



Consider the geometry of a circular hole in a square. By inspection determine the location where the center of mass of the object is located.

Locate the coordinate system at the center of the square.

$$\text{A) } (x_c, y_c) = \left(\frac{(4r)^2(0) + (\pi r^2)(-r)}{(4r)^2 + \pi r^2}, \frac{(4r)^2(0) + (\pi r^2)(-r)}{(4r)^2 + \pi r^2} \right).$$

$$\text{B) } (x_c, y_c) = \left(\frac{(4r)^2(0) + (-\pi r^2)(-r)}{(4r)^2 + \pi r^2}, \frac{(4r)^2(0) + (-\pi r^2)(-r)}{(4r)^2 + \pi r^2} \right).$$

$$\text{C) } (x_c, y_c) = \left(\frac{(4r)^2(0) + (\pi r^2)(-r)}{(4r)^2 - \pi r^2}, \frac{(4r)^2(0) + (\pi r^2)(-r)}{(4r)^2 - \pi r^2} \right).$$

$$\text{D) } (x_c, y_c) = \left(\frac{(4r)^2(0) + (-\pi r^2)(-r)}{(4r)^2 - \pi r^2}, \frac{(4r)^2(0) + (-\pi r^2)(-r)}{(4r)^2 - \pi r^2} \right).$$

Think of the hole as having negative mass, therefore

$$x_c = \frac{(4r)^2(0) + (-\pi r^2)(-r)}{(4r)^2 - \pi r^2} = \frac{(4r)^2(0) + (\pi r^2)(r)}{(4r)^2 - \pi r^2}.$$

The same is true for y_c .

Answer **D**.

09.06-03 Circular Hole in a Square 2004-3-24