

# *Energy and Work*

**Amusement Park Style**

# Forms of Energy

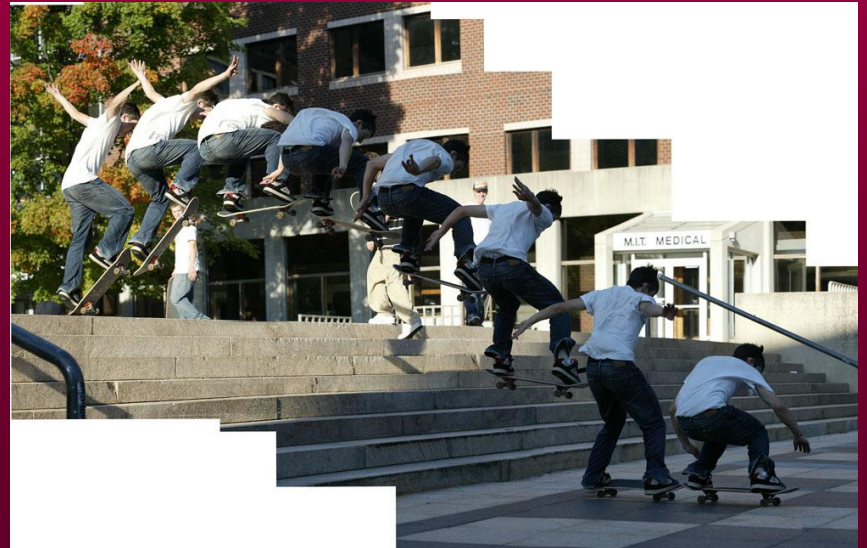
# Forms of Energy

- Mechanical
- Thermal
- Chemical



- Electrical
- Electromagnetic
- Nuclear

Energy can be transferred, or converted, from one form to another!



# Mechanical Energy

- Energy associated with the motion of an object.



- Chewing
- Sound
- Frog Dancing

# Thermal Energy

- Total energy of the particles in a substance or material.

- All objects give off thermal energy
- Ice cream melting gains thermal energy



# Chemical Energy

- Potential energy stored in chemical bonds.



- Food
- Fire Cracker
- Stomach
- Battery

# Electrical Energy

- Moving electrical charges that produce electricity and energy.

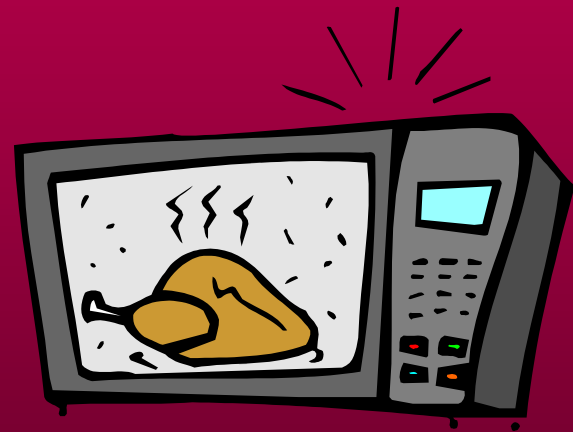
- Static Shock
- Lightning
- Computers/TVs/Radios
- Lights



