A student lands a summer job in a biophysics laboratory studying single cell bacteria.  In order to develop an effective bacteria containment protocol it is crucial to find *k* for the growth rate of the bacteria.  For bacteria *x* the student isolates a single bacterium, places it in a 1 cm x 1 cm x 1 cm container, and finds that every 10 minutes all cells in the container undergo cell division.  Find kg.

 In addition, it is known that after 30 divisions some of the bacteria start to die with a rate constant equal to 0.065 minute-1.  Assuming that the bacteria are exactly cylindrical, have the same dimensions as E. coli, and are hexagonally close packed with cylinders lining up perfectly end-to-end, determine if it is safe to leave them unattended for 24 hours.  Note that it is not safe if within 24 hours of placing the single bacterium in the container the bacteria spill over the edge of the container.