1. (15%) A stone is dropped from rest and falls freely. Determine the position and speed of the body after 1.0, 2.0, and 4.0 sec have elapsed.

2. (15%) Please find (a) the momentum and (b) the kinetic energy of a 10-gm bullet with a speed of 760 m/sec. (c) How fast must a 90-kg man move to have the same momentum?

3. (15%) Two 100-gm ice cubes are dropped into 400gm of water in a cup. If the water was initially at a temperature of 25°C, and if the ice came directly from a freezer operating at a temperature of -15°C, what will be the final temperature of the water? The specific heat of ice is approximately 0.50 cal/gm C° in this temperature range and the heat required to melt ice to water is approximately 80 cal/gm.

4. (15%) What is the electric potential at the surface of a gold nucleus? The radius is 6.6×10^{-5} Å and the atomic number is 79. The nucleus, assumed spherically symmetrical, behaves electrically for external points as if it were a point charge, equal to that of 79 protons. ($e = 1.6 \times 10^{-19}$ coul, $\varepsilon_0 = 8.85 \times 10^{-12}$ farad/meter, $\pi = 3.14$).

5. (15%) (a) In the Fig. 1, what is the equivalent resistance of the network? (b) What are the currents in each resistor? Put $R_1 = 100\Omega$, $R_2 = R_3 = 50\Omega$, $R_4 = 75\Omega$, and E = 6 V.

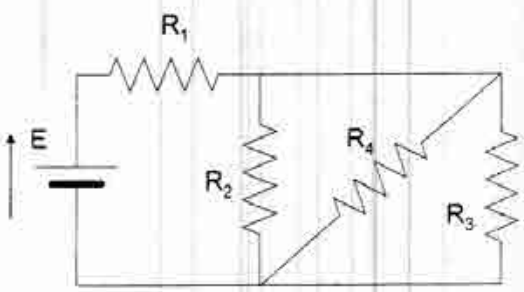

Fig. 1

6. (25%) Please briefly explain the following terms.

(a) Snell's Law　(b) Ohm's Law　(c) Doppler Effect

(d) Newton's Laws of Motion　(e) Young's Experiment