Free Fall Word Problems

Falling body problems are a special subset of constant acceleration kinematics problems. Use the kinematics equations and $g = -9.80 \text{ m/s}^2$ to solve the word problems below.

1. Hiker Harriet comes to the edge of a ravine. She wants to know how deep it is, so she drops a rock off the edge. The rock lands at the bottom 2.6 seconds later. How deep is the ravine?

2. Evil Ed throws a snowball straight down from a 25 meter high bridge. It hits the ground 1.2 seconds later. How fast did he throw it?

3. A construction worker sitting on a girder drops his thermos from a height of 60.0 m. What is the velocity of the thermos just before it hits the ground?

4. A basketball player is dribbling the ball. The ball leaves her hand with an initial downward velocity of $-3.0 \text{ m/s}$, and strikes the floor with a velocity of $-5.0 \text{ m/s}$. How long did it take to reach the floor?
5. A physics student with a stopwatch decides to figure out how fast he can throw a ball. He throws the ball straight up and catches it at the same height 5.0 seconds later.
   a) What was his throwing speed?
   b) How high did the ball go?

6. A child tosses a peanut up with an initial velocity of 4.8 m/s, and catches it in her mouth. Her mouth is 35 cm higher than her hand. How fast is the peanut going when it reaches her mouth? Why there are two possible answers, and what does each mean?

7. An arrow is shot straight up into the air with a speed of 45.0 m/s.
   a) How long is it in the air?
   b) How high does it go?