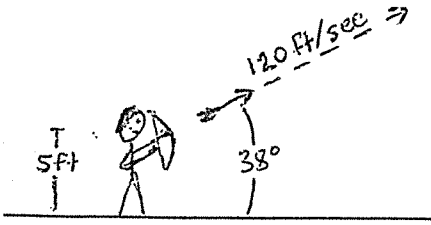


Projectile Motion (Assignment 9)

1. a) To the right of the picture, find  $h_i$ ,  $v_v$ ,  $v_h$ , and  $a$  (where  $a$  is the vertical acceleration from gravity).



b) Write two equations, one relating the height,  $h$ , of the arrow to time,  $t$ , and the other relating the horizontal distance,  $d$ , of the arrow to time,  $t$ .

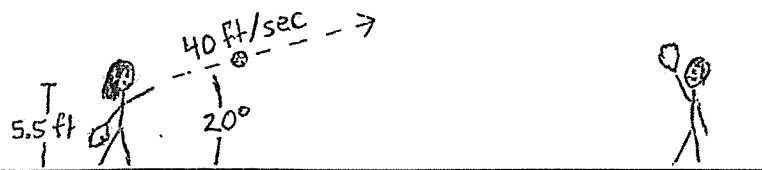
c) How far will the arrow have traveled horizontally after 2 seconds?

d) How high above the ground will the arrow be after 2 seconds?

e) When will the arrow have traveled 100 feet forward (horizontally)?

f) How long will it take the arrow to hit the ground?

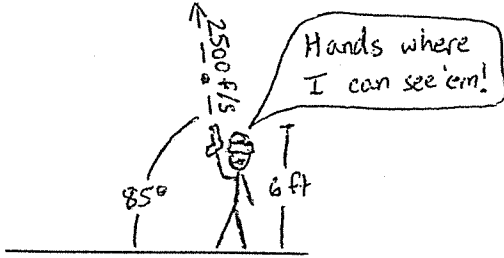
2. a) Write two equations to the right of the picture, one relating the height,  $h$ , of the baseball to time,  $t$ , and the other relating horizontal distance,  $d$ , of the baseball from the thrower to time,  $t$ .



b) How high above the ground will the baseball be after 1.5 seconds?

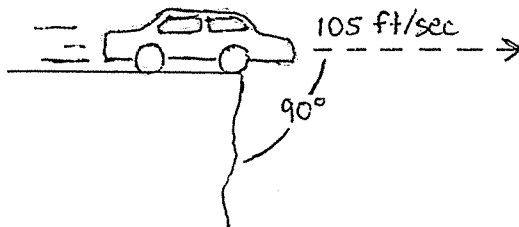
c) If the catcher is 75 feet away from the thrower, how long will it take for the ball to reach catcher?

3. a) Write two equations to the right of the picture, one relating the height,  $h$ , of the bullet to time,  $t$ , and the other relating horizontal distance,  $d$ , of the bullet from the policeman to time,  $t$ .



- b) When will the bullet reach its maximum height?
- c) What is the maximum height of the bullet?
- d) If the bullet takes 162.5 seconds to hit the ground, how far from the shooter will it land?

4. a) Write two equations to the right of the picture, one relating the height,  $h$ , of the car (let  $h_i = 0$ ) to time,  $t$ , and the other relating horizontal distance,  $d$ , of the car from the cliff to time,  $t$ . Don't worry, the driver has already jumped out.



- b) How far away from the wall of the cliff will the car be after 3 seconds?
- c) The bottom of the cliff is 600 feet below the top. When will the car crash into the ground?
- d) What will the car's vertical velocity be upon impact?
- e) What will the car's horizontal velocity be upon impact?
- f) What will the car's velocity be upon impact? (Think and think, then think some more. This question is difficult. Give it an honest effort.)