Module 4 Physics

Assignment #1 Read pages 105 -114.

Write the answers on your own paper, not on this sheet.

1. Write the definition of parabolic motion from page 111 of the book.
2. Which of the following objects would have parabolic motion?
   a. A leaf falling from a tree
   b. A jet airplane flying at a constant altitude
   c. An arrow fired at a target
   d. A person riding on a Ferris wheel
3. A baseball is dropped at the same instant that another baseball is hit horizontally at a speed of 12.0 meters per second. If both balls start at the same height, which will hit the ground first?
4. A ball is thrown with an initial horizontal velocity of 28 meters per second and an initial vertical velocity of 10 meters per second. When the ball reaches maximum height:
   a. What is its horizontal velocity?
   b. What is its vertical velocity?
5. A long jumper leaves the ground at an angle of 37° and a speed of 11.2 m/s. Complete the chart with the information you know, then solve the problems.

a_x =		a_y =	
v_{xi} =		v_{yi} =	
v_{xf} =		v_{yf}	
Δx =		Δy =	
t =			

   a. What is the maximum height of his jump?
   b. How long does he take to return to the ground?
   c. How far does he jump horizontally?

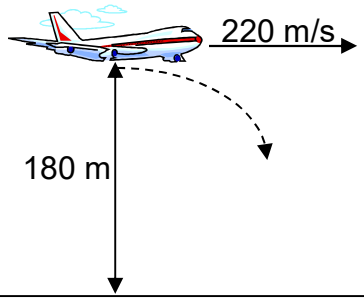
6. A rescue plane drops a package of emergency supplies to people in a flooded area. The plane is traveling horizontally at 220.0 m/s and is 180.0 meters above the ground. Complete the chart, then solve the problems.

a_x =		a_y =	
v_{xi} =		v_{yi} =	
v_{xf} =		v_{yf}	
Δx =		Δy =	
t =			

   a. How long does it take the package to hit the ground?

   b. Where does the package hit the ground relative to the point at which it was released?

   c. BONUS: Assuming the plane doesn't change its speed, where is the plane when the package hits the ground?



7. An artillery shell is fired with an initial velocity of 316 m/s at 42° above horizontal. It explodes on a mountainside 8 seconds after being fired. Find the Δx and Δy of the shell.

8. A ball is tossed from an upper-story window of a building with an initial velocity of 8.0 m/s at 15° below horizontal (345°). It hits the ground 4.5 seconds later.

   a. How far away from the base of the building did the ball land?

   b. From what height was the ball thrown?

9. Honors – A ball is thrown from the top of a building upward at an angle of 36.0° to horizontal with a speed of 14.0 m/s. The height of the building is 95.0 m.

   a. How long does it take for the ball to hit the ground?

   b. What was the speed of the ball just before it hit the ground?

Module 4 Physics

Assignment #2 Read pp.115 – 127.

Write the answers on your own paper, not on this sheet.

1. What condition has to be true to use the range equation?

2. What angle will give a projectile the farthest range?

3. William Tell, the famous Swiss archer, told someone to hold an apple and he would shoot it from 20 meters away. The person was nervous about having an arrow shot towards him, so he dropped the apple when Tell released the arrow. If the arrow hit the center of the apple as it was falling, did Tell aim above the apple, at the apple, or below the apple? Explain your answer.

4. William Tell couldn't find anymore people brave enough to hold an apple, so he put the apple on a fence post. As always, Tell hit the apple from 20 meters away. Did Tell aim above the apple, at the apple, or below the apple? Explain your answer.

5. A football kicker kicks the ball at a velocity of 31 m/s at 44°. How far will the ball go if no one catches it?

6. You are playing catch with your neighbor and you throw a baseball over their house. If you throw it up at an angle of 63° at a speed of 18 m/s, it will clear the roof. How far away from your neighbor will you be when he catches the ball on the other side of the house?

7. The Spurs coyote fired his T-shirt gun above a crowd standing on the ground. The T-shirt went 19.0 meters. If the coyote held the gun at a 74° angle, what was the initial velocity of the T-shirt as it was fired from the gun?

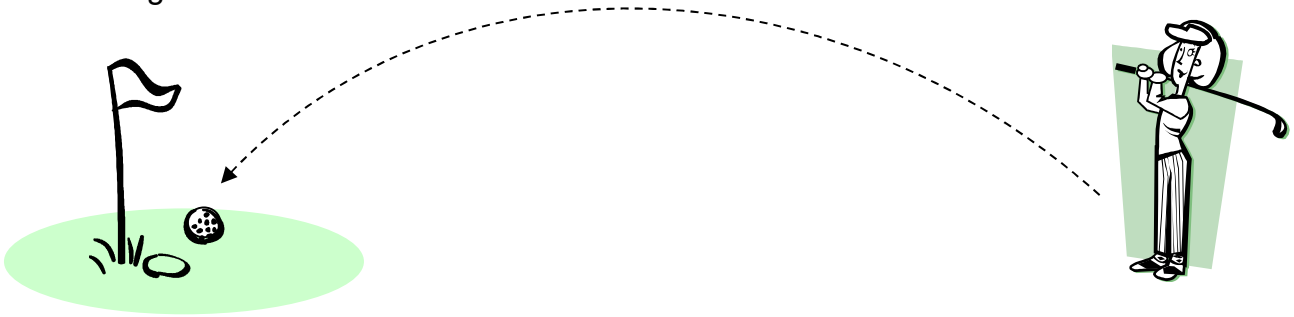
8. A ship fires missiles at a town on the other side of a mountain range. The ship and the town are at approximately the same elevation. The ship's guns shoot the missiles at a velocity of 240. m/s at an angle of 44°. The ship is 5870 meters from the center of town and the mountains are 800 meters tall.

    a. Find the range of the missiles.

    b. Find the maximum height of the path of the missiles.

    c. Will the missiles hit the town or hit the mountains?

9. Honors - A golfer lands her shot in the rough. The hole is 14.0 meters away. She knows her chip shot has a velocity of 13.0 m/s. At what angle should she shoot the ball to get it to the hole?



10. Honors: You are having a water balloon fight with someone. You are going to throw a high water balloon so they will look up at it, then you will throw a low balloon while they are distracted. You throw the high balloon at 13 m/s at 65° above horizontal. If you throw the low balloon at the same speed, what angle should you throw it at to hit the same distance away as the first balloon?