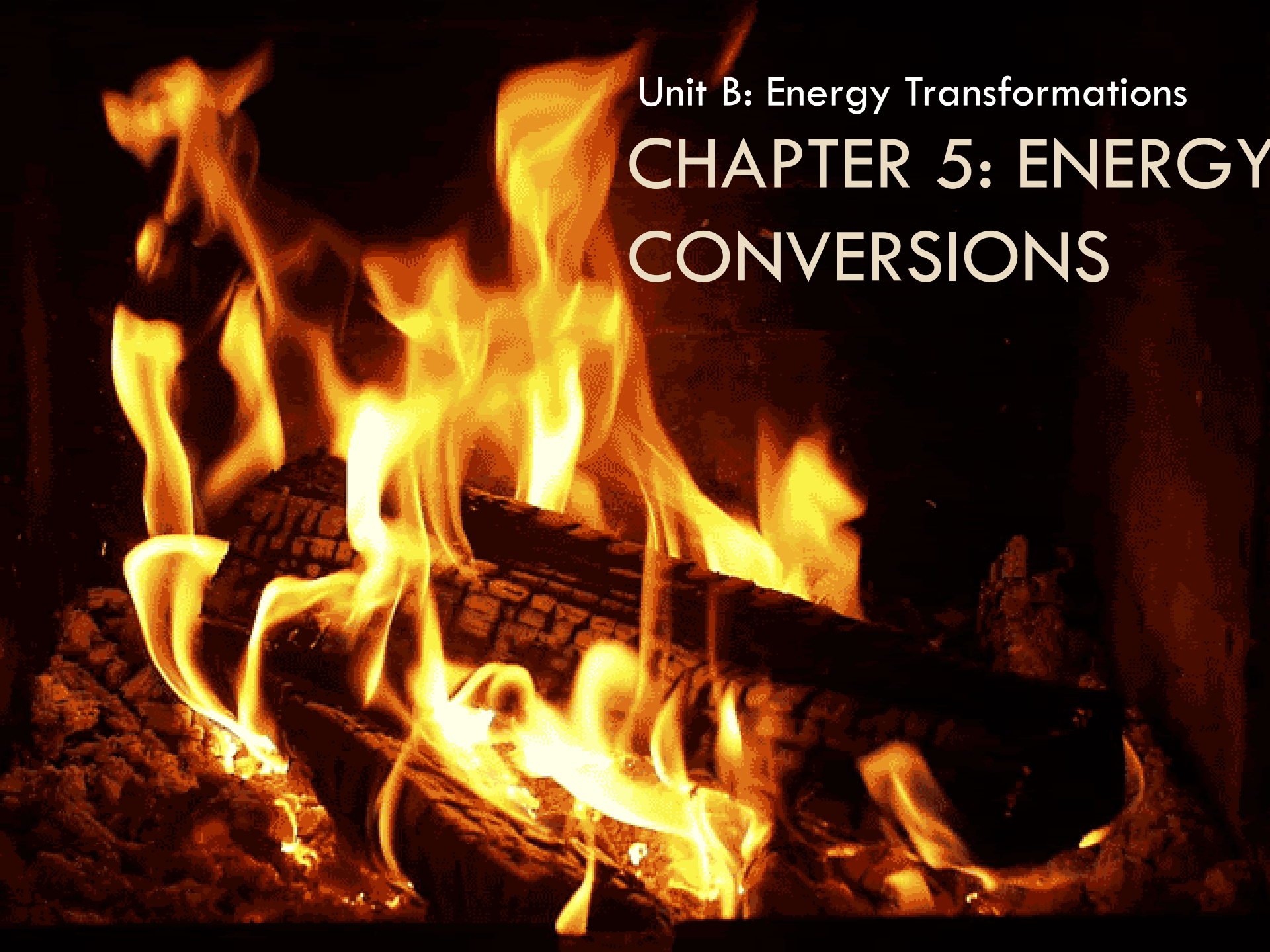
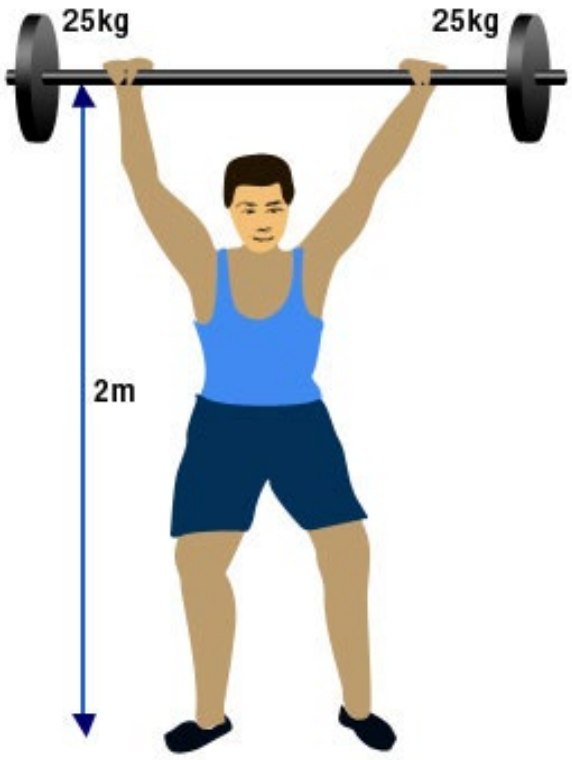


Unit B: Energy Transformations

CHAPTER 5: ENERGY CONVERSIONS

Energy

- Energy is the ability to do **work**
- **Work** is done when a force that is applied to an object moves that object.
- Energy can cause changes to the temperature, shape, speed, or direction of an object

