Practice Problems Type 1:Vertical Launch

1. A cannon shoots a 10 kg cannon ball straight up at 49 m/s.
a. find the maximum height it reaches, does the mass of the cannon ball affect how high the ball soars?
[120m]
b. find the time it takes to return to the ground. **[10s]**
c. What is the cannon balls velocity when it hits the ground? **[49 m/s [down]]**

Practice Problems Type 2:Horizontal Launch

2. A cannon ball is fired horizontally with an initial velocity of 49 m/s from the top of a 176.4 m cliff.
   a. find how long the cannon ball is in the air (i.e. when does it hit the ground) **[6.0s]**
   b. how far from the base of the cliff does the cannon ball land? **[290m]**
   c. what is the velocity of the cannon ball when it hits the ground? **[77m/s[50°BH]]**

3. A cannon ball is fired horizontally with an initial velocity of 23 m/s from the top of a cliff. If it lands 75m from the base of the cliff, how tall is the cliff? **[52m]**

4. An airplane is flying horizontally at a height of 82 m above the ground when it releases a package of supplies to an earth quake ravaged city. The package travels a horizontal distance of 96 m before landing on the ground. Assuming that there is negligible wind or air resistance, what was the package's (and therefore the plane's)
   a. initial velocity with respect to the ground? **[23m/s (horizontally)]**
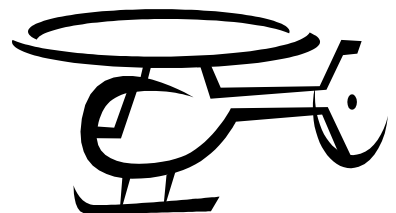   b. final velocity before hitting the ground? **[46m/s [60°BH]]**

Practice Problems Type 3 : Angle Launches

#5.A football player kicks a football so that the angle of elevation is 50° and the initial magnitude of the velocity of the ball is 15 m/s. Find the following:
   a. ball's max height **[6.7m]**
   b. time to reach maximum height **[1.2s]**
   c. overall time the ball is in the air **[2.4s]**
   d. horizontal distance travelled **[23m]**
   e. velocity at impact. **[15m/s [50°BH]]**

Practice Problems Type 4 : Angle Launches with Different Launch and Landing Heights

#6. A hiker is standing on a cliff that is 60.0m high. He throws a stone with an initial velocity of 21 m/s at 35° above the horizontal from the edge of the cliff . How far from the base of the cliff does the stone land? **[84m]**

#7. A helicopter is rising vertically at a uniform velocity of 14.7 m/s. When it is 196 m from the ground a ball is projected from it with a horizontal velocity of 8.5 m/s with respect to the helicopter.
   a. when will the ball reach the ground? **[8.0s]**
   b. where will it hit the ground? **[68 m]**
   c. what is the ball's velocity when it hits the ground? **[64 m/s [[82°BH]]**

#8. A golfer hits the golf ball off a tee giving it an initial velocity of 32.6 m/s at an angle of 65° with the horizontal. The green where the ball lands is 6.30m higher than the tee. Find:
   a. The time interval during which the golf ball was in the air **[5.8s]**
   b. The horizontal distance it travelled **[80m]**
   c. The velocity of the ball just before it hit the ground. **[31 m/s [63°BH]]**
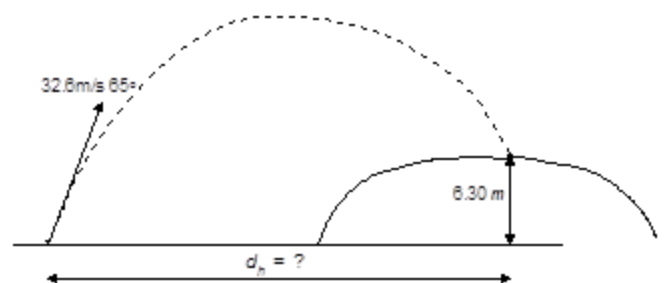
#9 Standing at the edge of a straight cliff, a hiker throws a rock at a velocity of 28 m/s at an angle of 50° above the horizontal. The rock is released at a point that is 75.0m above the ground below the cliff's edge.
   a. Calculate the time it takes for the rock to land on the ground below. **[6.7s]**
   b. How far away from the base of the cliff does the rock land? **[120m]**
   c. Determine the velocity the rock hits the ground with. **[47m/s[68°BH]]**