Projectile Motion

Pre-Class Questions

Problem #7

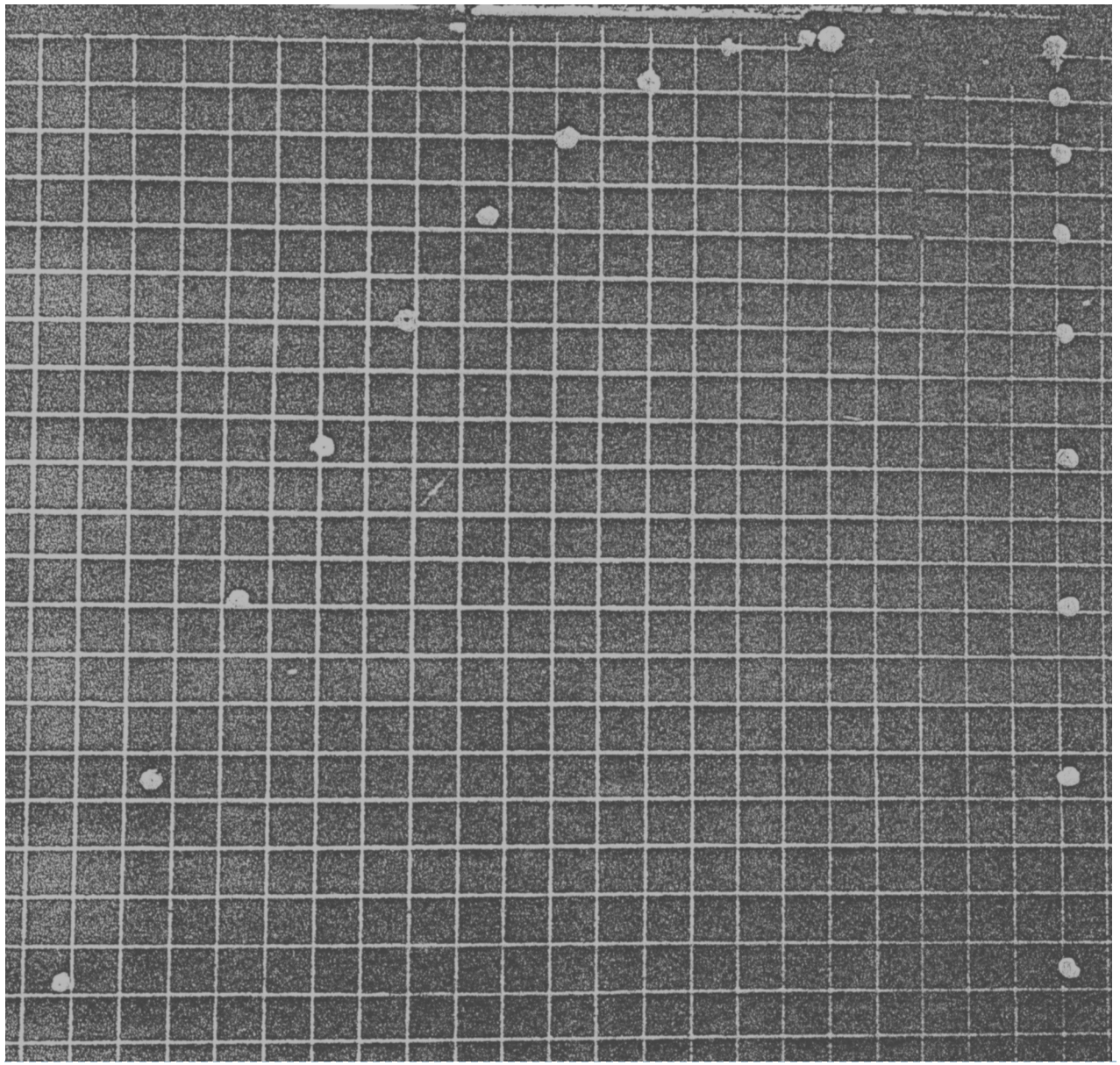
Lecture Outline

1. The Rule of Falling Bodies in Two Dimensions
2. Using the Equations of Motion for Projectiles

Pre-Class Summary:

The Rule of Falling Bodies applies in two dimensions.