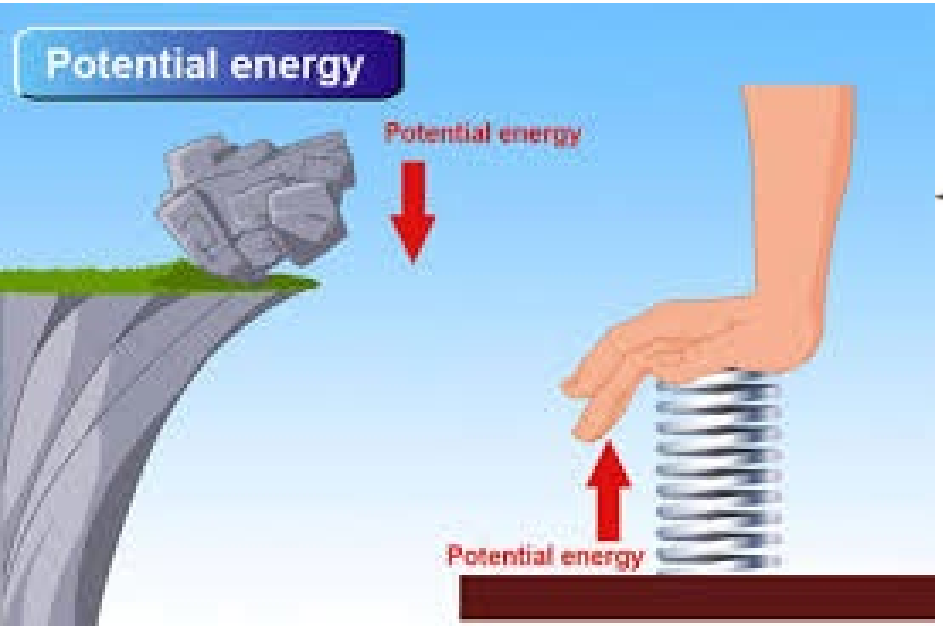


Energy

- Where do we get our energy?
- Our main source of energy is food, and if we don't use all the energy it is stored
- Stored energy that has the potential to do work is called **Potential Energy**
- Potential Energy is then converted to **kinetic energy**

Potential Energy

- In physics, **potential energy** is the **energy** that an object has due to its position
- Often the higher off the ground the object is the higher it's potential energy is



Kinetic Energy

- In physics, the **kinetic energy** of an object is the **energy** that it possesses due to its motion.
- The body maintains this **kinetic energy** unless its speed changes.

Forms of Energy

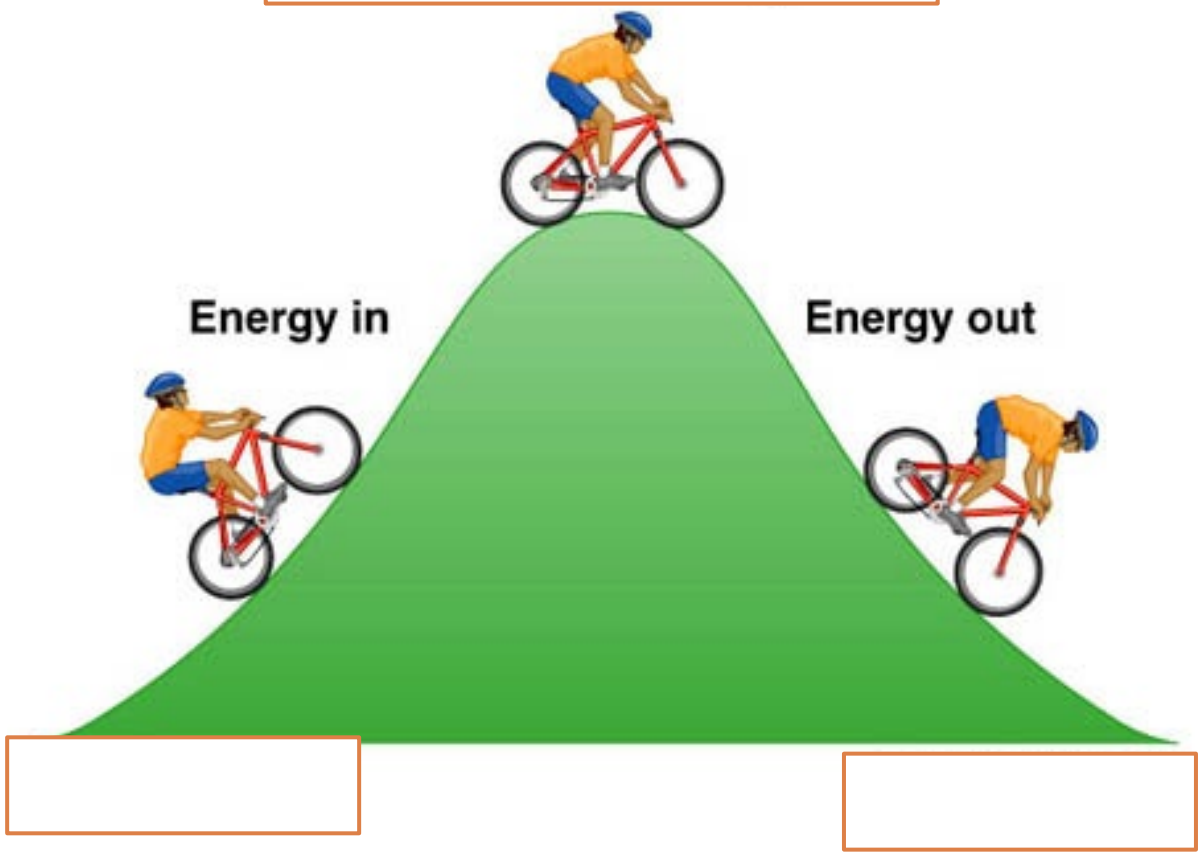
All forms of energy fall under two categories

