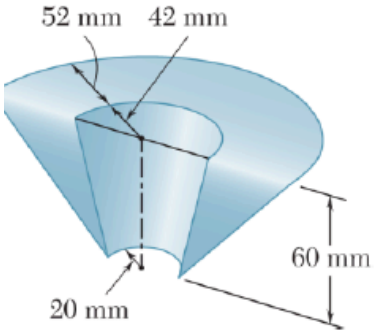
ES 208 Mechanics

Tutorial 10

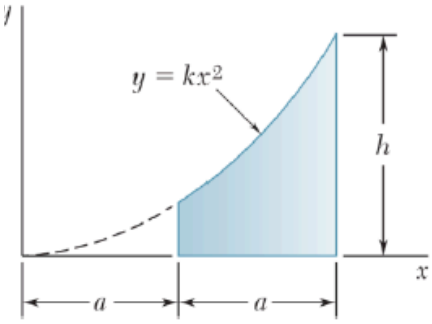
All problems are from Beer and Johnston's book



PROBLEM 5.61

Determine the volume and total surface area of the bushing shown.

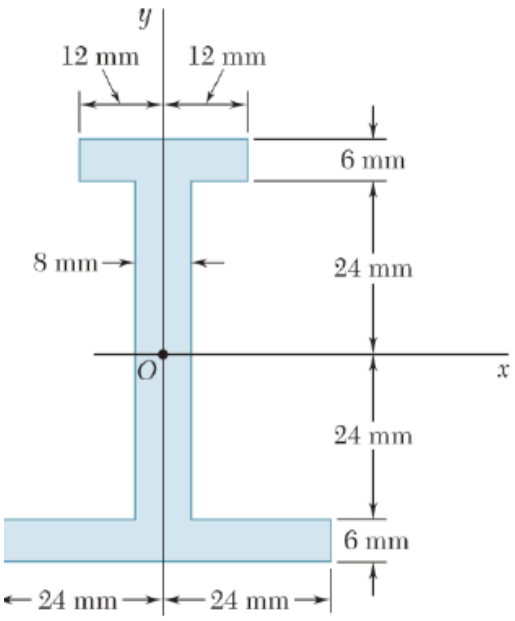
Ans: Volume = 255×10^3 mm^3, Area = 7.5×10^3 mm^2



PROBLEM 9.18

Determine the moment of inertia and the radius of gyration of the shaded area shown with respect to the y axis.

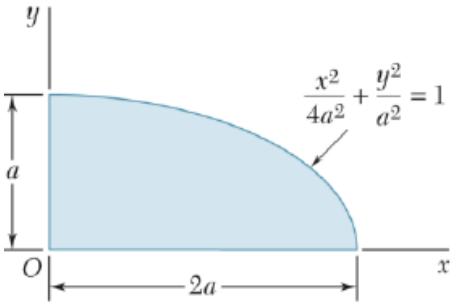
Ans: $I_y = \frac{31}{20}ha^3, k_y = a\sqrt{\frac{93}{35}}$



PROBLEM 9.31

Determine the moment of inertia and the radius of gyration of the shaded area with respect to the x axis.

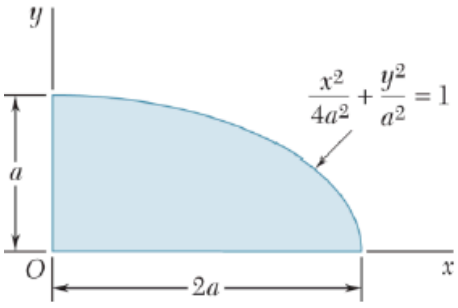
Ans: $I_x = 390 \times 10^3 \text{ mm}^4, k_y = 21.9 \text{ mm}$



PROBLEM 9.67

Determine by direct integration the product of inertia of the given area with respect to the x and y axes.

Ans $a^4/2$



PROBLEM 9.79

Determine for the quarter ellipse of Problem 9.67 the moments of inertia and the product of inertia with respect to new axes obtained by rotating the x and y axes about O (a) through 45° counterclockwise, (b) through 30° clockwise.

Ans: a) $I_{x'} = 0.482a^4, I_{y'} = 1.482a^4, I_{x'y'} = -0.589a^4$

b) $I_{x'} = 1.120a^4, I_{y'} = 0.843a^4, I_{x'y'} = 0.760a^4$