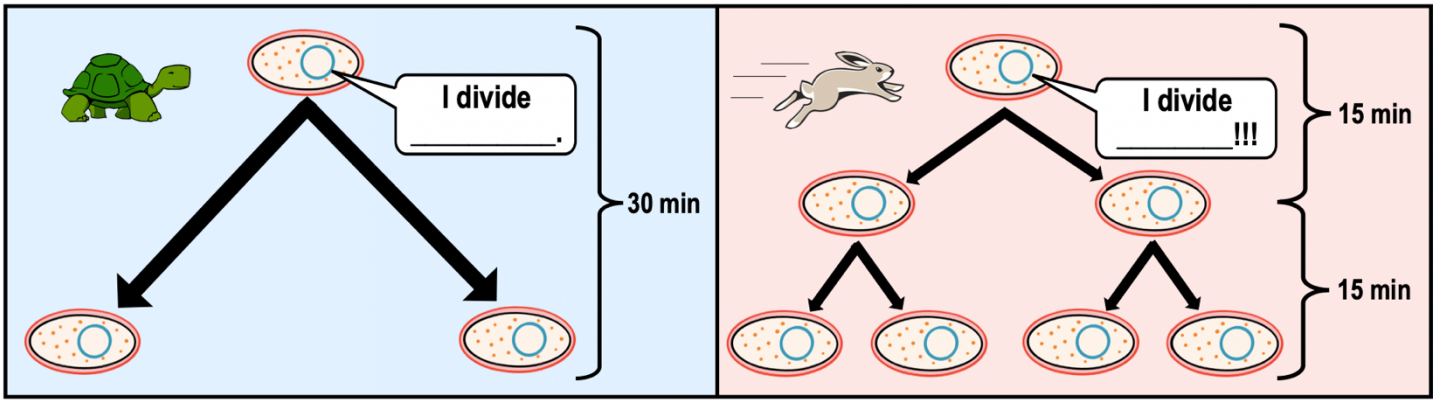
CONCEPT: GENERATION TIMES

●Scientists can measure the growth _____ of a microbial population by calculating its *generation time.*

□ _____ **Time (Doubling Time):** time it takes a population to _____ in the number of cells.

□ Represents how long it takes for _____ *fission* to make a new generation of cells.

□ Different microbes tend to have _____ *generation times*.



Using Generation Times To Calculate # of Cells

●If given the *generation time*, the following equation can be used to calculate the ____ of cells after a certain period of time:

$$N_t = N_0 \times 2^n$$

□ N_t = final # of cells after a given amount of time.

□ N_0 = Initial # of cells.

□ n = # of new generations over a given amount of time = Given Amount of Time/Generation Time.

EXAMPLE: Calculate the number of cells after 3 hours of growth starting from 10 cells with a generation time of 30 minutes.

a) 23 cells.

b) 74 cells.

c) 1,108 cells.

d) 640 cells.

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PRACTICE: Calculate the number of cells that have grown after 12 hours starting from 100 cells that have a generation time of 1 hour.

a) 40,960 cells.
b) 4,096 cells.
c) 4,096,000 cells.
d) 409,600 cells.

PRACTICE: A microbiologist is has a population of 300 *E. coli* bacteria in an experiment in her lab. *E. coli*'s generation time is 15 minutes. The scientist lets the *E. coli* population grow for 1 hour and 45 minutes. How many E. coli bacteria are present after this time?

a) 29,700 cells.
b) 38,400 cells.
c) 600,000 cells.
d) 308,400 cells.

PRACTICE: A microbiologist is studying the growth of Bacteria X. He allowed the population of Bacteria X to grow for 4 hours and 30 minutes which resulted in 140,800 bacterial cells. The microbiologist realizes that he forgot to determine the size of his starting bacterial population. He knows that Bacteria X's generation time is 30 minutes, how many bacteria were in the starting population?

a) 275 cells.
b) 350 cells.
c) 125 cells.
d) 470 cells.