1. A 3500 kg open train car is rolling on frictionless rails at $35 \mathrm{~m} / \mathrm{s}$ when it starts pouring rain. A few minutes later, the car's speed is $22 \mathrm{~m} / \mathrm{s}$. What is the mass in kg of the water collected in the car?
2. Janet is gliding on her skateboard at $11 \mathrm{~m} / \mathrm{s}$. She suddenly jumps backward off the skateboard, kicking the skateboard forward at $23 \mathrm{~m} / \mathrm{s}$. Janet has mass 37 kg and the skateboard's mass is 7 kg
a. How fast is Janet going as her feet hit the ground?
b. How much energy in Joules did Janet use to kick the skateboard?
3. A 78 kg football player running at $+12 \mathrm{~m} / \mathrm{s}$ catches a .4 kg ball traveling at $-20 \mathrm{~m} / \mathrm{s}$.
a. What will the final velocity of the football player and ball combined mass after the catch?
b. How much heat was generated during the catch?
