$N_A = 6.022 \times 10^{23}/mol$	$R = 8.31 J/(mol \cdot K)$	$k_B = 1.38 \times 10^{-23} J/K$
$1atm = 1.013 \times 10^5 Pa$		$\sigma = 5.67 \times 10^{-8} W/(m^2 \cdot K^4)$
$T_F = \frac{9}{5} T_C + 32$	$T_K = T_C + 273$	
Ideal Gas: $PV = nRT$	$\frac{P_i V_i}{T_i} = \frac{P_f V_f}{T_f}$	First Law of Thermo: $\Delta E_{th} = Q + W$
Boyle's Law (isotherm):	$P_i V_i = P_f V_f$	isochoric means *V* = constant, $W = 0$
Charles' Law (isobaric):	$\frac{V_f}{V_i} = \frac{T_f}{T_i}$	isothermic means *T* = constant $\Delta E_{th} = 0$
Gay-Lussac (isochoric):	$\frac{P_f}{P_i} = \frac{T_f}{T_i}$	adiabatic means $Q = 0$
Work on a Gas:	$W_{on} = -\int P dV$	isobaric work $W_{on} = -P \Delta V$
Specific Heat:	$\Delta E_{th} = mc\Delta T$	$\Delta E_{th} = nC\Delta T$
Adiabatic Process:	$P_i V_i^{\gamma} = P_f V_f^{\gamma}$	$P_i T_i^{\gamma-1} = P_f T_f^{\gamma-1}$
	monatomic $\gamma = 5/3$	diatomic $\gamma = 7/5$
Gas Specific Heat:	isobaric	$\Delta E_{th} = nC_P \Delta T$
	isochoric	$\Delta E_{th} = nC_V \Delta T$
monatomic:	$C_V = \frac{3}{2} R$	$C_P = \frac{5}{2} R$
diatomic:	$C_V = \frac{5}{2} R$	$C_P = \frac{7}{2} R$
Conduction:	$\frac{dQ}{dt} = kA \frac{\Delta T}{L}$	
Heat Engine:	$Q_H = W_{out} + Q_C$	

Efficiency:	$\eta = \frac{W_{out}}{Q_H} = 1 - \frac{Q_C}{Q_H}$	
Refrigerator:	$Q_C + W_{in} = Q_H$	
Performance:	$K = \frac{Q_C}{W_{in}}$	
Perfect Efficiency and Performance:	$\eta_{max} = 1 - \frac{T_C}{T_H}$	$K_{max} = \frac{T_C}{T_H - T_C}$
Equipartition:	$E_{th}^{molecule} = \frac{DOF}{2} k_B T$	monatomic: $DOF = 3$ diatomic: $DOF = 5$