# Some potentially useful formulas

$F = \frac{G m_1 m_2}{r^2}$ ($m_1$ and $m_2$ in kg, $r$ in meters) $\rightarrow G = 6.7 \times 10^{-11}$

$F = \frac{k q_1 q_2}{r^2}$ ($q_1, q_2$ in Coulombs, $r$ in meters) $\rightarrow k = 9 \times 10^9$

in both cases, Force comes out in Newtons

$F = ma$

(distance) = (speed)(time)

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

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

work = force x distance

Momentum = $p = mv$

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

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

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

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

speed of sound = 330 m/s

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

$v = \lambda \nu$

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

gravitational force at earth's surface

$F = mg$ where

$g = \frac{G M_E}{R_E^2} = 9.8$ m/s$^2$