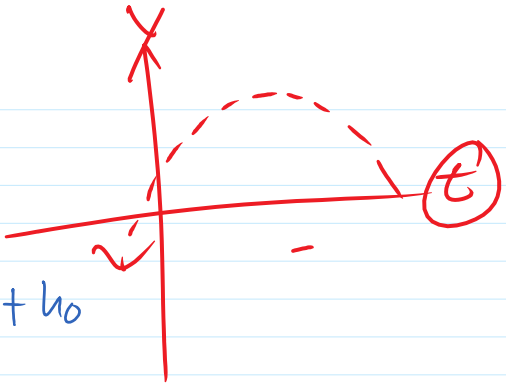
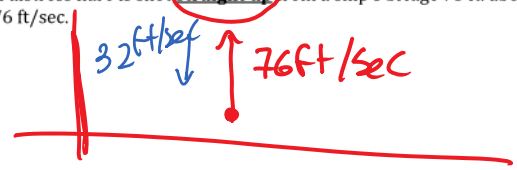
Day 5 Notes

Sunday, March 1, 2015 2:38 PM



6.3 Day 3 Parametric Equations
PROJECTILE MOTION

1. A distress flare is shot **straight up** from a ship's bridge 75 ft. above the water with an initial velocity of 76 ft/sec.



$V.V. = -\frac{1}{2}gt^2 + V_0 t + h_0$

Write parametric equations to model the height of the flare.

$x_1 =$ 5 $y_1 =$ $-16t^2 + 76t + 75$

What height does the flare reach? At what time?

*Function Mode Vertex

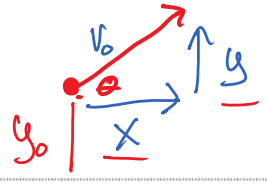
When does the flare hit the water?

zero

WINDOW:
TMIN: 0
TMAX: 10
TSTEP: .1
XMIN: 0
XMAX: 10
XSCL: 1
YMIN: 0
YMAX: 300
YSCL: 25

Modeling Projectile Motion:
Objects NOT launched straight up into the air

2. Suppose a baseball is thrown from a point y_o feet above the ground level with an initial velocity of v_o ft/sec at an angle of θ with the horizontal. The initial velocity can be represented by the vector:



$\sin\theta = \frac{y}{V_0}$ $y = V_0 \cdot \sin\theta$

$x = V_0 \cos\theta$

The path of the ball can be modeled by the parametric equations:

X = $V_0 \cdot \cos\theta \, t$ and Y = $-16t^2 + V_0 \cdot \sin\theta \, t + y_0$

t = time
x = how far
y = how high

The x-component is simply: x-component * t

The y-component is simply made up of a combination:

gravity y-component * t Initial height

3. Eric hits a baseball from 3ft above the ground with an initial velocity of 150 ft/sec at an angle of 18 degrees with the horizontal. Will the ball clear a 20-ft fence that is 400 ft away? Sketch a graph of the situation below.

No! x

WINDOW:
TMIN: 0
TMAX: 15
TSTEP: .1
XMIN: 0
XMAX: 500
XSCL: 25
YMIN: 0
YMAX: 50
YSCL: 25

$400 = 150\cos 18 \cdot t$

$t = 2.804\text{ s}$

PATH OF BALL: X = $150\cos 18\, t$ Y = $-16t^2 + 150\sin 18t + 3$

$y \approx 7.$

Can you find a way for Brock to hit a homerun? The only thing you cannot change about the scenario is Brock's height (meaning, he must hit the ball 3ft above the ground).

4. Patrick hits a ball with an initial velocity of 160mph and an angle of 20 degrees, 3.5 feet above the ground. The wind is blowing out with a horizontal velocity of 5 ft./sec. Answer the following questions.

x'

PATH OF BALL: X = $(160\cos 20 + 5)t$ Y = $-16t^2 + 160\cdot\sin 20\, t + 3.5$

a) Will Justice hit a homerun?

b) What is the highest Justice's ball is off of the ground?

c) How long does it take for his ball to reach the fence?

d) What was the height of his ball when it reaches the fence?

WINDOW:
TMIN: _____
TMAX: _____
TSTEP: _____
XMIN: _____
XMAX: _____
XSCL: _____
YMIN: _____
YMAX: _____
YSCL: _____