

Algebra 1

Chapter 7

Section 7-7

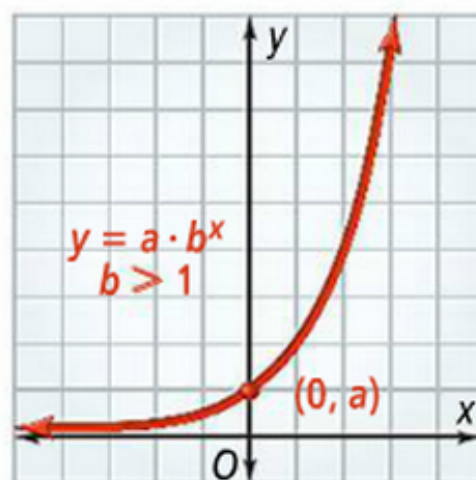
Exponential Growth

Graph

initial amount (when $x = 0$)

$y = a \cdot b^x$ ← exponent

The base, which is greater than 1, is the growth factor.



A certain bacteria population doubles every three weeks. A science lab starts with a sample of 150 of the bacteria. Write an equation to model the situation. Then find the amount of bacteria after fifteen weeks.

$$150 = a$$
$$2 = b$$

$$\textcircled{1} y = 150 \cdot 2^x$$

$$\textcircled{2} y = 150 \cdot 2^5$$

$$y = 4800 \text{ bacteria}$$

$$x = 5$$
$$15 \div 3$$

For the past decade a company's net worth has been increasing by 2% per year. Ten years ago their net worth was \$875,000. Write an equation that models the situation. Then estimate the net worth in five years.

$$100\% + 2\%$$

$$1.02 = b$$

$$a = 875,000$$

$$\textcircled{1} y = 875000 \cdot 1.02^x$$

$$\textcircled{2} y = 875000 \cdot 1.02^{15}$$

$$y \approx 1,177,634.80$$

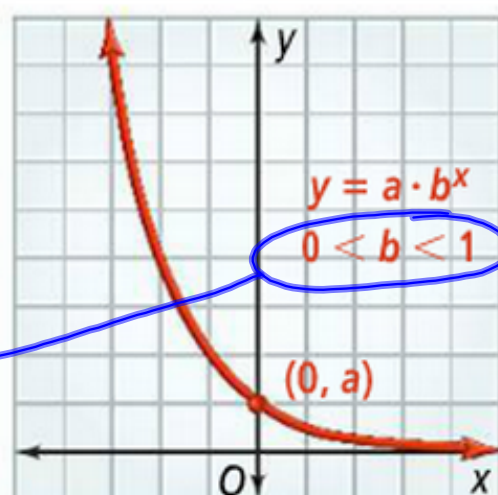
Exponential Decay

Graph

initial amount (when $x = 0$)

$$y = a \cdot b^x \leftarrow \text{exponent}$$

The base is the decay factor



A half-life is the time it takes for half of a sample to decay. A radioactive sample of 4400 atoms has a half-life of 6 years. Write an equation that models the situation. Then estimate the sample's size after 36 years.

$$b = \frac{1}{2}$$
$$a = 4400$$

$$y = a \cdot b^x$$
$$y = 4400 \left(\frac{1}{2}\right)^x$$

$$x = 6$$
$$36 \div 6 = 6$$

$$y = 4400 \left(\frac{1}{2}\right)^6$$
$$y = 69 \text{ atom}$$

The population of a certain city is decreasing at an average rate of 7% per year. In 1990 the population was 65,511. Write an equation that models the situation. Then estimate the city's population in 2010.

$$100\% - 7\% = 93\%$$

$$x=20$$

$$b = .93$$

$$a = 65,511$$

$$\textcircled{1} y = 65,511 \cdot .93^x$$

$$\textcircled{2} y = 65,511 \cdot .93^{20}$$

$$y \approx 15,345$$

Compound Interest Formula

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

A - balance or Amount

P - Principle or Put in

r - rate of interest (as a decimal not percent)

n - number of compounds per year

t - total time in years

.07
7%

You invest \$600 in an account with an interest rate of 2% compounded monthly. How much money will be in the account after eight years?

$$P = 600$$

$$r = .02 \leftarrow 2\%$$

$$n = 12$$

$$t = 8$$

$$A = ?$$

$$A = 600 \left(1 + \frac{.02}{12} \right)^{(12 \cdot 8)}$$

$$A \approx 704.01$$