

## Exponential and Logarithms Test Review

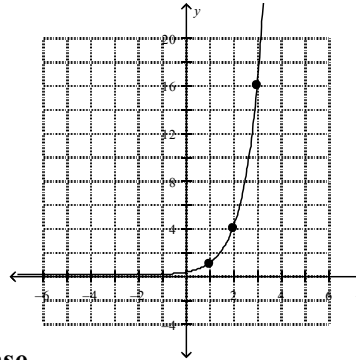
Review is due on the day of the test. All work & answers must be on a separate sheet of paper.

Questions with \* will be on the Non-Calc part of the test.

- An initial population of 910 armadillos increases at an annual rate of 5%. Write an exponential function to model the armadillo population. How many armadillos will there be after 6 years?

Write an exponential function  $y = ab^x$  for a graph that includes the following points.

- (1, 15) and (0, 6)
- (2, 28) and (0, 7)
- Write an exponential function for the graph.



Find the annual percent increase or decrease.

- $y = 0.35(1.75)^x$
- $y = 0.35(2.3)^x$
- $y = 0.35(0.7)^x$
- For an annual rate of change of  $-18\%$ , find the corresponding growth or decay factor.
- For an annual rate of change of  $51\%$ , find the corresponding growth or decay factor.
- The half-life of a certain radioactive material is 52 days. An initial amount of the material has a mass of 801 kg. Write an exponential function that models the decay of this material. Find how much radioactive material remains after 10 days. Round your answer to the nearest thousandth.
- The half-life of a certain radioactive material is 12 hours. An initial amount of the material has a mass of 3 kg. Write an exponential function that models the decay of this material. Find how much radioactive material remains after 33 hours. Round your answer to the nearest thousandth.
- The sales of lawn mowers  $t$  years after a particular model is introduced is given by the function  $y = 3200 \ln(8t + 2)$ , where  $y$  is the number of mowers sold. How many mowers will be sold 5.5 years after a model is introduced? Round the answer to the nearest whole number.
- Suppose you invest \$1600 at an annual interest rate of  $3.6\%$  compounded continuously. How much will you have in the account after 4 years?
- Suppose you invest \$700 at an annual interest rate of  $7.7\%$  compounded monthly. How much will you have in the account after 10 years?
- How much money invested at  $6\%$  compounded continuously for 6 years will yield \$750?
- The amount of money in an account with continuously compounded interest is given by the formula  $A = Pe^{rt}$ , where  $P$  is the principal,  $r$  is the annual interest rate, and  $t$  is the time in years. Calculate to the nearest hundredth of a year how long it takes for an amount of money to double if interest is compounded continuously at  $7.3\%$ . Round to the nearest tenth.
- The table shows some notable earthquakes that occurred in recent years. How many times more energy was released by the earthquake in the Scotia Sea than by the earthquake in Cuba?

Earthquake Location	Date	Richter Scale Measure
New Zealand	February 2, 2014	6.5
Fontana, California	January 15, 2014	4.4
Puerto Rico	January 12, 2014	6.4
Cuba	January 9, 2014	5.1
Scotia Sea	November 17, 2013	7.7

**Graph the exponential function. Write the equation for the graph's asymptote and give the domain and range.**

\*18.  $y = 3(4)^x$       \*19.  $y = 2(3)^x$       \*20.  $y = 2(3)^{x+4} + 1$       \*21.  $y = 7\left(\frac{1}{4}\right)^{x-1} + 2.$

\*22. Evaluate  $\log_7 \frac{1}{49}$ .

\*23. Evaluate  $\log_3 81$ .

\*24. Write the equation  $\log_{16} 8 = \frac{3}{4}$  in exponential form.

**Write the equation in logarithmic form.**

\*25.  $5^2 = 25$

\*26.  $4^4 = 256$

**Write the expression as a single logarithm.**

\*27.  $6 \log_3 t + 7 \log_3 w$

\*28.  $\log_3 4 - \log_3 2$

**Expand the logarithmic expression.**

\*29.  $\log_5 \frac{a^2}{6}$

\*30.  $\log_3 11p^3$

\*31. Write the expression as a single natural logarithm:  $2 \ln b - 4 \ln c$

**Use the properties of logarithms to evaluate each expression.**

\*32.  $\log_4 8 + \log_4 16 - \log_4 2$

\*33.  $\log_2 6 + \log_2 16 - \log_2 3$

**Graph the logarithmic equation.**

\*34.  $y = \log_4 x$

\*35.  $y = \log(x - 5) + 3$

**The pH of a liquid is a measure of how acidic or basic it is. The concentration of hydrogen ions in a liquid is labeled  $[H^+]$ . Use the formula  $pH = -\log[H^+]$  to answer questions about pH.**

36. Find the pH level, to the nearest tenth, of a liquid with  $[H^+]$  about  $7.7 \times 10^{-13}$ .

37. The pH of a juice drink is 2.8. Find the concentration of hydrogen ions in the drink.

38. Use the Change of Base Formula to evaluate  $\log_2 71$ .

**Solve the exponential equation (hint: use a log). Round to the nearest hundredth if necessary.**

39.  $3^{3x} = 122$

40.  $125^{9x-2} = 150$

**Solve the log equation (hint: turn into exponential form). Round to the nearest hundredth if necessary.**

41.  $\log(2x + 6) = 2$

42. Solve  $\log_3(x + 1) = 4$ .

**Use natural logarithms to solve the equation. Round to the nearest thousandth.**

43.  $4e^{4x} + 11 = 19$

44.  $5e^{4x} + 2 = 16$

**Solve the natural log equation (hint: turn into exponential form with e). Round to the nearest hundredth if necessary.**

45.  $\ln(4x + 1) = 1$

46.  $\ln 5 + \ln x = 8$

47. An investment of \$300 is now valued at \$635.75. The interest rate is 4.5%, compounded continuously. About how long has the money been invested?

48. An investment of \$1,750 earns 5.75% interest, which is compounded monthly. After approximately how many years will the investment be worth \$5,000?

49. One scientist estimates that the population of snow leopards in the world will decrease by 3% each year if nothing is done to save them. There are currently around 7,000 snow leopards. If nothing is done to help them, how long will it take the population of snow leopards to decrease to 2,000?

50. The function  $y = 60(1.12)^x$  models the kindergarten population  $y$  of a certain elementary school  $x$  years after the year 2000. After how many years will the kindergarten population be 76? What year will that be?