Exam 3 monday April 14

H.w Due today

Elastic collisions

$(a+bx)^2 \neq (a^2+b^2x^2)$

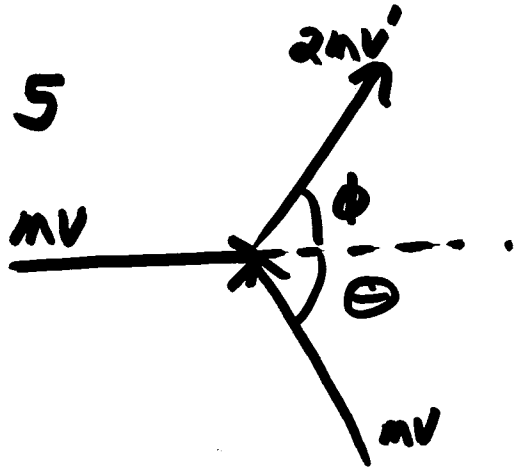
$(a+bx)(a+bx) = a^2 + b^2x^2 + abx + bxa$

(FOIL)

webCT scores

complete download after 3rd Exam

H.w #5

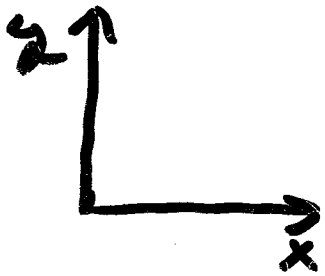


