Chapter 5: Newton’s Third Law of Motion

4) For each of the following interactions, identify action and reaction forces. (a) A hammer hits a nail. (b) Earth gravity pulls down on a book. (c) A helicopter blade pushes air downward.

11) Is it true that, when you drop from a branch to the ground below, you pull upward on Earth? If so, then why is the acceleration of Earth not noticed?

16) Consider the two forces acting on the person who stands still, namely, the downward pull of gravity and the upward support of the floor. Are these forces equal and opposite? Do they form an action-reaction pair? Why or why not?

17) Why can you exert greater force on the pedals of a bicycle if you pull up on the handlebars?

21) You push a heavy car by hand. The car, in turn, pushes back with an opposite but equal force on you. Doesn't this mean the forces cancel one another, making acceleration impossible? Why or why not?

24) If a Mack truck and Honda Civic have a head-on collision, upon which vehicle is the impact force greater? Which vehicle experiences the greater deceleration? Explain your answers.

30) What aspect of physics was not known by the writer of this newspaper editorial that ridiculed early experiments by Robert H. Goddard on rocket propulsion above the Earth's atmosphere? “Professor Goddard … does not know the relation of action to reaction, and of the need to have something better than a vacuum against which to react … he seems to lack the knowledge ladled out daily in high schools.”