POTENTIAL

Stored energy or energy of position (gravitational)

KINETIC

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



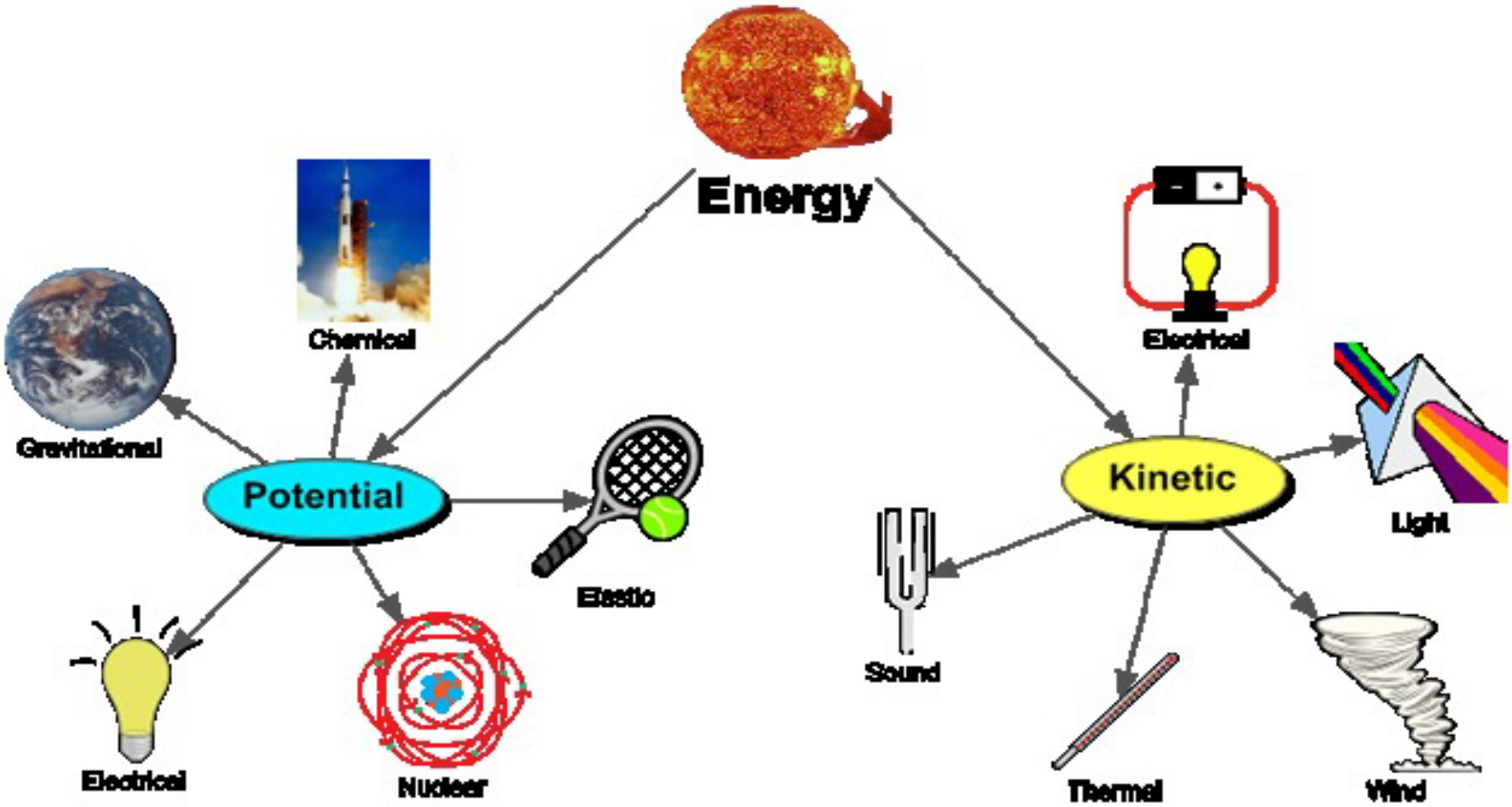
As Kinetic Energy increases Potential Energy decreases

So as Kinetic Energy decreases, Potential Energy increases!

Many Forms of Energy

- Energy Conversions – turning one form of energy into another
- We probably wouldn't be able to survive without certain energy conversions
- Without energy from the sun, life wouldn't exist on earth
- As with food webs most energy will start with plants

