AP Momentum Review Questions

1. Two cars are hurtling toward each other, both traveling at 40 m/s. One has a mass of 150 kg and the other 200 kg. After impact the smaller car is moving at 60 m/s in the direction it came from. What the velocity of the bigger car? (35 m/s)
2. Tiger Woods has an average drive speed of 180 mph. If Tiger Woods uses a 46 g golf ball and hits a 180 mph drive with an impact time of 0.5 ms, how much force does the golf ball experience? (7400 N)
3. An AK-47 has a mass of 4.3 kg and fires a bullet with mass 123 g with a muzzle velocity of 720 m/s. What is the difference of the kick back speed of the gun when held in the air versus pressed against the shoulder of an 80 kg man? (19.5 m/s)
4. You crash your car into a tree going at 35 m/s. Your head (15 kg) flies forward. What is the difference in impact forces with an airbag (impact time = 0.35 sec) versus no air bag (impact time = 0.025 sec) if after impact your head is moving backward with a speed of 3 m/s? (21,200 N)
5. An atomic nucleus initially moving at  emits an alpha particle in the direction of its velocity, and the remaining nucleus slows to  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? (4235 m/s)
6. An eagle  moving with speed  is on a collision course with a second eagle  moving at  in a direction perpendicular to the first. After they collide, they hold onto one another. With what speed are they moving after the collision? (6.69 m/s)
7. With the engines off, a spaceship is coasting at a velocity of 230 m/s through outer space. It fires a rocket that is 1300 kg. The mass of the spaceship (not including the rocket) is 4 million kg. If the firing of the rocket brings the spaceship to half its original speed, what is the velocity of the rocket? (354,000 m/s)
8. A 0.5 kg air track glider with an initial speed of 4 m/s collides with another similar glider, initially at rest. If the struck glider moves off at 3 m/s, how much Kinetic Energy is lost during the collision? (1.5 J)