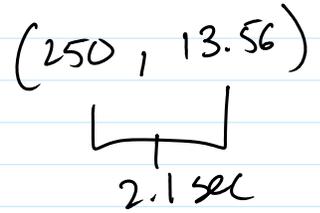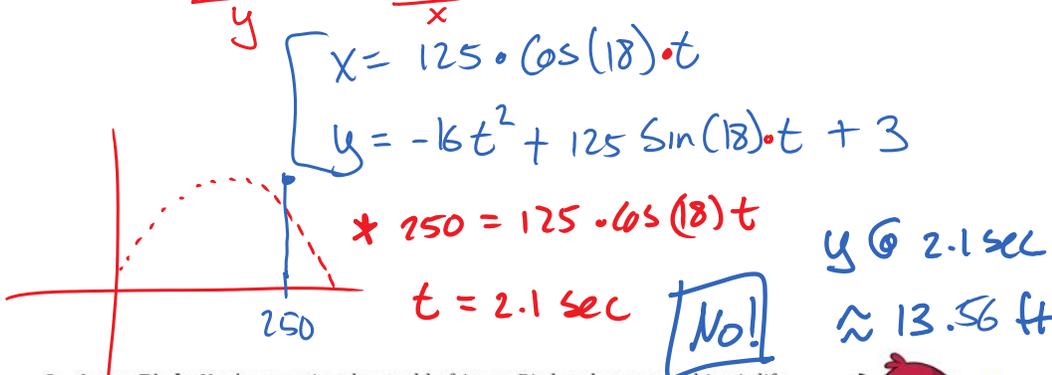# Day 7 Notes

Thursday, March 24, 2016   7:40 AM

Precalculus   Name:
6.3 Day 5 – Applications of Parametric Equations   Period:

1. **It's Outta Here?!** The Cubs' newest recruit, Jorge Soler made a name for himself crushing his first MLB at bat with a homerun. Can he repeat his success this season? Jorge's first at-bat this season might be a success ... he connects with the ball at a height of 3 feet, an angle of 18° and a velocity of 125 ft/s. To hit it out the park, the ball must clear a 20 foot tall fence that is 250 feet away from the batter. Does he do it?

y

$$\begin{cases} x = 125 \cdot \cos(18) \cdot t \\ y = -16t^2 + 125\sin(18)\cdot t + 3 \end{cases}$$

x

$$* \ 250 = 125 \cdot \cos(18)t$$

$$t = 2.1 \ sec$$ No!

250

$y @ 2.1 \ sec$

$\approx 13.56 \ ft$

$(250, \ 13.56)$

2.1 sec

2. **Angry Birds.** You're entering the world of Angry Birds, where everything is life-sized and gravity exists. You are working hard to beat a level – all you need to do is knock off the Pig balancing on a tower. You aim your Angry Bird up – out of a 2 foot sling-shot – at an angle of 20° with a velocity of 130 feet per second.

   a. Write a parametric equation representing the path of the Angry Bird based on the time – t – traveled in seconds.

$$\begin{cases} x = 130 \cdot \cos 20 \ t \\ y = -16t^2 + 130\sin 20 \cdot t + 2 \end{cases}$$

Function Mode

   b. What is the maximum height the Angry Bird reaches? After how many seconds?

$32.89 \ ft @ \underline{1.39 \ sec}$ How far has it gone?
                    t $t = 1.39$

$(1.39, 32.89)$

   c. Will the Angry Bird knock off the pig if it is 340 feet away from the sling shot and 3 feet off the ground?
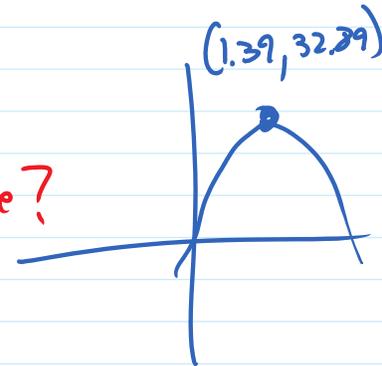
x $> y$

$$340 = 130 \cdot \cos 20 \cdot t$$

$$t = 2.78 \ sec$$

$y @ 2.78 \ sec$

$\approx 1.81 \ ft$

So ... No !

3. **Track Invite**. Hinsdale Central is attending the LT Track invitational this weekend. Hinsdale Central Mike can run the 100m dash at a constant speed of 15 meters per second. Lyons Township Richard misfires and unintentionally starts 1 full second after HC Mike, but runs at a constant speed of 18 meters per second.

a. Write the parametric equations to model Mike and Richard's distance traveled in terms of time (in seconds).

Mike
$$x = 15 \cdot t$$
$$* \cancel{y = 3}$$

Richard
$$x = 18(t-1)$$
$$* \cancel{y = 23}$$

b. Who will win the 100m dash?

$$100 = 15 \cdot t$$
$$\approx 6.67 \text{ sec}$$

$$100 = 18(t-1)$$
$$* \approx 6.56 \text{ sec} * \quad \text{winner!}$$

4. **Pumpkin Tossing**. In a pumpkin tossing contest in Morton, Illinois, a contestant won the catapult competition by using two telephone poles, huge rubber bands, and a power crank. Suppose the pumpkin was launched with an initial speed of 125 feet per second, at an angle of 45°, from an initial height of 25 feet.

a. Write a set of parametric equations to model the motion of the pumpkin.

$$x = 125 \cdot \cos 45° \cdot t$$
$$y = -16t^2 + 125 \cdot \sin 45° \, t + 25$$

b. How far did the pumpkin travel? How long did it take to hit the ground?

$$\boxed{x} \qquad \boxed{t} \qquad \boxed{y=0}$$

Function
Zero
$$0 = -16t^2 + 125 \sin 45 \, t + 25$$
$$t \approx 5.79 \text{ sec}$$

$$x \;@\; t \approx 5.79 \qquad \approx \boxed{511 \text{ ft}}$$

(5.79, 0)
t   height