

# Applications

- If you don't brush your teeth regularly, it won't take long for large colonies of bacteria to grow in your mouth. Suppose a single bacterium lands on your tooth and starts multiplying by a factor of 4 every hour.

  - Write an equation that describes the number of bacteria  $b$  in the new colony after  $n$  hours.
  - How many bacteria will be in the colony after 7 hours?
  - How many bacteria will be in the colony after 8 hours? Explain how you can find this answer by using the answer from part (b) instead of the equation.
  - After how many hours will there be at least 1,000,000 bacteria in the colony?
  - Suppose that, instead of 1 bacterium, 50 bacteria land in your mouth. Write an equation that describes the number of bacteria  $b$  in this colony after  $n$  hours.
  - Under the conditions of part (e), there will be 3,276,800 bacteria in this new colony after 8 hours. How many bacteria will there be after 9 hours and after 10 hours? Explain how you can find these answers without using the equation from part (e).
- Loon Lake has a "killer plant" problem similar to Ghost Lake in Problem 2.1. Currently, 5,000 square feet of the lake is covered with the plant. The area covered is growing by a factor of 1.5 each year.

  - Copy and complete the table to show the area covered by the plant for the next 5 years.
  - The surface area of the lake is approximately 200,000 square feet. How long will it take before the lake is completely covered?

**Growth of Loon Lake Plant**

Year	Area Covered (sq. ft)
0	5,000
1	■
2	■
3	■
4	■
5	■



3. Leaping Leonora just signed a contract with a women's basketball team. The contract guarantees her \$20,000 the first year, \$40,000 the second year, \$80,000 the third year, \$160,000 the fourth year, and so on, for 10 years.



- Make a table showing Leonora's salary each year of this contract.
- What total amount will Leonora earn over the 10 years?
- Describe the growth pattern in Leonora's salary.
- Write an equation for Leonora's salary  $s$  for any year  $n$  of her contract.

4. As a biology project, Talisha is studying the growth of a beetle population. She starts her experiment with 5 beetles. The next month she counts 15 beetles.

- Suppose the beetle population is growing linearly. How many beetles can Talisha expect to find after 2, 3, and 4 months?
- Suppose the beetle population is growing exponentially. How many beetles can Talisha expect to find after 2, 3, and 4 months?
- Write an equation for the number of beetles  $b$  after  $m$  months if the beetle population is growing linearly. Explain what information the variables and numbers represent.
- Write an equation for the number of beetles  $b$  after  $m$  months if the beetle population is growing exponentially. Explain what information the variables and numbers represent.
- How long will it take the beetle population to reach 200 if it is growing linearly?
- How long will it take the beetle population to reach 200 if it is growing exponentially?

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