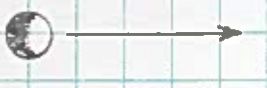
Proton



$u = 0.999c$

$m_p = 1.67 \times 10^{-27}\ kg$

a.) $p = \gamma_p m u$, $\gamma_p = \frac{1}{\sqrt{1 - \frac{u^2}{c^2}}} = 22.37$

$p = 1.119 \times 10^{-17}\ \frac{kg\ m}{s}$

b.) Newtonian, $P_N = mu$

$\therefore \frac{p}{P_N} = \frac{\gamma_p m u}{mu} = \gamma_p = \underline{22.37}$