

Unit 1 1.6 AP Calculus BC

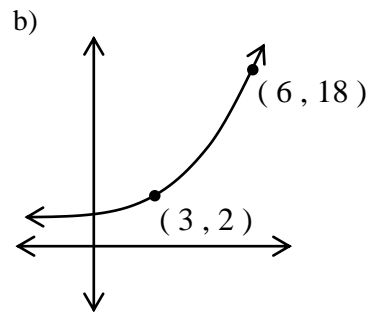
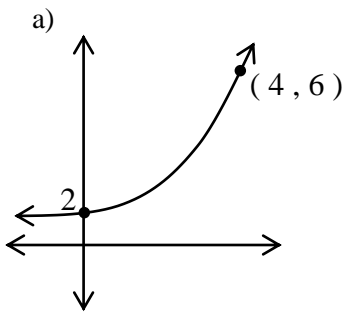
Exponential Growth

Name: _____

1. The table below shows the growth of bacteria for a 5-day period. Write the equation of the line that models the situation.

Day	0	1	2	3	4	5
mm ²	1.99	2.3	2.63	3.05	3.5	4.03

2. Write the equation of each graph. Hint: Use the form $Q = Q_0 a^t$.



Write an exponential equation, then solve. Hint: Use the form $Q = Q_0 a^t$, $Q = Q_0 e^{kt}$, or $Q = Q_0 g^{\frac{1}{P}t}$.

3. The population in 2000 is 50,000. If there is an annual growth of 3%, then in how many years will the population be 75,000?

4. The size of a fungus doubles every 13 days. If after 2 days the fungus is 3 mm², then what is the size after 30 days?

5. Strontium-90 is a radioactive substance whose half-life is 29 years. What percent remains 40 years after being exposed to it?

6. After 10 years, 70% of a substance remains. What is its half-life?

7. Bacteria, B , grows according to the equation $\frac{dB}{dt} = kB$. Suppose the bacteria doubles every 5 days.

a) Then the value of k is

- (A) 0.072 (B) 0.139 (C) 0.693 (D) 1.733 (e) 3.466

b) Find the annual growth rate.

- (A) 8.334% (B) 9.869% (C) 14.869% (D) 71.530% (e) 73.509%

JFF) What is the continuous growth rate?

8. The population of a certain city increase at a rate proportional to the current population. If the population doubles in 30 years, then in how many years will the population triple?

- (A) $\frac{2 \ln 3}{\ln 2}$ (B) $\frac{30 \ln 3}{\ln 2}$ (C) $30 \ln\left(\frac{3}{2}\right)$ (D) $\ln\left(\frac{3^{30}}{2}\right)$ (e) $\ln\left(\frac{30^3}{2}\right)$

9. During a certain epidemic, the number of people that are infected at any time increases at a rate proportional to the number of people that are infected at that time. If 1,000 people are infected when the epidemic is first discovered, and 1,200 are infected 7 days later, how many people are infected 12 days after the epidemic is first discovered?

- (A) 343 (B) 1,343 (C) 1,367 (D) 1,400 (E) 2,057

10. The number of bacteria in a culture is growing at a rate of $3,000e^{2t/5}$ per unit of time t . At $t = 0$, the number of bacteria present was 7,500. Find the number present at $t = 5$.

- (A) $1,200e^2$ (B) $3,000e^2$ (C) $7,500e^2$ (D) $7,500e^5$ (E) $\frac{15,000}{7}e^7$

ANSWERS:

- 1) $y = 1.99(1.15)^t$ 6) 19.434 yrs
2a) $y = 2(\sqrt[4]{3})^t$ 7a) B
b) $y = (2/9)(\sqrt[3]{9})^t$ b) C
3) 13.717 yrs JFF) 13.863%, the same as k
4) 13.350 mm² 8) B
5) 38.440% 9) C
10) C