

Each situation is exponential:  $y = a(b)^x$

What would the exponent,  $x$ , represent in each situation?

1. Each year there is 20% more.  $x$  is # of years
2. Each day there is 5% less.  $x$  is # of days
3. Each 6 months there is 31.6% more.  $x$  is # of 6 month periods.
4. Every 20 minutes the number of cells doubles  
 $x = \#$  of 20 minute periods

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Does each exponential equation represent growth or decay?

1.  $y = 4500(0.9983)^x$   
 $b < 1$   
Decay
2.  $y = 0.045(1.00201)^x$   
 $b > 1$   
Growth
3.  $y = 7\left(\frac{12}{13}\right)^x$   
 $b < 1$   
Decay
4.  $y = 12.06\left(\frac{42}{39}\right)^x$   
 $b > 1$   
Growth
5.  $y = 145(1.33)^{-x}$   
 $= \left(\frac{1}{1.33}\right)^x$   
 $b < 1$   
Decay

Use the given information to find the base ( $b$ ) of an exponential equation that could model the situation.

$$y = a \cdot b^x$$

1. Each year there is 20% more.  $b = 1.2$   
 $100\% + 20\% = 120\%$
2. Each day there is 5% less.  $b = 0.95$   
 $100\% - 5\% = 95\%$
3. Each month there is 31.6% more.  $b = 1.316$   
 $100\% + 31.6\% = 131.6\%$
4. Each week there is 17.3% less.  $b = 0.827$   
 $100\% - 17.3\% = 82.7\%$
5. The half life of a medicine is 2 hours.  $b = 0.5$   
This is like saying there is a 50% decrease.  
 $100\% - 50\% = 50\%$
6. Every day the number of mosquitos doubles  $b = 2$   
This is like saying there is a 100% increase.  
 $100\% + 100\% = 200\%$

For each function find the percent change that the function models and state if it represents an increase or decrease.

1.  $800(0.816)^x$

$\rightarrow (.816) \cdot 100 = 81.6\%$

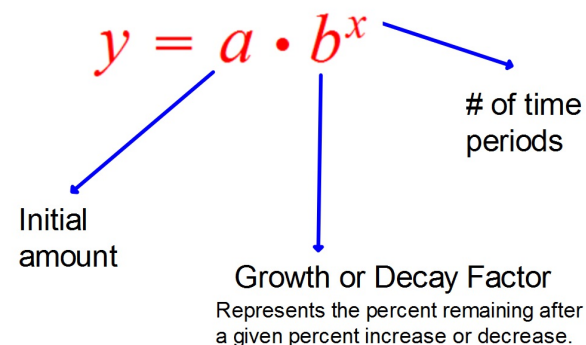
$100 - 81.6 = 18.4\%$   
decrease

2.  $1.667(1.204)^x$

$\rightarrow (1.204) \cdot 100 = 120.4\%$

$120.4 - 100 = 20.4\%$   
increase

If an exponential equation models a real situation:



1. The value of a house has been increasing 1.2% each year since 2011. The value of the house in 2011 was \$138,000. Find the value of the house in the following years. Round to the nearest penny.

$100\% + 1.2\% = 101.2\%$   
 $b = 1.012$

a) 2012

$x = 1$   $y = 139,656$

$y = 138,000(1.012)^x$

b) 2016

$x = 5$   $y = 146,481.12$

$x$  is # yrs since 2011

2. The population of a city has been decreasing 3.9% each year. The population of the city in 2006 was 458,000. Find the population of the city in the following years. Round to the nearest whole number.

$100 - 3.9 = 96.1\%$   
 $b = .961$

a) 2010

$x = 4$   $y = 390,624$

b) 2017

$x = 11$   $y = 295,681$

c) 2000

$x = -6$  [6 years in the past]  
 $y = 581,467$

$y = 458,000(.961)^x$   
 $x$  is # yrs since 2006