Problem 1 A softball player hits a line drive to the outfield and starts running towards first base. Draw a graph to illustrate her position and velocity during the first few seconds of her run.

Problem 2 The graph below shows the acceleration in the $x$ direction of an object as a function of time.

(a) Draw a graph of the $x$ velocity of this object. (assume that the velocity is 0 m/s at $t = 0$ s)
(b) Draw a graph of the $x$ position of this object. (assume the initial position is $x_i = 0$ m)

Problem 3 You throw an apple straight up into the air. At each of the following moments decide whether the acceleration of the apple is less than, greater than, or equal to $g$. Explain.

(a) Just after leaving your hand.
(b) At the top of its trajectory (maximum height).
(c) Just before hitting the ground.

Problem 4 The position of a particle is given by the function $x(t) = 2t^4 + 5t^2 + 6$ meters, where $t$ is in seconds.

(a) What is the function for velocity in the $x$ direction, $v_x(t) =$?
(b) What is the function for the acceleration, $a_x(t) =$?

Problem 5 A villain has stolen a precious treasure, but is near capture. In order to avoid being caught in possession of the treasure he drops it off a 140 meter tall tower. Three seconds after the treasure was dropped, Batman arrives and dives from the top of the building flying towards the ground at 70 m/s to try and save the treasure. Will he be able to catch it before it hits the ground? Show your work.

Problem 6 Imagine two cars heading towards each other, car A and car B (see figure below). Car A is traveling at a speed of 30 m/s, and car B is traveling at a speed of 25 m/s. When the cars are 100 meters apart, both drivers slam on their brakes. This causes both cars to experience an acceleration of 10 m/s$^2$ in the direction opposite their movement (they are slowing down).
(a) How far will car A travel before stopping?
(b) How far will car B travel before stopping?
(c) Will there be a collision?
(d) How much time does it take each car to stop?