Physics 11
M. Lam   <u>Projectile Motion (Launched at Angles)</u>   Block:

1. A cannon ball is launched on a flat field at an angle of 30.0° above the horizontal and has an initial velocity of 120 m/s.
   a) Draw a vector diagram showing the initial velocity vector and its horizontal and vertical components.
   b) What is the time of flight?
   c) What is the horizontal range?

2. A soccer ball is kicked from ground level. The ball stays in the air for 4.3 s and the ball hits the field 55 m away from where it was kicked.
   a) What is the initial velocity of the ball?
   b) What is the velocity upon impact?
   c) What maximum height does the ball reach?

3. In a circus, a "human cannonball" is launched from a cannon and lands in a net. The cannon releases him at the same height as the net. His initial velocity is 18.3 m/s in a direction 40.0° above the horizontal.
   a) For how much time will he be in the air?
   b) How far does he travel horizontally?
   c) What is the velocity upon impact?

4. The circus manager from the previous question wants to make the stunt more dramatic by firing the stuntman through a hoop 9.0 m high then land in a safety net at the same height as the cannon. The cannon's angle is changed to 45.0° and the velocity is increased to 21.0 m/s. The manager needs to know where to place the hoop and safety net.
   a) How far from the cannon should the safety net be placed?
   b) What is the time required to reach the height of the hoop?
   c) How far from the cannon should the hoop be placed?
   d) Sketch the setup of the stunt showing the location of the cannon, hoop and net?

5. A catapult flings a rock from a castle wall of height 60.0 m. The initial velocity of the rock is 80.0 m/s at an angle of 25° above the horizontal.
   a) What is the horizontal range?
   b) What is the velocity upon impact?
   c) What maximum height above the ground does the ball reach?
   d) If there is a 75 m high tree along the flight path 76 m from the wall, will the rock clear the tree? If so, by how much?