

Exploring Exponential Models

Choose the word or phrase from the list that best completes each sentence.

exponential
function asymptote

exponential growth
growth factor

exponential decay
decay factor

1. In the function $y = 12(2.3)^x$, the value 2.3 is the _____.
2. An _____ is a line that a graph approaches as x or y increases in absolute value.
3. For _____, as the value of x increases, the value of y decreases.
4. A function in the general form $y = ab^x$ is called an _____.
5. For _____, as the value of x increases, the value of y increases.
6. In the function $y = 4(0.3)^x$, the value 0.3 is the _____.

Identify whether each function represents exponential growth or exponential decay.

7. $y = 0.75(4)^x$ _____
8. $y = 0.63(0.5)^x$ _____
9. $y = 9(0.83)^x$ _____
10. $y = 12(7)^x$ _____

Identify the y -intercept for each function.

For each annual rate of change, find the corresponding growth or decay factor.

11. $y = 4.5(7)^x$ _____

13. 35%

14. - 20%

15. 62%

12. $y = 5(3.2)^x$ _____

16. Identify the meaning of the variables in the exponential growth or decay function.

$$A(t) = a(1 + r)^t$$

a. a = _____

b. r = _____

c. t = _____

17. The population of Bainsville is 2000. The population is supposed to grow by 10% each year for the next 5 years. How many people will live in Bainsville in 5 years?

18. A music store sold 200 guitars in 2007. The store sold 180 guitars in 2008. The number of guitars that the store sells is decreasing exponentially. If this trend continues, how many guitars will the store sell in 2012?

$$r = \frac{y_2 - y_1}{y_1}$$

$$A(t) = a(1 + r)^t \rightarrow A(t) =$$

$$r = \frac{180 - 200}{200}$$

$$A(5) =$$

$$r =$$

7.1/2 B Exponential Function Applications & Summary

(Name/period)

Write and solve an exponential equation to answer each question.

1. Suppose an investment of \$5,000 **doubles** every 12 years. How much is the investment worth after 36 years? After 48 years?
2. The population of a city this year is 34,500. The population is expected to grow by 3% each year. What will be the population of the city in 12 years?
3. A tree 3 ft tall grows 8% each year. How tall will the tree be at the end of 14 yr? Round the answer to the nearest hundredth.
4. A butterfly population is **decreasing** at a rate of 0.82% per year. There are currently about 100,000 butterflies in the population. How many butterflies will there be in the population in 250 years?
5. A car depreciates 10% each year. If you bought this car today for \$5000, how much will it be worth in 7 years?
6. A business purchases a computer system for \$3000. If the value of the system **decreases** at a rate of 15% per year, how much is the computer worth after 4 years?
7. \$3000 investment, 8% **loss** each year for 3 years

Write an exponential function to model each situation. Find each amount after the specified time.

$$A = P \left(1 + \frac{r}{n} \right)^{nt}$$

8. \$200 principal, 4% compounded quarterly for 5 years

9. \$1000 principal, 3.6% compounded monthly for 10 years

10. You deposit \$750 in an account with 7% interest compounded semiannually. What is the balance in the account after 4 years?

11. You deposit \$520 in an account with 4% interest compounded monthly. What is the balance in the account after 5 years?

For problems involving continuously compounded interest, use the following formula:

Continuously Compounded Interest $A(t)$ is the amount in account after time t .

$$A(t) = P e^{rt} \quad P \text{ is the principal.}$$

r is the annual interest rate (as a decimal).

t is time (in years).

12. Suppose you invest \$2000 at an annual interest rate of 5.5% compounded continuously. How much will you have in the account in 10 years?

13. Suppose you invest \$7500 at an annual interest of 7% compounded continuously.

a. How much will you have in the account in 10 years?

b. How long will it take for the account to reach \$20,000?