Forms of Energy



Examples

1. Eating food
2. Light bulbs
3. Dropping a beet
4. Gasoline in a car
5. Wind Turbine

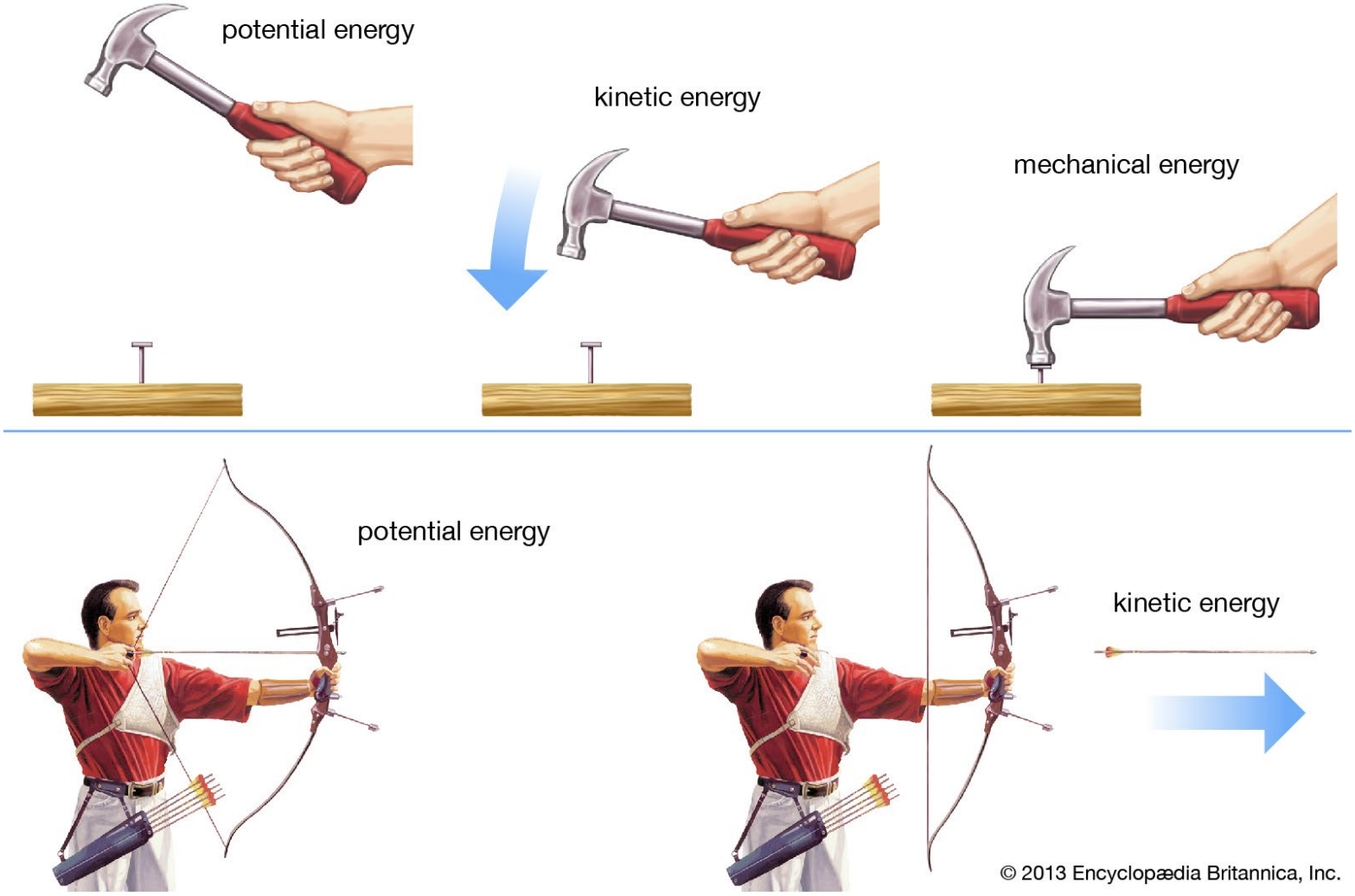
1. Chemical → Potential
2. Electrical → Light
3. Potential → Kinetic
4. Chemical → Kinetic
5. Kinetic → Electrical

SCIENCE!