Projectile Motion - along the x-axis the acceleration is zero and along the y-axis the acceleration is g. Therefore, a ball tossed horizontally should fall just like a dropped ball and it should move horizontally with a constant speed.



She tosses the ball along the dashed path. The velocity vector, complete with its horizontal and vertical components, is shown at position A. Carefully sketch the appropriate components for positions B and C.

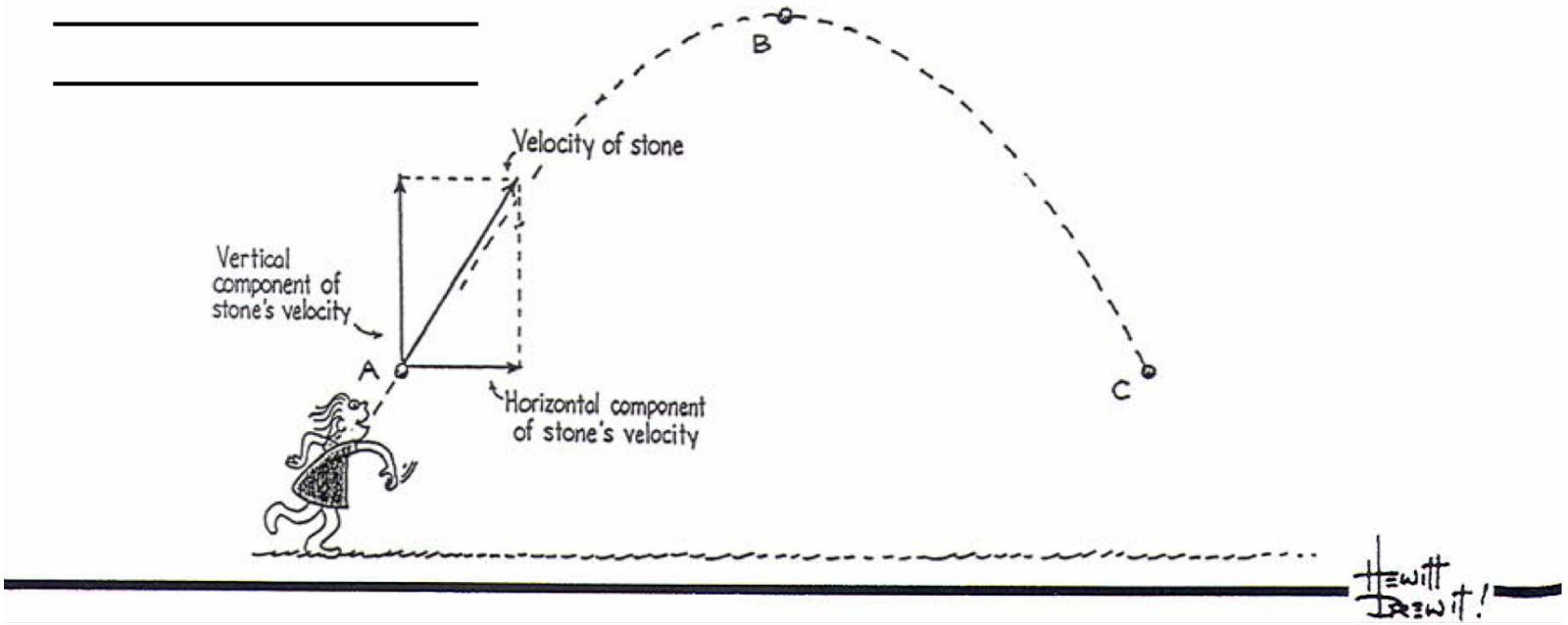
a. Since there is no acceleration in the horizontal direction, how does the horizontal component of velocity compare for positions A, B, and C? _____

b. What is the value of the vertical component of velocity at position B? _____

c. How does the vertical component of velocity at position C compare with that of position A?