# Electromagnetic Energy

- Energy that travels in waves

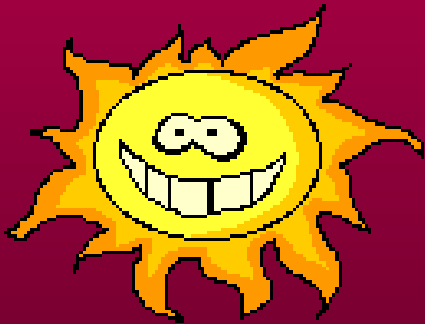
- Visible light
- UV Rays
- Microwaves



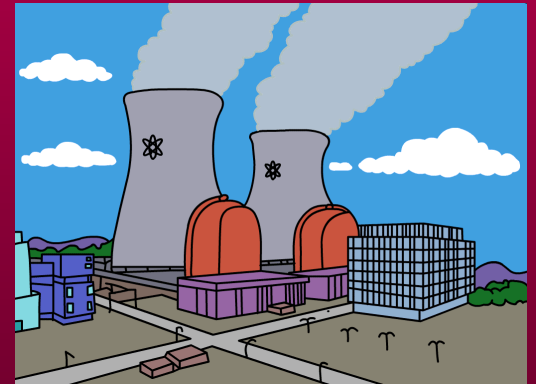


# Nuclear Power

- Energy stored in the nucleus of an atom from fission or fusion



- Sun
- Stars
- Nuclear Power Plant



# *Energy and Work*

Types of Energy

Forms of Energy

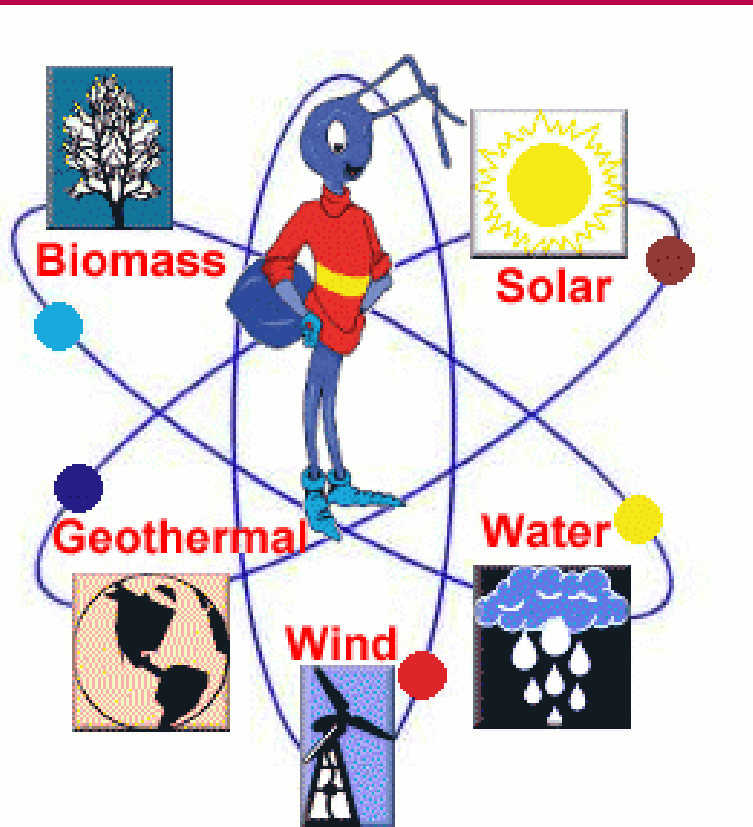
**Law of Conservation  
of Energy**

**Work**

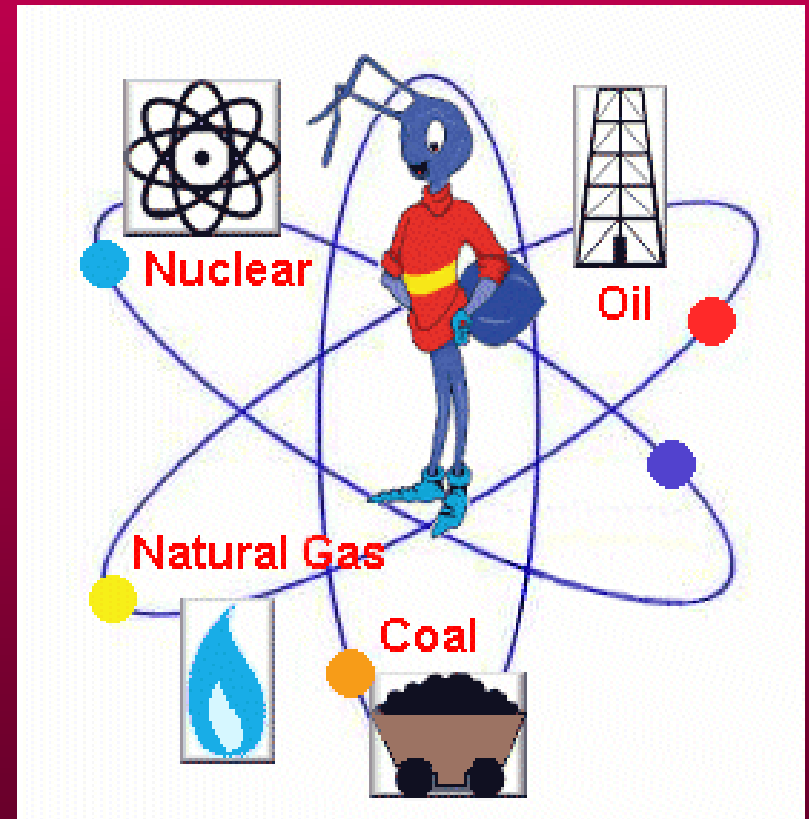
**Amusement Park  
Physics and Activities**

