Chapter 7, Figure 1
Free-Falling Bodies

1. A bowling ball and a small rock are dropped at the same time from the same height. Which one lands first? Here is a student's answer:

STUDENT: "They land at the same time. If there were no air, the bowling ball would land first. But air resistance slows the bowling ball down, so they land together."

Do you agree with the student's reasoning? Disagree? Explain.

2. A bowling ball and a small rock are dropped from the same height at the same time. Which one lands first if this experiment is done

(a) on the Earth?

(b) on the Moon (which has no air)?

Be sure to explain your reasoning and to answer both (a) and (b).

3. To escape a burning building, a father drops his baby out the second-floor window, and at the same moment, the father lets himself fall out the window. They both land in a padded "person catcher" set up underneath the window by firefighters. Who, if either, lands first: the baby or the father? Explain your reasoning.

4. Two identical plastic soda bottles, one of them full of soda and the other completely empty, are dropped from the roof of this school at the same time. A student, when asked which object lands first, answers as follows:

STUDENT: "We learned from those Galileo experiments that objects of different mass all fall at the same rate. So the full and empty bottle land at the same time."

Do you agree? Disagree? Explain your reasoning.

5. A slippery ice cube is released from rest from the top of the ramp shown here. It slides without friction and reaches the bottom in one second. Then, a bigger, heavier ice cube is released from rest from the top, and slides without friction. Does it reach the bottom in less than a second? Exactly one second? More than one second? Explain your reasoning.