Due 10/3 PreAP

1. A rocket is shot at 42º from its launch pad on the ground (so you know its initial velocity). It has an acceleration of 12 m/s2 and has 15 seconds of fuel. How high does it get (find its maximum altitude).

   Bonus Question: How far away from its launch pad does it eventually land?

2. A cannon shoots a 12 kg cannonball at 35º and 45 m/s.
   A) Find the range of the ball.
   B) How high did the cannonball rise? (Find its maximum height.)

3. Whilst under siege, Sir Monte of Willett sets up cat-apults on the ramparts of his castle. His attackers, lead by the nefarious Sir Riley, know to his enemies simply as "Sklar", is camped in the meadows below the 20 meter tall castle walls. Sir Monte is attempting to scare off Sklar, knowing that Sklar is allergic to cats
   A) What would be the best angle for Sir Monte to launch his cats to get the longest range possible?
   B) Unfortunately, Sir Monte does not have you as his ballistics advisor, so he fires his cats at 68º and 32 m/s. How far away do his cats land?
   C) To get the best possible range would it be better for him to use Siamese cats or Persians?

4. An object is rolling 2 m/s on a 1.5 meter tall level desk.
   A) What Vx and Vy?
   B) When it rolls off the desk it will be a horizontal projectile. Find how far away it lands from the edge of the desk. *(If you answered part A correctly, this is easy.)*

   Let's see if I can talk you through this next one. Hmmmmm….(Mr. Murray enters his "pensive" state—Rhode Island.) For real—if you want to do well on the test—try this one without the help, then check the help later.

5. A projectile reaches a maximum height of 85 m and has a range of 62 m. Find the initial velocity and angle of the projectile.

Helps— Use each hint individually, then fight a bit more.
Hint 1: Write down what you know in the x and y directions, including what you'd LIKE to know.

Hint 2: The projectile's total hang time (t) will be twice the time for it to fall from its highest point.

Hint 3: Since you know how far up it goes. That's in which direction: x or y?

Hint 4: Treat the maximum height as if it was an object being dropped from 85 m. Find that time.

Hint 5: If you found the time in Hint 4, double that for the total hang time (t) for the projectile.

Hint 6: If you have the total time (t), then you can find Vx. (You have the distance.)

Hint 7: Since the object drops from 85 meters, you can find its final velocity just before it hits the ground.

Hint 8: Won't the initial Vy be equal and opposite to the final Vy (from Hint 7).

Hint 9: (I hope you didn't need all of these.) Since you now have Vx and Vy, find the original V (mag + dir).

Really not that hard, but you have write what you know and don't know and keep the x and y independent.