Law of Conservation of Energy

Remember Newton's Cradle

- Chant: "Energy can neither be created, nor destroyed, WHAT? Energy can neither be created, nor destroyed, WHAT? Energy can neither be created, nor destroyed, It just changes form."
- Energy **NOT** created or destroyed
- Total amount stays the **SAME**
- Can only **change form** of energy

Five (5) Forms of Energy

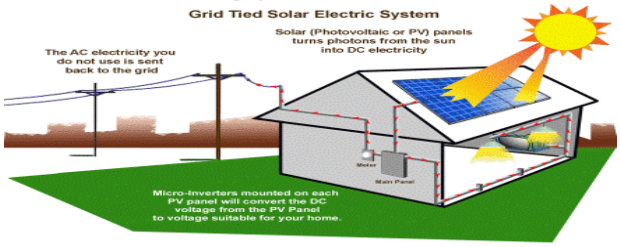
*Mnemonic Device:

HCSME!

Light, sound & nuclear (like the atom bomb) are forms of energy also, but more emphasis is placed on the main 5 forms.

1. **H**eat
2. **C**hemical
3. **S**olar
4. **M**echanical (includes potential/kinetic)
5. **E**lectrical-sound and light energy can be transformed with electrical energy in a circuit.

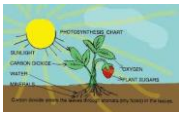
Solar Energy



- Original source of all energy is from the sun
- Solar cell- changes solar energy → electrical energy

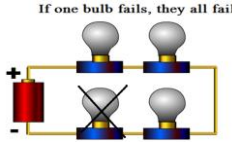
Chemical Energy

Chemical Energy is POTENTIAL Energy

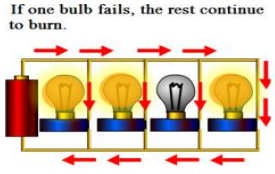


- Energy *stored (potential)* in particles & released (batteries & food)
- Photosynthesis (sugar) solar → chemical

Electrical Energy



- **Series circuit-if one burns out they all go out.**



Parallel circuit-(2 or more paths for electricity) if one burns out they can stay on.

- Energy that **flows** through an electric circuit
- Produced by ***batteries***, by burning fuels in ***generators***
- **4 parts circuit (copper wire, switch, voltage source, resistor)**
- **Sources of electrical energy include: stored chemical energy in batteries; solar energy in solar cells; fuels or hydroelectric energy in generators**

******IF IT HAS A WIRE, IT HAS TO BE ELECTRICAL ENERGY!**

Mechanical Energy-

all energy that is in a moving object; may be potential (stored) or kinetic (moving).

potential → stored energy due to **position** of object can move but isn't (stretching a rubber band stores mechanical potential energy, rock at the top of a hill, water behind a dam).

kinetic → motion/moving ***verb showing action** (*releasing* a rubber band uses mechanical kinetic energy, rock *falling* from the top of a hill, water *going over* a dam).

Heat Energy

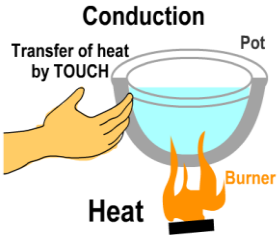
The total energy of the particles in a substance (***associated with motion***)

- faster object (more kinetic)→hotter
- slower object (less kinetic) → colder

3 types of heat energy?

Conduction, convection, radiation

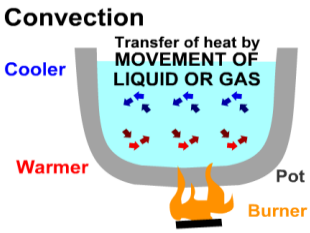
Con**D**uction (heat transfer)



heat transfer (objects heating up) by **D**irect contact/2 objects touching

- **H**eat flows from **H**otter to colder objects

Con**V**ection

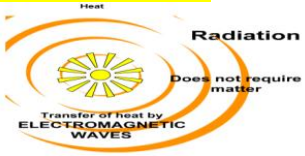


(heat transfer)

gases and liquids heat up by:

wa**r**m **r**ising (weighs less), cold sinking (weighs more)

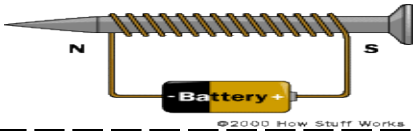
Radiation-like sun "rays"



(heat transfer)

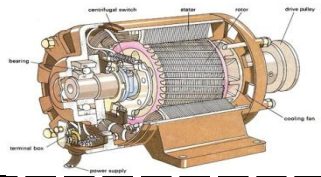
- heat moving through **space**
- heat does not need to travel through air or other particles

Electromagnet



- Uses electrical energy to make magnetic field (makes a temporary magnet), device doesn't spin.

Simple **E**lectric **M**otor



device changes:

Electrical → **M**echanical/kinetic

"Oh my word, electric motors haven't ya heard? E to the M, E to the M, E to the M . . .

