Kinematic and Free Fall 2

Solve the following problems.

1. A tennis ball is dropped from 1.2 m above the ground. It rebounds to a height of 1 m. With what velocity does it hit the ground? With what velocity does it leave the ground with after rebounding? If the tennis ball was in contact with the ground for only .01 s, find its acceleration during this time.

2. A ball is dropped from a building 50.0 m high. How long will it take the ball to hit the ground below? How fast is it traveling just as it hits the ground?

3. A ball is thrown vertically upward with an initial velocity of 40 m/s. Calculate the vertical position and vertical velocity at the end of 2, 4, 6, and 8 seconds.

4. A weather balloon is floating at a constant height above Earth when it releases a pack of instruments. If the pack hits the ground with a velocity of – 73.5 m/s, how far does the pack fall? How long does it take the pack to fall?

5. A ball is thrown up into the air at 20 m/s. When is the velocity of the ball 5m/s? How about -5m/s? When is the ball 18m above the ground?

6. A helicopter, at an altitude of 300 m, is rising vertically at 20 m/s when a wheel falls off. How high will the wheel go with respect to the ground? How long will it take for the wheel to hit the ground? What will be its velocity when it hits the ground?

7. A stone is thrown vertically upward from a bridge 30.5 m high at an initial velocity of 15 m/s. How long will it take to reach its maximum height? How far above the water is it when it is at its maximum height? How long will it take for the stone to hit the water below?

8. A cannon ball is fired straight up at the edge of a 20m cliff. If the cannon ball's maximum height is 25m above the cliff how long does it take to get to the canyon floor? When is the cannon ball 10m above the canyon floor? How fast is the cannon ball moving at this point?