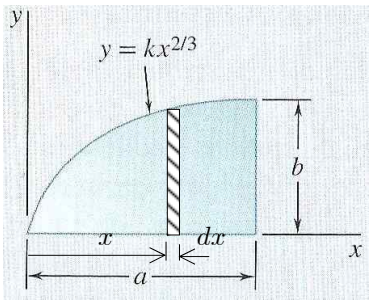
[9.1절]



9.15&17　　$y = k\,x^{2/3}, \qquad (a,\ b) \ \Rightarrow \ \ b = k\,a^{2/3}$

$$\Rightarrow \quad k = \frac{b}{a^{2/3}}\ , \qquad y = \frac{b}{a^{2/3}}\,x^{2/3}$$

$$dA = y\,dx = \frac{b}{a^{2/3}}\,x^{2/3}\,dx$$

$$A = \int dA = \int_0^a \frac{b}{a^{2/3}}\,x^{2/3}\,dx$$

$$= \frac{b}{a^{2/3}}\left[\frac{3}{5}\,x^{5/3}\right]_0^a = \frac{b}{a^{2/3}}\left[\frac{3}{5}\,(a^{5/3}-0)\right] = \frac{3}{5}\,a\,b$$

9.15　　$dI_x = \dfrac{1}{3}\,y^3\,dx$

$$I_x = \int dI_x = \int_0^a \frac{1}{3}\,y^3\,dx = \frac{1}{3}\int_0^a \frac{b^3}{a^2}\,x^2\,dx = \frac{1}{3}\,\frac{b^3}{a^2}\,\left[\frac{1}{3}x^3\right]_0^a = \frac{1}{9}\,a\,b^3$$

$$\Rightarrow \qquad I_x = 0.1111\ a\,b^3$$

$$k_x^2 = \frac{I_x}{A} = \frac{\frac{1}{9}\,a\,b^3}{\frac{3}{5}\,a\,b} = \frac{5}{27}\,b^2 \qquad \Rightarrow \qquad k_x = \sqrt{\frac{5}{27}}\,b \qquad \Rightarrow \qquad k_x = 0.430\ b$$

9.17　　$dI_y = x^2\,dA = x^2\ \dfrac{b}{a^{2/3}}\,x^{2/3}\ dx = \dfrac{b}{a^{2/3}}\,x^{8/3}\ dx$

$$I_y = \int dI_y = \int_0^a \frac{b}{a^{2/3}}\,x^{8/3}\,dx = \frac{b}{a^{2/3}}\left[\frac{3}{11}x^{11/3}\right]_0^a = \frac{b}{a^{2/3}}\left[\frac{3}{11}(a^{11/3}-0)\right] = \frac{3}{11}\,a^3\,b$$

$$\Rightarrow \qquad I_y = 0.273\ a^3\,b$$

$$k_y^2 = \frac{I_y}{A} = \frac{\frac{3}{11}\,a^3\,b}{\frac{3}{5}\,a\,b} = \frac{5}{11}\,a^2 \qquad \Rightarrow \qquad k_y = \sqrt{\frac{5}{11}}\,a \qquad \Rightarrow \qquad k_y = 0.674\ a$$