2 B Continued

Chapter 5 continued

Review


potential energy
kinetic energy
mechanical energy
potential energy
kinetic energy
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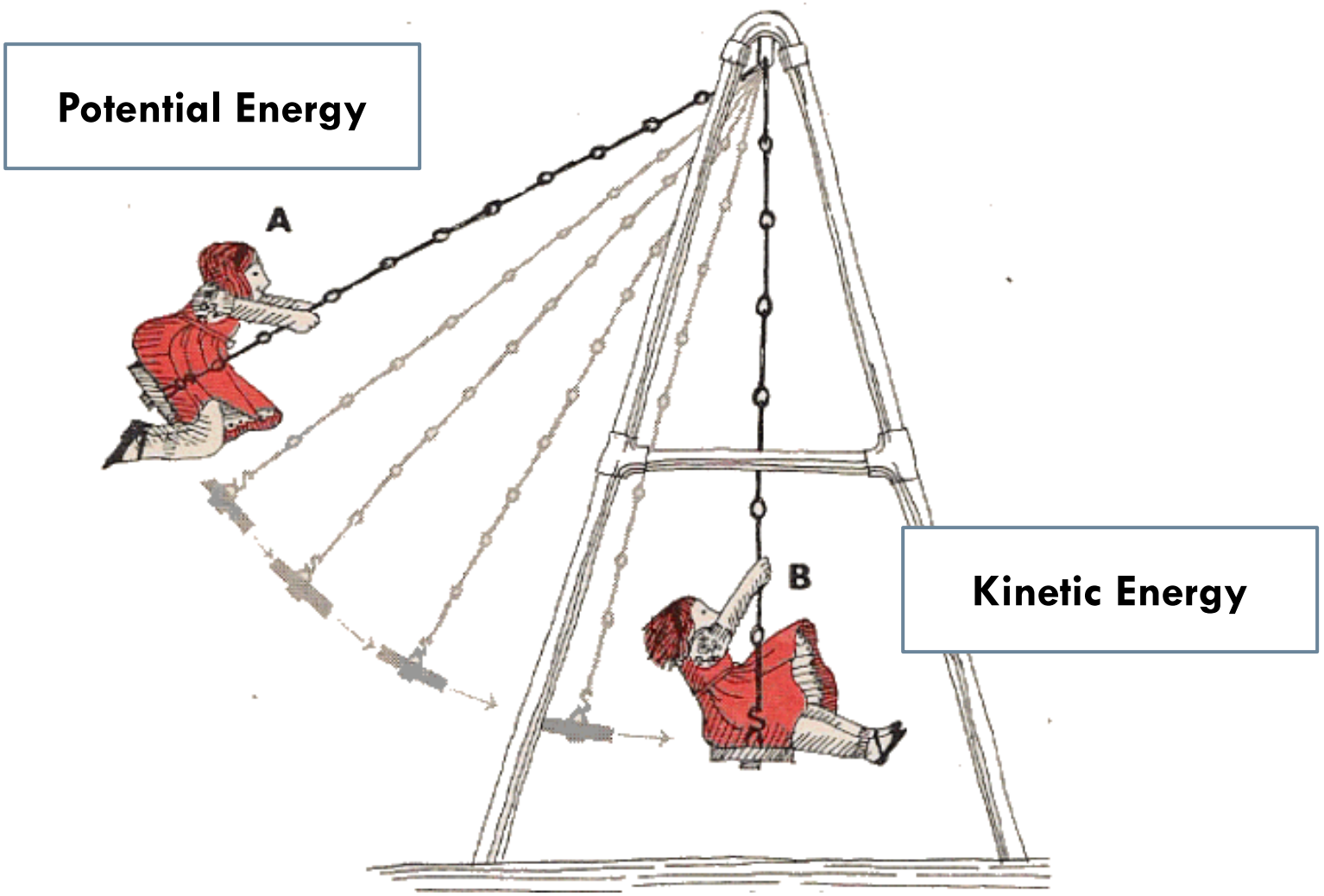
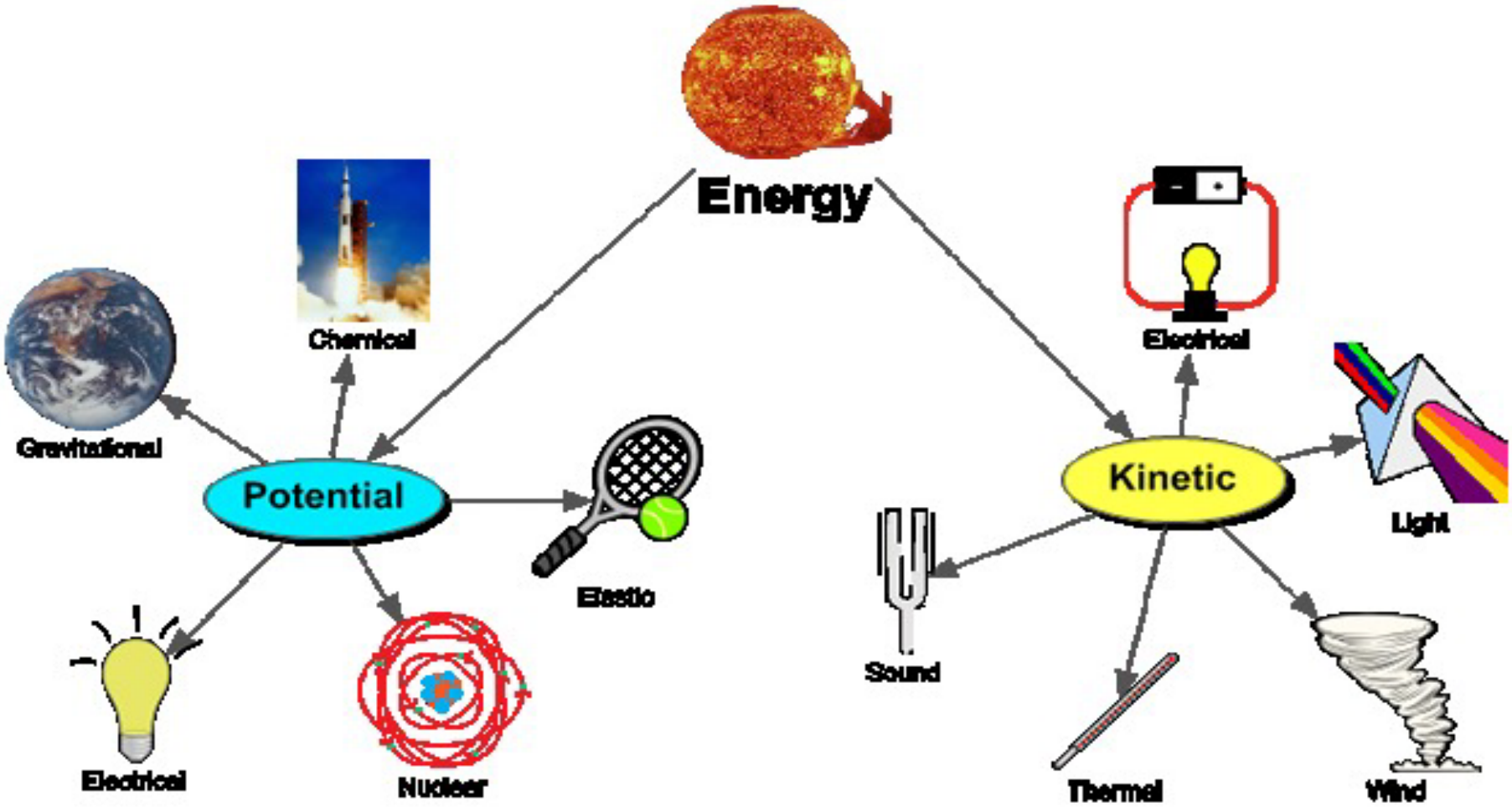
Review

