

1. A hot-air balloon ascends at a rate of  $12\text{m/s}$ . A person stands in the balloon holding a package over the edge of the basket and when the package reaches an altitude of  $80\text{m}$  the person releases it.
  - (a) How long does after being released does it take the package to reach the ground?
  - (b) What is the package's speed just before impact?
2. You have been hired to design the interior of a special executive express elevator for a new office building. This elevator has all the latest safety features and will stop with an acceleration of  $g/3$  in case of any emergency. The management would like a decorative lamp hanging from the unusually high ceiling of the elevator. You design a lamp which has three sections which hang one directly below the other. Each section is attached to the previous one by a single thin wire which also carries the electric current. The lamp is also attached to the ceiling by a single wire. Each section of the lamp weighs  $7.0\text{ N}$ . Because the idea is to make each section appear that it is floating on air without support, you want to use the thinnest wire possible. Unfortunately the thinner the wire, the weaker it is. To determine the thinnest wire that can be used for each stage of the lamp, calculate the force on each wire in case of an emergency stop.