Reminders 03-09-10:

-Exam 2 Average 67%

-Quiz 6 on Chapter in Recitation this week.

-POW 6 Due Thurs

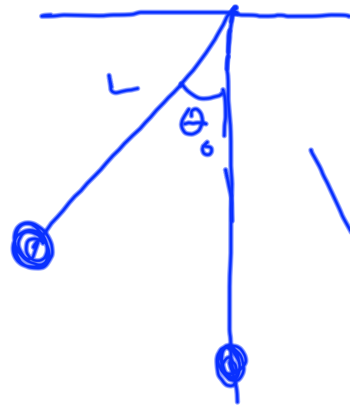
-Since Centripetal Force Lab is our fourth experiment, it was the last lab with free pre-check.

Objectives:

-Potential Energy

-Conservation of Energy

-Examples



$$W_g = mg\Delta y$$

$$\Delta y = L(1-\cos\theta_0)$$

Work done by gravity indep. of path.

$$\int \vec{F}\cdot d\vec{r} = f(b) - f(a)$$

$$\oint \vec{F}\cdot d\vec{r} = f(a) - f(a) = 0$$

$\vec{F}$ is conservative

Define new quantity such that

$$\int \vec{F}_c \cdot d\vec{r} = U(a) - U(b) = -\Delta U$$

Call U potential Energy

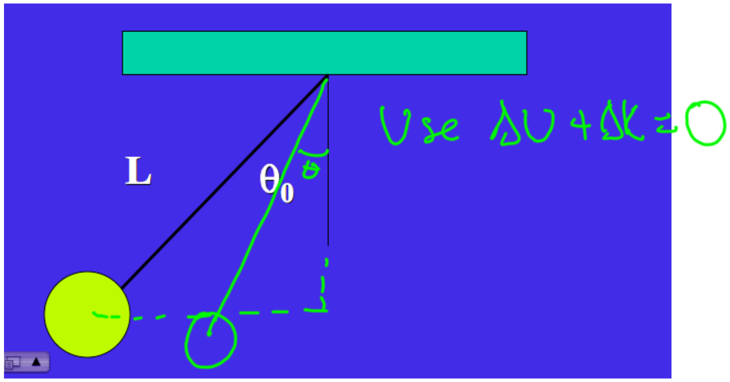
$$\Delta U + \Delta K = 0$$

$$U_f - U_i + K_f - K_i = 0$$

$$\underbrace{U_f + K_f} - (U_i + K_i) = 0$$

$$E_f - E_i = 0$$

$$\Delta E = 0$$



need ΔU need Δy

$y_i = -L\cos\theta_0$
$y_f = -L\cos\theta$

$\Delta y = -L\cos\theta - (-L\cos\theta_0)$

$\Delta U = -mgL(\cos\theta - \cos\theta_0)$

$-mgL(\cos\theta - \cos\theta_0) + \frac{1}{2}mv^2 = 0$

$+gL(\cos\theta - \cos\theta_0) = \frac{1}{2}v^2$

$V = \sqrt{2gL(\cos\theta - \cos\theta_0)}$

if $\theta_0 = 30°$ $\theta = 15°$

$V = \sqrt{2(9.80\,m/s^2)(1m)(\cos 15 - \cos 30)}$

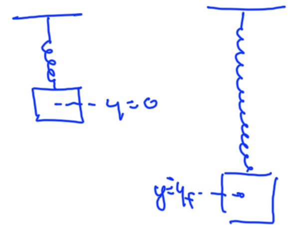
$= 1.40\,m/s$

if $\theta_f = 0°$

$V = \sqrt{2(9.80\,\frac{m}{s^2})(1m)(\cos 0 - \cos 30)}$

$= 1.62\,m/s$

A 1 kg mass is attached to the end of an unstretched spring and then dropped. If the spring constant is 19.6 N/m what would be the maximum extension of the spring?
What would be the speed of the mass as it passed through the equilibrium point (where the force of the spring equals the weight of the mass).



