Thermal Equilibrium

Kinetic energy of a particle: $KE = \frac{1}{2} m_{particle} v^2$.

Temperature is related to the **average** kinetic energy of a group of particles:

$\left\langle \frac{1}{2} mv^2 \right\rangle_{average} = \frac{3}{2} kT$, where k=Boltzmann's constant.

For blackbody radiation (Planck's law) at temperature T, the peak of the energy distribution comes at a wavelength , λ_{peak} such that $\lambda_{peak} \quad \frac{1}{T}$.

When matter and radiation are in equilibrium, such as they were in the early times of the universe's history, both values of temperature are equal.