**Calculation of Generation Time**

When growing exponentially by binary fission, the increase in a bacterial population is by geometric progression. If we start with one cell, when it divides, there are 2 cells in the first generation, 4 cells in the second generation, 8 cells in the third generation, and so on. The **generation time** is the time interval required for the cells (or population) to divide.

G (generation time) = (time, in minutes or hours)/n(number of generations)

G = t/n

t = time interval in hours or minutes

B = number of bacteria at the beginning of a time interval

b = number of bacteria at the end of the time interval

n = number of generations (number of times the cell population doubles during the time interval)

b = B x 2n (This equation is an expression of growth by binary fission)

Solve for n:

logb = logB + nlog2

n = logb - logB   
           log2

n = logb - logB   
           .301

n = 3.3 logb/B

G = t/n

Solve for G

G =        t\_\_\_\_\_  
       3.3 log b/B

**Example: What is the generation time of a bacterial population that increases from 10,000 cells to 10,000,000 cells in four hours of growth?**

G =        t\_\_\_\_\_  
       3.3 log b/B

G =    240 minutes   
       3.3 log 107/104

G =   240 minutes   
           3.3 x 3

G = 24 minutes

EX:An experiment began with 4 cells and ended with 128 cells. How many generations did the cells go through?

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