

39. (a) We set Eq. 38-38 equal to mc , as required by the problem, and solve for the speed. Thus,

$$\frac{mv}{\sqrt{1 - v^2/c^2}} = mc$$

leads to $v = c/\sqrt{2} = 0.707c$.

- (b) Substituting $v = \sqrt{2}c$ into the definition of γ , we obtain

$$\gamma = \frac{1}{\sqrt{1 - v^2/c^2}} = \frac{1}{\sqrt{1 - (1/2)}} = \sqrt{2} \approx 1.41 .$$

- (c) The kinetic energy is

$$K = (\gamma - 1)mc^2 = (\sqrt{2} - 1)mc^2 = 0.414mc^2 .$$