Kinetic and Potential Energy
What is energy?

Ability to do work (change)
Remember the forms of energy!

1. **Thermal Energy** – motion of energy in the particles of matter due to more/less heat.
   (Heat energy = when thermal energy is transferred)

2. **Radiant Energy** – electromagnetic waves of light
   (Solar Energy = specifically from the Sun)

3. **Chemical Energy** – energy stored in matter

4. **Electrical Energy** – energy flowing in an electric circuit.

4. **Mechanical Energy** – due to motion and position
   1. **Potential Energy** – stored energy
   2. **Kinetic Energy** – moving energy
Forms of Energy

All forms of energy fall under two categories:

**POTENTIAL**

- Stored energy or energy of position

**KINETIC**

- Energy of motion (motion of waves, electrons, atoms, molecules, and substances)

**Types:**

- Chemical

**Types:**

- Thermal
  - Heat
  - Solar
  - Electrical
  - Radiant
Potential Energy

- Is stored energy = not in use
- Can’t see it, but it is there.
- Based on position/height or composition (inside materials)

It is called potential energy because it has the potential to be converted into other forms of energy, such as kinetic energy.
Potential Energy Examples:

1. Wound-Up Spring

2. Baseball Pitcher (not released yet)

3. Holding a hammer high
The higher the object = the more the potential energy

What letter will the cart have the most PE?
The more mass an object has the more the potential energy.
More Examples of (Position) Potential Energy:

4. Stretching a rubber band..
   - Stores energy

Water at the top of a waterfall..
   - Stores energy

Yo–Yo held in your hand..
   - Stores energy because of position

Drawing a Bow…
   - Stores energy because of position
Chemical Energy is a type of Potential Energy

- Energy is stored in bonds of chemicals that make up the substance.
- Energy can be released, but hasn’t been yet.

Food is a form of chemical energy!
Chemical Examples:

- **FUELS:**
  - Wood
  - Coal
  - Oil
  - Gas

*Energy is stored until they are burned.*
Chemical Examples:

- Food
- Batteries
- Candle wick
Kinetic Energy

- Is based on **movement**.
- Can see it.
Examples of Kinetic Energy

- Running
- Wood Burning
- Rock Falling
More Examples of Kinetic Energy

• Shooting a rubber band.

• Water falling over the fall.

• A Yo-Yo in motion.

• Releasing the arrow from the bow.
Types of Kinetic Energy

- **Thermal/Heat** – particles in matter move as heat is added.
- **Radiant/Solar** – electromagnetic waves move through space to Earth
- **Electrical** – electrons move through metal in a closed circuit to provide power to objects.
Energy doesn’t always stay in one form…it TRANSFORMS

- Occurs between various types of energy.
- Energy is never lost.
- 1 energy form can transform into 2 different forms.
Law of Conservation of Energy

• “Energy can neither be created nor destroyed, it just changes forms.”

• This means that no energy is ever “lost”!
• Energy is just transformed.
• Total amount of energy in = total energy out
Potential Energy Converted to Kinetic Energy…

When stored energy begins to move, the object now transfers from potential energy into kinetic energy.
Energy Transformation with Food

- **Potential Energy:** When you look at your food and eat it because it has the potential to give you energy.

- **Kinetic Energy:** When you digest your food into usable energy the chemicals in the food are set into motion.
Examples of transformations of Potential to Kinetic

Water behind a dam > water falling down.
Examples of transformations of Potential to Kinetic

Book on high shelf > book falling down.
Examples of transformations of Kinetic to Potential

Water moving down a river > water stopping at a closed dam.
Examples of transformations of Kinetic to Potential

Moving book up to a shelf > book sitting on a high shelf.
Name the transformations…
Don’t forget about friction…

• Friction generates heat
• This means…
Not all potential energy is converted to kinetic….some is also transformed to thermal energy.

• This makes objects stop and transform back to potential.
Energy Lesson Review

- Energy is the ability to do work.

- All forms of energy fall under 2 categories: Kinetic or Potential
  - Potential = stored
  - Kinetic = moving

- Energy cannot be created or destroyed.

- Energy is always being transformed.