{9.1절}

9.16&18 $y = k\,x^2$, $(2\,a,\ h)$ $\Rightarrow$ $h = k\,(2\,a)^2$

$\Rightarrow$ $k = \dfrac{h}{4\,a^2}$, $y = \dfrac{h}{4\,a^2}\,x^2$

$dA = y\,dx = \dfrac{h}{4\,a^2}\,x^2\,dx$

$A = \displaystyle\int dA = \int_a^{2a} \dfrac{h}{4\,a^2}\,x^2\,dx = \dfrac{h}{4\,a^2}\left[\dfrac{1}{3}x^3\right]_a^{2a}$

$= \dfrac{h}{12\,a^2}\left[(2\,a)^3 - a^3\right] = \dfrac{7}{12}\,a\,h$
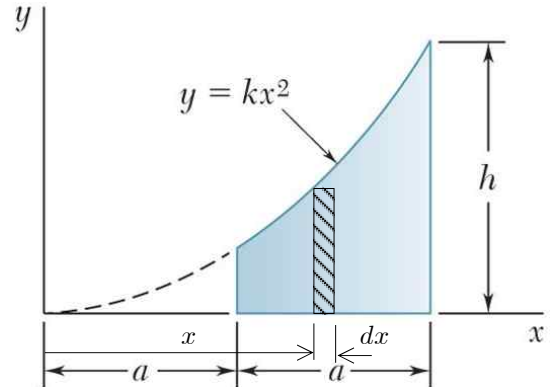
9.16 $dI_x = \dfrac{1}{3}\,y^3\,dx$

$I_x = \displaystyle\int dI_x = \int_a^{2a} \dfrac{1}{3}\,y^3\,dx = \dfrac{1}{3}\int_a^{2a}\left(\dfrac{h}{4\,a^2}x^2\right)^3 dx = \dfrac{1}{3}\left(\dfrac{h}{4\,a^2}\right)^3 \int_a^{2a} x^6\,dx$

$= \dfrac{1}{3}\,\dfrac{h^3}{64\,a^6}\left[\dfrac{1}{7}x^7\right]_a^{2a} = \dfrac{1}{3}\,\dfrac{h^3}{64\,a^6}\,\dfrac{1}{7}\left[(2\,a)^7 - a^7\right] = \dfrac{127}{(3)(64)(7)}\,a\,h^3 = 0.0945\ a\,h^3$

$k_x^2 = \dfrac{I_x}{A} = \dfrac{\dfrac{127}{(3)(64)(7)}a\,h^3}{\dfrac{7}{12}a\,h} = \dfrac{127}{(16)(7)(7)}\,h^2 = 0.16199\ h^2$

$k_x = \sqrt{0.16199\,h^2} = 0.402\ h$

9.18 $dI_y = x^2\,dA = x^2\,\dfrac{h}{4\,a^2}\,x^2\,dx = \dfrac{h}{4\,a^2}\,x^4\,dx$

$I_y = \displaystyle\int dI_y = \int_a^{2a} \dfrac{h}{4\,a^2}\,x^4\,dx = \dfrac{h}{4\,a^2}\left[\dfrac{1}{5}x^5\right]_a^{2a} = \dfrac{h}{20\,a^2}\left[(2a)^5 - a^5\right] = \dfrac{31}{20}\,a^3 h = 1.550\ a^3 h$

$k_y^2 = \dfrac{I_y}{A} = \dfrac{\dfrac{31}{20}a^3 h}{\dfrac{7}{12}a\,h} = \dfrac{(31)(3)}{(5)(7)}\,a^2 = \dfrac{93}{35}\,a^2 = 2.657\ a^2$

$k_y = \sqrt{2.657\,a^2} = 1.630\ a$