1. A 6.0-kg object undergoes an acceleration of 2.0 m/s\(^2\). (a) What is the magnitude of the resultant force acting on it? (b) If this same force is applied to a 4.0-kg object, what acceleration is produced?
2. A freight train has a mass of $1.5 \times 10^7$ kg. If the locomotive can exert a constant pull of $7.5 \times 10^5$ N, how long does it take to increase the speed of the train from rest to 80 km/h?
3. A boat moves through the water with two forces acting on it. One is a 2,000-N forward push by the water on the propeller, and the other is a 1,800-N resistive force due to the water around the bow. (a) What is the acceleration of the 1,000-kg boat? (b) If it starts from rest, how far will the boat move in 10.0 s? (c) What will its velocity be at the end of that time?
4. Two blocks are fastened to the ceiling of an elevator as in this figure; the mass of each is 5.0 kg. The elevator accelerates upward to 2.0 m/s\(^2\). Find the tension in each rope.
5. The block in this figure has a mass of 5 kg. The inclined plane has an angle of $\theta = 30^0$. The coefficient of static friction is 0.2; the coefficient of kinetic friction is 0.1. What must $F_{up}$ be in order for the block to remain in place?

If $F_{up} = 55$ N, what is the acceleration of the block?
5. The block in this figure has a mass of 5 kg. The inclined plane has an angle of $\theta=30^0$. The coefficient of static friction is 0.2; the coefficient of kinetic friction is 0.1. What must $F_{up}$ be in order for the block to remain in place?

If $F_{up}=55$ N, what is the acceleration of the block?
6. This figure shows a block suspended by two ropes. The ropes are attached to the ceiling at an angle of $\theta = 45^\circ$. If the mass of the block is 10 kg, what is the tension in the rope on the left?
7. A dockworker loading crates on a ship finds that a 20-kg crate, initially at rest on a horizontal surface, requires a 75-N horizontal force to set it in motion. However, after the crate is in motion, a horizontal force of 60 N is required to keep it moving with a constant speed. Find the coefficients of static and kinetic friction between crate and floor.