Some Practice Problems in Constant Acceleration Motion

In the problems below that involve free fall, use 9.81 m/s^2 for the acceleration due to gravity in metric units. For English units, use 32.2 ft/s^2. Numerical answers are given for each problem.

1. A ball is dropped from a high window. After what time will its speed be 50 m/s? How far will it have fallen by that time?   (5.10 sec, 128 m)

2. A batter hits a fly ball straight up into the air. The catcher catches the ball 6 sec later. How high did the ball go? What was its original speed? This is Canadian baseball, so use metric units.   (44.1 m, 29.4 m/s)

3. A naughty student throws a water balloon straight down with a speed of 5 ft/s from a window 40 ft above the ground. When will the balloon hit the head of an innocent, 6-ft-tall passerby? What is its speed when it hits?   (1.31 sec, 47.1 ft/s)

4. An electron with speed of 10^4 m/s enters a "forbidden" region where an electric force tries to push it back along its path with a constant acceleration of 10^7 m/s^2. How far will the electron go into the "forbidden" region? How long will it be in that region?   (5 m, 0.002 sec)