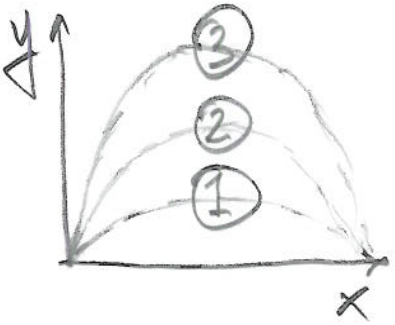
KEY

This is P110, Quiz 4. As usual, you are allowed to use a cheat sheet and a calculator.

Three balls are thrown with the trajectories as shown in the figure (all the balls have the same range)



1. What is the correct ordering of the initial y-velocities?
   a) 1>2>3
   (b) 1<2<3
   c) 1=2=3
   d) Not enough info to decide

$H \propto T^2 \propto v_{y_0}^2$

so $3 > 2 > 1$

2. What is the correct ordering of the time of flight?
   a) 1>2>3
   (b) 1<2<3
   c) 1=2=3
   d) Not enough info to decide

see above

3. What is the correct ordering of the initial x-velocities?
   (a) 1>2>3
   b) 1<2<3
   c) 1=2=3
   d) Not enough info to decide

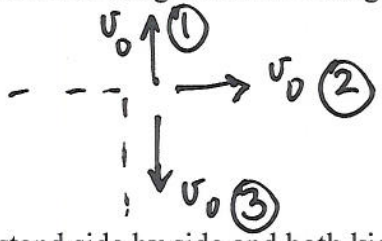
$R \propto v_{x_0} \cdot v_{y_0}$

↑

same, so inverse

$1 > 2 > 3$

4. Three balls are thrown simultaneously with the same speed from the top of a cliff, 50m high. Ball 1 is thrown straight up, ball 2 is thrown horizontally, and ball 3 is thrown straight down. Which ball hits the ground with the greatest speed?
   a) ball 1
   b) ball 2
   c) ball 3
   (d) all 3
   e) 2 and 3



1 comes back down looking like 3, so clearly 1 & 3 are same. 2's v_{x_0} is unchanged and it gains same Δv

A punter and a passer stand side by side and both kick/throw a football at the same time and both balls reach the same height. The kicker's ball lands twice as far away as the passer's.

5. What, if anything can you say about the relative initial x-velocities of the pass and punt?
   a) They are the same
   b) The punt is twice that of the pass
   c) The pass is twice that of the punt
   d) The punt is four times that of the pass
   e) The pass is four time higher that of the punt