Roller Coaster Analysis

Use the simple roller coaster shown below to solve all of the following problems. Assume the roller coaster car (with riders) is 1000kg, and neglect friction and drag between the top of the first drop (B), and ground level AFTER the loop, when the brakes must stop the ride.

The top of the loop is the most dangerous spot. Choose a radius for the loop, and then you know that the height at the top is double that radius. The radius of the loop is:\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Calculate the speed the ride must have at the top of the loop so the riders feel a normal force

EQUAL to their weight (the gravitational force). (This uses UCM principles)

1. Calculate their speed at the bottom of the loop. (This uses Energy)
2. Calculate how many times larger the normal force is compared to the force of gravity at the bottom of the loop. (This uses UCM principles)
3. Calculate the height of the first hill to cause the desired speed in #1 & 2. (This uses Energy)
4. Calculate the work done to lift the car up that hill. (This uses Work and Energy)
5. Calculate the work that must be done to stop the ride. (This uses Work and Energy)
6. If the Stopping (friction) force is 4900N, how far will it take the ride to stop?
7. What happened to all the mechanical energy the ride had when it was at B, C, D, E?