Review Exercises 1:

A car has a mass of 2000 kg and is traveling at a speed of 30 m/sec. What is its kinetic energy in joules?

$KE = 1/2mv^2 = 0.5 \times 2000 \times (30)^2 = 9 \times 10^5$ (J)

A 5 kg mass is attached to the end of a string 2 meters long. The other end of the string is fixed to a hook to make a simple pendulum. Initially, the mass is held so that the string is horizontal. The mass is then released. At the point when the string is vertical, what is the kinetic energy of the mass?

$KE = PE = mgh = 5 \times 9.8 \times 2 = 98$ (J)

Per person, the energy consumption in the United States is about 3.3 × 10^8 Btu/yr. This is equivalent to a power of _____W. (1 Btu = 1055 J)

P = Energy/time = 3.3 x 10^8 x 1055 / (365 x 24 x 3600) = 11.0 (kW)

What is the potential energy increase of a 1000 kg auto driven up the 1000 meter elevation gain from Boulder to Nederland, CO?

PE = mgh = 1000 x 9.8 x 1000 = 9.8 x 10^6 (J)

In the United States, the average person eats about 3000 **food** calories per day. What is the average power of this energy intake?

P = Energy/Time = 3000 x 10^3 x 4.18 / (24 x 3600) = 145 (W)

The Principle of Energy Conservation is

- a possible means for extending our fossil fuel reserves
- inconsistent with the motion a pendulum
- a law of physics often violated in thermodynamic systems
- a law of physics with no known exceptions
- obeyed in chemical reactions but not in nuclear reactions.

Kinetic and potential energy are energies of___and___, respectively.

- springs and gravity
- solids and liquids
- position and motion
- motion and position
- force and power

The total mass energy of one pound (454 g) of anything is about___J.

$E = mc^2 = 0.454 \times (3 \times 10^8)2 = 4 \times 10^{16}$ (J)

One horsepower for one hour represents how many joules? (1 horse power = 745.7 W)

$E = P \cdot t = 745.7(W) \times 3600(s) = 2.68 \times 10^6$ (J)

Classify the following terms according to whether they represent energy (E), power (P), or neither (N).

a. calorie	E	f. Watt	P
b. horsepower	P	g. Btu/hr	P
c. joules/sec	P	h. kilowatt·hour	E
d. joule·sec	N	i. Btu	E
e. kilowatt/hour	N	j. horsepower/day	N