conserve P_x and P_y

$\cos^2\Theta + \sin^2\Theta = 1$

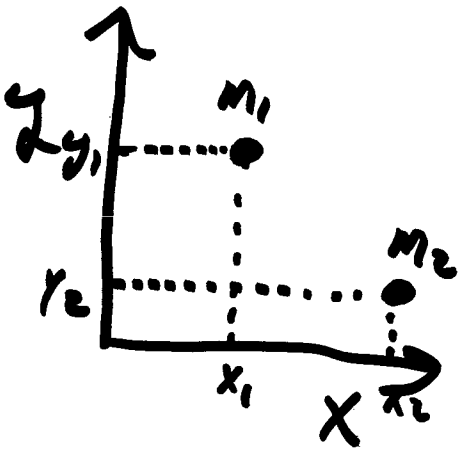
$\cos^2\phi + \sin^2\phi = 1$

Define Center of Mass



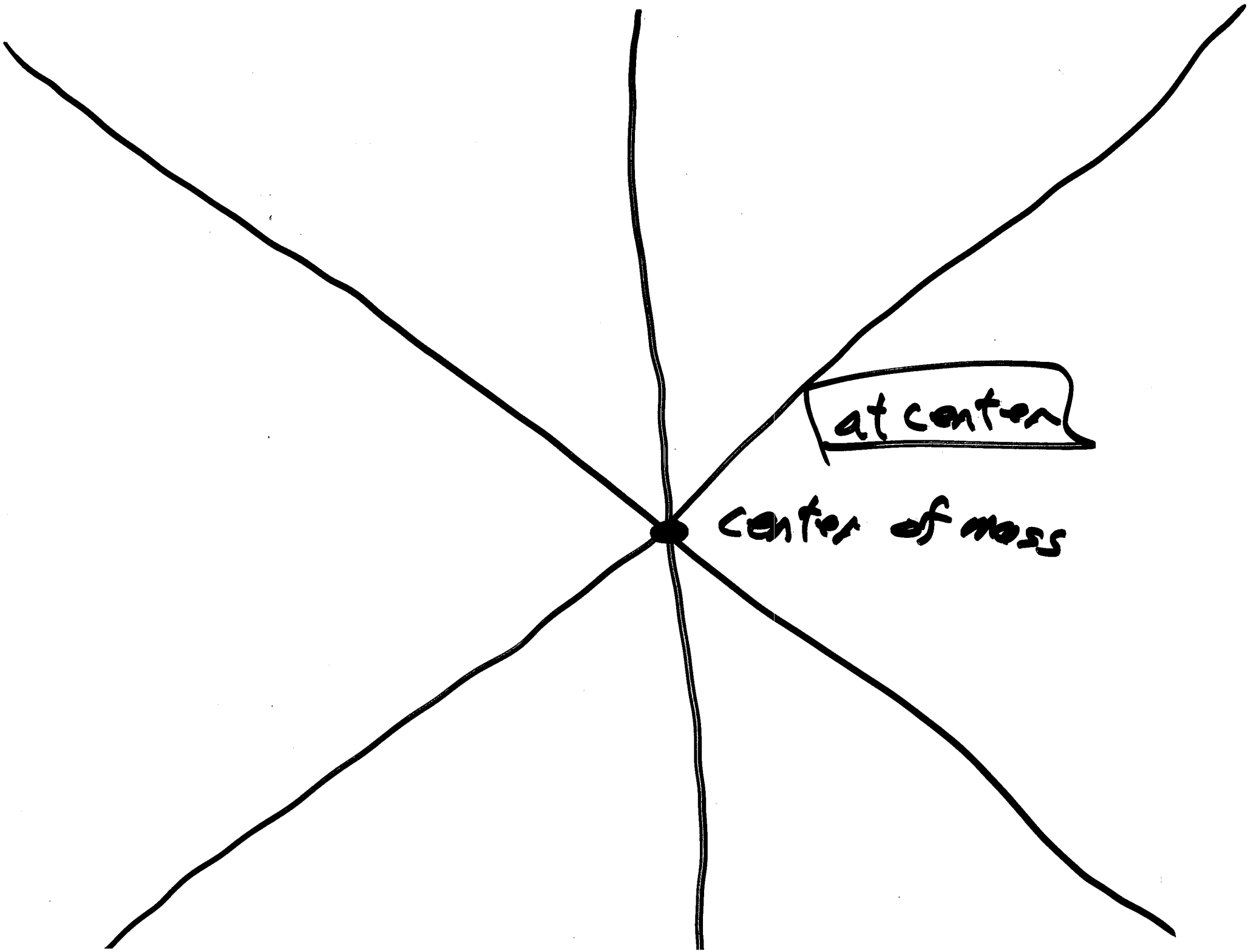
$$x_{cm} = \frac{\sum m_i x_i}{\sum m_i}$$

