Projectile Motion

Pre-Class Questions

Problem Set (due next time)
Ch 3 – 7, 8, 19a, 22

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

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?

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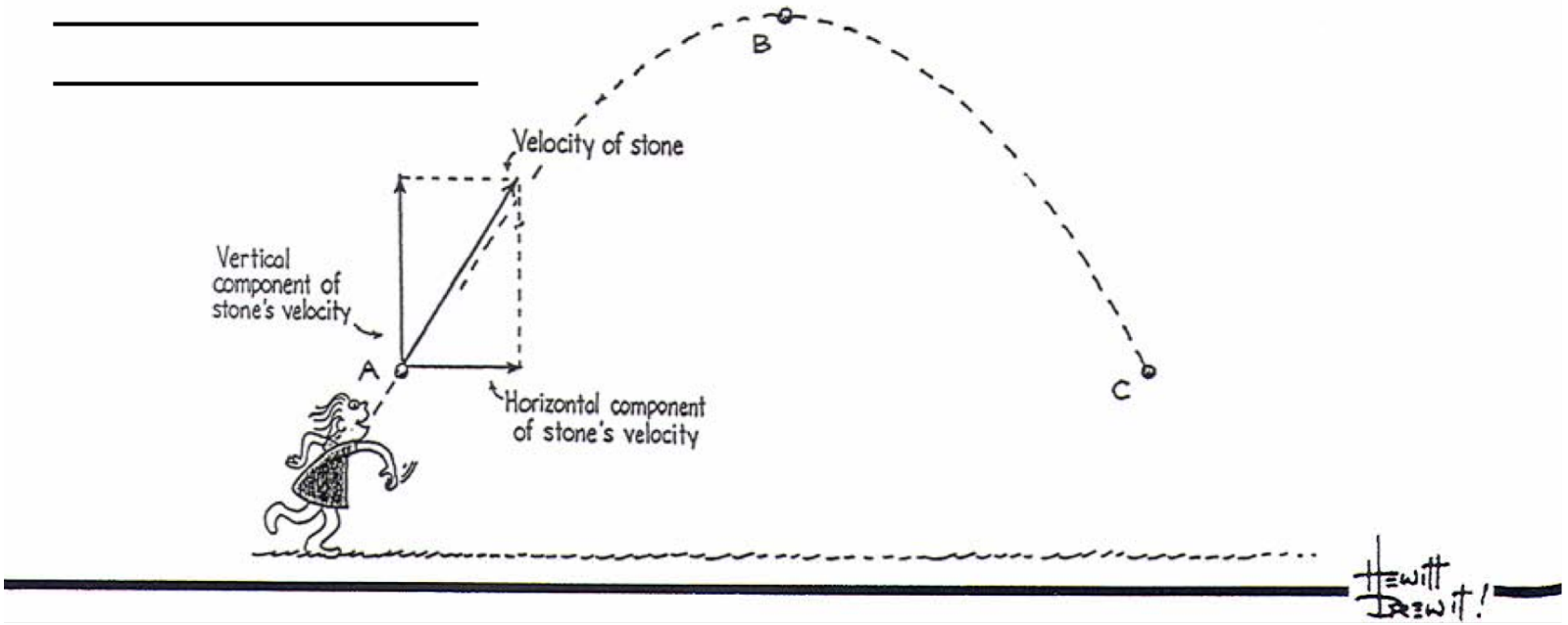
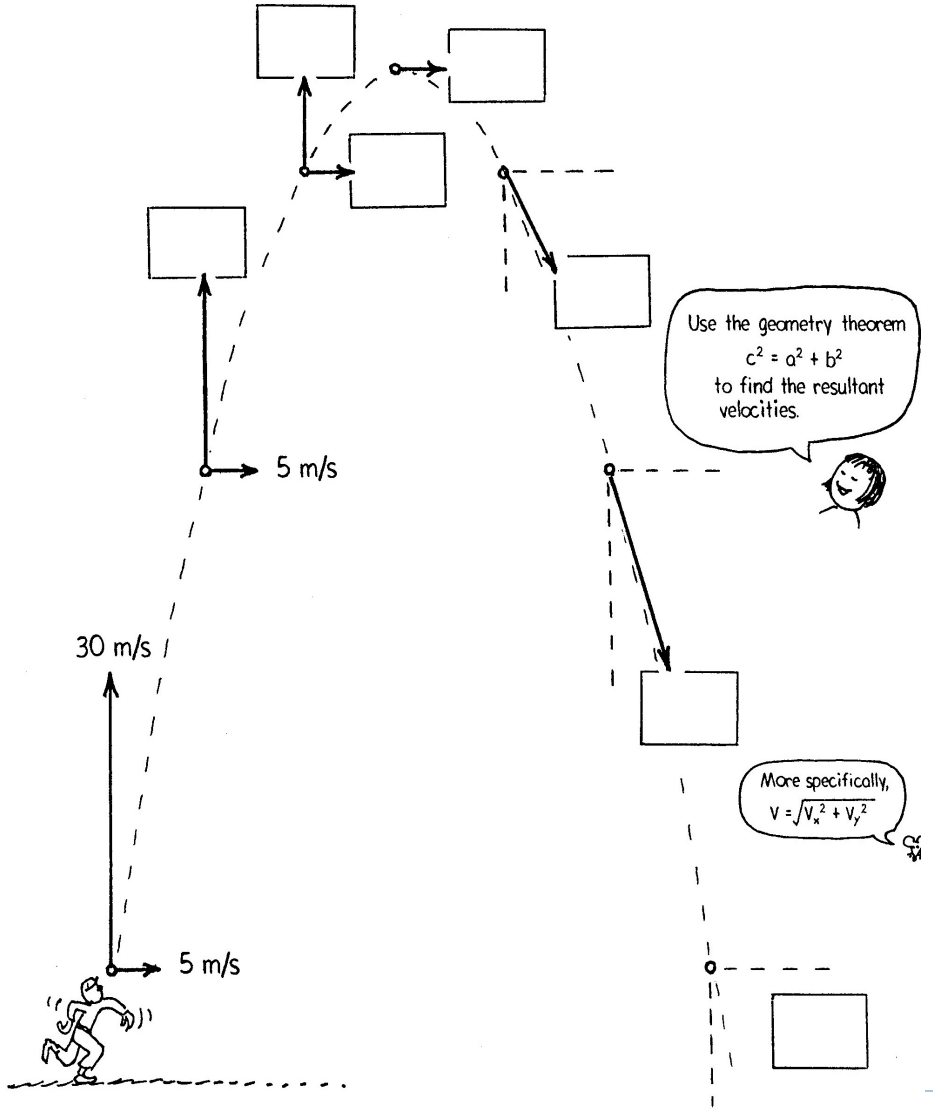
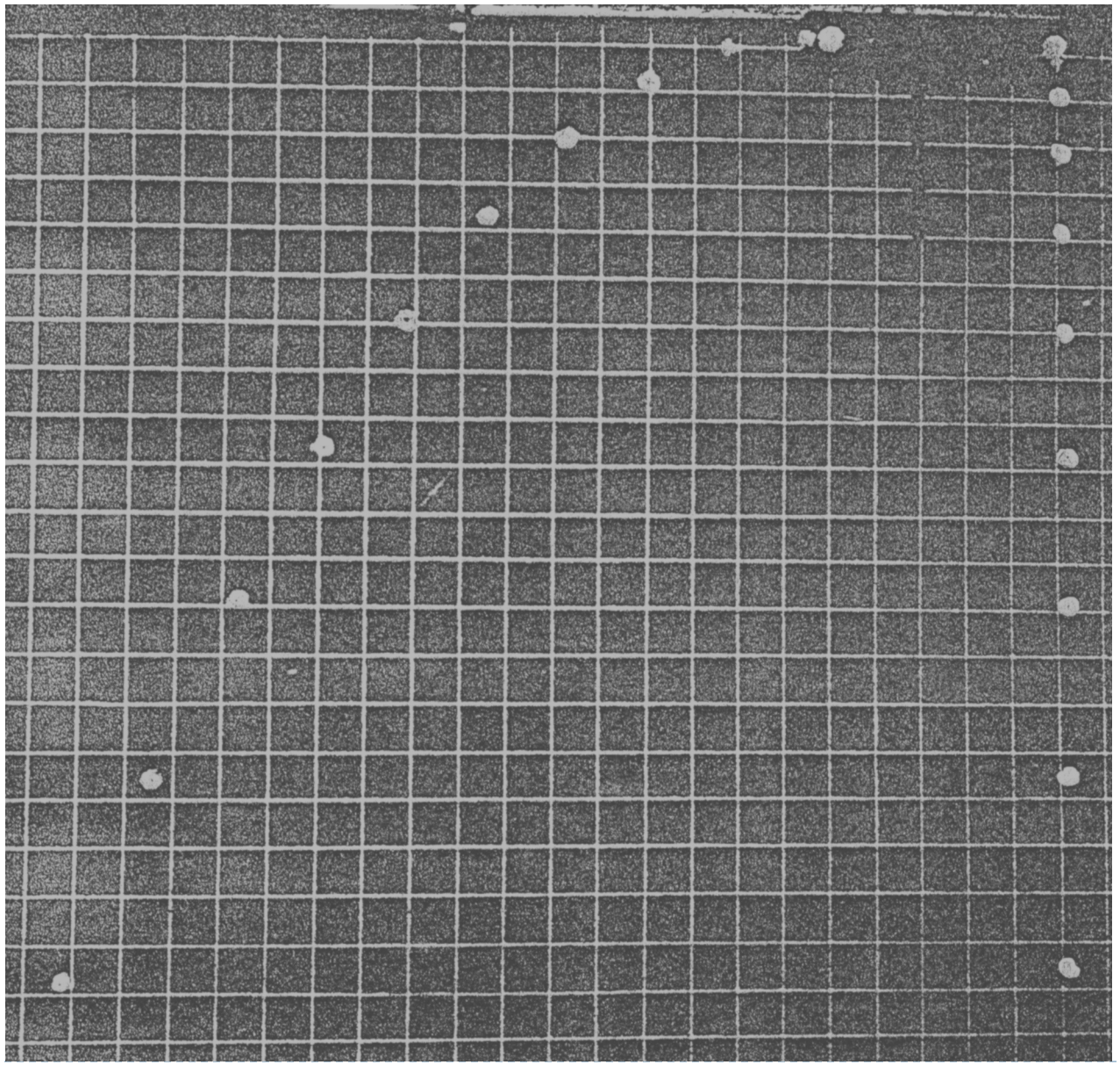


