Physics 2A Fall 2024

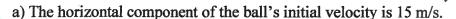
Name ANSwer Key

Lab: early late (circle one)

## **Quiz #3: Vectors and Motion in Two Dimensions**

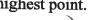
## **Problem 1** (2 points)

A girl kicks a soccer ball with an initial velocity of 15 m/s at an angle of 30°. Which one of the following statements is true? 1 (Vx) = (15 m/s) cos 300



b) The vertical component of the ball's initial velocity is zero. (Vy) = (15 m/s) s 10 30° c) The vertical component of the ball's velocity remains constant during the ball's flight.

d) The horizontal component of the ball's velocity is zero at the ball's highest point.



e none of the above

$$\sqrt{y} = 0 m/s$$
  
 $\sqrt{x} = (\sqrt{x}) \epsilon$ 

## **Problem 2** (4 points)

Find the magnitude and direction of  $\vec{A} - \vec{B}$ . Vector  $\vec{A}$  has components  $A_x = 5.0$  m and  $A_y = -2.0$ m. Vector  $\vec{B}$  has components  $B_x = -7.5$  m and  $B_y = 4.0$  m.

$$C = \sqrt{(2+Cy^3)^3 + (-6.0m)^3} = 13.9m$$

$$\Theta = +a\overline{n}'\left(\frac{Cv}{Cx}\right) = +a\overline{n}'\left(\frac{Cv}{Cx}\right) = +a\overline{n}'\left(\frac{-6.0m}{12.5m}\right)$$

Problem 3 (5 points)

A football is kicked upward from the ground with an initial velocity of 25.0 m/s at an angle of 35.0° above the horizontal. (a) How long a time does it take for the ball to reach its maximum height? (b) What is the ball's maximum height? (c) What is the ball's speed at its maximum height?

$$(V_x)$$
: =  $(25.0 \,\text{m/s}) \cos 35.0^\circ = 20.5 \,\text{m/s}$   
 $(V_y)$ : =  $(25.0 \,\text{m/s}) \sin 35.0^\circ = 14.3 \,\text{m/s}$ 

(a) 
$$(v_y)_f = (v_y)_i + a_y \Delta t \rightarrow \Delta t = -\frac{(v_y)_i}{a_y}$$
  
 $\Delta t = -\frac{(14.3 \text{ m/s})}{-9.80 \text{ m/s}^2} \rightarrow \Delta t = 1.46 \text{ s}$ 

(b) 
$$y_f - y_i = (v_0)_i \Delta t + y_0 \alpha_y (\Delta t)^2$$
  
 $y_f = (14.3 \text{ m/s})(1.465) + y_0 (-9.80 \text{ m/s}^2)(1.465)^2$   
 $y_f = 10.4 \text{ m}$