

# Exponential Models 4 Practice

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lead  
ans.

A colony of bacteria grow in number exponentially according to  $y = Ae^{kt}$ .

Given: 100 bacteria initially. A

Given: 300 bacteria after 20 hours.

It may help to make a table of  $(t, y)$ .

$$y = Ae^{kt}$$

a) Find  $k$  to 5 decimals. What are the units?

$$300 = 100e^{k(20)}$$
$$\frac{\ln(3)}{20} = \frac{20k}{20} \quad k = .05493$$

b) Find the number of bacteria after 10 hours. Why is it not 200 bacteria (midway between 100 and 300)?

$$y = 100e^{.05493(10)} = 173$$

c) Find the number of bacteria after 30 hours. (It's not 400.)

$$y = 100e^{.05493(30)} = 519$$

d) Find the doubling time. Guess first.

$$200 = 100e^{.05493t}$$

$$(12.62 \text{ hours})$$

e) After how long will there be 800 bacteria? Guess first.

$$800 = 100e^{.05493t}$$

$$(37.856 \text{ hr})$$