**Renewable and  
Nonrenewable Sources**

# Renewable and Nonrenewable Sources



**Renewable**



**Nonrenewable**

# *Types of Energy*



Potential Energy



Kinetic Energy

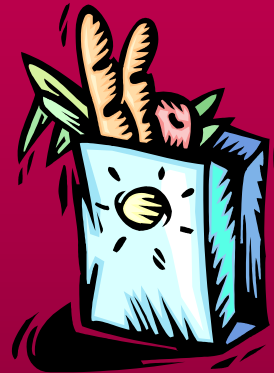
# Forms of Energy



**Radiant**



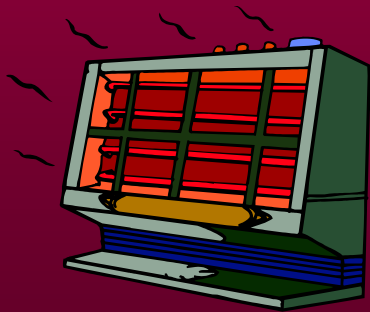
**Electrical**



**Chemical**



**Sound**



**Thermal**



**Nuclear**



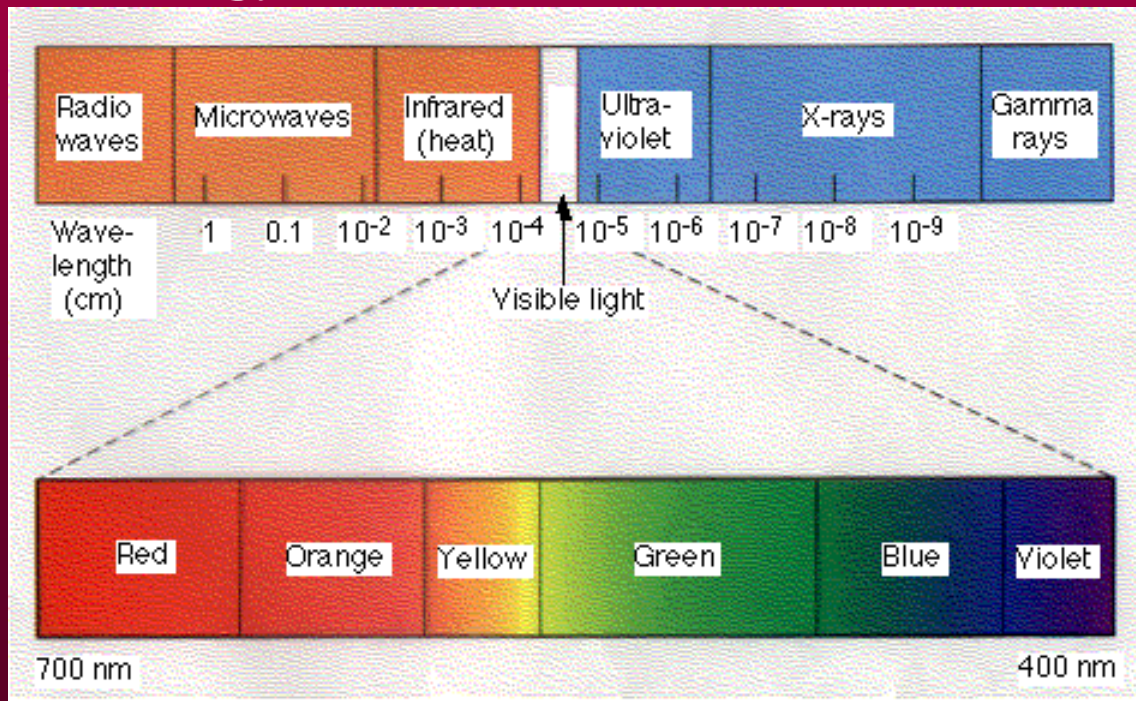
**Mechanical**



**Magnetic**

# Radiant Energy

**Radiant energy is also called electromagnetic energy. Radiant energy is the movement of photons. All life on earth is dependent on radiant energy from the sun. Examples of radiant energy include radio waves (AM, FM, TV), microwaves, X-rays, and plant growth. Active solar energy uses photovoltaic panels and light to turn radiant energy into chemical energy.**



# *Chemical Energy*

**Chemical energy is the energy stored in the bonds of atoms and molecules. This a form of potential energy until the bonds are broken. Fossil fuels and biomass store chemical energy. Products that contain chemical energy include: TNT, baking soda, and a match. Biomass, petroleum, natural gas, propane and coal are examples of stored chemical energy.**



# *Electrical Energy*

**Electrical energy is the movement of electrons. Lightning and static electricity are examples of electrical energy that occur naturally. Science hasn't found a way to use natural forms of electrical energy, like lightning. Instead, we use different energy sources to create electrical energy by using generators and turbines.