Leonard Bernstein

Chichester Psalms

Outline

- Force
- Pressure
- Work
- Energy
  - Potential Energy
  - Kinetic Energy
- Transformations and Conservation of Energy
- Heat

Force

- A push or pull
- Force = F
- Exerted by contact or at a distance
- Units = Newtons = N
- Weight = force of gravity

Newton's Third Law

- For every force there is an equal but opposite reaction force.
  - Equal Magnitude
  - Opposite direction
  - Acts back on the "causing" object

Pressure

- Pressure = p
- Force = F
- Surface area = S

$$p = F/S \quad (N/m^2)$$

Atmospheric Pressure

- Pressure = 1×10^5 N/m^2
- = 1 atmosphere = 1 atm
- = 14.7 $lbs./in^2$

Relative Pressure or Gauge Pressure

- Pressure above atmospheric pressure
- Absolute Pressure = Gauge pressure + 1 atm

Work

- Work = Force x Displacement
- Work = F x d = Fd
- Units = Nm^2 = joule

Energy

The ability of an object to do work as a result of its motion or relative position

Types of Energy

- ***Kinetic Energy***
  - Energy of motion
- ***Potential Energy***
  - Energy of relative position

Conservation of Energy

Energy can never be created or destroyed. It can only be changed from one form to another.

Damped Motion

- Friction - rubbing or contact
- Heat is a form of energy
- Heat removes energy from a system

No Friction

# Cycles	P.E.	K.E.	Total
0	36	0	36
¼	0	36	36
½	36	0	36
¾	0	36	36
1	36	0	36
1 ¼	0	36	36
1 ½	36	0	36
1 ¾	0	36	36
2	36	0	36

With Friction

# Cycles	P.E.	K.E.	Heat	Total
0	36	0	0	36
¼	0	35	1	36
½	34	0	2	36
¾	0	33	3	36
1	32	0	4	36
1 ¼	0	31	5	36
1 ½	30	0	6	36
1 ¾	0	29	7	36
2	28	0	8	36