



## Concept:

Two balls are released simultaneously from the same height with zero vertical velocity. One ball has zero horizontal velocity, while the other has non-zero horizontal velocity. At any instant, the two balls have equal vertical position as shown above. So, both balls land simultaneously because their time of flight depends only on their initial height and vertical velocity. Thus, the horizontal and vertical motions, for projectiles experiencing only a vertical force due to gravity, are independent.

## Equipment:

- Large Stand
- Ball Drop/Launch Device
- Large Rod Clamp
- Billiard Ball with Hole
- Billiard Ball without Hole
- (2) Metal Sheets

## Procedure:

1. Verify that the ball drop/launch device is clamped to the top of the stand in a horizontally leveled position (with spring compressed) with balls attached as shown in the top-right picture.
2. Verify that the metal plates are set up below the dropped ball and about one meter from the launched ball.
3. Pull the string to cause one ball to drop while the other is simultaneously launched sideways.
4. Notice that both balls hit the metal plates with a loud bang at the same time.