BoxSand Thermodynamics 1ˢᵗ Law Quantitative Problems

Thermodynamics.1ˢᵗ-Law.**QP.BS.1:** A sprinter's internal energy changes because she performs 5.5 X 10^6 J of work and gives off 3.2 X 10^6 J of heat. However, to cause the same change in his internal energy while jogging he must do 7.6 X 10^6. Determine the magnitude of the heat given off while walking.

Thermodynamics.1ˢᵗ-Law **QP.BS.2:** Four moles of an ideal monatomic gas are at a temperature of 315 K. Then, 2252 J of heat are added to the gas, and 745 J of work is done on it. What is the final temperature of the gas?

Thermodynamics.1ˢᵗ-Law.**QP.BS.3:** During practice, a soccer player loses 0.630 kg of water through evaporation; the heat required to evaporate the water coming from the soccer player's body. The work done while playing soccer is 1.8 X 10^4 J. (A) Assuming that the latent heat of evaporation of perspiration is 1.96 X 10^5 J/kJ, find the change in the internal energy of the soccer player. (B) Determine the minimum number of nutritional calories of food (1 nutritional calorie = 4,186 J) that must be consumed to replace the loss of internal energy.