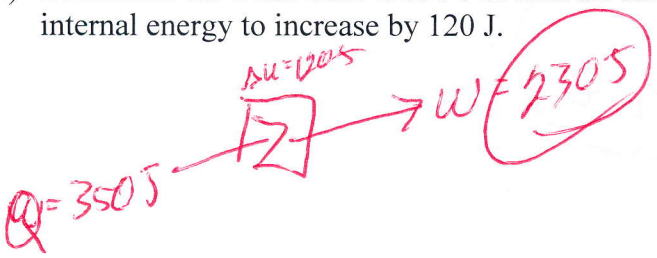
key Level I Physics Pd 2

Thermodynamics

AT Thermodynamics(11)

Solve the following problems showing ALL work and CIRCLING your answers. Each is worth 5 points.

1) Determine the work done if 350 J of heat are added to a system causing the internal energy to increase by 120 J.



2) Determine the cost of freezing 1 kg (about a quart) of water. The water is placed in a freezer (L-330,000 J/kg) at zero (The water is at zero) degrees Celsius (I know, a little strange, but it makes the problem easier). The freezer has a c.p. of 2. Determine how much it will cost if electricity is \$0.24/kWhr (yes... you need to do some "fun" unit analysis. Yes, you know all the terms/quantities/equivalents.) to freeze the water to ice at zero degrees Celsius.

$$c.p. = \frac{Q_c}{W} = \frac{Q_c}{\cancel{Q_c}}$$

$$W = \frac{Q_c}{c.p.} = \frac{mL}{c.p.} = \frac{(1\,kg)(3.30\times10^5\,J/kg)}{2}$$

$$W = 1.65\times10^5\,J$$

$$\left(\frac{\$\,.24}{\cancel{kW}\,\cancel{hr}}\right)\left(\frac{1\,\cancel{kW}}{1{,}000\,\cancel{W}}\right)\left(\frac{1\,\cancel{hr}}{3600\,s}\right)\left(\frac{1\,\cancel{W}}{1\,J/s}\right)\left(1.65\times10^5\,\cancel{J}\right) = \$.01$$