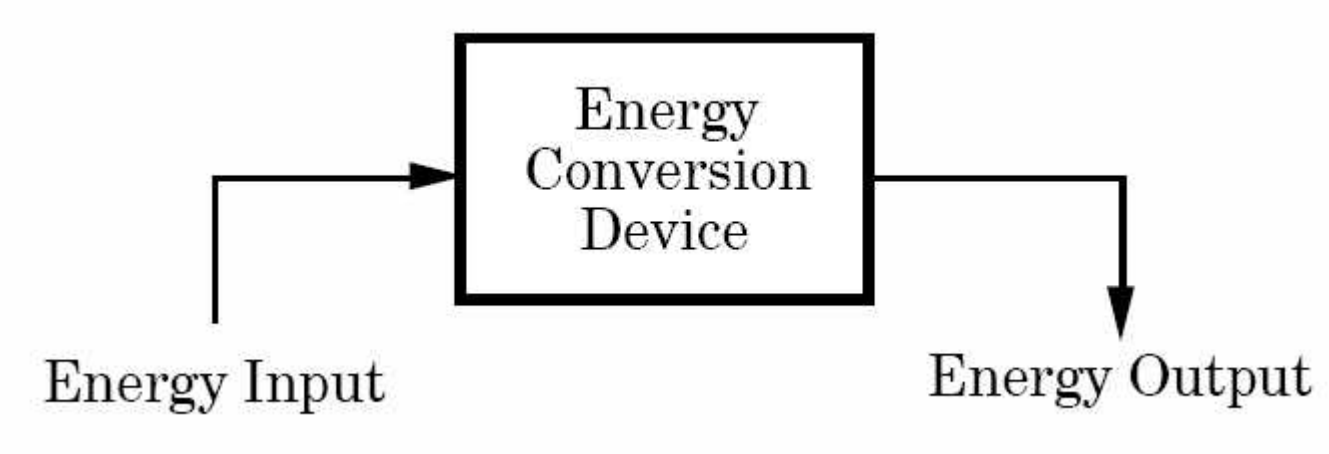


Forms of Energy

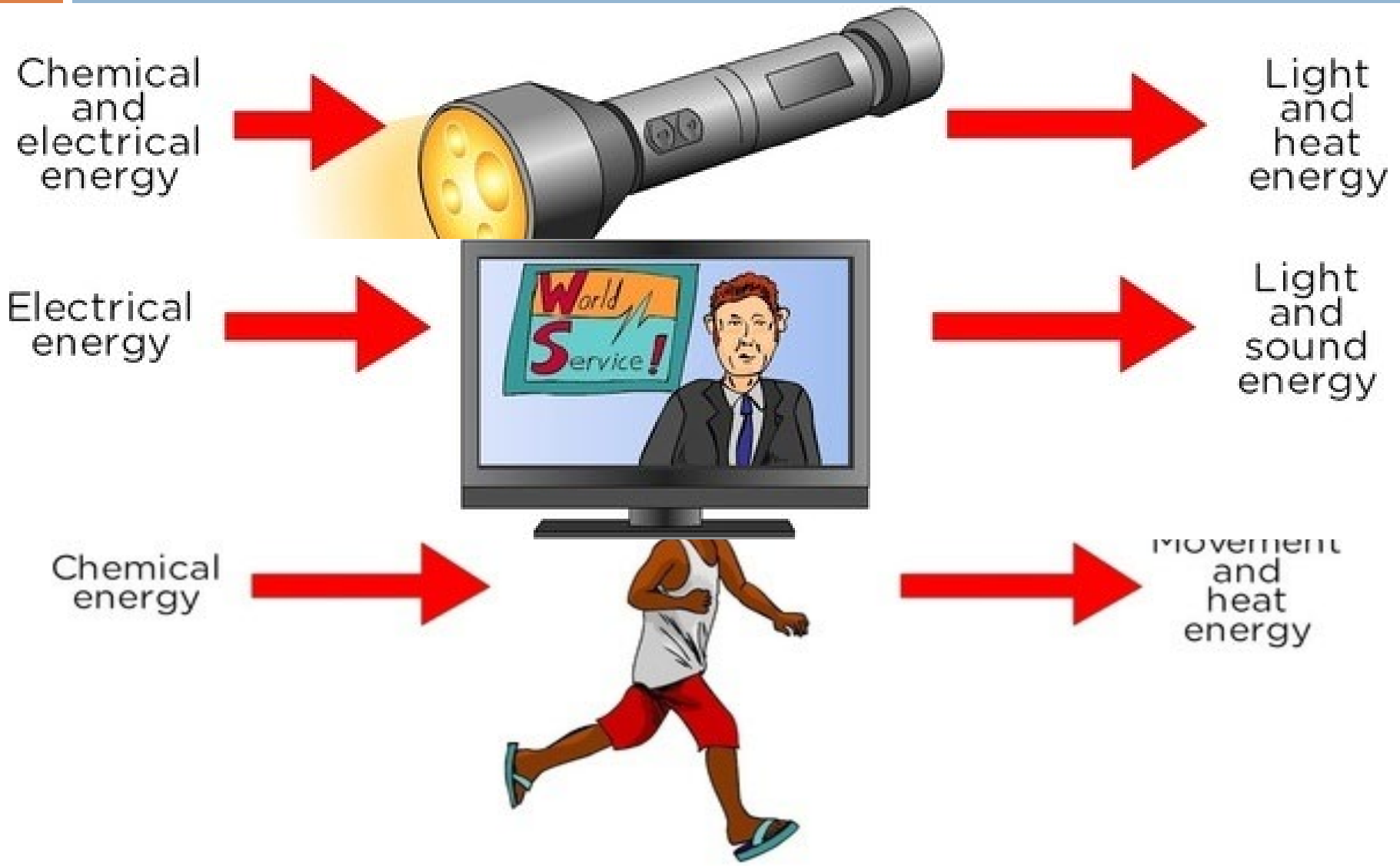


Energy Conversions

- In order to do work energy constantly changes from one form to another
- **Input energy** – energy that enters the system
- Energy is changed from one form to another at the **converter**
- **Output energy** – energy that leaves the system



