Name   :

Neptun id. number:

”Nobel-prize physics in …”

Short Test 7.

1. A particle with the rest of mass m_o is moving at a speed of v. The energy of the particle is:

a. $m_o c^2$ b. $\dfrac{m_o c^2}{1-\dfrac{v^2}{c^2}}$ c. $\dfrac{m_o c^2}{\sqrt{1-\dfrac{v^2}{c^2}}}$ d. $\dfrac{m_o c^2}{\sqrt{1-\dfrac{v^2}{c^2}}} - m_o c^2$ e. none of them

2. A particle with the rest of mass m_o is moving at a speed of v. The linear momentum of the particle is:

a. $\dfrac{m_o c}{1-\dfrac{v^2}{c^2}}$ b. $\dfrac{m_o v}{1-\dfrac{v^2}{c^2}}$ c. $\dfrac{m_o v}{1+\dfrac{v^2}{c^2}}$ d. $\dfrac{m_o v}{\sqrt{1-\dfrac{v^2}{c^2}}}$ e. none of them

3. A particle with the rest of mass m_o is moving at a speed of v & v > c/2. The linear momentum of a particle: p. The energy of the particle is:

a. $E = \dfrac{p^2}{2m}$ b. $E = \sqrt{m_o^2 c^4 + p^2 c^2}$ c. $E = \sqrt{m_o^2 c^4 + p^2 c^2} - m_o c^2$ d. $E = \dfrac{p}{c}$ e. none of them

4. A particle with the rest of mass m_o is moving at a speed of v & v > c/2. The kinetic energy of the particle is:

a. $\dfrac{m_o c^2}{\sqrt{1-\dfrac{v^2}{c^2}}} - m_o c^2$ b. $\dfrac{m_o v^2}{\sqrt{1-\dfrac{v^2}{c^2}}} - m_o c^2$ c. $\dfrac{m_o v^2}{2}$ d. $\dfrac{dp}{d\tau} c$ e. none of them

5. Calculate the mass increase for a completely inelastic head-on collision of two 5.0-kg balls each moving toward the other at 450 m/s (the speed of a fast jet plane).

a. $1.1*10^{-11}$ kg   b. $2.4*10^{-24}$ kg   c. $3.7*10^{-10}$ kg   d. $6.5*10^{-13}$ kg   e. none of them

Show your work!