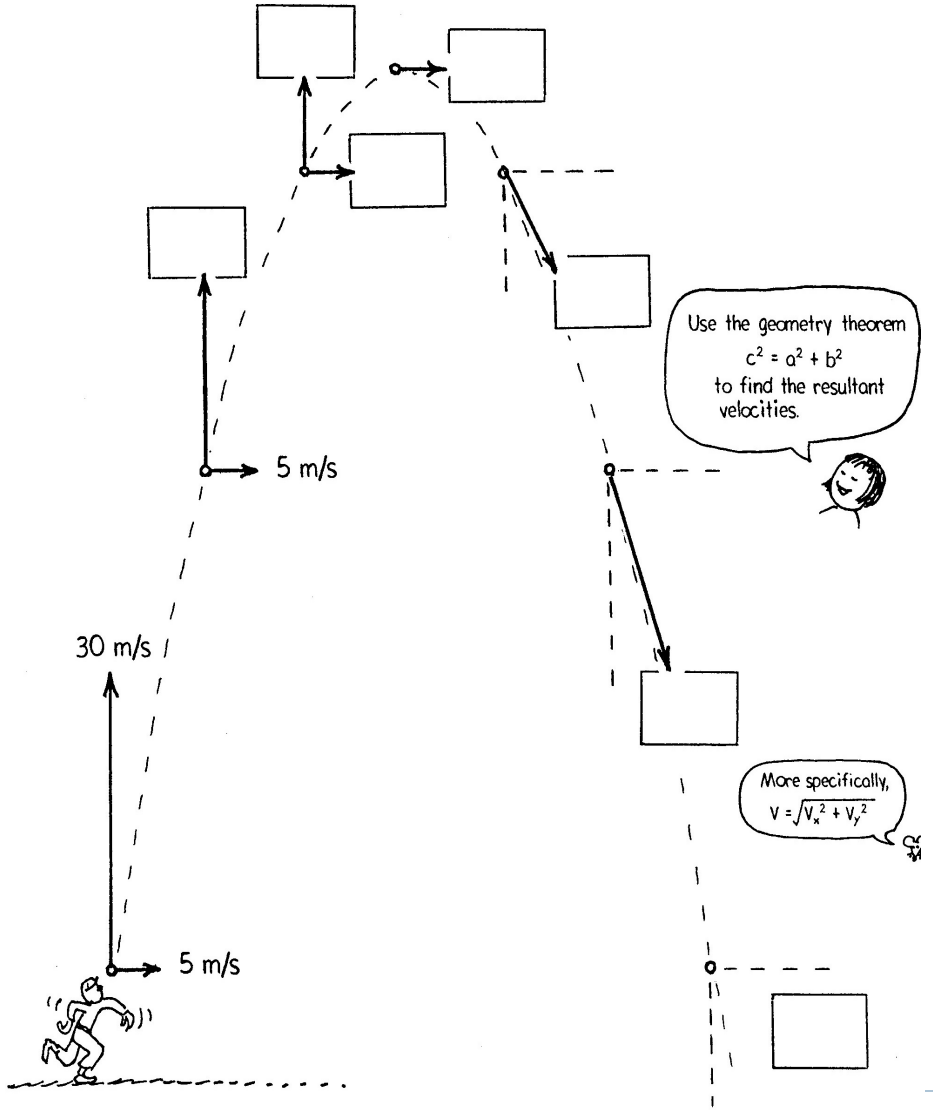
_____

_____



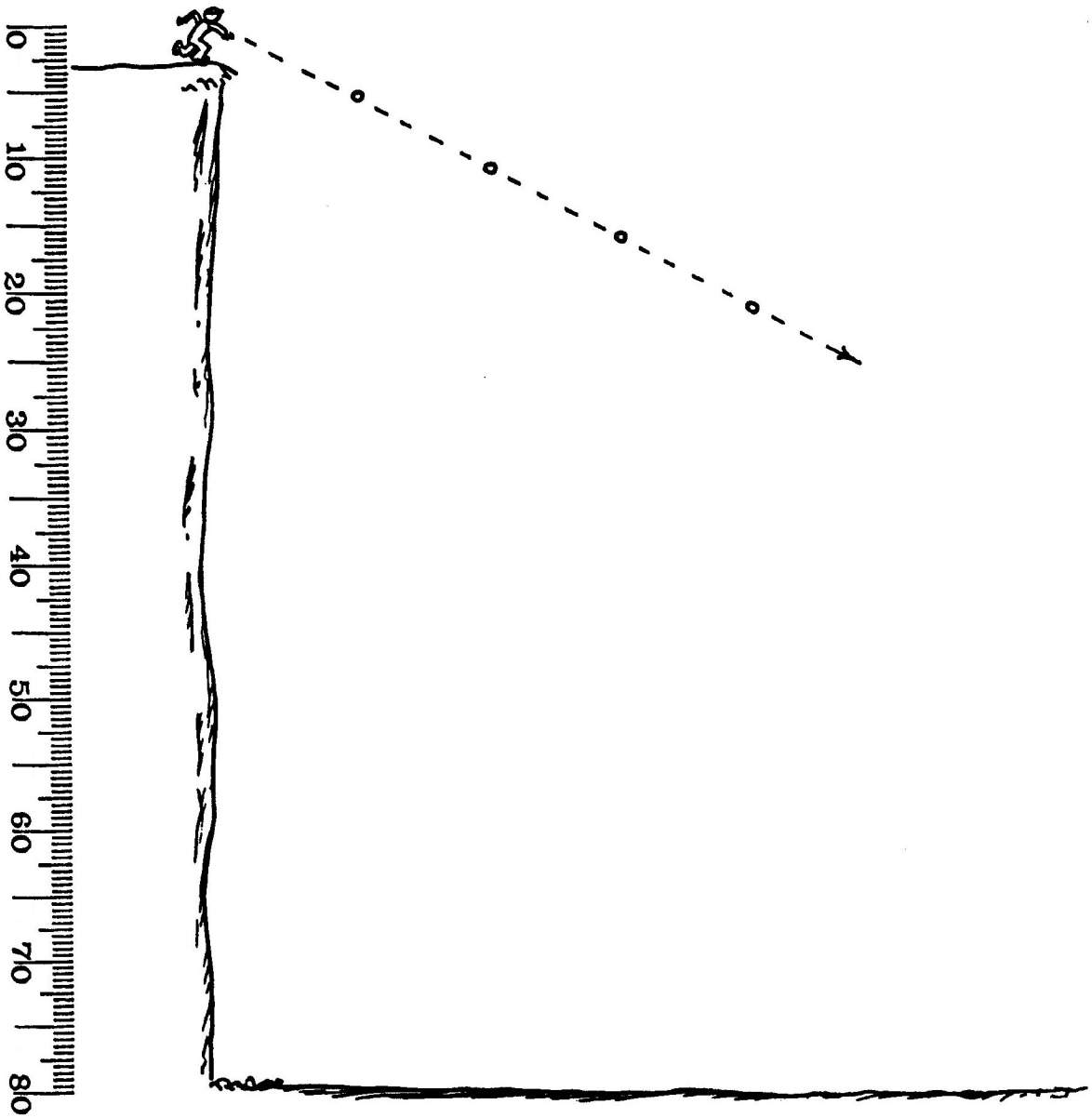
Tossed Ball

A ball tossed upward has initial velocity components 30 m/s vertical, and 5 m/s horizontal. The position of the ball is shown at 1-second intervals. Air resistance is negligible, and $g = 10\ m/s^2$. Fill in the boxes, writing in the values of velocity ***components*** ascending, and your calculated ***resultant velocities*** descending.



Example 1: A Fiat 500 goes horizontally off a cliff at 40.0mph (17.9m/s) and lands 50.0m from the base of the cliff. Find (a)the time it takes to hit the water and (b)the height of the cliff.

Example 2: A soccer player is 20.0m from the goal when he kicks the ball with a speed of 30.0m/s at an upward angle of 10°. Find the height of the ball when it reaches the front of the goal.



The ball is thrown downward. The four positions of the ball are shown with *no gravity* at 1-second intervals. Draw the positions of the ball *with* gravity. Neglect air drag and use g = 10m/s^2. Connect the positions with a smooth curve to show the path of the ball.

Example 3: A person wants to leave a ramp at the speed of 25.0m/s and land 60.0m away in a pool that is at the same height as the end of the ramp. Find the launch angle.

Lecture 07 - Summary

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