

## Some potentially useful formulas

$$F = \frac{G m_1 m_2}{r^2} \left[ \begin{array}{l} m_1 \text{ and } m_2 \text{ in kg} \\ r \text{ in meters} \\ F \text{ in Newtons} \end{array} \right] \rightarrow G = 6.7 \times 10^{-11}$$

$$F = k \frac{q_1 q_2}{r^2} \left[ \begin{array}{l} q_1, q_2 \text{ in Coulombs} \\ r \text{ in meters} \\ F \text{ in Newtons} \end{array} \right] \rightarrow k = 9 \times 10^9$$

$$F = ma$$

$$(\text{distance}) = (\text{Speed})(\text{time})$$

$$v = \frac{\Delta x}{\Delta t}$$

$$a = \frac{\Delta v}{\Delta t}$$

$$\text{Work} = \text{force} \times \text{distance}$$

$$\text{Momentum} = p = mv$$

$$\Delta x' = \gamma \Delta x, \Delta x \text{ longest in proper frame}$$

$$\Delta t' = \gamma \Delta t, \Delta t \text{ shortest in proper frame}$$

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

$$1 \text{ Joule} = 1.6 \times 10^{-19} \text{ eV}$$

$$\text{speed of Sound} = 330 \text{ m/s}$$

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

$$h = 6.6 \times 10^{-34} \text{ J}\cdot\text{s}$$

$$\text{or } 4.5 \times 10^{-15} \text{ eV}\cdot\text{s}$$

$$\lambda = \frac{h}{p} = \frac{h}{mv}$$

$$v = \lambda \nu$$

$$\nu = \frac{1}{T} \quad (T = \text{period})$$

$$E = h\nu$$

$$\Delta x \Delta p \geq \frac{h}{2\pi} \quad \Delta E \Delta t \geq \frac{h}{2\pi}$$

$$\frac{\Delta N}{\Delta t} = \lambda N \quad E_{1/2} = 0.693/\lambda$$