Generator

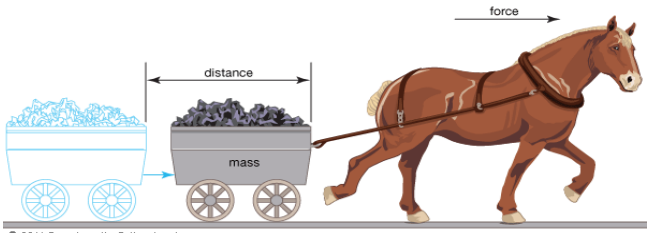
Generators generate elec-tri-city! For who, who, who? For ME, ME, ME!

Mechanical/Kinetic → **E**lectrical

Energy

- The ability to do work. If there is no energy, then there is no work done.

Work



- Since energy is needed to do work (no energy, no work).
- Formula: Work = force x distance
- Units : Joules=Newtons x meters

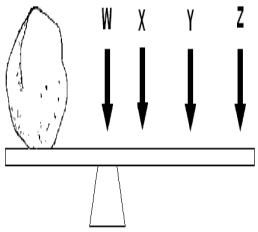
Simple Machines- Chant

A simple machine of course, of course, always reduces the force of course. A simple machine of course, of course, always reduces force!

Compound/Complex Machines

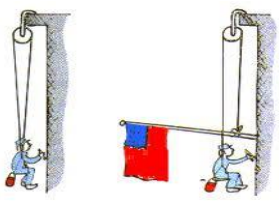
- *reduce* ***force*** by increasing **distance** traveled; Amount of work stays the same ***only effort force changes!***
- compound- more than 1 simple machine

Levers

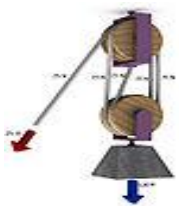


- fulcrum- pivot (turning point), fulcrum closer to load requires less force to move; moves up/down, side/side
- don't forget your arm is a lever (elbow-fulcrum, muscle-effort force, pen in hand-load)

Pulleys



single, fixed

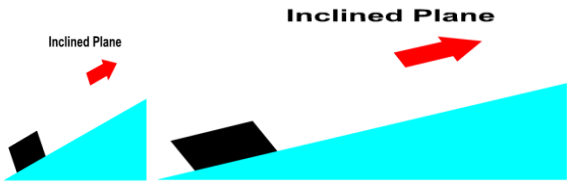


movable

single, fixed- only changes direction of load, doesn't reduce force (flag pole, clothesline)

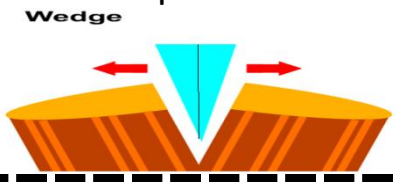
***moveable**- *does* *reduce force* needed to move load (block and tackle-lifts engine)

Inclined Plane



ramp- *reduces force* needed
by increasing distance object moves/

wedge- 2 inclined planes back to back



Screw

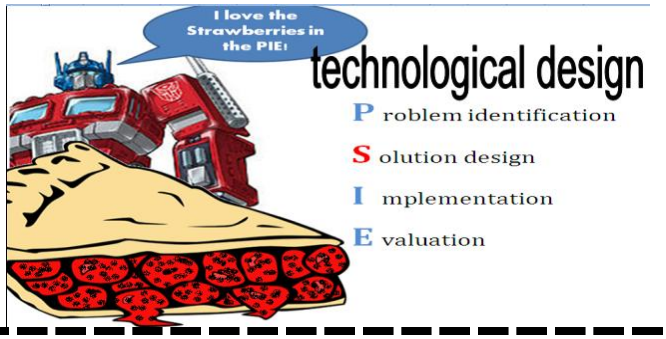
- modified inclined plane wrapped around a cylinder
- *reduces force* needed by increasing distance

Wheel & Axle

wheel rotates, axle passes through center of wheel

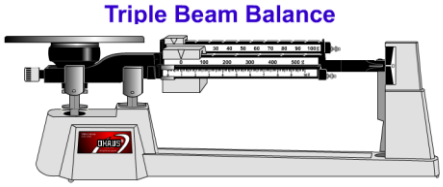
Mnemonic device to remember the six simple machines plus the gear.

Technological Design



Goal: improve life
Strawberries in the PIE:
1. **P**roblem Identification (What's needed?)
2. **S**olution Design (back to the drawing board)
3. **I**mplementation (testing it on people)
4. **E**valuation (Did it work?)

Triple Beam Balance



Mass means matter and that's a fact with the triple beam balance add front to back, add 1, add 2, add the 3rd beam . . . ya that's right you get the scene! Keep it up and you use your hand and don't forget to label **grams**!

Tool used to measure mass in grams (g).

Spring Scale

Tool used to measure weight or **force** in **Newtons (N).**