

FORMULA SHEET

$$\Delta L = \frac{\Delta L'}{\gamma}$$

$$\Delta t = \gamma \Delta t'$$

$$x' = \gamma(x - vt)$$

$$t' = \gamma\left(t - \frac{v}{c^2}x\right)$$

$$u_x' = \frac{u_x - v}{1 - \left(\frac{u_x v}{c^2}\right)}$$

$$u_{y,z}' = \frac{u_{y,z}}{\gamma \left[1 - \left(\frac{u_x v}{c^2}\right)\right]}$$

$$f_{\text{obs}} = \frac{\sqrt{1 \pm (v/c)}}{\sqrt{1 \mp (v/c)}} f_{\text{source}}$$

$$m_e c^2 = 0.511 \text{ MeV}$$

$$m_p c^2 = 938 \text{ MeV}$$

$$\lambda' - \lambda = \frac{h}{m_e c} (1 - \cos \theta)$$

$$eV_s = hf - \phi$$

$$e = \sigma T^4$$

$$E = nhf$$

$$h = 6.626 \times 10^{-34} \text{ J} \cdot \text{s}$$

$$e = 1.6 \times 10^{-19} \text{ C}$$

$$m_e = 9.11 \times 10^{-31} \text{ kg}$$

$$c = 3 \times 10^8 \text{ m/s}$$

$$1 \frac{\text{MeV}}{c} = 5.45 \times 10^{-22} \text{ kg} \cdot \frac{\text{m}}{\text{s}}$$