**





# *Nuclear Energy*

**Nuclear energy is the energy stored in the nucleus of an atom. Nuclear energy is unusual in that it can give off energy in the form of light or heat, but it is the change in the atom's makeup that produces the energy. Submarines, power plants, and smoke detectors all use nuclear energy. Nuclear power plants use uranium, a radioactive element, to create electricity.**



# *Thermal Energy*

**Thermal energy is the internal energy in substances-the vibration and movement of atoms and molecules within substance. Thermal energy is created in the movement of atoms. Boiling water, burning wood, and rubbing your hands together really fast are all examples of heat energy. Geothermal and passive solar are sources of heat energy, but biomass (a type of chemical energy) can be burned to produce heat energy.**





# Sound Energy



**Sound energy is the movement molecules in the air that produces vibrations. Alarms, music, speech, ultrasound medical equipment all use sound energy. VCR tapes change sound energy into electrical energy. The electrical energy records the sound using magnetic tape. Speakers read the magnetic tape and change it back into sound.**



# *Mechanical Energy*

**Mechanical energy is the movement of machine parts. Mechanical energy is also the total amount of kinetic and potential energy in a system. Wind-up toys, grandfather clocks, and pogo sticks are examples of mechanical energy. Wind power uses mechanical energy to help create electricity.**



