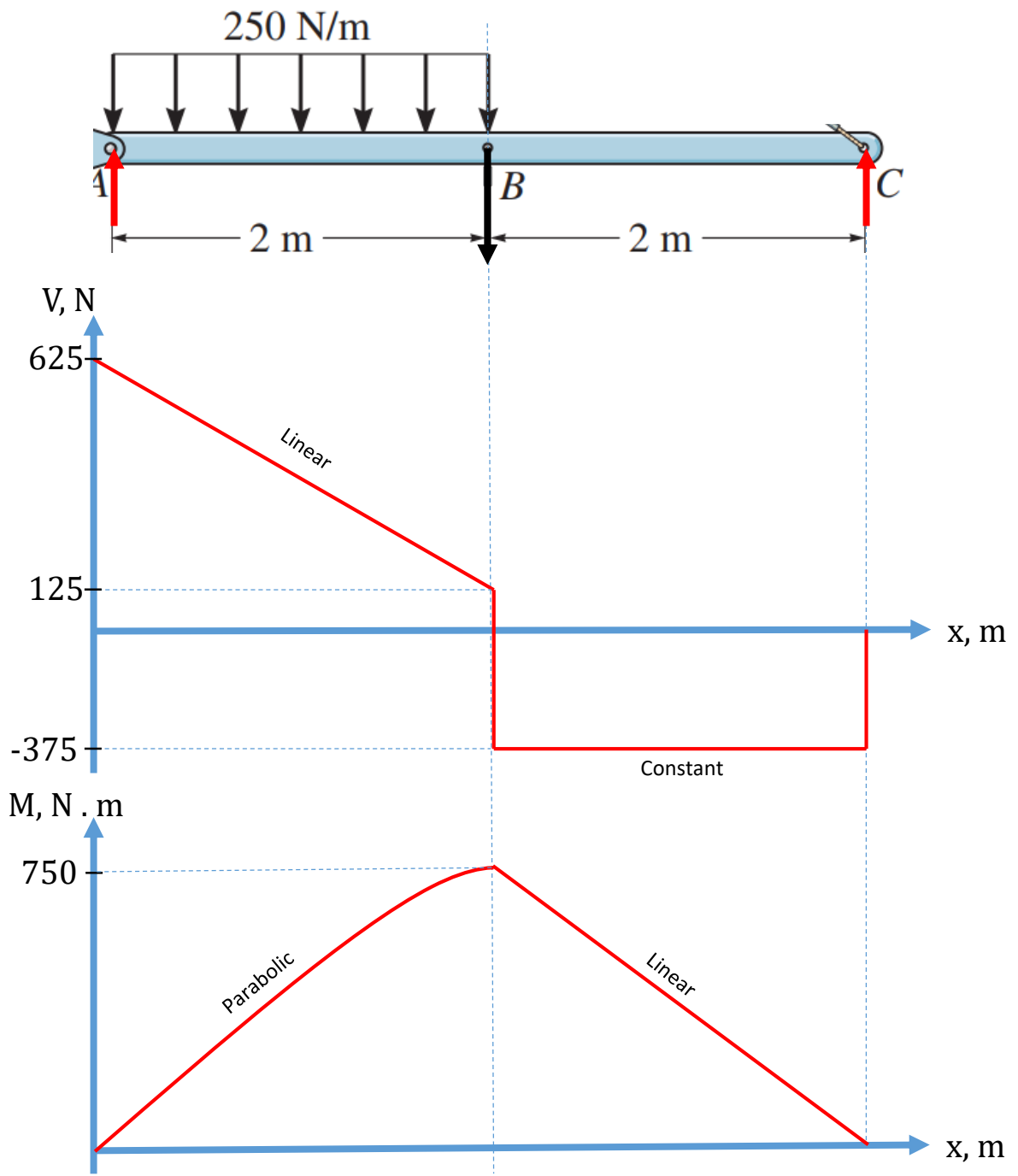
Draw the shear force and bending moment diagrams for the beam.





Draw the shear force and bending moment diagrams for the beam. Also find the shear force and bending moment at points $x = 1.2$ m and $x = 2.8$ m (to the right of the point A).





Ans. At $x=1.2$: $V=325$ N and $M=570$ N.m
 At $x=2.8$: $V=-375$ N and $M=450$ N.m

Thanks for listening.

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or by visiting my office: HUBF/Room 105