

Unit 8 Day 5: Writing and Interpreting Exponential Functions

Focus Question: What does the equation of an exponential function mean and how do I use it?

A. Students of Magnolia Middle School conducted an experiment. They put a mixture of chicken bouillon (BOOL yahn), gelatin, and water in a shallow pan. Then they left it out to mold. Each day, the students recorded the area of the mold in square millimeters.

The students wrote the equation $m(d) = 50 \cdot 3^d$ to model the growth of the mold. In this equation, m is the area of the mold in square millimeters after d days.

1. What is the area of the mold at the start of the experiment? **Initial 50 sq. mm.**

2. What is the growth factor? **3 (the mold size triples daily)**

3. What is the area of the mold after 5 days? **$m(5) = 50 \cdot 3^5$ 12,150 sq. mm**

4. On which day will the area of the mold reach 6,400 mm²? (Hint, use the table feature on your calculator). **after 4 days but not a full 5 during the 5th day**

B. 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.

1. Write an equation that describes the number of bacteria, b , in the new colony after h hours.

$b(h) = 1 \cdot 4^h$ $b(h) = 4^h$

2. How many bacteria will be in the colony after 7 hours? **16,384 bacteria**

$b(7) = 4^7$

3. How many bacteria will be in the colony after 8 hours? **65,536 bacteria**

$b(8) = 4^8$

4. How can you use the answer from #2 to find the answer to #3 instead of using the equation?

$16384 \cdot 4$

5. After how many hours will there be at least 1,000,000 bacteria in the colony?

more than 9 full hrs. < than 10 full hrs.

6. 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 h hours.

$b(h) = 50 \cdot 4^h$

C. Loon Lake has a "killer plant" problem. Currently 5,000 square feet of the lake is covered with a plant that is killing all other aquatic life. The area covered is growing by a factor of 1.5 each year.

1. What is the equation for the growth of the plant?

$$f(x) = 5000 \cdot 1.5^x$$

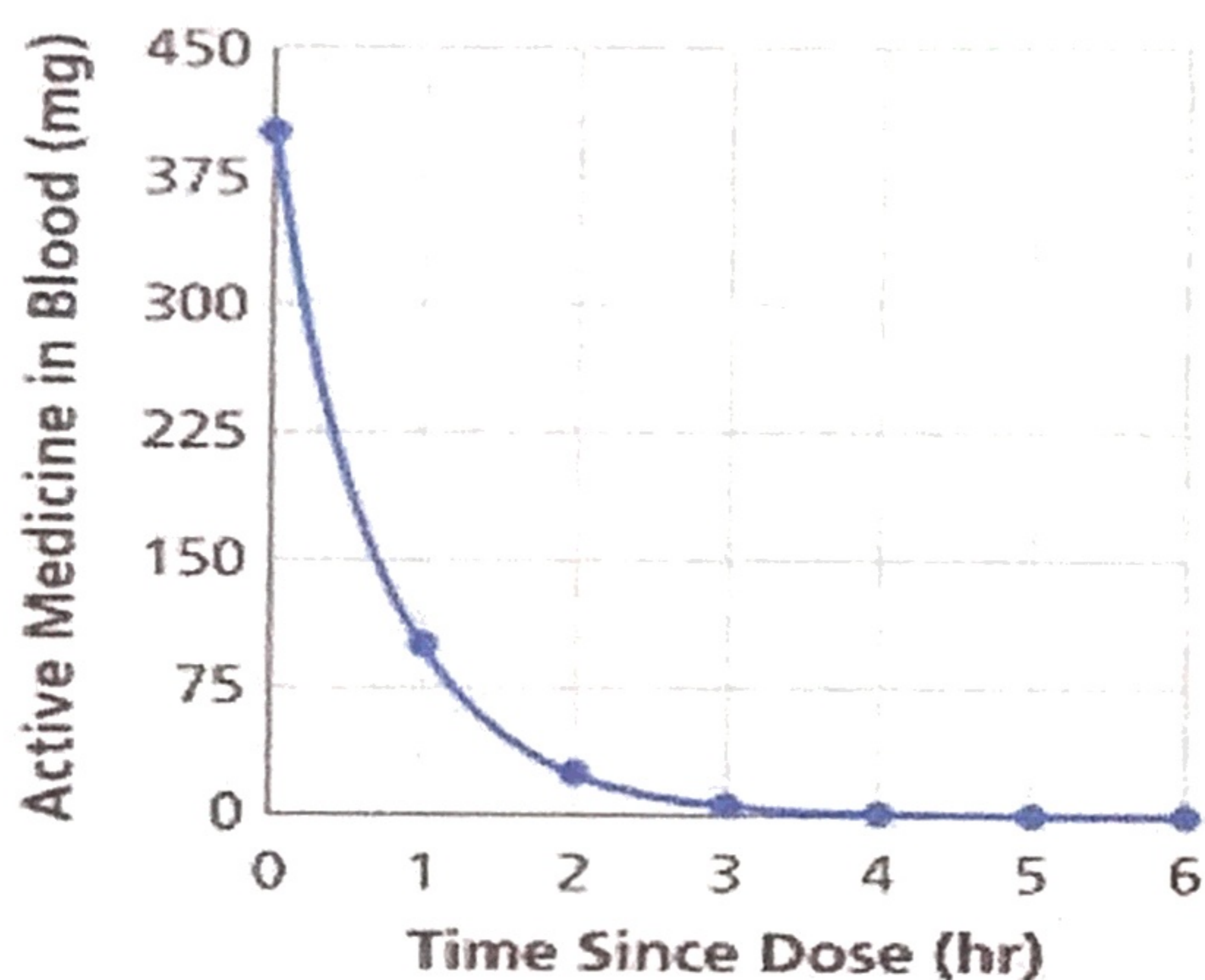
2. The surface area of the lake is approximately 200,000 square feet. How long will it take before the lake is completely covered?

$$200,000 = 5000 \cdot 1.5^x$$

more than 9 yrs
but less than 10

D. A dog receives a 400 milligram dose of flea medicine. The table and graph show the amount of medicine in the dog's bloodstream each hour for 6 hours after the dose.

Breakdown of Medicine



Time Since Dose (hr)	Active Medicine in Blood (mg)
0	400
1	100
2	25
3	6.25
4	1.5625
5	0.3907
6	0.0977

~~1/4~~ $\cdot \frac{1}{4}$

1. How does the amount of active medicine in the dog's blood change from one hour to the next?

its decaying by a factor of $\frac{1}{4}$

$$m(h) = 400 \left(\frac{1}{4}\right)^h$$

2. Write an equation to model the decay of the flea medicine.