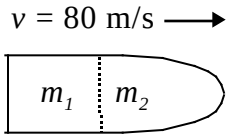
Exploding Shells—Final Location of Center of Mass[76]

Shown below are six situations where shells are at the top of their trajectories. These shells explode, at this instant, into two pieces with one piece, m_1, falling straight down (vertically) to the ground. All of these projectiles where fired from the same point at the same angle. We are told the speed of the shell at the top of the trajectory and the masses of the two pieces. Ignore air resistance in this situation.

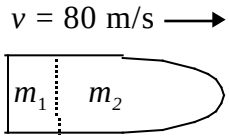
Rank these situations, from greatest to least, on the basis of how far from the launch point the center of mass of the projectile ends up. That is, put first the situation where the final location of the center of mass is farthest from the launch point and put last the situation where it ends up closest to the launch point.

A



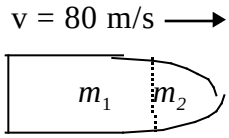
m_1 = 500 g
m_2 = 500 g

B



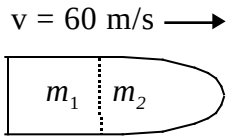
m_1 = 200 g
m_2 = 800 g

C



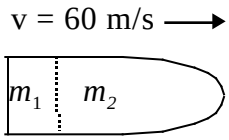
m_1 = 800 g
m_2 = 200 g

D



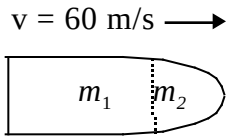
m_1 = 500 g
m_2 = 500 g

E



m_1 = 200 g
m_2 = 800 g

F



m_1 = 800 g
m_2 = 200 g

Greatest 1_____ 2_____ 3_____ 4_____ 5_____ 6_____ Least

Or, all six of the centers of mass end up the same distance from the launch point. _____

Please carefully explain your reasoning.

How sure were you of your ranking? (circle one)

Basically Guessed				Sure					Very Sure
1	2	3	4	5	6	7	8	9	10

[76] D. Maloney