6-3 Exponential Growth and Decay

NOTES

LEARNING OBJECTIVE: I will learn how to write and solve exponential growth and decay equations.

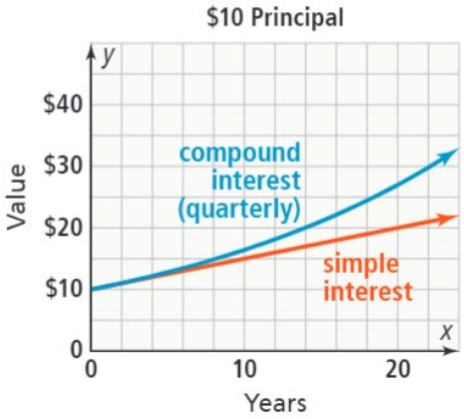
Exponential Function: $f(x)=a(b)^x$

Exponential Growth	Exponential Decay
$f(x) = a(1 + r)^t$	$f(x) = a(1 - r)^t$
The population of Hillville grows at 15%. If its current population is 5,000, what will its estimated population be in 5 years?	The population of Central City is currently 300,000. However, it is decreasing by 5% each year. What will its estimated population be in 7 years?
The value of a painting increases by 96% each year. If the painting was purchased four years ago for $9700, how much is it worth today?	The value of Taran's car depreciates by 10% each year. If his car is currently valued at $10,000, what will its estimated value be in 3 years?

Interest can be calculated in two ways: Simple Interest, which is paid only on the principal, and Compound Interest, which is paid on both the principal and interest already earned.

Simple Interest: $I = Prt$	Compound Interest: $A = P\left(1 + \frac{r}{n}\right)^{nt}$
I = Interest P = Principal r = rate (as decimal) t = time	A = Total Amount P = Principal r = rate (as decimal) n = number times interest is compounded t = time

This graph shows \$10 at 5% simple interest and 5% compounded quarterly.



Jan's family invested \$3000 for her in a Certificate of Deposit (CD) when she was born. It earns 8% interest compounded quarterly. What is the value after 5 years?

Will the value of Jan's CD be greater after 15 years if it is compounded annually rather than quarterly?

Amy wants to buy a new car that costs \$15,600. If the interest is 3% compounded monthly, how much will Amy actually end up paying for her car?

Sidney invests \$5,000. Her investment earns 6% interest compounded semi-annually. How much will her investment be worth in 10 years?