**Laws of Motion: Second Law of Motion Problems**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_\_\_

**I. Solve the following problems. Show all your work.**

1. A 2500 kg truck accelerates from rest to 55.0 km/h over a distance of 75m. Find the net force acting on the truck. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. A 2200 kg car is traveling at 44 m/s when the driver takes his foot off of the gas. The car eventually rolls to a stop after 235 m. Find the force of friction acting on the car. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. A 750 kg car travels at a constant speed of 65 m/s. If 350 N of friction act on the car, what is the applied force provided by the engine? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. Juan pushes Pedro on a toboggan across some frictionless snow. Pedro and the toboggan have a total mass of 85 kg and they are accelerating at 3.0 m/s2.

a. Find Juan’s applied force \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b. If Juan and Pedro hit a bare patch of concrete that exerts a force of friction on the sled of 180 N, what will their acceleration be in this time? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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 5. A student raises their 25 kg backpack from the floor at a constant velocity of 40m/s. How much force must the student apply? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

6. A physics teacher attaches a 3.0 kg brick to a light string and pulls straight up on it. The brick accelerates upwards at 3.4 m/s2. How much force did the teacher apply to the brick? \_\_\_\_\_\_\_\_\_\_\_\_\_\_

7. A 75kg skydiver falls at terminal velocity (220 km/h) before pulling the chute. If she slows to 25km/h in 3.8 s, determine the average force of air friction that acts on her during her deceleration.

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8. A 45 kg chimpanzee on a skateboard accelerates from rest to 13.0 m/s over a distance of 8.0 m. A force of friction of 65 N acts on the board. What force must the chimp apply? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

9. A 1350 kg crash test car strikes a cement wall at 24.0 m/s and bounces back at 8.0 m/s.

a. If it is in contact with the wall for 0.90 s, what force did the wall exert on the car? \_\_\_\_\_\_\_\_\_\_\_\_\_

b. If the same car had no crumple zones then it would only be in contact with the wall for 0.080 s. What force would the wall exert in this case? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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