Planck Units

G - Newton's constant - $\frac{Nm^2}{kg^2}$

c - speed of light - $\frac{m}{s}$

$\hbar$ - Planck's constant - J·s

Express any mechanical quantity in terms of these.

---

e.g. $L \propto G^a c^b \hbar^n$

$$L^1 M^0 T^0 \propto \left(\frac{L^3}{T^2 M}\right)^a \left(\frac{L}{T}\right)^b \left(\frac{L^2 M}{T}\right)^n$$

$$= L^{3a+b+2n} \cdot M^{-a+0+n} \cdot T^{-2a-b-n}$$

$1 = 3a+b+2n$

$0 = n-a \longrightarrow a = n$

$0 = -n-2a-b$

$1 = 5a + b$

$0 = -3a - b \rightarrow b = -3a = -\frac{3}{2}$

$1 = 2a \Rightarrow a = \frac{1}{2}$, $n = \frac{1}{2}$

$$L_p \propto G^{\frac{1}{2}} c^{-\frac{3}{2}} \hbar^{\frac{1}{2}} = \sqrt{\frac{G\hbar}{c^3}} \approx 10^{-35}\ m$$

$$M_p \propto \sqrt{\frac{\hbar c}{G}} \approx 10^{-8}\ kg \approx 10^{-5}\ g$$

mass of flea egg

$$T_p \propto \sqrt{\frac{\hbar G}{c^5}} \approx 10^{-44}\ s$$