Law of Conservation of Energy

Remember Newton’s Cradle

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.

Solar Energy

Original source of all energy is from the sun

Solar cell - changes
solar energy → electrical energy

Chemical Energy

Energy stored (potential) in particles & released (batteries & food)

Photosynthesis (sugar)
solar → chemical

Electrical Energy

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

Conduction (heat transfer)

Heat transfer (objects heating up) by Direct contact/2 objects touching
- Heat flows from Hotter to colder objects

Convection

(heat transfer)

gases and liquids heat up by:
- warm rising (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 Electric Motor

**device changes:**

**Electrical** → **Mechanical/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** → **Electrical**

### 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**- 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. Problem Identification (What’s needed?)
2. Solution Design (back to the drawing board)
3. Implementation (testing it on people)
4. Evaluation (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!

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