Find the speed at which the mass of a particle will be double?

Solution.

The mass of the moving particle is:

$$m = \frac{m_0}{\sqrt{1-\frac{v^2}{c^2}}};$$

where m_0 - is the mass of the rest particle, kg;

v – is the speed of the moving particle, m/s;

$c = 299792458$ m/s – is the speed of light in vacuum;

In this case $m = 2 \cdot m_0$:

$$2 \cdot m_0 = \frac{m_0}{\sqrt{1-\frac{v^2}{c^2}}};$$

Find the speed of the moving particle:

$$2 = \frac{1}{\sqrt{1-\frac{v^2}{c^2}}} \to \sqrt{1-\frac{v^2}{c^2}} = \frac{1}{2} \to 1-\frac{v^2}{c^2} = \frac{1}{4} \to \frac{v^2}{c^2} = \frac{3}{4} \to v^2 = \frac{3}{4}c^2 \to v = \frac{\sqrt{3}}{2}c =$$

$$= \frac{\sqrt{3}}{2} \cdot 299792458 \approx 259627885 \text{ m/s};$$

Answer: the speed of the moving particle is $\frac{\sqrt{3}}{2}c$ or $\mathbf{259627885}$ **m/s.**