

5. The picture to the right shows a pattern for a snowman (three circles) which is to be cut from a flat piece of wood, which is 0.5 cm thick and has a density of 600 kg/m^3 . The units in the pattern are centimeters.

- A. Calculate the snowman's mass.
 B. Calculate the snowman's center of mass.

$$\begin{aligned} \text{Volume} &= .5 \times \text{Area} \\ &= .5 \times (\pi \times 2^2 \\ &\quad + \pi \times 3^2 \\ &\quad + \pi \times 4^2) \\ &= 45.55 \text{ cm}^3 \end{aligned}$$

$$\text{Mass} = \rho V$$

$$600 \frac{\text{kg}}{\text{m}^3} \times 45.55 \text{ cm}^3 \times \left(\frac{1 \text{ m}}{100 \text{ cm}} \right)^3$$

$$M = \underline{\underline{0.0273 \text{ kg}}}$$

$x_{\text{CM}} = 4 \text{ cm}$ ← snowman is symmetric about $x = 4 \text{ cm}$.

$$y_{\text{CM}} = \frac{4(\pi 4^2) + 11(\pi 3^2) + 16(\pi 2^2)}{\pi 4^2 + \pi 3^2 + \pi 2^2}$$

$$y_{\text{CM}} = \frac{4 \cdot 16 + 11 \cdot 9 + 16 \cdot 4}{16 + 9 + 4}$$

$$= \frac{227}{29}$$

$$= \underline{\underline{7.83 \text{ cm}}}$$

