Hewitt Chapter 16 Relativity Problems

Problem

1. A woman 1.70 m tall lies along the axis of a space vehicle traveling at $0.95c$. What is her height as measured by a stationary observer?

2. Consider an object with a length at rest of 5 meters. When it approaches the speed of light, an observer at rest would measure its length approaching what value?

3. How fast must a particle move if its momentum is to be 2.6 times its classical momentum?

4. What is the energy equivalent of 5.0 kg of mass?

5. What is the mass equivalent of 2.0 MJ?

6. The fractional change of mass to energy in a fission reactor is about 0.1%, or 1 part in a thousand. If 1.0 kg of uranium undergoes fission, what amount of energy is released?