Physics of Imagineering **In-class assignment #7**
October 31, 2011 **Energy**

Goals

1. To be introduced to energy.
2. To calculate the values of various forms of energy and show that it is conserved.
3. To practice calculations.

Equipment:

Notebook (draw diagrams directly inside)

Potential Energy

Potential energy depends on the mass of the object, how high the object is, and the acceleration due to gravity. This is represented by $PE = mgh$.

1. Calculate the amount of PE you (or, if you'd rather, a 150 pound person) have when standing on the second floor of a building.
2. Would you have more or less PE when stading the same distance from the surface of the moon? Explain.
3. Calculate the PE of a California Screamin' car at the top of the first lift hill (120 feet).

Kinetic Energy

Kinetic energy depends on how fast something is moving and on the mass of the object moving. It depends more on the velocity than the mass, because when mass doubles the energy doubles, but when velocity doubles, the energy goes up by a factor of 4. This can be represented by the equation $KE = \frac{1}{2}mv^2$.

4. Calculate the amount of KE you (or, if you'd rather, a 150 pound person) would have when moving at 30 mph. Make sure your answer is in units that make sense.
5. Calculate your KE when moving at 60 mph.
6. Calculate the KE of a California Screamin' car after it has left the magnetic accelerators.
7. How much work is required to get you to spin (or, if you prefer, a 150 lb person) in a teacup at 5s per revolution?

Conservation of Energy

8. Should your answers to #3 and #6 match? Why? Do they?
9. According to http://en.wikipedia.org/wiki/Disney's_Blizzard_Beach, Summit Plummet is 120 feet tall. Calculate your PE at this height.
10. Using conservation of energy, what should your speed be at the bottom of the slide?
11. Should this speed depend on the mass of the person using the slide? Explain.
12. Does your result match the number quoted in the article above? Does that surprise you? Why?

Rides

- Mad Tea Party, Grizzly River Run, any Roller Coaster