Name:_____ Date:_____

Mr. Croom's Physics Chapter 3: Two Dimensional Motion

Advanced Symmetrical Projectile Motion

1. A football is kicked at an angle of 45° and travels 82 m before hitting the ground.
   a) Find its **initial velocity**
   b) **How long** was it in the air?
   c) What is its **maximum height**?

2. A shot put is released with a velocity of 12 m/s and stays in the air for 2.0 sec.
   a) At what **angle** was it released? [HINT: Think of **ALL** the kinematic equations with **θ** in it!]
   b) What was the shot put's **range**?

3. Find the **angle of elevation θ** of a tank's cannon which fires a shell with a muzzle velocity of 120 m/s and hits a target on the same level (What is Δy?) but 1300 m distant.

4. A baseball is thrown straight downward with initial velocity of 8 m/s from a height of 25 m. Compute the following:
   a) Compute the **time** it takes the baseball to reach the ground.
   b) Calculate the **velocity** the baseball strikes the ground with.

5. A marble dropped from a bridge strikes the water in 5 sec.
   a) Calculate the **impact velocity** (v_y).
   b) What is the **height** of the bridge?

6. Morten Anderson, a place kicker, tries for a field goal. He kicks the ball 40 ° above the horizontal. The initial velocity (v_i) of the ball is 23 m/s.
   a. Determine the maximum height that the ball attains.
   b. Determine the time of flight between kickoff and landing.
   c. Determine the range of the football.
   d. If the uprights were 27 yards away, and the uprights are 10 feet off the ground, does he make the field goal? [hint: find y at the time t where x = 22 yards.] [convert!]

7. A hunter aims *directly* at a target 120 m away.
   a) If the bullet leaves the gun at a velocity of 250 m/s, by how much will it miss the target?
   b) **At what angle** *should* the gun be aimed so the target will be hit?

8. A projectile is launched from ground level to the top of a cliff which is 195 m away and 155 m high. If the projectile lands on top of the cliff 7.6 sec after it is fired, find the **initial velocity** of the projectile (**BOTH** magnitude **AND** direction). Neglect drag.