Ch 15 Notes

Energy
- The ability to do _____ (_____)

- measured in _____ (_____)

Types of Energy

<u>Kinetic Energy (_____)</u>
- Energy of motion

- KE= _____

m = _____ v = _____

The faster and object moves (_____) and the heavier it is (_____) gives it more KE

<u>Potential Energy (_____)</u>
-stored energy due to _____ or _____

-position- the higher an object is = _____

PE = mgh
m=_____ g=_____ h=_____

-shape- bending or stretching an object can store energy (rubber bands)

Types of Potential Energy

_____ - potential energy that depends upon an object's height.

*Most common type and what we will mostly talk about!

_____ - potential energy of an object that is stretched or compressed.

Potential Energy Problems
1. Find the potential energy of a light that has a mass of 13.0 kg and is 4.8 m above the ground.

2. What is the potential energy of a car that is held up on a crane 40 meters high, and has a mass of 3000. kg?

Kinetic Energy Problems

1. The fastest human foot speed on record was 12.42 m/s seen by Usain Bolt during a 100 meter sprint. If Usain Bolt has a mass of 94 kg what was his kinetic energy during this run?

2. What is the kinetic energy of a jogger with a mass of 65.0 kg traveling at a speed of 2.5 m/s?

Forms of Energy

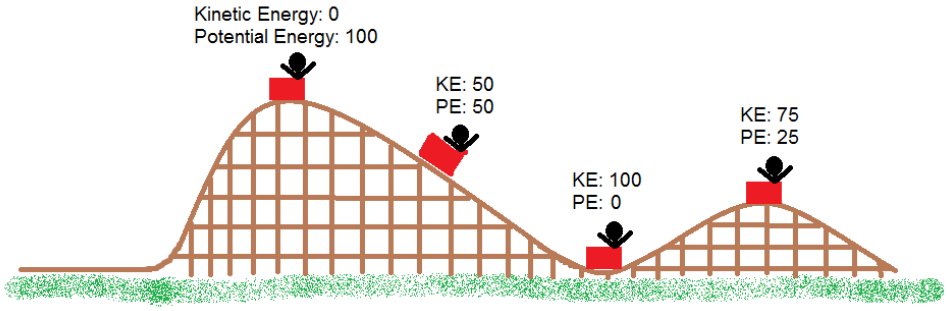
1. _____- moving objects (not looking at atomic level)
2. _____- movement of atoms, related to heat
3. _____- dealing with movement of electrons/electric charges
4. _____- energy trapped in bonds (gas, coal, bread, apples)
5. _____- energy from the strong and weak force
    a. _____- splitting an atom (power plants use U)
    b. _____- joining atoms (sun combining H's into He's)
6. _____- spectrum found on pg 540 of book (UV, xrays, visible light, radio waves)

Mechanical Energy

- (KE + PE)_____ = (KE + PE)_____
- - A diver on the board has no velocity (so their initial KE is 0), but they have lots of height (so their initial PE is very high)
- Just before they hit the water their velocity is very high (so the final KE is high), and their height is almost 0m (so their final PE is almost 0)
- PE at the _____ is converted to KE at the _____
- _____ = _____

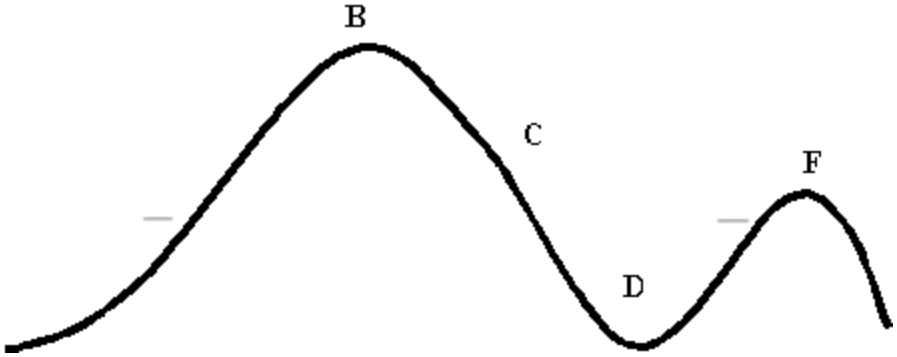
Kinetic vs. Potential in Roller Coasters

Diagram 1



Label each letter in Graph 2 with...
KE & PE with these numbers…
10, 5, & 0 J

Diagram 2



Energy and Mass

- energy and mass are basically different forms of the same thing and can be converted into one another.

-_____ made this famous with

$$E = m c^2$$

_____ = _____ x (_____)^2

* a little bit of mass can turn into massive amounts of energy.

Energy Conversions

Energy can be converted from one form to another

Striking a Match --> Match Lighting --> Heating the Air

_____--> _____--> _____

Law of Conservation of Energy- Energy _____, only transferred from one form to another.

Energy Resources

How we get our energy

_____ Energy- energy that can be replaced in a relatively short period of time.

_____ Energy- generally fossil fuels, can not be replenished at the rate that we are using them.

Coal

Pros-

- _____
- We can get it in the U.S.
- How we get most of our _____

Cons

- _____
- Mining is tough on environment
- Nonrenewable

Oil

Pros

- Provide _____ for the price and mass

Cons

- _____
- Nonrenewable
- Not enough in this country _____

Solar

Active/Solar Panels

Cons

- Only works _____
- Not efficient
- Doesn't give as much energy as _____

Pros

- Clean/Renewable

Passive-Water heating on roof, South facing homes, etc.

Pros

- _____
- Cheap
- Renewable

Cons

- Won't _____
- Only acts as a supplement

Biomass-using the chemical energy stored in _____

Pros- energy can be produced locally

- Ex- burning wood, collecting methane from cow manure, _____

Cons

- Takes more energy to make energy

Hydroelectric-using dams to force water to turn a _____ to make electricity

Pros

- _____
- Clean, no fossil fuels

Cons

- Changes river ecology- fish, plants, people

Wind

Pros

- _____
- Clean energy

Cons

- _____
- Only works in windy areas
- Noisy/birds

Hydrogen Fuel Cells

Pros

- Renewable
- Water is the _____
- Fuel is Hydrogen, which is found everywhere

Cons

- Not efficient
- Still science fiction in terms of efficiency

Geothermal

- _____- using the heat from magma to boil water, make steam, run turbines for electricity
- Only works in areas near surface magma

- _____- stealing the heat from regular ground water, to heat buildings

Nuclear

Fission-_____ U atoms, capturing the heat to boil water and make electricity

Pros

- High energy for only a _____

Cons

- _____
- Radioactive waste

Fusion-combining _____ atoms to make energy (how our sun works)

Cons

- Not efficient
- Still science fiction with efficiency