Half-Life and Doubling Time
Zombie Apocalypse

Gilbert Labs has been conducting research on rhesus monkeys. Recently, a monkey became infected with a highly contagious virus.
The lead researcher, Dr. Gilbert and three of his associates, have become infected with the virus and it is spreading fast!

Currently, the number of individuals infected is doubling every 4 hours.

1. Determine an equation to represent the number of infected individuals over time. Be sure to identify your variables!

2. Use your equation to determine the number of infected after each time period. Be sure to show your calculations.
   a. 8 hours

   b. 1 day (24 hours)

   c. 2 days

   d. 4 days

3. The current world population is estimated at 7.1 billion people. Use guess and check to determine how long it would take for the infection to reach global saturation.

Luckily, all borders and airports in the country were shut down early and the infection did not spread beyond Canada's borders.

NATO has, reluctantly, decided that the only long-term solution to the infection is to "neutralize" the area. Basically, they are going to nuke Canada.

The bombs contain Cesium-137, a dangerous isotope with a half-life of 30 years. After detonation, the "dose rate" will be 52 units of Cs-137. The affected area will be uninhabitable until the "dose rate" has dropped below 1 unit of Cs-137.

1. Determine an equation to represent the amount of Cs-137 present in the affected area over time. Be sure to identify your variables!

2. What will the dose rate of Cs-137 be after each time period?
   Be sure to show your calculations.
   a. 1 year?

   b. 5 years?

   c. 30 years?

   d. 60 years?

2. Use guess and check to determine when the area will be habitable once again.