Midterm and course website

1) Midterm: Friday, Oct 12, 2007 Please mark your calendar!!

2) <u>Physics 100 Home Page</u> http://www.phas.ubc.ca/~phys100/

Phy100: Heat transport

1) Review of Thermal energy and energy conservation;

2) Three basic forms of thermal heat transport

i) Conduction;

ii) Convection;

iii) Radiation.

Summary: Energy transfer, work and energy conservation for open systems

Work is an energy transfer due to mechanical forces.



Environment

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Three Steps

A. Correctly identify "system" and "external forces" .

B. Identify kinetic energy, potential energy and thermal energy. E(final)=E(initial) if external forces are zero.

C. If there are external forces, calculate the work done.
W =+ Fs if an external force F is applied along the direction of motion; (s is the distance).

W=-Fs if the force F is applied opposite to the direction of motion.

Power= W/t, work done per unit time.

Q1: Work

A block of mass m (initial velocity zero) is pushed on a frictionless surface over a distance s; the exerted force is F. If the mass and distance s are doubled,

- 1) the final velocity is unchanged;
- 2) the final kinetic energy is halved;
- 3) the final velocity is doubled;
- 4) Not enough information.



Q2: thermal energy

Now suppose there is a small friction force. When both the friction force f and distance s (over which force F is exerted) are doubled, the heat produced because of frictions before the block comes to a stop is (First, define your "system"!)

- 1) Doubled;
- 2) Four times as much;
- 3) Unchanged;

4) Not known because the distance S' over which the object moves before becoming still is not given.



Heat conduction

Conduction is heat transfer, or transfer of thermal energy within a substance or between different substances without motion of materials. It occurs when there is a temperature gradient within a substance or temperature differences between substances.



Conduction and collisions

Microscopically, heat conduction occurs by means of collisions between molecules or atoms in crystals or diffusions of electrons in metals.

The following pictures Illustrate such processes.





