PAL Problem Set M1 for Phys 5A
(Kinematics Practice Problems)

Always explain your answers and show your work.

Problem 1 - A football is punted straight up into the air; it hits the ground 5.2 s later. What was the greatest height reached by the ball? What was its initial velocity?

Problem 2 - An arrow is launched vertically upward. It moves straight up to a maximum height then falls to the ground.

  A. Rank the arrow's speed at positions A, B, C, D, and E.
  B. Rank the arrow's acceleration at positions A, B, C, D, and E.
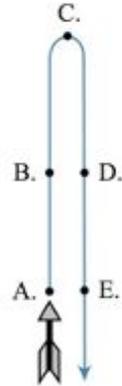
Problem 3 - The graph shows the motion of students A and B walking to class. Both curves are parabolas.

  A. When are students A and B in the same location at the same time?
  B. Is there a time when students A and B have the same velocity? If so, when?
  C. Sketch a velocity vs. time graph with the motion of both students on the same graph. Include an estimate of the initial and final velocities of each student.
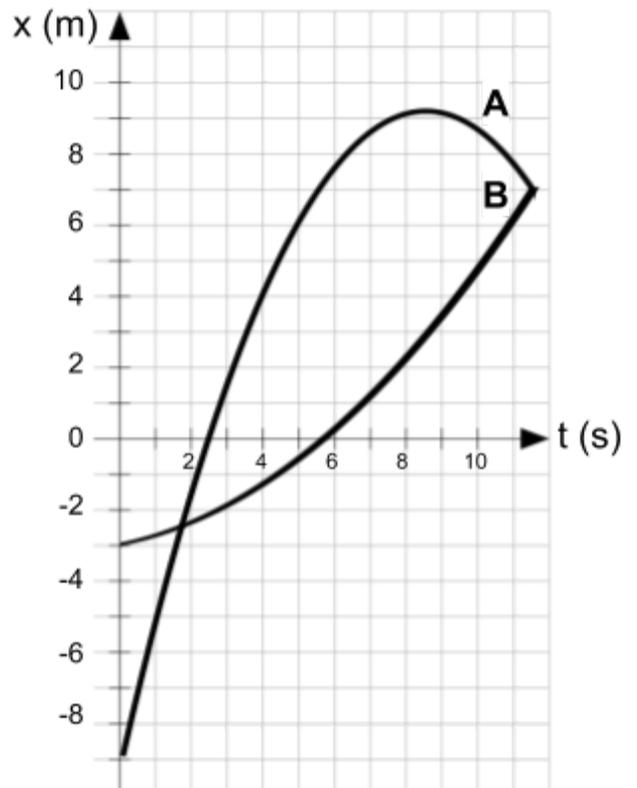
Problem 4 - A physics student on planet Exidor throws a ball, and it follows the parabolic trajectory shown in the figure. The ball's position is shown at 1.0 s intervals. At $t = 1.0\ s$ the ball's velocity has components $v_x = 2\ m/s$ and $v_y = 2\ m/s$. Air resistance is negligible.

A. Determine the x- and y- components of the velocity at $t = 0\ s$, $2\ s$, and $3\ s$.
B. What is the value of the acceleration of gravity on planet Exidor?
C. What was the ball's launch angle?