PHY 231 CW7 Feb 4, 2015

Problem 1: Ball A is rolled across the top of a table and as it reaches the edge it has a horizontal velocity, *v*. Just as it rolls off the edge another ball, Ball B, is dropped from rest at the same height.

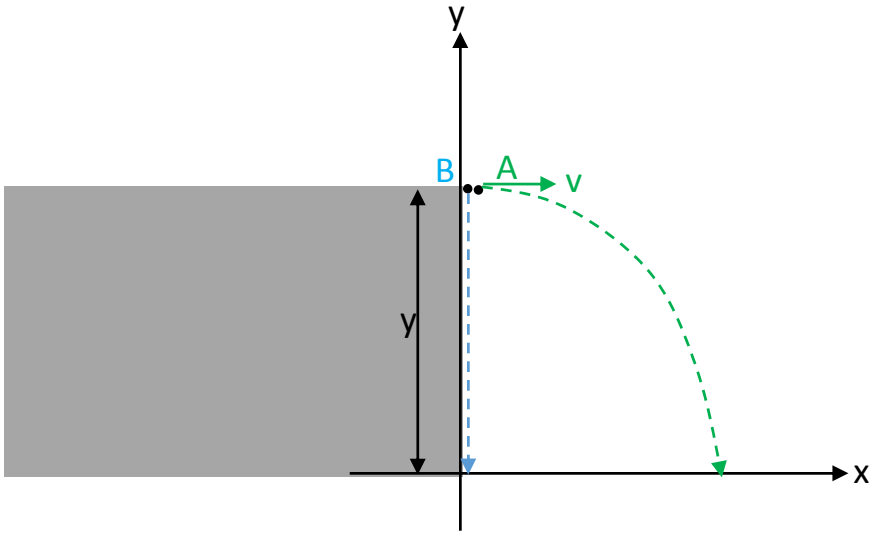
Part (a) Which ball will hit the ground first?

1) Ball B
2) Both will hit the ground at the same time.
3) Ball A

Part (b) At the time of impact for each, which ball will have the greatest speed?

1) Both will hit the ground with the same speed.
2) Ball A
3) Ball B

Solution:



(a) Since $v_{ix} = 0$ for both balls A and B, so they have the same equation of motion for the y-coordinate:

$$h = 0\,t - \frac{1}{2}gt^2$$

So both balls will hit the ground at the same time (choice (2)).

(b) Since $v_{ix} = 0$ for both balls A and B, so they have the same equation of motion for v_y:

$$v_y = 0 - gt$$

So both balls with have the same v_y when they hit the ground. However, ball A has a horizontal component and B has no horizontal component, so ball A will hit the ground with a greater speed (choice (2)).