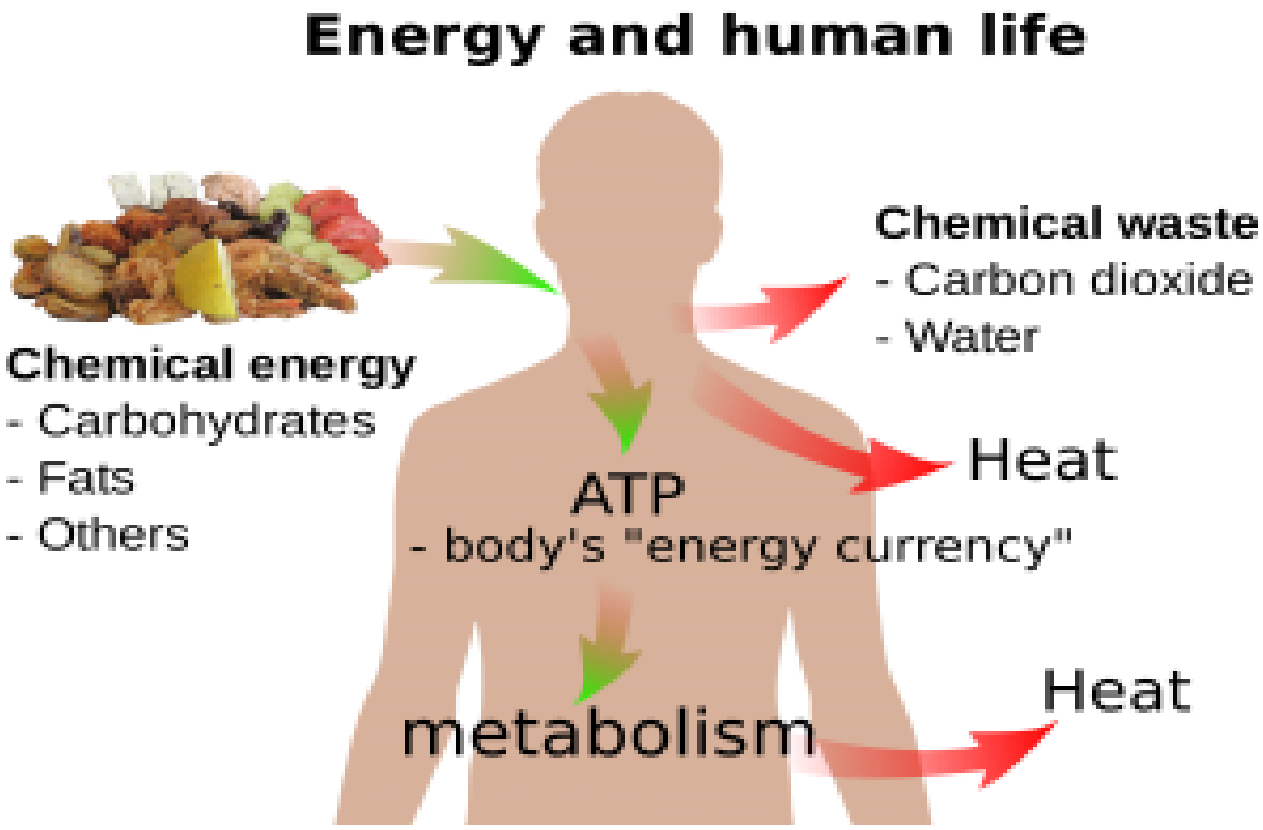
Input → Converter → Output



Chemical Conversions

- The heat you feel during exercise is produced by a chemical reaction within the muscles of your body
- **Potential** Energy from food is converted to **Thermal** Energy
- Potential Chemical Energy → Kinetic Energy
- Potential Chemical Energy → Thermal Energy

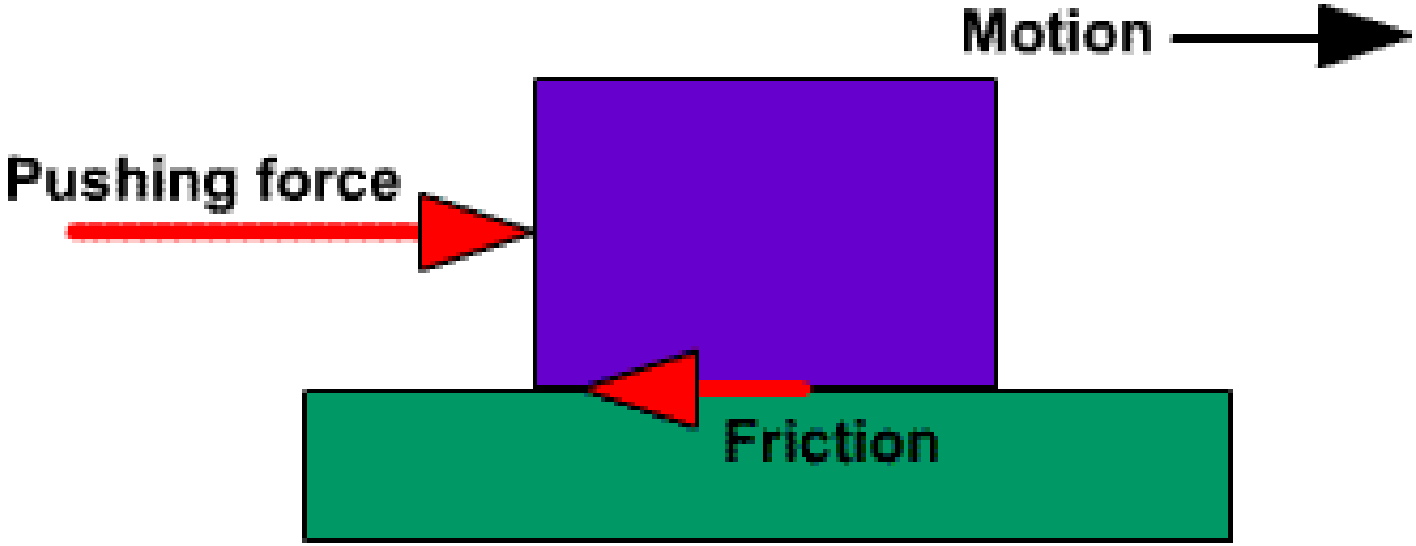
The Body


Energy and human life
Chemical energy
- Carbohydrates
- Fats
- Others
Chemical waste
- Carbon dioxide
- Water
Heat
ATP
- body's "energy currency"
metabolism
Heat

