Constant Percentage Change

College Algebra

Main Ideas

- When a quantity increases or decreases by a certain percentage each time unit, that quantity can be modeled by an exponential function.

- All of the ideas from the section on exponential growth and decay can be used here.

- Constant percentage change is very common in financial math and economics.

Percentage Growth Rate or Decay Rate

Definitions

If a quantity increases by a discrete percentage r (written as a decimal), then r is called the percent growth rate and the quantity can be modeled using an exponential function with growth factor $a = 1 + r$.

If a quantity decreases by a discrete percentage r (written as a decimal), then r is called the percent decay rate and the quantity can be modeled using an exponential function with decay factor $a = 1 - r$.

Percentage Change and Unit Conversions

How To – Convert Percent Growth or Decay Rates for Different Time Units

If r is the percentage growth or decay rate for a time unit (like years) and R is the percentage growth or decay rate for k repeated time units (like decades), then use the following to convert between the percentage change rates.

		Percentage Increase	Percentage Decrease
From r to R	1.	$a = 1 + r$	$a = 1 - r$
	2.	$A = a^k$	$A = a^k$
	3.	$R = A - 1$	$R = 1 - A$
From R to r	1.	$A = 1 + R$	$A = 1 - R$
	2.	$a = A^{\frac{1}{k}}$	$a = A^{\frac{1}{k}}$
	3.	$r = a - 1$	$r = 1 - a$