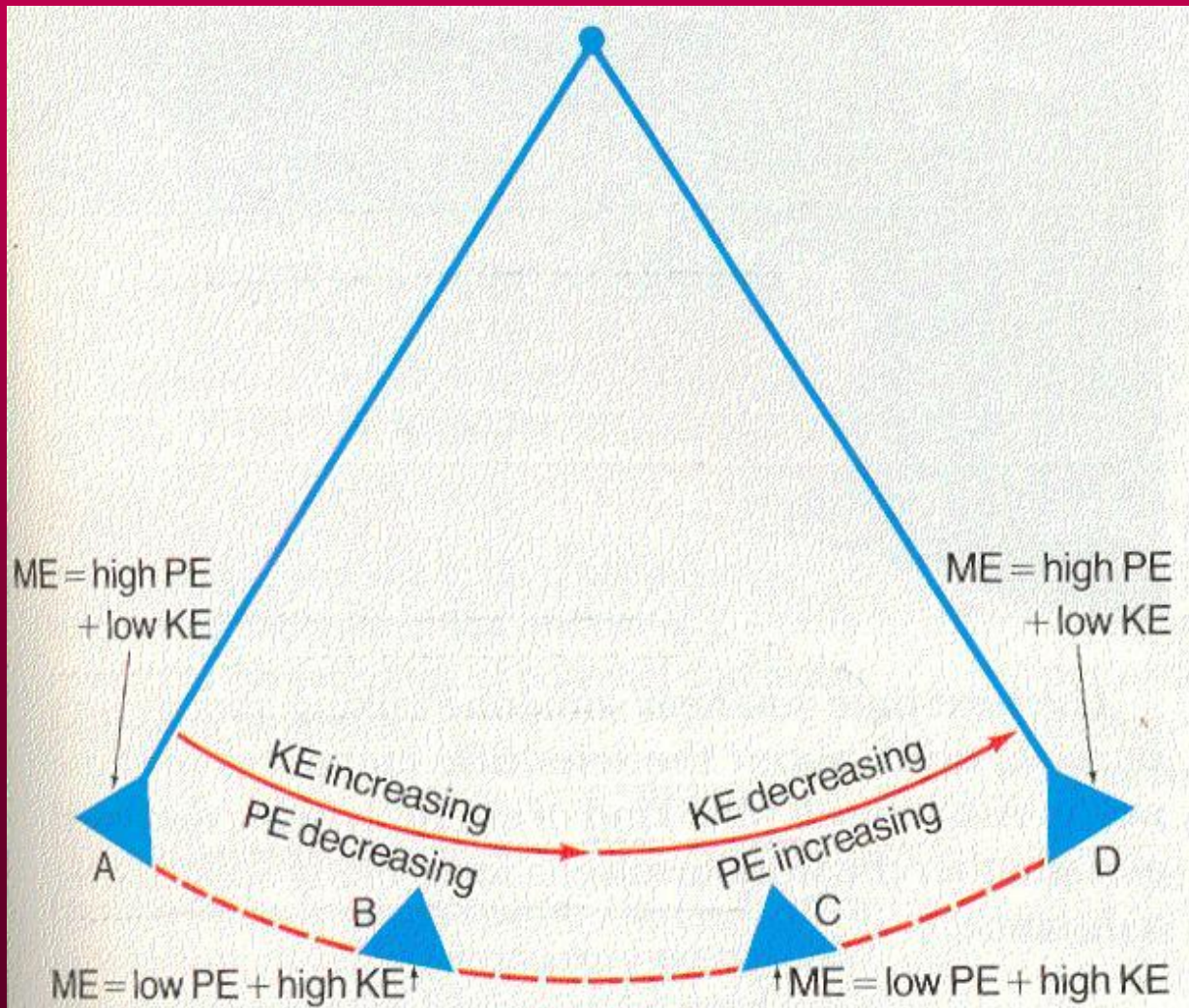
**Potential energy + Kinetic energy =**

**Mechanical energy**

Next

# Mechanical Energy

**Potential energy + Kinetic energy = Mechanical energy**



**Example of energy changes in a swing or pendulum.**

# *Magnetic Energy*

**Magnetic energy is the attraction of objects made of iron. Medical equipment, compass, refrigerator magnets are all examples of magnetic energy. Any type of energy source that uses a generator in the process to make electricity uses magnetic energy.**



