Physics 101Rec
Quiz#3
Chapter 4

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Name: _____Key_____   Id: _____   Sect: _____

A particle leaves the origin with an initial speed of 5.00 m/s in a direction along the negative y direction. The particle experiences a constant acceleration of $\vec{a} = 3.00\ \hat{i} - 2.00\ \hat{j}$ m/s^2.

(a) Find the position vector $\vec{r}$ of the particle at t = 2 sec in unit vector notion.

$$\vec{r} = \vec{r_0}^{\nearrow 0} + \vec{v_0}t + \frac{1}{2}\vec{a}t^2 \quad \underset{\searrow y = V_{oy}t + \frac{1}{2}a_y t^2}{\overset{x = V_{ox}t + \frac{1}{2}a_x t^2}{}}$$

$$\Rightarrow \vec{v_0} = 0\hat{i} - 5\hat{j}$$

$$\Rightarrow x = 0 + \frac{1}{2}(3)(2)^2 = 6\ m$$

$$y = -5(2) - \frac{1}{2}(2)(2)^2 = -14\ m$$

$$\boxed{\vec{r} = 6\hat{i} - 14\hat{j}}\quad (m)$$

(b) What is the velocity vector $\vec{v}$, in unit vector notation of the particle at that instant?

$$\vec{v} = \vec{v_0} + \vec{a}t \quad \underset{\searrow V_y = V_{oy} + a_y t}{\overset{V_x = V_{ox} + a_x t}{}}$$

$$\Rightarrow V_x = 0 + 3(2) = 6\ m/s$$

$$V_y = -5 - 2(2) = -9\ m/s$$

$$\boxed{\vec{v} = 6\hat{i} - 9\hat{j}}\quad (m/s)$$