

Chapter 7 Assignment 7

All items are from Chapter 7 of Giancoli.

4. A child in a boat throws a 6.40-kg package out horizontally with a speed of 10 m/s. (See Fig. 7-31.) Calculate the velocity of the boat immediately after, assuming it was initially at rest. The mass of the child is 26.0 kg, and that of the boat is 45.0 kg. Ignore water resistance.
7. A 12,600-kg railroad car travels alone on a level frictionless track with a constant speed of 18 m/s. A 5350-kg load, initially at rest, is dropped onto the car. What will be the car's new speed?
8. A 9300-kg boxcar traveling at 15.0 m/s. strikes a second boxcar at rest. The two stick together and move off with a speed of 6 m/s. What is the mass of the second car?
11. An atomic nucleus, ${}^{222}_{86}\text{Rn}$, initially moving at 420 m/s, emits an alpha particle (which is a helium nucleus, ${}^4_2\text{He}$) in the direction of its velocity, and the remaining daughter nucleus, ${}^{218}_{84}\text{Po}$, slows to 350 m/s. If the alpha particle has a mass of 4.0 u and the original nucleus has a mass of 222 u, what speed does the alpha particle have when it is emitted?
40. A radioactive nucleus at rest decays into a daughter nucleus, an electron, and a neutrino. The electron and neutrino are emitted at right angles and have momenta of 9.30×10^{-23} kg m/s and 5.40×10^{-23} kg m/s respectively. What are the magnitude and direction of the momentum of the daughter nucleus?