# Worksheet 1.9

A Potpourri of Questions

1. A weather balloon with a skydiving hitchhiker is traveling with a velocity of 8 m/s directly upward. When the balloon is 2000 m above the ground, the skydiver jumps out.
a. What is the velocity of the skydiver just before he lands on the ground below (assume no parachute)?

b. How long is he in the air after he jumps?

c. What is the greatest height reached by the skydiver above the ground?

d. What is the distance between the weather balloon and the skydiver 4 seconds after he jumps?

2. You are sitting on your bike at rest. Your friend comes running at you from behind at a speed of 3 m/s. At the exact moment they pass you, you start up on your bike with an acceleration of 2 m/s^2.
    a. At what time t do you have the same speed as your friend?

    b. At what time t do you pass your friend?

3.
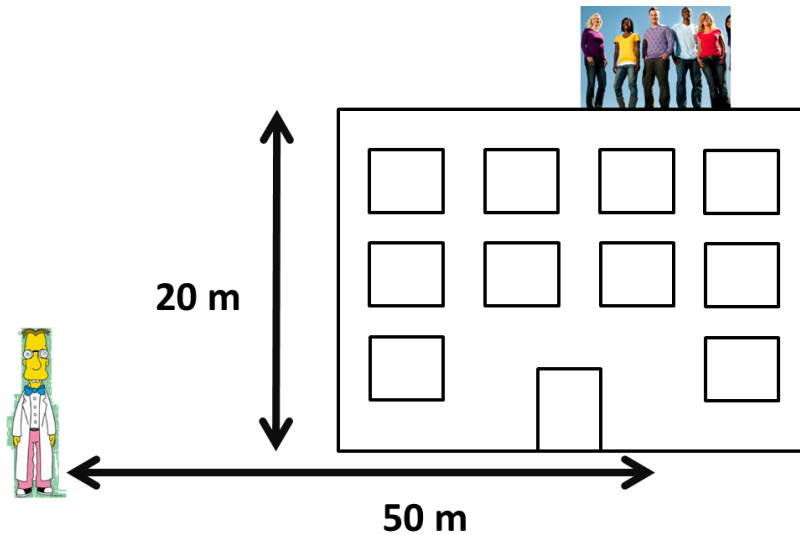
A group of college students are on the roof of their dorm at a height of 20 m with a bucket of water balloons. The first student sees his physics professor walking by. The professor is 50 m away and moving with a constant velocity of 3 m/s toward the students.

a. If the students drop a water balloon, how long will it take to hit the ground?

b. How much time will pass until the professor is directly under the students?

c. How long must the students wait to drop the balloon in order to hit their professor as he walks underneath them?

d. How fast is the balloon traveling when it hits the professor?

After getting hit by the water balloon, the professor accelerates from his initial velocity at a rate of 2 m/s^2 toward a campus police car that is 50 m away.

e. How long do the students have until he alerts the police?