Thermal Energy Waste

- Released during most activities – often as waste energy
- Also produced by machines
- Usually due to **friction**
- Opposes motion
- Excess heat can be dangerous in both man and machine

Friction



Conversion of Energy

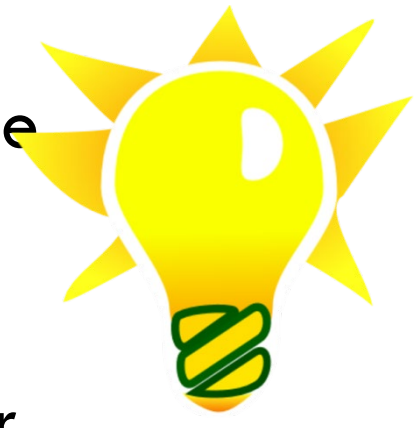
- What types of energy are produced by?

Conservation of Energy

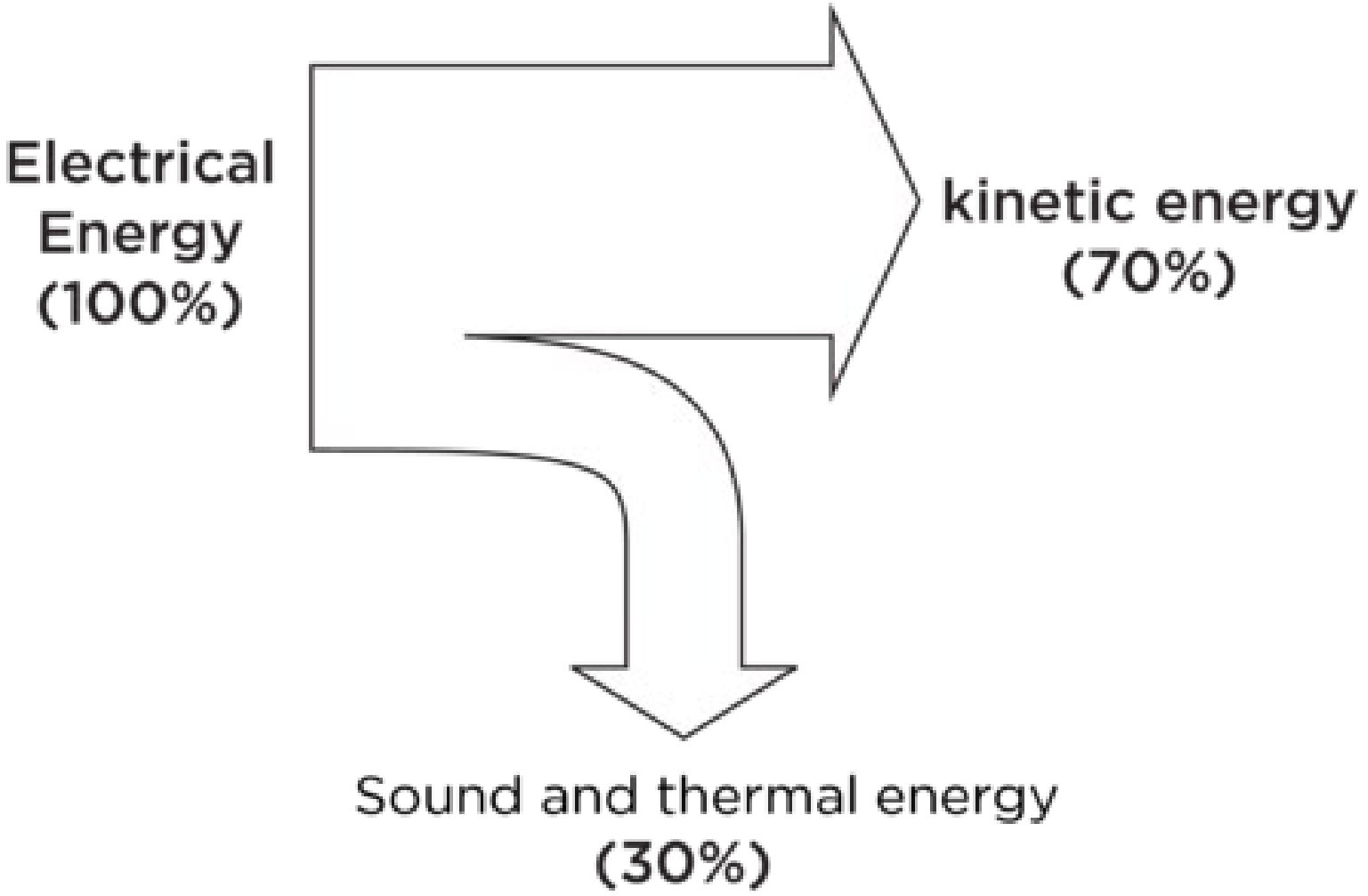
- Energy cannot be created or destroyed
- **Input Energy = Output Energy**
- IPhone
- Input: Chemical Energy = Output: thermal + kinetic + light + sound
- Energy does not disappear it is just changed to different forms that may be hard to detect

Energy Conversion System

- **Input Energy = Output Energy**
- But **Input energy** does not equal **useful output energy**
- Every process will give off some sort of waste energy and not be 100% efficient
- In cars only about 1/3 of the energy provided by gasoline is used to move the car
- For lightbulbs 95% of the energy is waste energy in the form of heat



Example


Electrical Energy (100%)
kinetic energy (70%)
Sound and thermal energy (30%)

End of Chapter 5