ASTROPHYSICS PRINCIPLES SUMMARY

Fundamental Laws & Constants
Reference Chart 01-A

CORE PRINCIPLE	KEY EQUATION / LAW	PHYSICAL SIGNIFICANCE
Universal Gravitation	`F = G(m1m2)/rÂ²`	Governs the motion of celestial bodies and large-scale structures of the universe.
Wien's Law	`Î»max = b/T`	Relates the peak wavelength of light emitted by a blackbody to its absolute temperature.
Schwarzschild Radius	`Rs = 2GM/cÂ²`	Defines the event horizon of a non-rotating black hole based on its mass.
Hubble-LemaÃ®tre Law	`v = H0d`	Describes the expansion of the universe; velocity of recession is proportional to distance.
Stefan-Boltzmann Law	`L = 4Ï€RÂ²ÏƒTâ´`	Determines the total luminosity of a star based on its radius and surface temperature.
Hydrostatic Equilibrium	`dP/dr = -Ïg`	The balance between inward gravitational collapse and outward gas/radiation pressure.
Mass-Energy Equivalence	`E = mcÂ²`	The fundamental principle powering stellar nucleosynthesis and energy release.