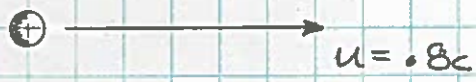

$m = 1.0\,g = .001\,kg$

$$\gamma_u = \frac{1}{\sqrt{1 - u^2/c^2}} = 1.667$$

So:

$$K = (\gamma_u - 1)mc^2 = 6.003 \times 10^{13}\ J.$$

$$E = \gamma_u mc^2 = 1.50 \times 10^{14}\ J$$

$$E_{rest} = mc^2 = 9 \times 10^{13}\ J.$$