Energy

Chapter 3

Great Idea:

The many different forms of energy are interchangeable, and the total amount of energy in an isolated system is conserved

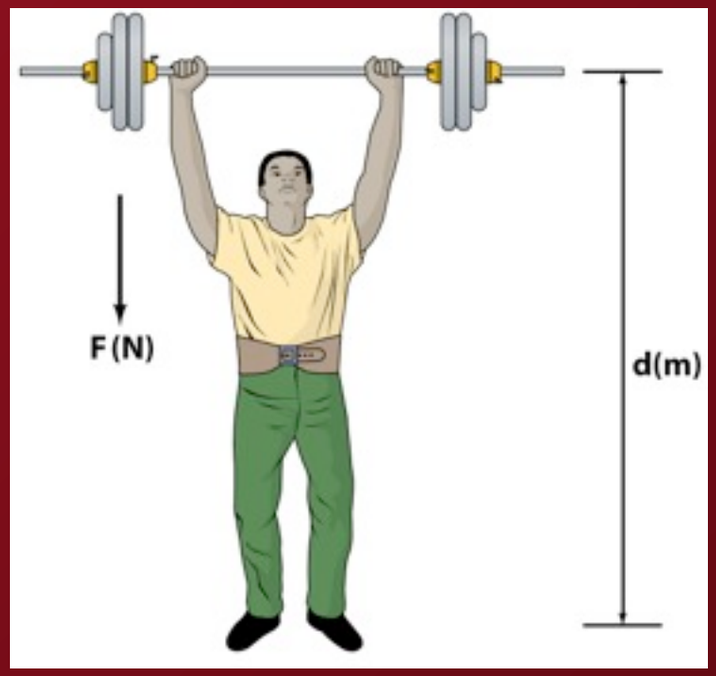
Chapter Outline

- The Great Chain of Energy
- Forms of Energy
- The Interchangeability of Energy
- The First Law of Thermodynamics: Energy is Conserved
- The United States and Its Energy Future

The Great Chain of Energy

Scientifically Speaking

- Energy and force
- Work
  - Force over distance
  - Equation: *W=Fd*
  - *Joule*
- Energy
  - Ability to do work
- Power
  - Rate at which work is done
  - Equation: *P=W/t*
  - *Watts*



Forms of Energy

Kinetic Energy

- Energy of moving object
- Mass and speed
  - Directly proportional to kinetic energy
- Equation: $E_k = \frac{1}{2}mv^2$

Potential Energy

- Energy waiting to be released
- Gravitational Potential energy
  - Equation: $E_p=mgh$
- Chemical potential energy
- Electrical potential energy
- Magnetic potential energy

Heat or Thermal Energy

- Atoms and Molecules
  - bonding
- Motion
  - force

- Thermal Energy
  - Heat
  - Random kinetic energy of atoms and molecules

Wave Energy

- Wave
- Sound wave
- Seismic wave
- Electromagnetic radiation

Mass as Energy

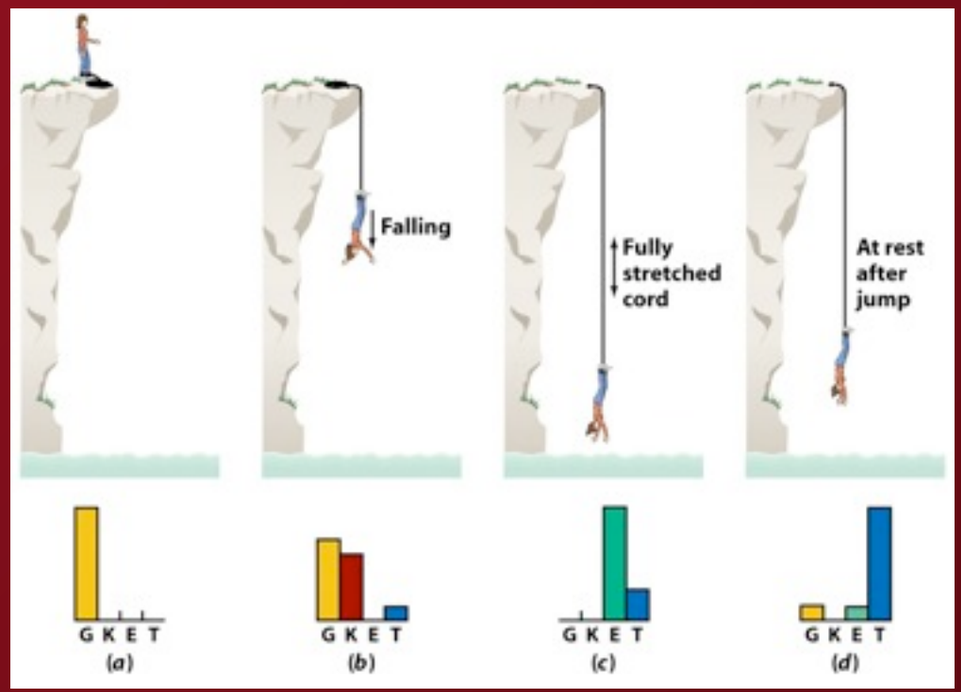
- Radioactivity
- Einstein
  - Equation: $E=mc^2$
- Can convert mass to energy

The Interchangeability of Energy

The Interchangeability of Energy

Table 3-2 Some Forms of Energy

Potential Energy	Kinetic Energy	Other
Gravitational	Moving objects	Mass
Chemical	Heat	
Elastic	Sound and other waves	
Electromagnetic		



The First Law of Thermodynamics: Energy is Conserved

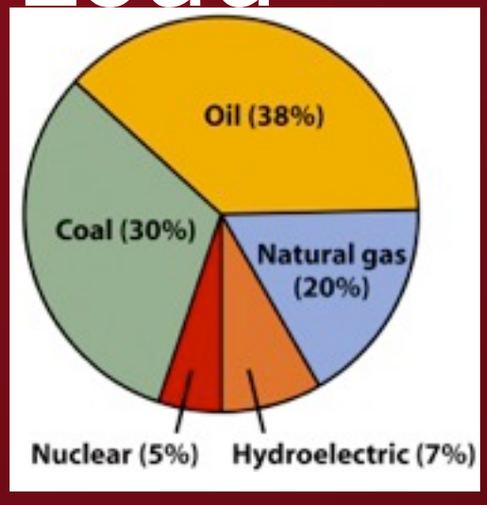
Energy is Conserved

- System
  - Closed
  - Open
- Law of Conservation of Energy
  - Total energy in system is conserved
  - Type of energy vs. total

The Future of Energy

The U.S. & Its Energy Future

- Fossil Fuels
  - –Oil, coal, natural gas
- Renewable Energy Sources
  - –Solar energy, wind
- Base Load vs. Peak Load



Transportation

- Electric vehicles
  - Battery
  - Short range
- Hybrid vehicles
  - Gas and battery
  - Many new models
- Fuel Cell vehicles
  - Hydrogen
  - Uses fossil fuel to create hydrogen