

Key

Math I EOC Review
Exponential functions rate of increase/decrease
A-CED.1&2

Exponential functions are of the form $f(x) = a(b)^x$, where a is the y-intercept or initial amount, and b is the growth/decay factor. If $b > 1$ it represents exponential growth and if $0 < b < 1$ it represents exponential decay.

Ex/ $f(x) = 5,236(1.08)^x$ exponential growth, growth rate is 8%

Ex/ $f(x) = 2,873(0.91)^x$ exponential decay, decay rate is 9%

Examples

- Which function could represent a population that is growing at a rate of 15% per year, t ?
 - $P = 1,500(0.85)^t$
 - $P = 0.85(1,500)^t$
 - $P = 1,500(1.15)^t$
 - $P = 1.15(1,500)^t$

- The population of a town t years after 2000 is modeled by the function $P(t) = 37,000(0.97)^{\frac{t}{12}}$. At what rate is the population decreasing each year?
 - 0.25%
 - 0.69%
 - 3%
 - 9%

Handwritten notes: $.9975^{12} = .97$
 $= 37,000 (.9975)^{\frac{t}{12}}$
 $= 37,000 (.97)^{\frac{t}{12}}$

- You purchase a car for \$22,000. Assuming the value of the car depreciates at a constant rate of 6% a year, **approximately** what is the value of the car after 6 years?
 - \$20,680
 - \$15,177
 - \$9,207
 - \$3,667

Handwritten note: $22,000 (.94)^6 = 15,177.14$

- The growth of a population is modeled by the function $P = (234,788)(1.09)^x$. What is the rate of growth of the population shown in this model?
 - 9%
 - 1.09%
 - 0.09%
 - 0.91%

- The function $f(x) = 2,500(0.97)^x$ models the value of an investment after x months. Which statement is true about the value of the investment?
 - The value of the investment increases by 3% each month.
 - The value of the investment decreases by 3% each month.
 - The value of the investment increases by 97% each month.
 - The value of the investment decreases by 97% each month.

- A scientist is observing the size of a sample of bacteria. The function $f(t) = 1,000(0.995)^t$ models the size of the sample t hours after the scientist began his observations. Which statement is true about the size of the sample?
 - The sample size is growing at a rate of 99.5% per hour.
 - The sample size is decaying at a rate of 0.5% per hour.
 - The sample size is growing at a rate of 0.5% per hour.
 - The sample is decaying at a rate of 0.5% per hour.

- The depreciation of Sam's car can be represented by the function $c(x) = 12,800(0.94)^x$, where x is the number of years since Sam purchased the car, and $C(x)$ represents the value of the car after x years. How much did Sam pay for his car when he purchased it?
 - \$10,631
 - \$11,310
 - \$12,032
 - \$12,800

Handwritten note: initial amount

- Over the history of Racer Insurance Company, the number of employees has increased at a constant rate of 9.4% per year. The current number of employees is 10,000. Approximately how long will it take the company to double its current number of employees?
 - 6 years
 - 7 years
 - 8 years
 - 9 years

Handwritten notes: $= 10,000 (.094)^x$
 plug in each for x to see which will equal 20,000

- The population of a city has been increasing exponentially since 1995. In 1995, the population was 26,543. In 2005, the population was 38,766. If t represents the time in years since 1995, which of the following equations best models the growth of the population P ?
 - $P = 26,543(1.43)^t$
 - $P = 26,543(1.04)^t$
 - $P = 38,766(1.04)^t$
 - $P = 38,766(0.96)^t$

Handwritten note: initial population was 26,543