HW 1.2 Momentum and Impulse Per ____ Name_____

1. What is the momentum of a 45 kg gazelle running with a velocity of 8 m/s?

2. A 0.5 kg football thrown by Nick Foles with a velocity of 15 m/s is caught by a stationary receiver and brought to rest in 0.02 seconds. (a) What impulse is delivered to the ball? (b) How much force must be exerted in order to stop the ball?

3. An 18,000 kg van containing Lex Luthor is moving with a speed of 15 m/s. If Superman is to stop the van in 0.5 seconds, what force must he exert on the van?

4. A 1500 kg Maserati moving with a speed of 15 m/s collides with a utility pole and is brought to rest in 0.3 seconds. Find the force exerted on the Merak during the collision.

5. A soccer ball of mass 0.4 kg is approaching Alex with a velocity of 15 m/s in horizontal flight. Illegally, Alex strikes the ball with his hand and causes it to move in the **opposite direction** at 22 m/s. If Alex provides -14,800 N of force to the ball, how long is his hand in contact with the ball?

6. If a blue whale has a mass of 1.46 E 5 kg and momentum of 9.73 E 5 kgm/s, what is its velocity?

7. An elevator at the Main Tower on the UT campus has a mass of 4500 kg and can carry a maximum load of 1800 kg. The elevator moves upward at a velocity of 3.4 m/s. Watt is the power of the motor required to maintain that speed when the elevator has a full load?

8. A cue stick strikes a pool ball initially at rest, exerting a force of 40 N over a time of 0.01 seconds. If the ball has a mass of 0.2 kg, what is its velocity immediately after impact?

9. Although it cannot sustain its top speed for more than 8.65 s, the cheetah can run a distance of 274 m during that time. If a cheetah with a mass of 50.0 kg is moving north at its top speed, what is its momentum?

10. The largest species of hummingbird is the *Patagonia gigas,* or the Giant Hummingbird of the Andes. This bird has a length of 21 cm and can fly with a speed of up to 50.0 km/h. Suppose one of these hummingbirds flies at this top speed. If the magnitude of its momentum is 0.278 kg•m/s, what is the hummingbird's mass?

11. A net force of 10.0 N to the right pushes a 3.0 kg book across a table. If the force acts on the book for 5.0 s, what is the book's final velocity? Assume the book to be initially at rest.