Name_____   Date _____   Period _____

Newtonian Physics – Problem Set 1

Answer the following questions a separate sheet of paper. Show all work and circle your answer.

1. A large motorcycle weighs 2450 N. Calculate its mass in kilograms.
2. A car with a mass of 1500. Kg changes its speed from 10.0 m/s to 30.0 m/s during a 10.0 second interval.
    Calculate the net average force acting on the car during the 10.0 second interval.
3. It takes a force of 109 N to lift a stone straight up. This force gives the stone an acceleration of 12.0 m/s^2.
    Calculate the mass of the stone.
4. If a horizontal force of 30.0 N is required to slide a 12.0 kg wooden crate across the floor at a constant velocity,
    what is the coefficient of sliding friction between the crate and the floor?
5. A 60.0 kg boy and a 40.0 kg girl engage in a tug of war on an icy frictionless surface. If the acceleration of the girl
    toward the boy is 3.00m/s^2, determine the magnitude of the acceleration of the boy toward the girl.
6. A 70.0 kg astronaut is standing on a scale in a spaceship as shown.
    While the ship is moving in a straight line with   constant velocity
    of 100.0 m/s near a large planet, the scale reads 30.0 N.
    The ship then accelerates away from the planet at 7.00 m/s^2
    in the direction indicated. What does the scale read now?
7. A 10.0 kg mass on a frictionless table is accelerated by a 5.0 kg mass
    hanging from the table as shown below. Calculate the acceleration
    of the mass on the table.

$a = 7$ m/s^2

10 kg

Frictionless Surface

5 kg
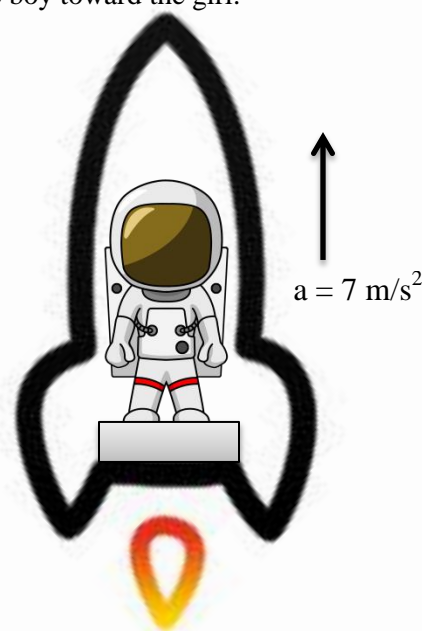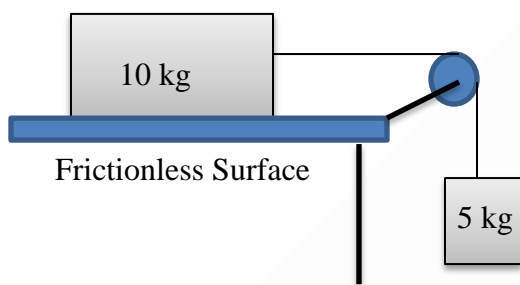
8. A 2.0 x 10^{-4} kg spider is suspended from a thin strand of spider web. The greatest tension the strand can withstand
    without breaking is 2.0 x 10^{-3} N. What is the maximum acceleration with which the spider can safely ascend
    the strand?
9. A 2500.0 kg car is traveling at a constant speed of 14.0 m/s along an icy, but straight and level road. The driver of the
    car, seeing an approaching traffic light turn red, slams on the brakes. Wheels locked and tires skidding, the car
    slides to a halt in a distance of 25.0 m. What is the coefficient of sliding friction between tires and icy surface?
10. A 3.00 kg mass and a 1.00 kg mass are hanging over a frictionless pulley as diagrammed.
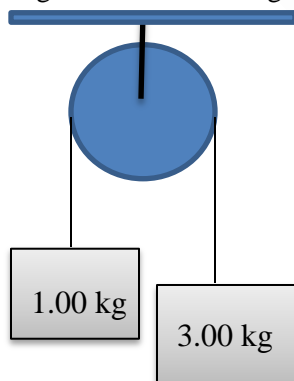
a. What is the acceleration of the 3.00 kg mass?
b. What is the tension force acting on the rope?

11. When a 0.40 kg apple is dropped, the earth exerts a force on it which
    accelerates it at 9.8 m/s2 towards the earth's surface. According to
    Newton's Third Law of Motion, the apple must exert an equal and
    opposite force on the earth. If the mass of the earth is 5.98 x 10^{24} kg
    determine the magnitude of the earth's acceleration.

1.00 kg

3.00 kg