Cell Biology by the Numbers - Exercise 2

A tale of bacteria, their DNA and your lab instruments

1) Read and suggest at least one property to be added with its value and a reference to the size axis. Cell Biology by the Numbers, Introduction to Chapter 1: Size and Geometry *http://book.bionumbers.org/size-and-geometry-introduction/*
2) Choose one vignette to read from Chapter 1 of "Cell Biology by the Numbers" textbook (you are welcome to read others if you like…), preferably one vignette that is related to your research topic or that you have previous knowledge of. Write a few sentences on what you learned from it, how you suggest to make it better and anything insightful you have to add. Bonus given to new insights and most useful suggestions.
3) Solve the following questions:
   Remember! You should adhere to these guidelines on the number of significant digits in writing numbers.
   (*Refer to Bionumbers database for data as needed (http://bionumbers.hms.harvard.edu/ and cite the proper BNID number you used).*

A) You're about to conduct an important experiment in the lab which requires growing *Bacillus subtilis* bacteria to an OD_{600} of 1, and your "starter" inoculation is at 7 PM in a 1 mL rich medium. Assuming you want to be an early bird and start the experiment at 7 AM the next day, what is the minimal number of *B. subtilis* cells you should take for the starter (assuming the media isn't limiting)?
(Hint: You might find this useful key numbers for cell biologists)

B) Next, you're interested in a unique 1000 bp DNA sequence in the *B. subtilis* genome encoding for a small mysterious protein. To subject this DNA fragment for subsequent experiments, you need to have 10 ng of this unique double stranded DNA sequence. Is it enough to harvest all the cells you have grown overnight and extract the sequence? Do you have to amplify it by PCR to get enough copies?

C) Regardless of your answer to question B, how many PCR cycles would have been needed to generate those 10 ng of the DNA sequence from a single template? Check your favorite PCR protocol to see if your answer makes sense.