

Relativistic Mass-Energy Drills

- 1 A muon with 2.648×10^{-11} J total energy is moving at $0.768c$. What is its rest mass?
- 2 A neutron has a rest mass of 1.675×10^{-27} kg. Calculate its rest energy in joules and electron-volts.
- 3 A neutron with a rest mass of 1.675×10^{-27} kg has a relativistic mass of 2.926×10^{-27} kg. What is its speed?
- 4 A pion with 2.823×10^{-11} J total energy is moving at $0.609c$. What is its rest mass?
- 5 An electron with 4.601×10^{-13} J total energy is moving at $0.984c$. What is its rest mass?
- 6 A neutron with a rest mass of 1.675×10^{-27} kg has a relativistic mass of 3.673×10^{-27} kg. What is its speed?
- 7 A neutron has a rest mass of 1.675×10^{-27} kg. Calculate its rest energy in joules and electron-volts.
- 8 A kaon with a rest mass of 8.800×10^{-28} kg has a relativistic mass of 1.234×10^{-27} kg. What is its speed?
- 9 A muon with 2.581×10^{-11} J total energy is moving at $0.754c$. What is its rest mass?
- 10 A muon has a rest mass of 1.884×10^{-28} kg. Calculate its rest energy in joules and electron-volts.
- 11 A proton has a rest mass of 1.672×10^{-27} kg. Calculate its rest energy in joules and electron-volts.
- 12 An electron with a rest mass of 9.108×10^{-31} kg has a relativistic mass of 1.267×10^{-30} kg. What is its speed?
- 13 A pion has a rest mass of 2.488×10^{-28} kg. Calculate its rest energy in joules and electron-volts.

$$1\text{E}-8 = 1 \times 10^{(-8)}$$

Answers:

1. 1.88×10^{-28} kg 2. 1.51×10^{-10} J, 9.42×10^8 eV 3. $0.82c$ 4. 2.49×10^{-28} kg 5. 9.11×10^{-31} kg 6. $0.89c$ 7. 1.51×10^{-10} J, 9.42×10^8 eV 8. $0.701c$ 9. 1.88×10^{-28} kg 10. 1.70×10^{-11} J, 1.06×10^8 eV 11. 1.51×10^{-10} J, 9.41×10^8 eV 12. $0.695c$ 13. 2.24×10^{-11} J, 1.40×10^8 eV