

Exponential Growth and Decay Problems | Lesson 16

Answer the following questions. If necessary, please round answers to the nearest whole number.

- A dish has 212 bacteria in it. The population of bacteria will grow by 80% every 2 days. How many bacteria will be present in . . .
 - 8 days
 - 11 days
 - When will the population be 2,000 bacteria?
- The house down the street has termites in the porch. The exterminator estimated that there are about 800,000 termites eating at the porch. He said that the treatment he put on the wood would kill 40% of the termites every day. How many termites will be eating at the porch in . . .
 - 3 days
 - 36 hours
 - 2 weeks
- In June, a 5th grade class started out with 10 mealworms for an experiment. The population of worms will double (grow by 100%) every month. How many mealworms will the class have for their experiment in . . .
 - 3 months
 - 1 year
 - 45 days
 - how many days will it take to reach a population of 500 mealworms?
- Your baby brother has an ear infection. The doctor said there are probably 50,000,000 bacteria in his left ear. The penicillin the doctor prescribed will kill 7% of the bacteria every 6 hours. How many bacteria will be in your brother's ear in . . .
 - 1 day
 - 3 hours
 - how many days does it take to reduce the amount of bacteria by 50%
- The population of Succasunna, NJ was 11,171 in 2000. The estimated population growth is 2.1% every 4 years. What is the estimated population in the year . . .
 - 2020
 - this year
 - in what year will the population first exceed 100,000
- This year an estimated 4,324,000 people in this country are illiterate. With new incentives and funding, the country is hoping to cut that number by 11% every 3 years. How many people do you predict will be illiterate in the year . . .
 - 2035?
 - 2095?
 - 2155?
- In Sub-Saharan Africa an estimated 28.5 million people are infected with AIDS. Unfortunately that number is rising, and it is estimated to grow at a rate of .4% every 2 years. How many people will be infected in . . .
 - 3 years
 - 10 years
 - When will we first have less than 10 million people infected?

Exponential Growth and Decay Problems | Lesson 16

8. Coal was once a booming industry in central Pennsylvania. However, the industry has begun to decline. In the year 1950 about 600,000 were employed in the local coalmines. Since then the number of coalminers has declined by 5% every 6 years. How many coal workers were/will be employed in the year . . .
- a) 1962 b) 2013 c) What is the annual rate of decrease?
9. A bacteria culture grows according to the formula: $N(t) = 12000 \times 2^{(t/4)}$ where t is in hours. How many bacteria are present:
- (a) at the beginning of the experiment?
(b) after 12 hours?
(c) after 1 day?
(d) after 19 hours?
10. A bacteria culture starts with 3000 bacteria. After 3 hours there are 48 000 bacteria present. What is the length of the doubling period?
11. A bacteria culture triples every 4 hours and starts with 10 000 bacteria. Find the number of bacteria in the culture after 30 hours.
12. The world population doubles every 35 years. In 1980 the population was 4.5 billion. Assuming that the doubling period remains at 35 years, estimate the population in the year 2120.
13. From 1983 to 1997, the ratio of students per computer at a school has dropped by about 16.8% per year. If there were 103 students per computer in 1983, what was the number of students per computer in 1997? How many years did it take for the ratio to reach 50 students per computer?
14. Bessy the Dinosaur bought a totally radical gaming computer for \$3,500.00. The value of his computer will depreciate at the rate of 24% per year. Estimate the value of the computer in 3 years.
15. A block of dry ice is losing its mass at a rate of 12.5% per hour. At 1 PM it weighed 50 pounds. What was its weight at 5 PM? What was the approximate half life of the block of dry ice under these conditions? (Half life is defined as the period of time for something to decay by 50%).

Exponential Growth and Decay Problems | Lesson 16

16. A child's grandmother set up a college savings account for her when she was 3 years old. The investment earned 5.2% per year compounded annually. The child is now 18 years old and the account has a value of \$18,500.00. To the nearest dollar, how much did the grandmother put in the account when the child was 3?
17. The rural town for Sanfilipposville has been losing population at a rate of 5.8% per year for the last 10 years. Its current population is 12,500. What was its population 10 years ago? What will its population be in 8 years if it keeps declining at the same rate?
18. You buy a new computer for \$2100. The computer decreases by 50% annually. When will the computer have a value of \$600?
19. You drink a beverage with 120 mg of caffeine. Each hour, the caffeine in your system decreases by about 12%. How long until you have 10mg of caffeine?
20. The foundation of your house has about 1,200 termites. The termites grow at a rate of about 2.4% per day. How long until the number of termites doubles?
21. The population of Winnemucca, Nevada, can be modeled by $P=6191(1.04)^t$ where t is the number of years since 1990. What was the population in 1990? By what percent did the population increase by each year?
22. You have inherited land that was purchased for \$30,000 in 1960. The value of the land increased by approximately 5% per year. What is the approximate value of the land in the year 2012?