

6.2.D3 ~ Linear & Exponential Function Modeling

Past due on: _____ Period: _____

1. Write a formula for the price p of a gallon of gas in t days if the price is \$2.50 on day $t = 0$ and the price is...
 - a. Increasing by \$0.03 per day.
 - b. Decreasing by \$0.07 per day.
 - c. Increasing by 2% per day.
 - d. Decreasing by 4% per day.

2. A population has size 5000 at time $t = 0$, with t in years.
 - a. If the population decreases by 100 people per year, find a function formula for the population, P , at time t .
 - b. If the population decreases by 8% per year, find a function formula for the population, P , at time t .

Can the situation be represented by a linear function or an exponential function?

3. Sebastian deposits \$100,000 in a local bank that will pay out 5% interest every year.
4. A certain type of corn grows at the rate of 3 inches per week.
5. The Munn Sugar Processing Plant is able to process 10 tons of sugar per month.
6. Exercise biologist, Samantha, discovered that to reduce soreness, people should start biceps curls at 10 pounds. Then, progress weekly to 15 pounds, 22.5 pounds, 33.75 pounds and so on.
7. The amount of money in Suzie's piggy bank which she adds \$10 to each week.
8. The amount of money a certificate of deposit that earns 4% interest each year.

9. Based on data from 1970 to 2004, the production of crude oil in the United States has decreased at a rate of roughly 0.27 quadrillion BTU per year. In 1970, the production level was 20.4 quadrillion BTU. Can this situation be best represented by a linear or an exponential function? Explain your reasoning.

10. Between 1960 and 2004, the total national expenditure on health costs increased by roughly 10.1% annually. In 1960, national health expenditures were \$28 billion. Can this situation be best represented by a linear or an exponential function? Explain your reasoning.

11. In 2000, the population of a town was 20,000, and it grew by 4.14% that year. By 2010, the town's population had reached 30,000. Can this situation be best represented by a linear or an exponential function? Explain your reasoning.

12. According to the World Health Organization, the population of the United States was 298,213 thousand in 2005. Between 1995 and 2004, the population grew at an average rate of 0.9% annually. Assuming the percentage growth rate will remain the same in the future, model the U.S. population as a function of the years since 2005.

13. Three years after opening a savings account, Eric has saved \$2000; after 10 years, the balance is \$5000.
- Assuming the balance has grown exponentially, find a possible function formula representing the balance, B , after t years. *Approximate values of a to 2 decimal places & b to 3 decimal places.*
 - What was the initial balance of Eric's savings account?
 - What annual interest rate does the account pay?
14. There were 178.8 million licensed drivers in the U.S. in 1989 and 187.2 million in 1999.
- Find an exponential function formula for the number, N , of licensed drivers in the U.S. as a function of t , the number of years since 1989. *Approximate values of a to 1 decimal place & b to 3 decimal places.*
 - Find a linear function formula for the number, N , of licensed drivers in the U.S. as a function of t , the number of years since 1989.
15. Between 1960 and 2004, insurance company expenditures for health care increased at an ever-increasing rate. In 1960, \$6 billion was spent on health care. In 2004, \$659 billion was spent on health care.
- Assume expenditures for health care are increasing at a constant annual rate, how much money is this? How much money was spent on health care in 2016?
 - Assume expenditures for health care are increasing at a constant annual percentage rate, what is this percentage? How much money was spent on health care in 2016?
16. The median price of a home in Las Vegas, Nevada dropped from \$312,346 in 2006 to \$306,100 in 2007. Let t be the number of years since 2006.
- Assume the decrease in housing prices has been *linear*. Give an equation for the line representing price, P , in terms of t .
 - According to the linear model, what was the price of a home in Law Vegas in 2020?
 - Assume the decrease in housing prices has been *exponential*. Give an equation for the curve representing price, P , in terms of t . *Approximate values of a & b to 3 decimal places.*
 - According to the exponential model, what was the price of a home in Law Vegas in 2020?