$$y_{cm} = \frac{\sum m_i y_i}{\sum m_i}$$

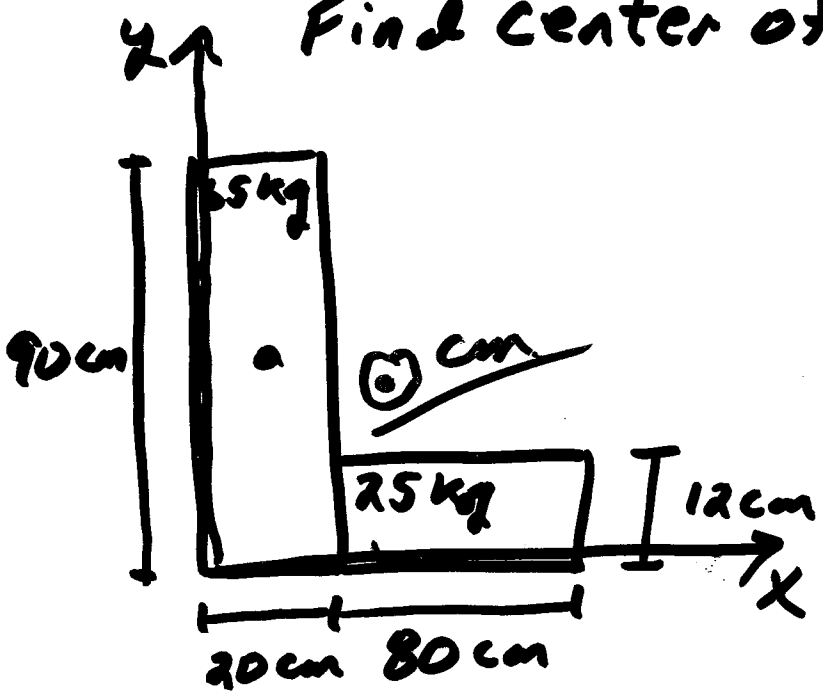


$$x_{cm} = \frac{m_1 x_1 + m_2 x_2}{m_1 + m_2}$$

$$y_{cm} = \frac{m_1 y_1 + m_2 y_2}{m_1 + m_2}$$


at center
center of mass

Find center of mass fun



$$x_{cm} = \frac{\sum m_i x_i}{\sum m_i}$$

$$y_{cm} = \frac{\sum m_i y_i}{\sum m_i}$$

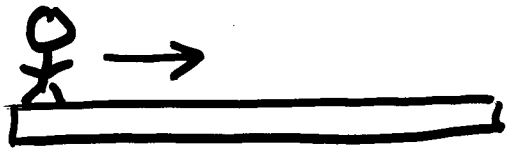
$$x_{cm} = \frac{(65\,kg)(10\,cm) + (25\,kg)(40\,cm)}{65\,kg + 25\,kg}$$

$$y_{cm} = \frac{(65\,kg)(45\,cm) + (25\,kg)(6\,cm)}{65\,kg + 25\,kg}$$

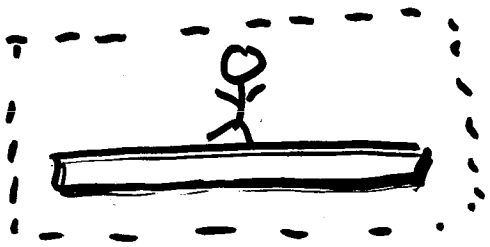
$x_{cm} = 24\,cm$

$y_{cm} = 34\,cm$

For complicated systems apply "Physics" to Center of Mass



Raft is at rest, then moves to left. Person at rest, then moves to right → acceleration

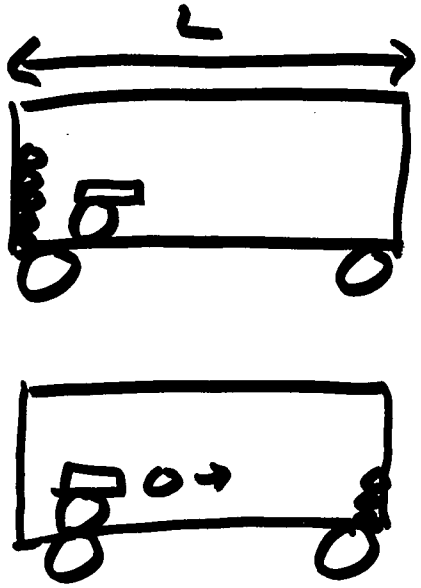


No net forces $\Sigma F = 0 \Rightarrow a = 0$

Explain!!

Center of mass does not move!

A train car holds a cannon and cannonballs it shoots them across the car. what is the maximum distance train car can move?



