Know: Kinetic energy = twice the rest energy.

Or, $K = 2mc^2$

also: $E = K + mc^2 = \gamma_u mc^2$

So: $K = (\gamma_u - 1)mc^2$

$\therefore$ $(\gamma_u - 1)mc^2 = 2mc^2$

and $\gamma_u - 1 = 2$

or, $\gamma_u = 3$

and, $\gamma_u = \dfrac{1}{\sqrt{1 - u^2/c^2}}$

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

$\therefore$ $$\frac{u}{c} = \sqrt{1 - \frac{1}{\gamma_u^2}} = 0.943$$

$$u = 0.943c$$