Center of Mass (COM)

Locate the center of mass on each picture.

Calculating the COM

For a two-particle system:

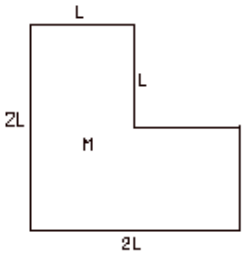
$$x_{com} = \frac{m_1 x_1 + m_2 x_2}{m_1 + m_2} = \frac{m_1 x_1 + m_2 x_2}{M}$$

For a multi-particle system:

$$x_{com} = \frac{1}{M}\sum_{i=1}^{n} m_i x_i$$

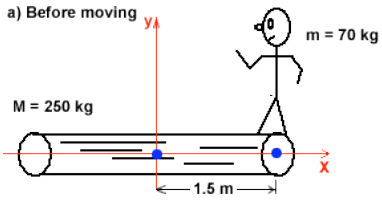
Example 1:
Two particles of 2 kg and 4 kg are located at (1, 4) and (3, -2) in the x-y plane. Find the COM.
[7/3, 0]

Example 2:
Find the COM of the shape to the right.
[5L/6, 5L/6]

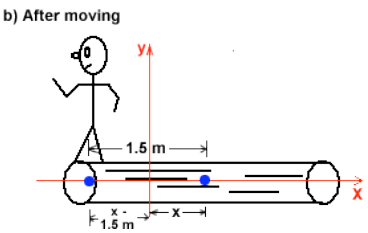


Now that we can calculate the COM, why do we care about it?

Example 3:
A 70-kg man is standing on the end of a 250-kg log that is floating in the water. Both the man and the log are at rest, and the log is 3 m long. Where is the COM located?



If the man walks to the other end of the log, how far will the log move in the water? Ignore any forces exerted on the log by the water.
[.328, .66]



Example 4:
A Chrysler with a mass of 1600 kg is moving along a straight stretch of road at 60 km/h. It is followed by a Ford with a mass of 2400 kg moving at 80 km/h. How fast is the center of mass of the two cars moving?
[72 km/h]