Engineering with Circus - The Human canon ball

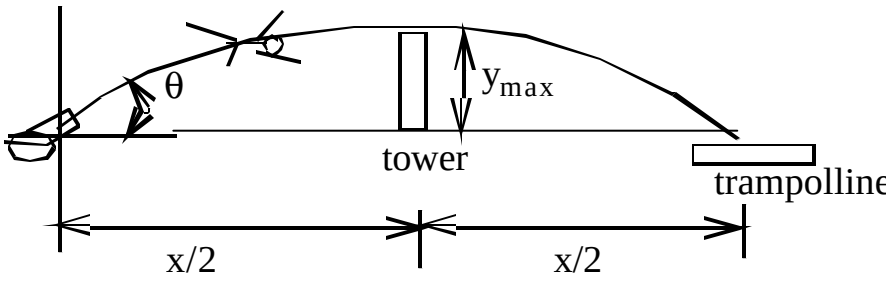
In-Class Team Competition:

The circus is in town! A recently lay-off Boeing engineer is trying out to become a member of the human canon ball team in the circus. The first test he is asked to do is to figure out how to fly over a newly constructed water tower and land safely on a trampoline without injuring himself. Before he actually does the stunt, he decides to make a scale model to test and see if he will be able to make the jump. Please help him !

Problem:

Find the angle, the height and the distance the engineer need to travel to land safely on the trampoline.

Given:



- The distance between the tower and the trampoline is same as the distance between tower to canon.
- The height of the tower is 28cm.
- Initial velocity is 3.885m/s
- Gravitational acceleration is 9.8m/s

Additional Information:

Y direction	X direction	$V_{ox} = V_o\cos\theta$
		$V_{oy} = V_o\sin\theta$
$V_{fy}{}^2 = V_{oy}{}^2 + 2aY$	$V_{fx}{}^2 = V_{ox}{}^2$	
$V_{fy} = V_{oy} + at$	$V_{fx} = V_{ox}$	
$Y = V_{oy}\, t + 1/2\, at^2$	$X = V_{ox}\, t$	
$Y = 1/2(V_{fy} + V_{oy})t$	$X = 1/2(V_{fx} + V_{ox})t$	

Additional Problem Constraints:

- Can you think of any other problems that are not being addressed in the model?

Judging:

We will see who made the jump. The winners get 1% extra credit points. Turn in the correct calculation get another 2% extra credit.