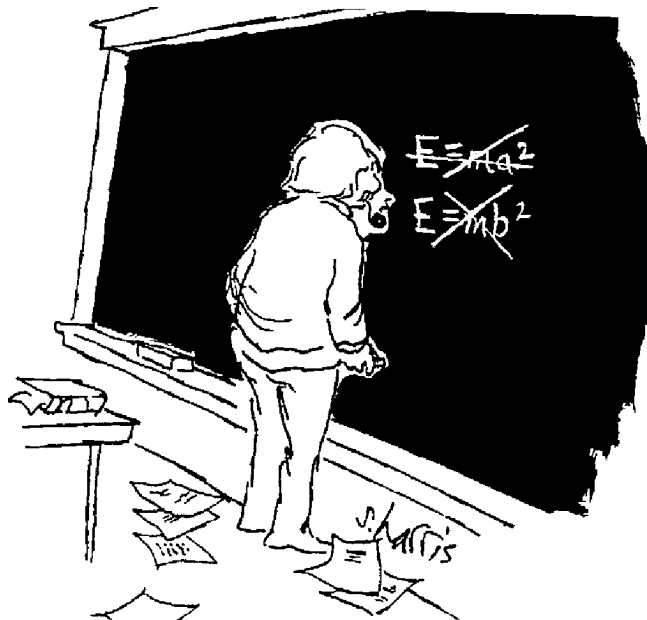


Name: \_\_\_\_\_

## Mass-Energy Worksheet

Directions: Use the information from the lecture and the practice problem to answer the following questions. Even though some questions are multiple choice, you must **SHOW YOUR WORK** in the space provided to receive credit for the question. Simply circling the response will get zero credit.



1)

In the cartoon, Einstein is contemplating the equation for the principle that

- A) mass always travels at the speed of light in a vacuum
- B) the energy of a photon is proportional to its frequency
- C) the fundamental source of all energy is the conversion of mass into energy
- D) energy is emitted or absorbed in discrete packets called photons

2) If a deuterium nucleus has a mass of  $1.53 \times 10^{-3}$  universal mass units less than its components, this mass represents an energy of

- A) 1.38 MeV
- B) 3.16 MeV
- C) 1.42 MeV
- D) 1.53 MeV

- 3) The energy equivalent of  $5.0 \times 10^{-3}$  kilogram is  
A)  $3.0 \times 10^{19}$  J      B)  $4.5 \times 10^{14}$  J      C)  $8.0 \times 10^5$  J      D)  $1.5 \times 10^6$  J
- 4) A tritium nucleus is formed by combining two neutrons and a proton. The mass of this nucleus is  $9.106 \times 10^{-3}$  universal mass unit less than the combined mass of the particles from which it is formed. Approximately how much energy is released when this nucleus is formed?  
A) 8.48 MeV      C) 273 MeV  
B)  $8.48 \times 10^{-2}$  MeV      D) 2.73 MeV
- 5) How much energy, in megaelectronvolts, is produced when 0.250 universal mass unit of matter is completely converted into energy?
- 6) What is the energy equivalent of a mass of 0.026 kilogram?  
A)  $2.3 \times 10^{17}$  J      B)  $2.34 \times 10^{15}$  J      C)  $2.3 \times 10^{15}$  J      D)  $2.34 \times 10^{17}$  J
- 7) Photons with an energy of 7.9 electronvolts strike a zinc plate, causing the emission of photoelectrons with a maximum kinetic energy of 4.0 electronvolts. What is the work function of the zinc plate?  
A) 4.0 eV      B) 7.9 eV      C) 3.9 eV      D) 11.9 eV
- 8) The energy equivalent of the rest mass of an electron is approximately  
A)  $5.1 \times 10^5$  J      B)  $8.5 \times 10^{-28}$  J      C)  $8.2 \times 10^{-14}$  J      D)  $2.7 \times 10^{-22}$  J