

Page 531: 13, 15, 21, 24****Find the initial horizontal velocity and vertical velocity**

13. a golf ball hit with an initial velocity of 69 yards per second at 37° with the horizontal

15. Golf Professional golfer Nancy Lopez hits a golf ball with a force to produce an initial velocity of 175 feet per second at an angle of 35° above the horizontal. She estimates the distance to the hole to be 225 yards.

$$15a. \begin{aligned} x &= 175t \cos 35^\circ, \\ y &= 175t \sin 35^\circ - 16t^2 \end{aligned}$$

a. Write the position of the ball as a pair of parametric equations.

b. Find the range of the ball. **899.32 ft**

21. Entertainment The “Human Cannonball” is shot out of a cannon with an initial velocity of 70 mph 10 feet above the ground at an angle of 35° .

a. What is the maximum range of the cannon? **323.2 ft**

b. How far from the launch point should a safety net be placed if the “Human Cannonball” is to land on it at a point 8 feet above the ground? **312.4 ft**

c. How long is the flight of the “Human Cannonball” from the time he is launched to the time he lands in the safety net? **3.71 s**

24. Baseball Derek Jeter, shortstop for the New York Yankees, comes to bat with runners on first and third bases. Greg Maddux, pitcher for the Atlanta Braves, throws a slider across the plate about waist high, 3 feet above the ground. Derek Jeter hits the ball with an initial velocity of 155 feet per second at an angle of 22° above the horizontal. The ball travels straight at the 420 foot mark on the center field wall which is 15 feet high.

$$24a. \begin{aligned} x &= 155t \cos 22^\circ \\ y &= 155t \sin 22^\circ - 16t^2 + 3 \end{aligned}$$

a. Write parametric equations that describe the path of the ball.

b. Find the height of the ball after it has traveled 420 feet horizontally. Will the ball clear the fence for a home run, or will the center fielder be able to catch it? **24b. About 36.04 ft; it will clear the fence.**

c. If there were no outfield seats, how far would the ball travel before it hits the ground? **528.86 ft**