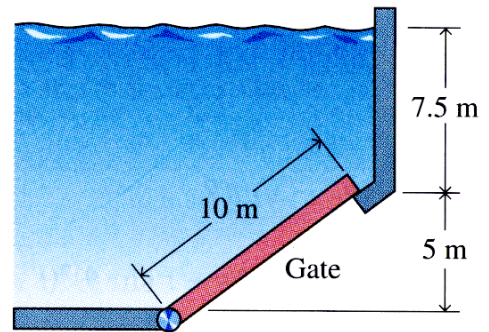1.   The width of the rectangular gate is 4 m, and the mass density of the water is 1000 kg/m³. Determine the magnitude of the resultant force **R** exerted on the gate by the water and the where it acts upon the gate with respect to the hinge at the bottom of the gate.

2. Use integration to determine the polar moment of inertia of the shaded area with respect to the axes shown.

$y^2 = x$

16 in.
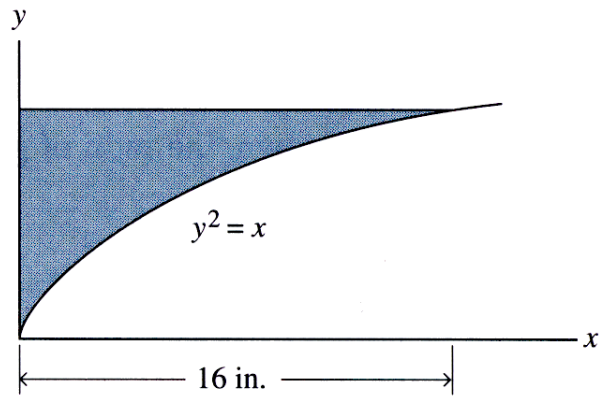
3.   Determine the moment of inertia of the shaded area with respect to the x-axis.
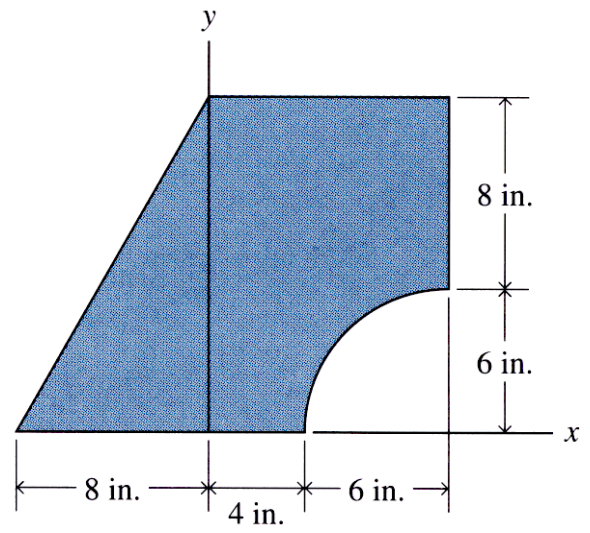
4. Determine the maximum and minimum moments of inertia and the orientation of the principal axes with respect to the axes through the triangle's centroid.