

8.3 Modeling with Exponential Functions

Warm-up: Write the following percents as decimals.

a. 45%

.45

b. 6%

.06

c. 12%

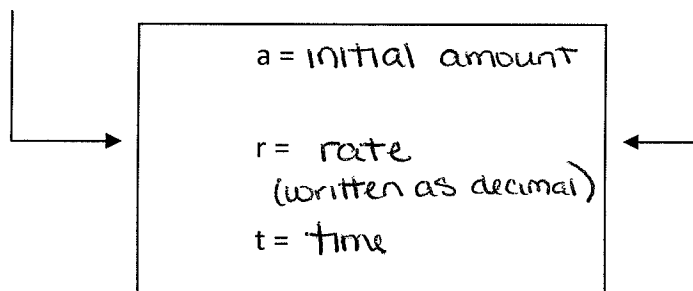
.12

d. 2.5%

.025

Objective: To be able to write models for exponential growth and decay and use them to solve real-life situations.

Exponential Growth	Exponential Decay
$y = a(1 + r)^t$	$y = a(1 - r)^t$



1.) In 2006 tuition at Illinois State University (Go Redbirds!) was \$4,079.75 for 15 credit hours. This cost increases at 12% each year. a

a. Write an exponential model that represents the tuition after t years.

$$y = 4,079.75(1 + .12)^t$$

$$y = 4079.75(1.12)^t$$

b. What will the tuition be in 2015?

$$\begin{array}{r} 2015 \\ - 2006 \\ \hline 9 \text{ years} \end{array}$$

$$y = 4079.75(1.12)^9$$

$$\boxed{\$11,313.47}$$

2.) You buy your first new car! You purchase the car for \$25,000. However, the car depreciates at a rate of 6% per year.

r

a

a. Write an exponential model that represents how much the car is worth after t years.

$$y = 25000(1 - .06)^t$$
$$y = 25000(.94)^t$$

b. How much is your car worth in 4 years?

$$y = 25000(.94)^4$$
$$= \$19,518.72$$

3.) Determine whether the function shows exponential growth or exponential decay.

a. $y = 2(1.05)^x$

growth

b. $f(x) = 100(0.25)^x$

decay

c. $g(x) = (2.5)^x$

growth

Your turn!

4.) A construction company purchases a truck for \$40,000. Each year, the value V of the truck decreases by 12%. How much will the truck be worth in 5 years?

r

a

$$y = 40000(1 - .12)^t$$
$$= 40000(1 - .12)^5$$
$$= \$21,109.28$$

5.) You purchase real estate for \$85,000. Each year, the value of the real estate increases by 5%. To the nearest dollar, how much will the real estate be worth in two years?

$$y = 85000(1 + .05)^2$$
$$= \$93,712.5$$

↓

$$= \$93,713$$