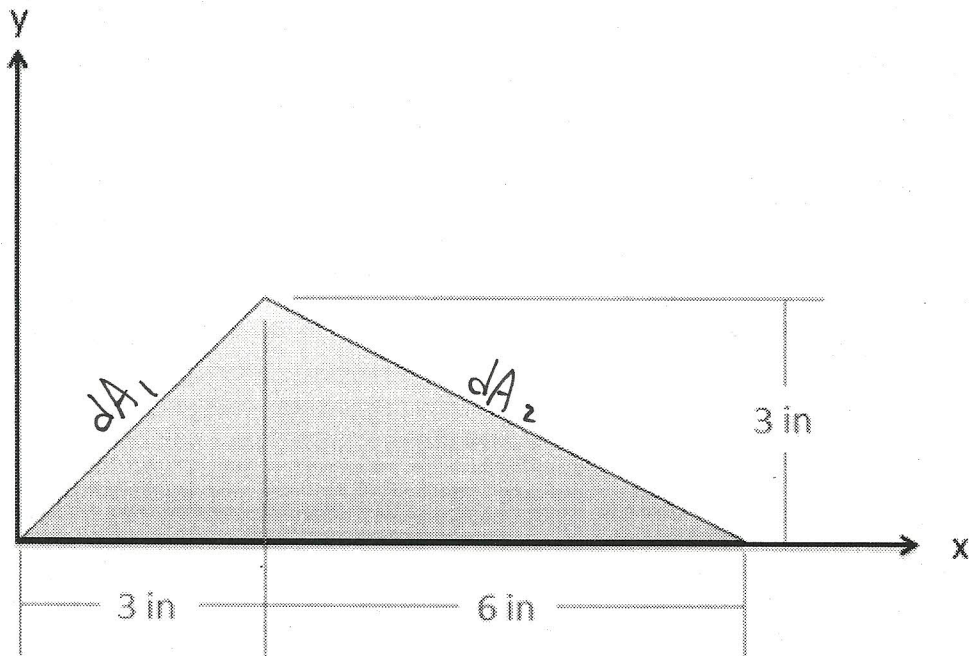


Question 2:

Find the x and y coordinates of the centroid of the shape shown below.



Calculations

$$\bar{X} = \frac{\int_0^3 (dA_1)(x) dx + \int_3^9 (dA_2)(x) dx}{A_{\text{rea}}}$$

$$\bar{X} = \frac{\int_0^3 (x)(x) dx + \int_3^9 \left(-\frac{1}{2}x + 4.5\right)(x) dx}{13.5}$$

$$\bar{X} = \frac{\int_0^3 \frac{1}{3}x^3 + \int_3^9 \left(-\frac{1}{6}x^3 + 2.25x^2\right) dx}{13.5}$$

$$\bar{X} = \frac{\left(\frac{1}{3}(3)^3\right) - (0) + \left(-\frac{1}{6}(9)^3 + 2.25(9)^2\right) - \left(-\frac{1}{6}(3)^3 + 2.25(3)^2\right)}{13.5}$$

$$\bar{X} = 4.1\text{m}$$

$$\bar{Y} = \frac{\int_0^3 (dA)(y)}{\text{Area}} = \frac{\int_0^3 (-3y+9)(y)}{13.5}$$

$$\bar{Y} = \frac{\int_0^3 -y^3 + \frac{9}{2}y^2}{13.5} = \frac{\left(-\frac{1}{4}(3)^4 + \frac{9}{2}(3)^3\right) - 0}{13.5}$$

$$\bar{Y} = 1\text{m}$$

Solution

$$\bar{X} = 4.1\text{m}$$

$$\bar{Y} = 1\text{m}$$