

Due date: Fri Apr 29 12:00:00 am 2011 (EDT)

Which of the following statements correctly describes what is happening when an object undergoes uniform circular motion?

- A. its speed is changing, but its direction stays the same **F**
- B.** Its speed is constant, but its direction is changing **T**
- C. its speed is constant and its direction stays the same **F**
- D. both its speed and direction are changing **F**
- E. it is moving in a straight line at constant speed **F**

Tries 0/99

A soccer ball is kicked with a speed of 9.37 m/s at an angle of 24.5° above the horizontal. If the ball lands at the same level from which it was kicked, how long was it in the air?

Tries 0/99

6) 2-d kinematics

known

$$v_i, \theta = 24.5^\circ$$

$$y_i, y_f = 0$$

$$v_i = 9.37 \text{ m/s}$$

$$a_y = -g; a_x = 0$$

unknown

$$t, h, x_f$$

estimate:

$$v_y \approx 5 \text{ m/s}; v = gt$$

$$t_{\text{up}} = t_{\text{down}} = \frac{5 \text{ m/s}}{9.8 \text{ m/s}^2} = \frac{1}{2} \text{ s}; t = t_{\text{up}} + t_{\text{down}} \approx 1 \text{ s}$$

0) $a_z v_{fy} = v_{iy} + a t_{\text{up}}$

$$t = 2 t_{\text{up}}$$

$$v_y = v \sin \theta$$



1) units check, agree with estimate

A) $2 t_{\text{up}} = t = \frac{2 v \sin \theta}{g}$

$$t = \frac{2 (9.37 \text{ m/s}) \sin(24.5^\circ)}{9.8 \text{ m/s}^2} = \underline{\underline{0.79 \text{ s}}}$$

No need for quadratic formula; simply find time for v_y to go to zero.