

Section 3.1 (p 318 to 343)

Devices and Systems convert energy with varying efficiencies

Energy = the ability to do work

Transformation = the conversion of one form of energy to another

Example 1 : transformation in a gas lawnmower :

Chemical **energy** → **Mechanical energy**



Example 2 : transformation in an electric lawnmower:

Electrical **energy** → **Mechanical energy**



Common forms of energy:

Chemical : energy stored in chemicals; released when chemicals react

ex. gasoline, inside batteries, food

Electrical : energy of charged particles; this energy is transferred when electrons travel

ex. produced by batteries, generators

Mechanical (or kinetic) : energy an object has because it is moving

ex. rolling ball, person walking, spinning fan

Thermal (or heat) : total kinetic energy of all the particles in a substance ; the faster a particle moves, the more kinetic energy it has

ex. warm water, mammals, furnace

Light Energy : the form of electromagnetic energy that you can see

ex. sun, flashlight, lamp

Sound Energy : the energy of vibrating particles ex. ipod

Devices that convert energy from one form to another:



toaster

Input energy → output energy
Electric -> Heat



battery-powered clock

Input energy → output energy
Electric -> Mechanical



blender

Input energy → output energy
Electrical -> Mechanical + Sound



flashlight

Input energy → output energy
Electrical -> Light



gasoline engine

Input energy → output energy
Chemical -> Mechanical



electric blanket

Input energy → output energy
Electric -> Heat



candle

Input energy → output energy
Chemical -> heat + Light

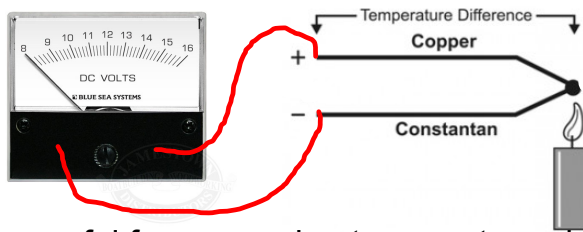


battery charger

Input energy → output energy
Electrical -> Chemical

Thermocouple: a device that can convert **thermal** energy into **electrical** energy

- made of two different metals which conduct heat at different rates
- different metals affect the amount of electricity produced



- useful for measuring temperatures in areas that are difficult to reach or are too hot for a liquid filled glass thermometer.

- Uses:**
- measure temperature in ovens, hot water tanks, furnaces
 - even farmers put them in grain bins



Section 3.1 Questions:

1. What is energy? - the ability to do work
2. What energy transformations take place in each of the following?

electric kettle:

battery operated toy car:

cordless telephone:

3. What does a thermocouple do?
 - converts thermal energy to electricity
4. What is thermal energy?
 - energy of the particles inside something

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5. What is the difference between mechanical and chemical energy?

mechanical - moving

chemical - energy stored in fuel

6. a) What form of energy is found in sugar?

chemical

b) How is that energy used in your body?

transformed into thermal, mechanical, electrical

7. A model rocket uses a flammable fuel to power its flight into the air. What energy transformation takes place in the rocket?

chemical --> thermal --> mechanical

8. In what way is an electric oven the opposite of a thermocouple?

oven converts electricity to thermal

thermocouple converts thermal to electricity

9. Why is a thermocouple a good device for indicating the temperature in a car engine?

- difficult to access