PHYSICS INMOTION

Unit 7B
Nuclear Fission
Practice Problems

Name:

Date:

Work each of the following problems. SHOW ALL WORK.

1. Nuclear fission that is not spontaneous starts by a neutron being captured by an unstable nucleus. Protons have nearly identical masses to neutrons. Protons and neutrons have nearly identical masses.

   _____

2. When heavy nuclei undergo fission, mass is lost. Where does this mass go?

   _____

3. One ton of TNT releases 4.18 gigajoules of energy. The metric prefix giga means billion. How much mass could be converted to energy to release this much energy?

4. How much energy is equivalent to 1 kilogram of mass?

5. If the mass lost in a nuclear fission reaction is 0.50 grams, how much energy is released?

PHYSICS *IN*MOTION ›››
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6. An electron has a mass of 9.12 x 10⁻³¹ kilograms. How much energy would be released if the mass of one electron was lost in a nuclear fission reaction?

7. The Little Boy atomic bomb released 63 terajoules of energy when it was dropped on Hiroshima, Japan. The metric prefix tera means 10¹² times the base unit. How much mass was converted to energy during this explosion?

8. The efficiency of nuclear reactors is 45%, meaning 45% of the energy created by nuclear fission turns into electricity. The highest producing nuclear power plant in 2015 created 11.63 billion kilowatt hours, which is equal to 4.18 x 10¹⁶ joules of energy. How much mass was converted at 45% efficiency to create this much energy?