The Schedule

Today:
• Finish up Chapters 6&7
• Chapter 6 in recitation if you haven’t already

Next week: (10/16)
• Chapter 6 HW due
• Chapter 8 in lecture (reading questions due)
• Chapter 7 in recitation

Following week: (10/23)
• HW 7 due
• Chapter 9 in lecture on Tues (reading questions due)
• Exam 2 on Thursday October 26th
Energy

- Potential Energy & Conservation of Energy problems
- The relationship between potential energy and Force
- Energy diagrams and Equilibrium
Energy Review

If there is net work on an object, it changes the kinetic energy of the object (Gravity forces a ball falling from height $h$ to speed up $\rightarrow$ Work done.)

$$W_{\text{net}} = \Delta K$$

If there is a change in the potential energy, some one had to do some work: (Ball falling from height $h$ speeds up $\rightarrow$ work done $\rightarrow$ loss of potential energy. I raise a ball up, I do work which turns into potential energy for the ball)

$$\Delta U_{\text{Total}} = W_{\text{Person}} = -W_{\text{Gravity}}$$
Energy Review

If work is done by a non-conservative force it is negative work (slows something down), and we get heat, light, sound etc.

\[ E_{\text{Heat+Light+Sound}..} = -W_{\text{NC}} \]

If work is done by a non-conservative force, take this into account in the total energy. (Friction causes mechanical energy to be lost)

\[ K_1 + U_1 = K_2 + U_2 + E_{\text{Heat}...} \]
\[ K_1 + U_1 = K_2 + U_2 - W_{\text{NC}} \]
Friction and Springs

A block of mass $m$ is traveling on a rough surface. It reaches a spring (spring constant $k$) with speed $V_o$ and compresses it a total distance $D$. Determine $\mu$. 

(b)
Force and Potential Energy

If we know the potential energy, $U$, we can find the force

$$F_x = -\frac{dU}{dx}$$

This makes sense... For example, the force of gravity points down, but the potential increases as you go up
Force and Potential Energy

Draw some examples…

– Gravity
– Spring
Potential Energy Diagrams

• For Conservative forces can draw energy diagrams

• Equilibrium points
  – Motion will move “around” the equilibrium
  – If placed there with no energy, will just stay (no force)
Stable vs. Unstable Equilibrium Points

The force is zero at both *maxima* and *minima* but…

– If I put a ball with no velocity there would it stay?
– What if it had a little bit of velocity?
Bungee Jump

You are standing on a platform high in the air with a bungee cord (spring constant $k$) strapped to your leg. You have mass $m$ and jump off the platform.

1. How far does the cord stretch, $l$ in the picture?
2. What is the equilibrium point around which you will bounce
Next Week…

- Chapter 8: Momentum
  - Reading Questions for Tuesday: Q8.6 and Q8.13
- Homework 6 Due Monday
- Recitation on Chapter 7
- Exam 2 is Thursday October 26th
End of Lecture Notes