When Carlos Gonzalez hits the ball well, it leaves the bat at about a 25˚ angle, 3.9 feet above the ground, with a velocity of 141 feet per second.

a. If the outfield wall is 10 ft high and 425 ft from home plate, how high will Cargo's hit likely be when the ball reaches the plane of the wall? Is it a home run?

b. Assuming nothing impedes the flight of the ball, how long is the ball in the air?

c. How far horizontally does the ball travel?

d. What is the maximum height the ball attains?

e. Suppose the ball traveled 492 ft horizontally and landed 82 feet up in the stands. With all other things remaining constant, at what initial velocity must the ball leave the bat.

$X = 141\cos 25t \qquad Y = -16t^2 + 141\sin 25t + 3.9$

a)

$425 = 141\cos 25t$

$t = \frac{425}{141\cos 25}$

$t = 3.33\text{ sec}$

$Y = -16(3.33)^2 + 141\sin 25(3.33) + 3.9$

$= 24.9\text{ ft}$

Yes HR!

b) $0 = -16t^2 + 141\sin 25t + 3.9$

$+ 59.59t$

$$\frac{-59.59 \pm \sqrt{(59.59)^2 - 4(-16)(3.9)}}{-32}$$

$t = 3.79$

c) $X = 141\cos 25(3.79)$

$= 484.32\text{ ft}$

d) $3.9 = -16t^2 + 59.59t + 3.9$

$-3.9 \qquad -3.9$

$0 = -16t^2 + 59.59t$

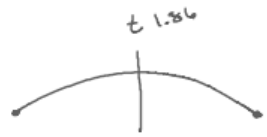
$0 = t(-16t + 59.59)$

$t = 0 \qquad -16t + 59.59 = 0$

$59.59 = 16t$

$t = \frac{59.59}{16}$

$= 3.72$



max height $= -16(1.86)^2 + 141\sin 25(1.86) + 3.9$

$= 59.38\text{ ft}$

e) $X = V_0\cos 25t \qquad Y = -16t^2 + V_0\sin 25t + 3.9$

$492 = V_0\cos 25t$

$V_0 = \frac{492}{\cos 25t}$

$Y = -16t^2 + \frac{492}{\cos 25t}\cdot\sin 25t + 3.9$

$-16t^2 + \frac{492\sin 25\cancel{t}}{\cos 25\cancel{t}} + 3.9$

$= -16t^2 + 492\tan 25 + 3.9$

$82 = -16t^2 + 233.3$

$-151.3 = -16t^2$

$9.45625 = t^2$

$t = \pm 3.075$

$\underline{3.075}$

$V_0 = \frac{492}{\cos 25\,(3.075)}$

$= 176.5\text{ ft/sec}$