

1. A 60 kg woman and a 90 kg man are standing 10 meters apart on frictionless ice.

a. How far from the woman is the center of mass of the system?

6 m

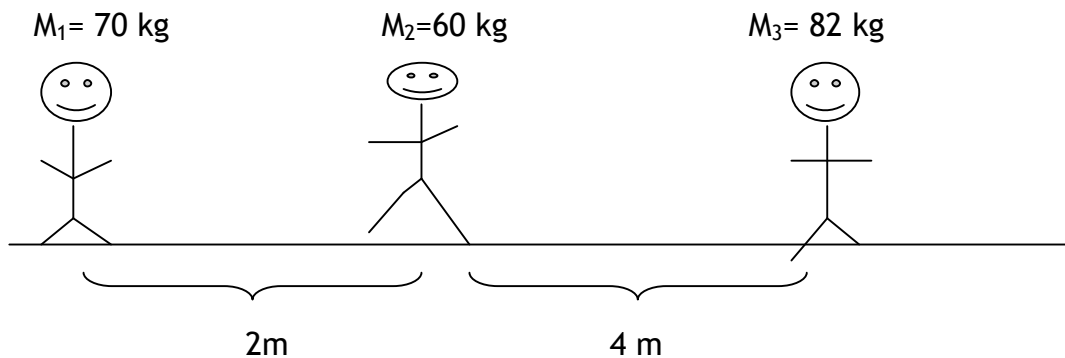
b. If they hold on to the two ends of a rope, and the man pulls the rope so he moves 2 meters, how close is he to the woman now?

5 m

c. How far will the man have moved when he collides with the woman?

2 m

2. Three people are standing on the sidewalk as shown below.



a. Determine the coordinate of the center of mass for the three people, assuming $x = 0$ is where the 70 kg person is standing.

$x = 2.88 \text{ m}$

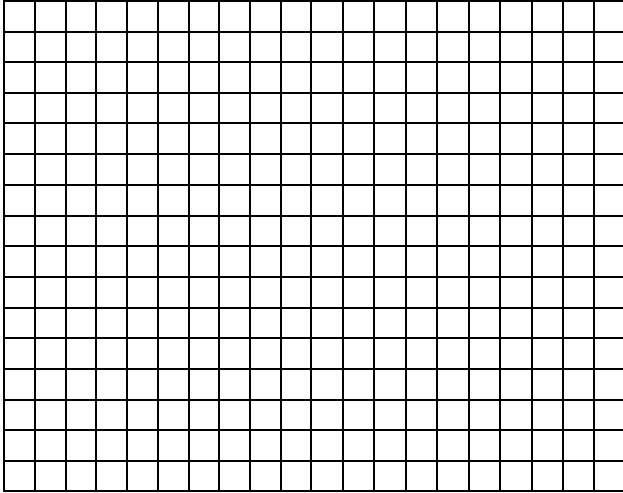
b. The person of mass 82 kg starts sprinting to the right at a speed of 3 m/s. Find the velocity of the center of mass.

$v = 1.16 \text{ m/s}$

c. Assume now that at the exact same time the 82 kg person starts running, the 70 kg person starts moving left with a speed of 6 m/s, while the person in the middle stays at rest. Determine the velocity of the center of mass of the three people.

$v = -0.82 \text{ m/s}$

3. Consider the following mass distribution: 5 kg at (0,0), 3 kg at (0,4) and 4 kg at (3,0). All coordinates are measured in meters. Where should a fourth mass of 8 kg be placed so that the center of mass of the arrangement is at (0,0)?



$(-1.5, -1.5)$