

# Newton's Cradle with unequal deviding masses

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I have a serious problem, i cant stop thinking about it!  
if you have a "newton cradle" with for example 9 pendulums. And if they all have the same mass ( $M_x$ ), except for the most left one. that one has a mass  $M_y$ . so that  $M_y/M_x$  is no whole number. e.g. 1,5.  
when this one is lifted and collides, two things would be held in mind  
i suppose:

the ball hits with velocity  $v_1$

1. preservation of momentum.
2. preservation of Energy.

what wil happen at the other end?

when I try to solve=>  $1.5 * M_x * V_1 = M * V_2$

$$\text{and } 1.5 * M_x * V_1^2 / 2 = M * V_2^2 / 2$$

$M$  stands for the unknown mass that will leave at the right side. for  $M = \text{integer} * M_x$  these equasions have no solution. So I made the right end 2 separate balls with mass  $M_x$  (of course) and velovity  $V_s$  and  $V_t$  the equasions:

$$1.5 * M_x * V_1 = (M_x * V_s + M_x * V_t) \text{ and } 1.5 * M_x * V_1^2 / 2 = (M_x * V_s^2 / 2 + M_x * V_t^2 / 2)$$

this gives solutions :

$$\{ V_t = 1/2 * (3/2 + 1/2 * 3^{1/2}) * V_1, V_s =$$

$$1.500000000 * V_1 - .5000000000 * (3/2 + 1/2 * 3^{1/2}) * V_1 \}, \{ V_t =$$

$$1/2 * (3/2 - 1/2 * 3^{1/2}) * V_1, V_s =$$

$$1.500000000 * V_1 - .5000000000 * (3/2 - 1/2 * 3^{1/2}) * V_1 \}$$

one of these states that the left one from te two right-end balls is faster than te most right one=> impossible. => one single solution.

is this the solution? because if you make 3 seperate balls their one ball could have the speed he wants and the other two shall compensate to fit the equasions. but certain values would be possible,no?

so how could you know how many pendulums will swing out?

and is my reasoning correct? thanks alot!