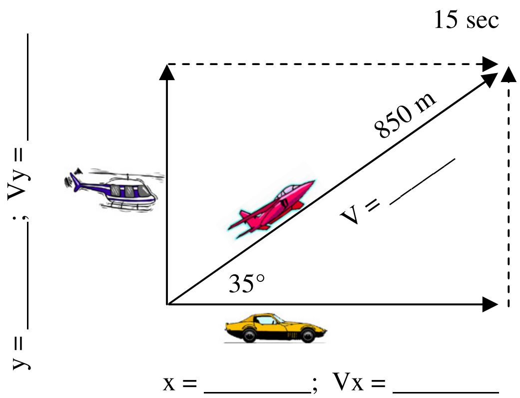
Due Mon, Sept 26

2011 PreAP Two Dimensions 7

1. A movie director wants to get a variety of film shots of a fighter jet taking off. To capture the vertical lift of the plane, he uses a helicopter that will rise along with the plane. To capture the ground shot, a racecar will follow beneath the plane. The crew stops filming after 15 seconds, at which point the plane has flown 850 m. (*Label the diagram as you go.*)



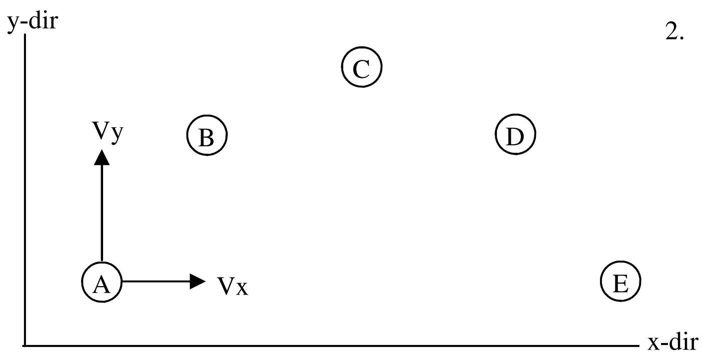
A. * Using sin and cos, calculate the distances of the helicopter and the race-car.

B. * Using S = D/T, calculate the velocities of all three vehicles

C. Now, using sine and cosine, verify what you calculated in part B.

D. Which is greater: $v_{helicopter}$ or $v_{racecar}$? Why?

E. What would the angle of the helicopter have to be for the speed of the helicopter to equal the speed of the car?

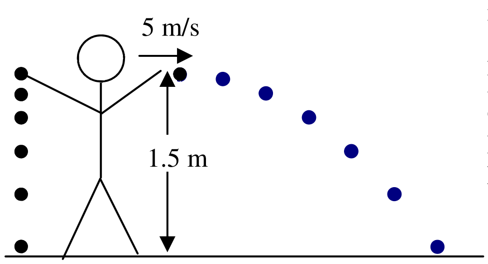


2. Draw arrows to show the horizontal and vertical velocities for each position. The first one is done for you. Remember that longer arrows = greater velocity.

   A. What is the velocity of the object at point C?

   B. What is the final x velocity of the object?

   C. If Vy at A = 11 m/s, the y velocity at B is greater, less than, or the same as 11 m/s?



3. Slim Jim throws a ball at 5 m/s horizontally from 1.5 m. At the exact same moment he drops an identical ball from the same height.

   A. What is the acceleration due to gravity for the dropped ball?
   B. What is the acceleration due to gravity for the thrown ball?
   C. Which ball hits the ground first?
   D. * What is the initial vertical velocity of the thrown ball?
   E. * Calculate the time for the right ball to hit the ground.

   F. Calculate how far away the right ball lands.

4. * Good ole Jar Jar Binks… Finding it surprisingly difficult to get rid of him, the devote Star Wars fans put Jar Jar on a make shift catapult. If Jar Jar is launched at 30° going 22 m/s and lands back on the ground, calculate how far away he lands. (*Use the last homework or the back of the "Projectile Motion" notes, if need be.*)

1A) x = 696.3m y = 487.5 m
1B) Vpl = 56.7 m/s Vhel = 32.5 m/s V car = 46.42 m/s
3D) 0 m/s 3E) .55 sec 3F0 2.75 m
4) t = 2.24 sec x = 42.6 m