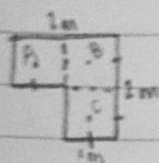Center of Mass

Discrete particles

Continuous mass distributions (plates)

$$x_{cm} = \frac{1}{M_T} \sum_{i=1}^{n} m_i x_i$$

$A(-\frac{1}{2}, \frac{1}{2})$ $B(\frac{1}{2}, \frac{1}{2})$ $C(\frac{1}{2}, -\frac{1}{2})$

$$x_{cm} = \frac{1}{3M}\left(-\frac{1}{2}M + \frac{1}{2}M + \frac{1}{2}M\right) = \frac{1}{6} m$$

$$y_{cm} = \frac{1}{6} m$$

$$\vec{F}_{cm} = m\vec{a}_{cm} \qquad \vec{P}_{cm} = M\vec{v}_{cm}$$

$$v_{cm} = \frac{1}{5.51}\left(.10(77.4) + 5.5(0)\right) = 1.4 \, m/s$$

$$v_{cm_f} = \frac{1}{5.51}\left(5.51(1.4)\right) = 1.4 \, m/s$$

$$md = m(x_f - x_i) + M(x_f - x_0)$$

$$x_f - x_i = \frac{md}{M+m}$$