

Energy Homework Problems:

p135: #30, 31

Problems taken from the school's old textbook:

Giancoli, D. (1980). *Physics*, 2nd Ed. Englewood Cliffs, NJ: Prentice Hall.

30. A radioactive nucleus that is initially at rest suddenly decays by breaking apart into three separate particles. One particle is a neutrino (imagine it traveling along the x-axis in the positive direction). The second particle is an electron (imagine it traveling along the y-axis in the positive direction). The final particle is what remains of the nucleus (now a new nucleus). The neutrino has a momentum of 6.2×10^{-23} kg m/s and the electron has a momentum of 8.6×10^{-23} kg m/s. What is the magnitude and direction of the momentum of the recoiling nucleus, the third particle?

31. A billiard ball of mass $m_A = 0.400$ kg moving with a speed $v_A = 2.00$ m/s strikes a second ball, initially at rest, of mass $m_B = 0.400$ kg. As a result of the collision, the first ball is deflected off at an angle of 30.0° with a speed $v'_A = 1.2$ m/s. Taking the x-axis to be the original direction of motion of ball A, and assuming it deflects above the x-axis, find the final velocity of ball B (which will include both a magnitude as well as a direction).

ANSWERS:

30. 1.06×10^{-22} kg m/s at 54.2° below the negative x-axis, using the reference frame described above

31. 1.133 m/s at 31.98° below the positive x-axis, using the reference frame described above