Parametric Motion Problems **<u>Show all work</u>**

1) A dart is thrown 3.5 feet above the ground with an initial velocity of 15 ft/sec at an angle of 41°.

   a) Find parametric equations to model the problem
   b) Find complete graph (label)
   c) When will the dart hit the ground?
   d) Find the maximum height of the dart.
   e) When did the maximum occur?

2) An arrow is shot into the air 4-ft above the ground with initial velocity of 45 ft/sec at an angle of 48°.
   a) Write equations
   b) When will the arrow strike the ground?
   c) Find complete graph (label)
   d) How far is the arrow from the initial position (horizontally)?

3) What is the initial velocity required so that a ball kicked from the ground at an angle of 35° will travel a total of 255 feet horizontally?

   a) write equations
   b) Find complete graph (label)

4) A golfer hits a ball with an initial velocity of 133 ft/sec at an angle of 36°.

   a) Find when and where the ball will hit the ground.
   b) Will the golf ball clear a fence 9-ft high at a distance of 510-ft?

5) Chris and Linda are standing 78 ft apart. At the same time, each throws a softball toward the other. Linda throws her ball with an initial velocity of 45 ft/sec at an angle of 44°. Chris throws her softball at an initial velocity of 41 ft/sec at an angle of 39°

   a) Find 2 sets of parametric equations to represent the problem
   b) Find complete graph (label). Indicate the direction on each curve!
   c) What values of *t* make sense?
   d) When does each ball hit the ground? Whose hits first?
   e) Whose hits closest to the other person? How far away was the ball from that other person?

6) A major league baseball player hits a ball with an initial velocity of 70-mph at an angle of θ° in the direction of a 10-ft fence that is 300 ft away from home plate. For each exercise, write the equations, draw the graph, and determine whether he hits a home run (over the fence) Remember gravity. The ball leaves the bat at a height of 3 ft. (use Calc)
   a) angle is 32° b) angle is 36° c) angle is 49°

7) Chris is standing on the ground to the right of a Ferris wheel at a distance of 100 feet from the bottom that is 30 feet in radius. His arm is at the same height as the bottom of the Ferris wheel. Lauren is on the Ferris wheel, which makes one revolution counterclockwise every 20 seconds. At the instant she is at the bottom, Chris throws a ball to her at 55 ft/sec at an angle of 45° above the horizontal. Neglecting air resistance,
   a) Will the ball get to Lauren?
   b) When does the ball reach its max height?
   c) When will the ball hit the ground?