# ***Kinetic Energy***

**Kinetic energy exists whenever an object which has mass is in motion with some velocity. Everything you see moving about has kinetic energy. The kinetic energy of an object in this case is given by the relation:**

$$\mathbf{KE = (1/2)mv^2}$$

**m=mass of the object**

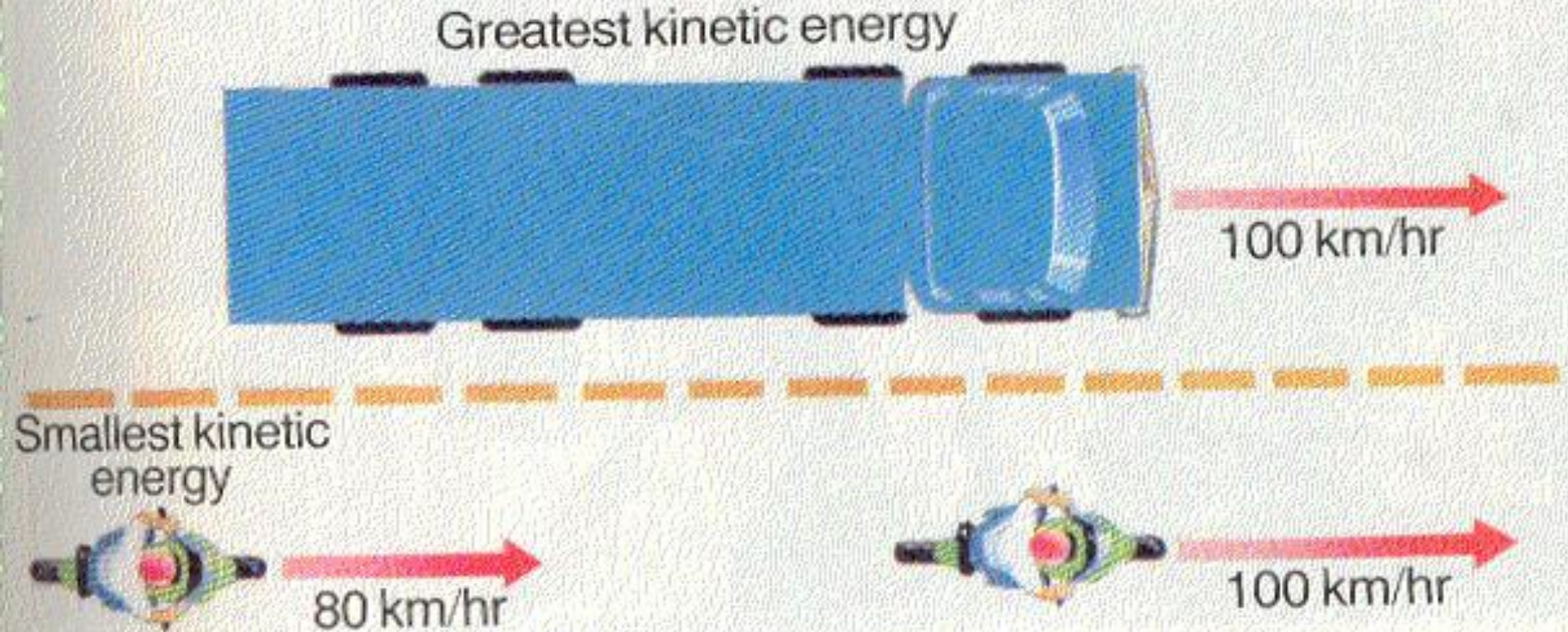
**V=velocity of the object**

**The greater the mass or velocity of a moving object, the more kinetic energy it has.**



# *Kinetic Energy*

**The greater the mass or velocity of a moving object, the more kinetic energy it has.**





# Potential Energy

**Potential energy exists whenever an object which has mass has a position within a force field. The most everyday example of this is the position of objects in the earth's gravitational field. The potential energy of an object in this case is given by the relation:**

