Answer on Question #73654, Physics / Other

Locate the centre of mass Rcm(Xcm, Ycm) of four particles, M1=2.0kg, M2= 6.0kg, M3=8.0kg and M4=10.0kg located at the coordinate points: (-1,7), (5, 11), (8,-4), and (-3,6) respectively, where the coordinates are given in metres.

Solution:

The centre of mass for x-direction is

$$x_{cm} = \frac{m_1x_1 + m_2x_2 + m_3x_3 + m_4x_4}{m_1 + m_2 + m_3 + m_4}$$

$$x_{cm} = \frac{2.0 \times (-1) + 6.0 \times (5) + 8.0 \times (8) + 10.0 \times (-3)}{2.0 + 6.0 + 8.0 + 10.0} = 2.38 \text{ m}$$

The centre of mass for y-direction is

$$y_{cm} = \frac{m_1y_1 + m_2y_2 + m_3y_3 + m_4y_4}{m_1 + m_2 + m_3 + m_4}$$

$$y_{cm} = \frac{2.0 \times (7) + 6.0 \times (11) + 8.0 \times (-4) + 10.0 \times (6)}{2.0 + 6.0 + 8.0 + 10.0} = 4.15 \text{ m}$$

So,

$$R_{cm}(x_{cm}, y_{cm}) = (2.38, 4.15)$$

Answer: $(2.38,\ 4.15)$.