Q9.5 Provided there is some form of potential energy in the system, the parts of an isolated system can move if the system is initially at rest. Consider two air-track gliders on a horizontal track. If you compress a spring between them and then tie them together with a string, it is possible for the system to start out at rest. If you then burn the string, the potential energy stored in the spring will be converted into kinetic energy of the gliders.

Q9.17 (c) In this case, the impulse on the Frisbee is largest. According to Newton’s third law, the impulse on the skater and thus the final speed of the skater will also be largest.

Q9.21 The planet is in motion around the sun, and thus has momentum and kinetic energy of its own. The spacecraft is directed to cross the planet’s orbit behind it, so that the planet’s gravity has a component pulling forward on the spacecraft. Since this is an elastic collision, and the velocity of the planet remains nearly unchanged, the probe must both increase speed and change direction for both momentum and kinetic energy to be conserved.

Q9.29 There was a time when the English favored position (a), the Germans position (b), and the French position (c). A Frenchman, Jean D’Alembert, is most responsible for showing that each theory is consistent with the others. All are equally correct. Each is useful for giving a mathematically simple solution for some problems.