$$\mathbf{PE = mgh}$$

**PE = Energy (in Joules)**

**m = mass (in kilograms)**

**g = gravitational acceleration of the earth (9.8 m/sec<sup>2</sup>)**

**h = height above earth's surface (in meters)**



# Law of Conservation of Energy

**Law of Conservation of Energy- Energy can neither be created nor destroyed. Energy is always changing from one kind to another. The total energy of an object never changes.**

**Potential energy + Kinetic energy = Total energy and Total energy – Kinetic energy = Potential energy and Total energy - Potential energy = Kinetic energy**

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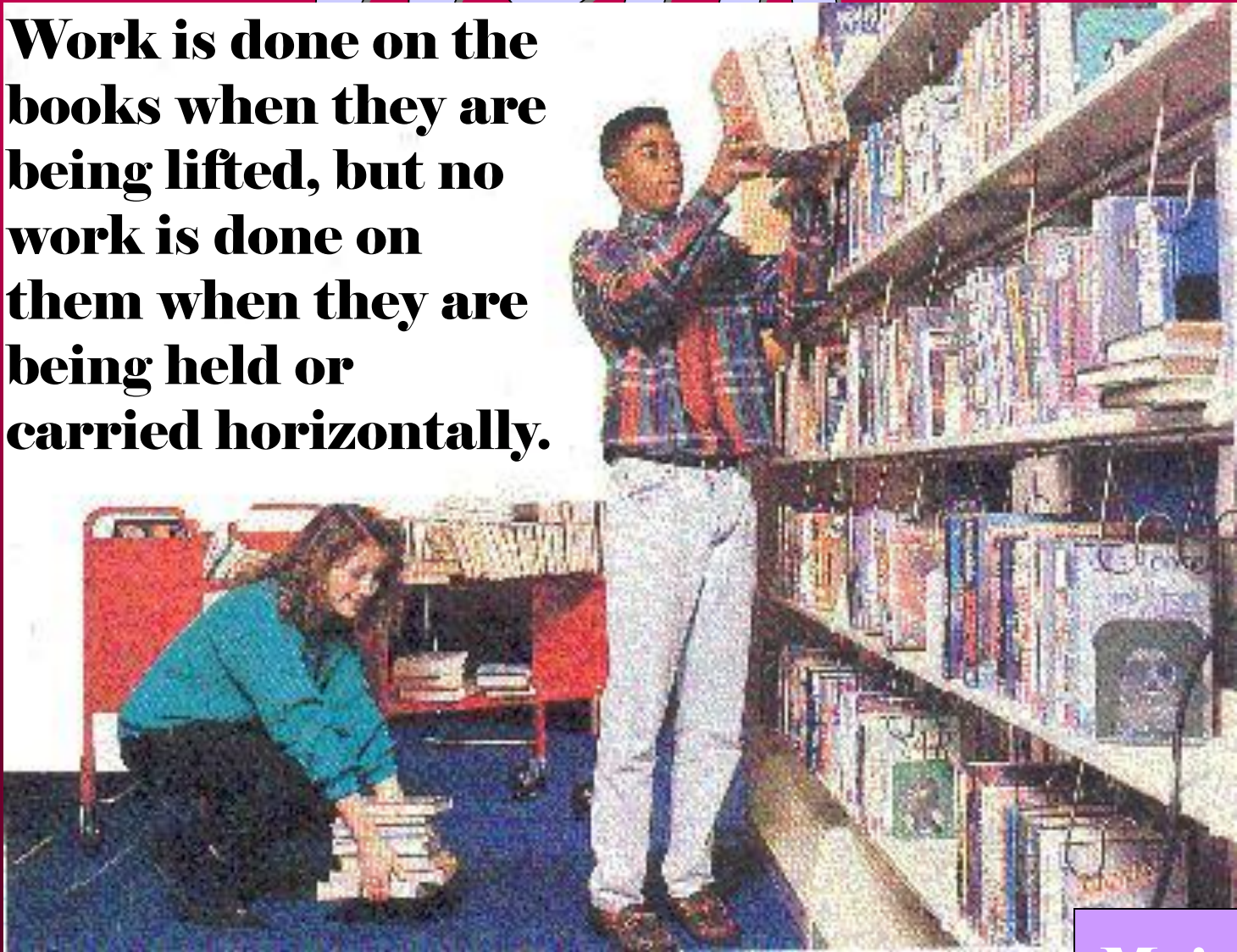
# Work

