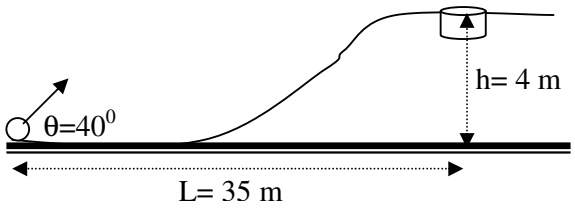
	UNIVERSITY OF GAZIANTEP **DEPARTMENT OF ENGINEERING PHYSICS** **EP 105 General Physics I** **Final Exam Questions**	**12/01/2005** **TIME 100 min.**

[1]. A particle moves on the x-y plane. The position vector of the particle is given by

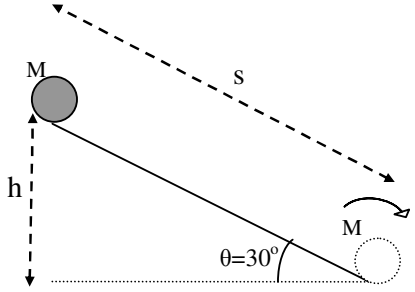
$$\vec{r}(t) = (t\text{-}10)\,\mathbf{i} + 2t\,\mathbf{j} \quad \text{(m)}$$

where t is the time in seconds.
(a) Find the instantaneous velocity, $\vec{v}$, and acceleration, $\vec{a}$, of the particle at t=0.
(b) What is the position of the particle at a time corresponding to $\vec{r}\cdot\vec{v} = 0$?

[2]. Suppose you wish to throw a golfball at an angle of 40^0 from ground into an eleveted golf green (a hole) 35 m horizontally away at a vertical height of 4.0 m from the launch point as shown in figure. At what initial speed should you throw the ball to place the ball on the target ?



[3]. Consider a solid cylinder of mass M and radius R=0.2m rolling down an inclined plane without slipping. When the cylinder reaches the bottom of the inclined plane, find
(a) the speed v of its center of mass
(b) its angular speed w.



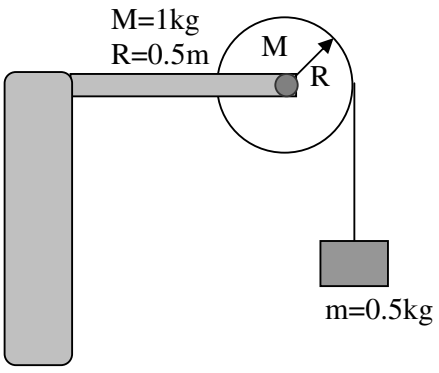
Assume that the cylinder travels s = 5 m along the inclined plane and $I_{cm} = MR^2/2$. Use the conservation of energy to solve this problem.

[4]. The angular speed of a rotating wheel is given as a function of time,

$$w(t) = 3t^2 + 4t + 2 \quad \text{(rad/s)}.$$

where t is the time in seconds.
(a) What is the angular position of the wheel in 2 s?
(b) What is the average angular acceleration of the wheel for the time interval between t=2 s and t=4s?
(c) What is the instantaneous angular speed of the wheel at t = 2 s ?
(d) What is the instantaneous angular acceleration of the wheel at t = 2 s ?

[5]. In the system shown below, determine
(a) the tangential (linear) acceleration of the mass m.
(b) the angular acceleration of the disk.
(c) the tension of the string.
Note that the moment of inertia of the disk is $I = MR^2/2$.



Useful constants:
g = 9.8 m/s^2, sin30=0.5, cos30=0.86