Tossed Ball

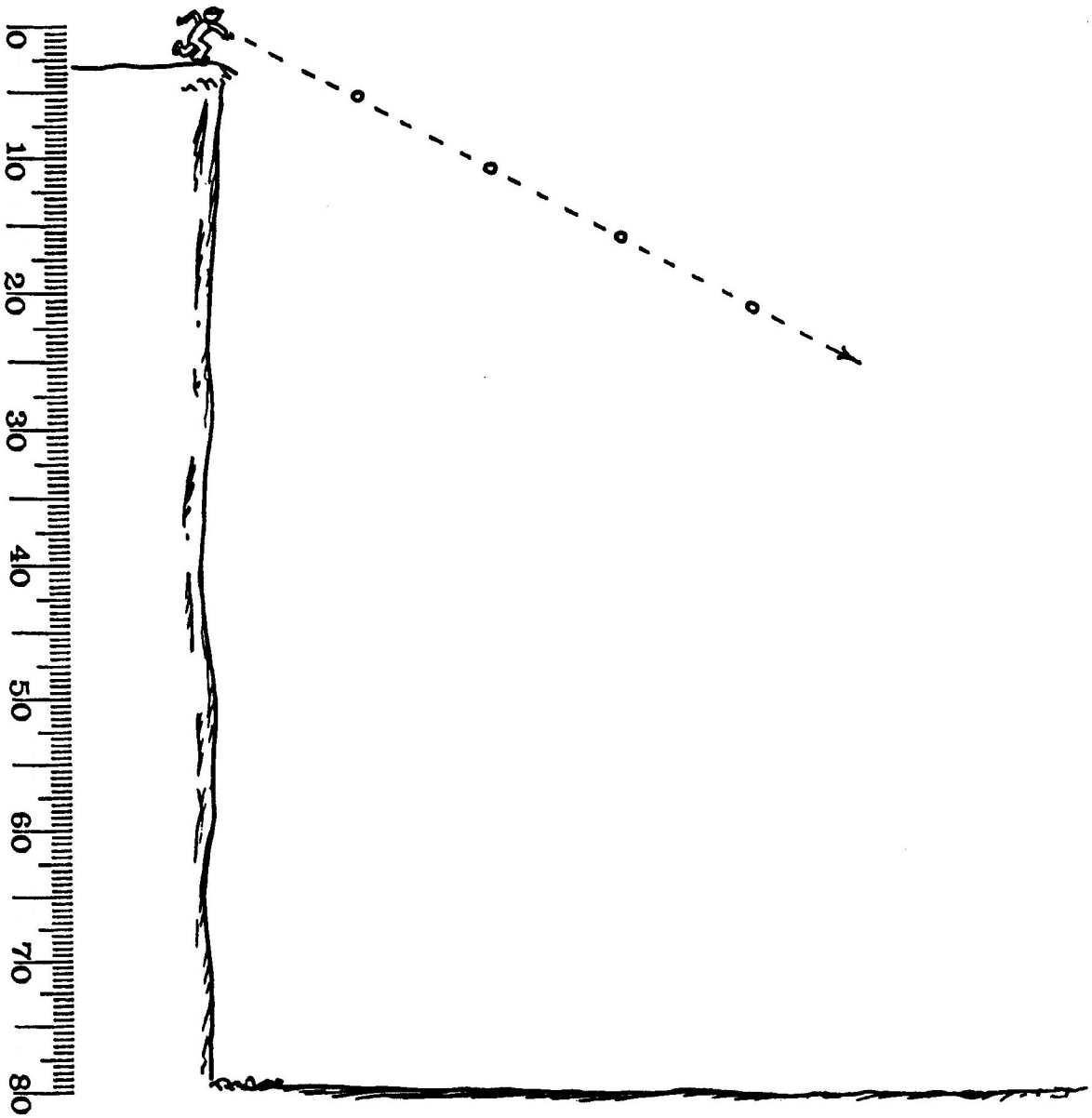
A ball tossed upward has initial velocity components 30 m/s vertical, and 5 m/s horizontal. The position of the ball is shown at 1-second intervals. Air resistance is negligible, and $g = 10\ m/s^2$. Fill in the boxes, writing in the values of velocity ***components*** ascending, and your calculated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





Example 1: A ball is thrown horizontally at a speed of 95.0mph (42.5m/s) by a pitcher. It is released at a height of 2.00m above the ground. Find (a)the time it takes to reach home plate 60.5ft (18.5m) away and (b)the height above the ground when it gets there.

Example 2:The distance from third to first is 121ft (36.9m). A third baseman throws the ball 40.0m/s at an angle of 6.5° above horizontal. Find the height (relative to the height at which it was released) when it reaches first base.



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.

Lecture 07 - 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.