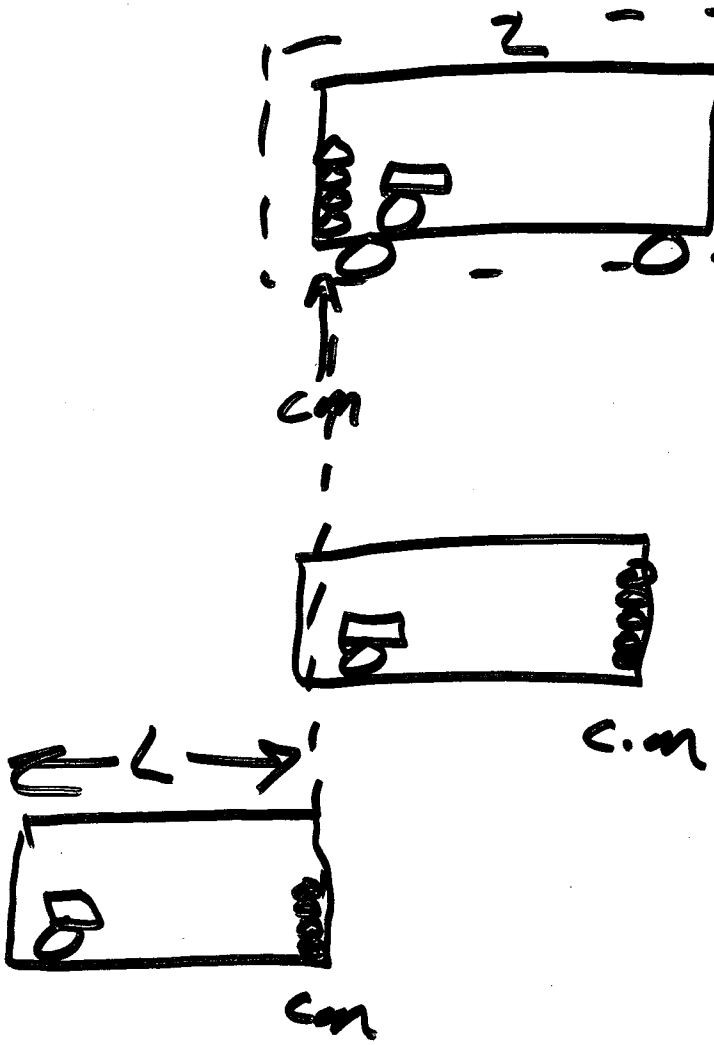
mass of cannonballs much larger than mass of train car and cannon

A) it won't move

B) can move any distance as long as cannon balls being shot

C) cannot be determined

D) length of train car (L)

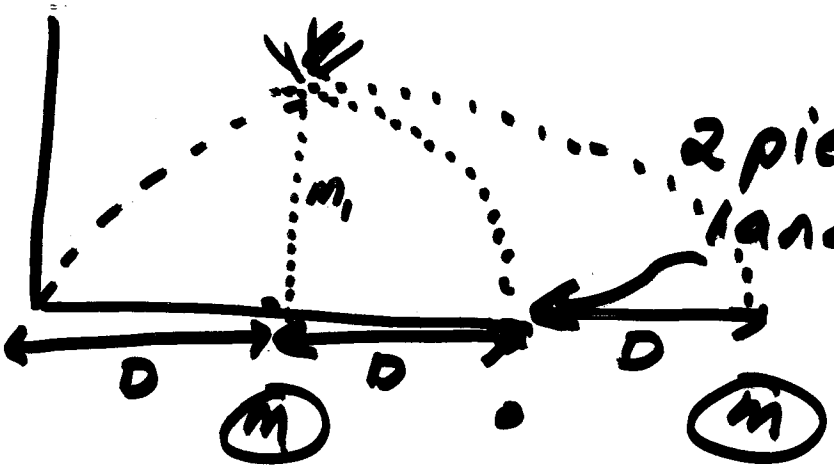


C.m can not move

Ex) A rocket is launched and at its peak it explodes into 2 pieces. one piece falls straight down. Where does other piece land?

a) $m_1 = m_2$

b) $m_2 = 3m_1$



a) 2D from m_1

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

b) $2D = \dfrac{m_1 D + X m_2}{m_1 + m_2}$

$2D = \dfrac{\cancel{m}D + X\cancel{m}}{\cancel{m} + 3\cancel{m}}$

$2D = \dfrac{D + 3X}{4}$

$2D = \dfrac{D}{4} + \dfrac{3X}{4}$

$\dfrac{3X}{4} = \dfrac{7D}{4} \Rightarrow \boxed{X = \frac{7}{3} D}$