**Work is the transfer of energy through motion. In order for work to take place, a force must be exerted through a distance. The amount of work done depends on two things: the amount of force exerted and the distance over which the force is applied. There are two factors to keep in mind when deciding when work is being done: something has to move and the motion must be in the direction of the applied force. Work can be calculated by using the following formula: **Work=force x distance****

Next

# Work

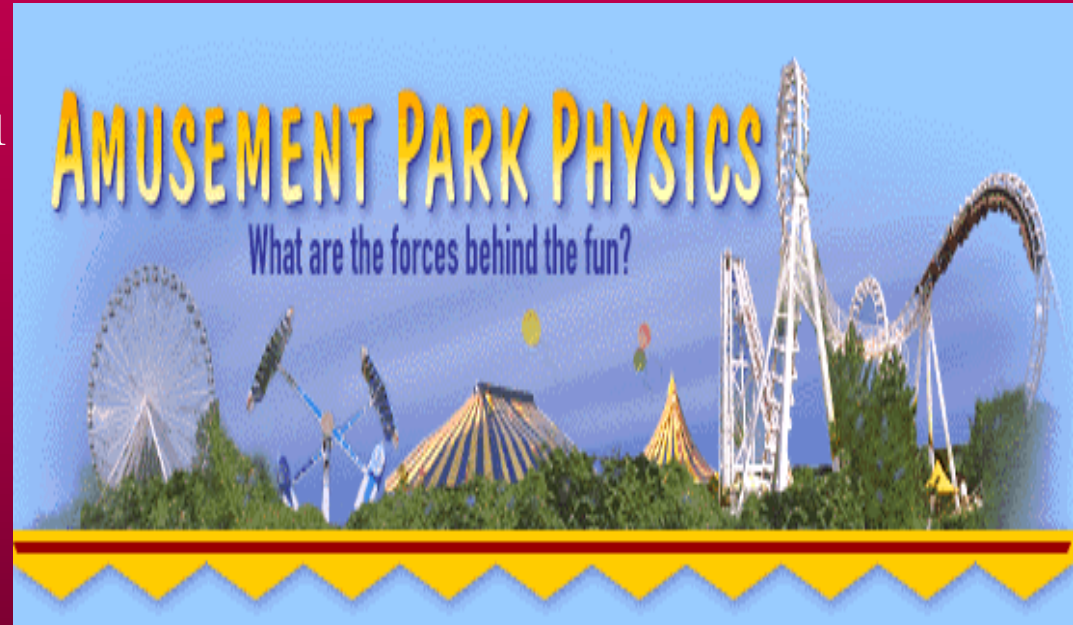
**Work is done on the books when they are being lifted, but no work is done on them when they are being held or carried horizontally.**



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# Energy Activities

The links provided will take you to several interactive sites where you will be expected to answer questions about energy, build roller coasters to specifications, and play games that involve providing the correct information to questions. Your teacher will instruct you on what to complete at each site.



[Amusement Park Physics](#)

[Energy Quiz](#)

[Change Coaster Properties](#)

[Build a Coaster](#)

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