

Last Name, First Name

Discussion Section

Student ID

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### Worksheet 10 • Unrestricted Growth

Continuously compounding interest and unrestricted population growth are both examples of quantities modeled by geometric growth. Suppose that you eat something contaminated with pathogenic e-coli. You ingest only 1,000 of these bacteria. Their population doubles every twenty minutes and undergoes unrestricted growth.

1. How many bacteria will there be in 20 minutes?
2. How many bacteria will there be in 40 minutes?
3. Set up an equation that describes the number of bacteria you will have at time  $t$ . What is the growth rate of this population?
4. How many bacteria will you have after 50 minutes?
5. You will get violently ill once you have 500,000,000 of these bacteria in you. How long will that take?
6. Suppose now that you have injected an unknown strain of bacteria. What you do know is that their population is undergoing unrestricted growth. If you have 1,000,000 bacteria at noon and 10,000,000 at 3:00pm, how many will you have at 4:00pm? What is the growth rate of this population and what is the doubling time of the population?