

## Key Physiology Equations for USMLE Step I

Equation Name	Equation	Page Reference
Mean arterial pressure	$Pa = CO \times TPR$	75
Resistance	$R = \frac{8\eta l}{\pi r^4}$	76
Compliance	$C = V/P$	77
Cardiac output	$CO = SV \times HR$	94
Cardiac output (measurement)	$CO = \frac{O_2 \text{ consumption}}{[O_2]_{\text{pulmonary vein}} - [O_2]_{\text{pulmonary artery}}}$	95
Ejection fraction	$EF = SV/EDV$	95
Starling equation	$J_v = K_f [(P_c - P_i) - (\pi_c - \pi_i)]$	103
Physiologic dead space	$VD = VT \times \frac{Pa_{CO_2} - PE_{CO_2}}{Pa_{CO_2}}$	128
Alveolar ventilation	$VA = (VT - VD) \times \text{breaths/min}$	128
Renal clearance	$C = \frac{U_x \dot{V}}{P_x}$	166
GFR	$GFR = \frac{U_{\text{inulin}} \dot{V}}{P_{\text{inulin}}}$	168
Free water clearance	$C_{H_2O} = \dot{V} - C_{\text{osm}}$	188
Henderson-Hasselbalch equation	$pH = pK + \log \frac{A^-}{HA}$	191
Serum anion gap	$\text{Anion gap} = Na^+ - (Cl^- + HCO_3^-)$	198