

40. (a) We set Eq. 38-49 equal to $2mc^2$, as required by the problem, and solve for the speed. Thus,

$$mc^2 \left(\frac{1}{\sqrt{1 - \left(\frac{v}{c}\right)^2}} - 1 \right) = 2mc^2$$

leads to $v = \frac{2\sqrt{2}}{3} c \approx 0.943c$.

- (b) We now set Eq. 38-45 equal to $2mc^2$ and solve for the speed. In this case,

$$\frac{mc^2}{\sqrt{1 - \left(\frac{v}{c}\right)^2}} = 2mc^2$$

leads to $v = \frac{\sqrt{3}}{2} c \approx 0.866c$.