**Advanced Net Force Problems**

Begin each problem by constructing an appropriate free-body diagram.

1. A 5.0 kg bucket of water is raised from a well by a rope. If the upward acceleration of the bucket is 3.0 m/s2, find the force exerted by the rope on the bucket of water.
2. Bob has a mass = 215 kg. He places a bathroom scale in the elevator, stands on it, and presses the down button causing him to descend at an acceleration of 4.00 m/s2. What does the bathroom scale read, in pounds, on the way down? (4.45 N = 1 lb)
3. Mark is playing tug of war with his cat using a stuffed toy. At one instant during the game, Mark pulls on the toy with a force of 22 N, the cat pulls in the opposite direction with a force of 19.5 N, and the toy experiences an acceleration of 6.25 m/s2. What is the mass of the toy in grams?
4. An elevator of mass 4,850 kg is to be designed so that the maximum acceleration is ± *0.0680* × *g*, where *g* is the acceleration of gravity on earth. What are the maximum and minimum forces the motor should exert on the supporting cable?
5. The cable supporting a 2,125 kg elevator has a maximum strength of 21,750 N. What maximum upward acceleration can it give the elevator without breaking?
6. (a) What is the acceleration of two falling sky divers (mass 132 kg including parachute) when the upward force of air resistance is equal to one-fourth of their weight? (See figure 4-39 on page 98 of your textbook.)

(b) After popping open the parachute, the divers descend leisurely to the ground at constant speed. What now is the force of air resistance on the sky divers and their parachute?