

PreAP Precal Application of Logs

Growth and Decay

PLEASE SHOW WORK NEATLY ON A SEPARATE PAPER BOX ANSWERS

1. A radioactive substance has a half-life of 420 years. How much remains of a 2 oz. sample after 200 years?
2. A bacteria culture has an initial count estimate of 4000. After 20 minutes the count is 22,400. What is the growth rate, and approximately how many minutes did it take for the culture to double?
3. An isotope of sodium has a half-life of 15 hours. How many hours will it take for 40% of a given amount to remain?
4. The number of bacteria in a certain culture increases from 600 to 1800 in 2 hours. How many bacteria will there be after 4 hours?
5. Radium has a half-life of 1600 years. If you begin with 50 mg, when will there be only 20 mg left?
6. The number of bacteria increases from 5,000 to 15,000 in 10 hours.
 - a) What is the bacteria's growth rate?
 - b) How many bacteria will there be in 20 hours?
 - c) When will there be 50,000 bacteria?
7. A bank pays 3.5% interest compounded daily. If you invest \$2000, how long will it take for your investment to double?
8. The population of a city increases 5% per year. If the present population is 500,000, what will the population be in 10 years?
9. If $\frac{1}{4}$ of a radioactive substance disintegrates in 10 days, what is its half-life?
10. A physicist has 12 grams of radioactive bismuth, which has a half-life of 5 days.
 - a) How much will be left after 15 days?
 - b) How long will it take for 2 grams to disappear?
11. In 1950 the population of a city was 80,000, and in 1960 it was 100,000.
 - a) What is its yearly growth rate?
 - b) What is the population in 1980?
 - c) What is the population in 2010?

Growth and Decay HWK Key

1. 1.437 oz
2. $e^k=1.089$,
8.046 minutes
3. 19.828 hours
4. 5400 bacteria
5. 2115.084 years
6. A. $e^k=1.116$
B. 45,000 bact
C. 20.959 hours
7. 19.805 years
8. 814,447 people
9. 24.094 years
10. A. 1.5 grams
B. 1.315 days
11. A. $e^k=1.022$
B. 156,250 people
C. 305,175 people