Let $U_s = 0$
$U_g = 0$
at $y = 0$

Use $\Delta U + \Delta K = 0$

here $\Delta K = 0$

$\Delta U = 0$

$$\Delta U_s + \Delta U_g = 0$$

$$\Delta U_s = -\Delta U_g$$

$$\frac{1}{2} k y_f^2 = -(-mg y_f) = mg y_f$$

$$\frac{1}{2} k y_f = mg \qquad y_f = \frac{2mg}{k}$$

$$y_f = \frac{2(1\,kg)(9.80\,m/s^2)}{19.6\,N/m} = \underline{1.0\,m}$$

find equil. point

$$k y_{eq} = mg \qquad y_{eq} = \frac{mg}{k} = \underline{0.5\,m}$$

$$\Delta U + \Delta K = 0$$

$$-mg(0.5) + \frac{1}{2}k(.50)^2 + \frac{1}{2}mv^2 = 0$$

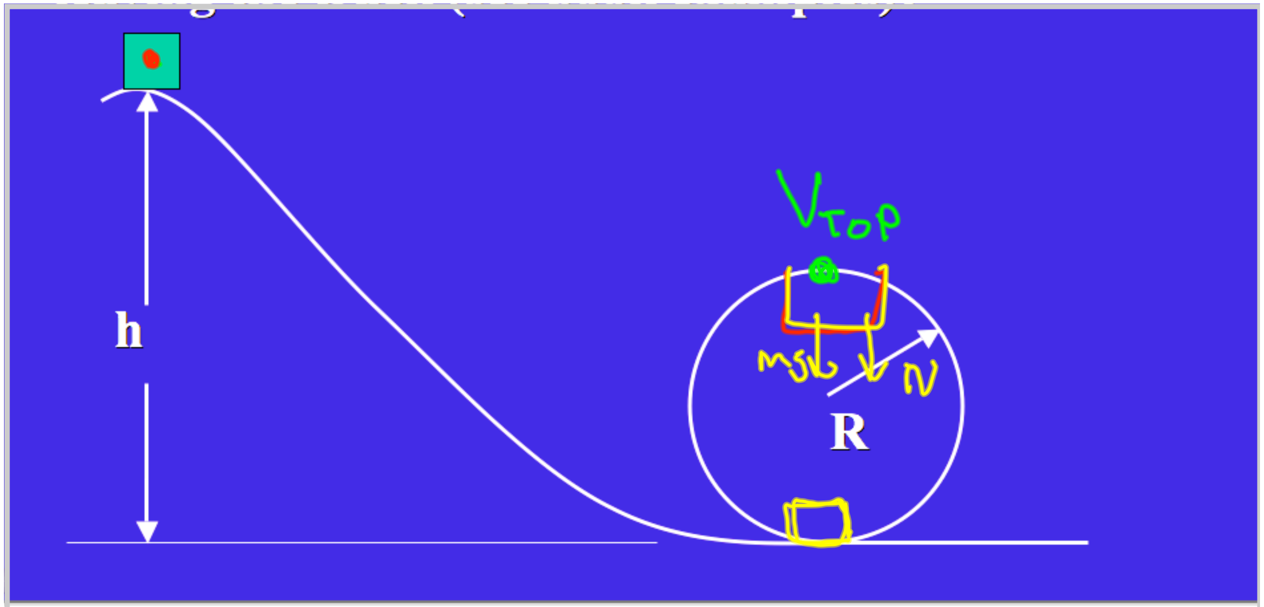
$$-\frac{1}{2}k(.50)^2 + mg(.50) = \frac{1}{2}mv^2$$

$$-\frac{k}{m}(.50)^2 + 2g(.50) = v^2$$

$$-(19.6)(.50)^2 + 2(9.8)(.50) = v^2$$

$$\sqrt{-4.9 + 9.8} = v$$

$$v = \sqrt{4.9} = 2.2\,m/s$$



$mgh = \frac{1}{2} m v_{TOP}^2 + mg\,2R$

$-N - mg = -\frac{m v_{TOP}^2}{R}$ Let $N \to 0$

$mg = \frac{m v_{TOP}^2}{R}$ $V_{TOP} = \sqrt{gR}$

$mgh = \frac{1}{2} mgR + mg\,2R = \frac{5}{2} mgR$

$h = \frac{5}{2} R$

A block that is on a table (not frictionless) is pushed to the left by a force equal to 5N. The block moves to the left at a constant speed of 2m/s. We can conclude that the total work done by all forces acting on the object is

a. greater than zero.

b. less than zero.

c. equal to zero.

d. unknown.