7. A 1500 kg pick-up truck is acted upon by an external force which reduces it's velocity from 8.6 m/s to 4.3 m/s in 6.7 s. What is the value of this retarding force?

8. A 15500 kg bus is traveling at 85 km/h (*23.6 m/s*). It is brought to a stop in 145 m. What force do the brakes on the bus provide in stopping the bus?

9. A 4.5 kg cannon shell is shot out of a 2.3 m long cannon. The exploding gun powder generates a force of 6.66×10^6 N on the cannon shell. How fast does the cannon shell leave the gun barrel?

10. A 52 kg bag of cement is dragged across a cement floor. The coefficient of friction between the bag of cement and the floor is 0.42.
    a. Sherry exerts a horizontal force of 165 N. Will the bag move? Explain.
    b. Tom exerts a horizontal force of 275 N. Will the bag now move? If so determine the acceleration of the bag of cement.
    c. Tom exerts his force for 5.0 s. How far did he move the bag of cement?

6. A 45 kg girl and 65 kg girl feel some attraction towards each other when sitting on a park bench. If they feel 1.3×10^{-7} N of attractive force (you know how sensitive some teens can be), how far apart are they?

12. A box of mass 30.0 kg is placed on the floor of an elevator. Answer each of the following questions:
    a. What force does the floor place on the box (F_N) when the elevator is still?
    b. What force does the floor place on the box (F_N) when the elevator is moving at a constant speed? Does it matter whether the elevator is moving up or down?
    c. What force does the floor place on the box (F_N) when the elevator is accelerating upwards at 2.0 m/s^2?
    d. What force does the floor place on the box (F_N) when the elevator is accelerating downwards at 3.0 m/s^2?
    e. What force does the floor place on the box (F_N) when the elevator support cable breaks causing the elevator to free-fall (accelerate at "g") down the elevator shaft?

13. A 16000 kg rocket carrying a satellite produces 185000 N of thrust.
    a. What is the initial acceleration of this rocket?
    b. Just before flame-out (where all the fuel is spent) the rocket only weighs 950 kg. What is the acceleration of the rocket just before flame-out?
    c. Why do you have such a large change in acceleration for this rocket?

Two Difficult Friction Problems

A 100 kg object is on grass. You are pulling it with a horizontal force of 833 N, and the object is sliding at 1.5 m/s. Suppose, through divine intervention perhaps, that the constant of acceleration near the Earth changed suddenly to half its current value (i.e. to 4.9 m/s/s). What force would you need to be applying to keep the object moving at 1.5 m/s? What force would be required to keep the object moving at a new constant speed of 4.5 m/s?

Object A (weight = 50 N) slides on top of the much larger object B (weight 10,000 N). The coefficient of sliding friction between the two objects is 0.25. The objects are transported to a distant planet which has a diameter of 8000 km and a mass of 8×10^{25} kg. How much force would it take to slide A along B at constant velocity on this new planet? How much force would it take on the new planet to accelerate object A along B from 1 m/s/s to 10 m/s/s in a 5 second interval?