Last year, 2014 the TV you wanted cost $450.

If each year the price increases 12%, how much will it cost in 2016?

$100\% + 12\% = 112\%$

$y = 450(1.12)(1.12)$ (2015, 2016)

$= \$564.48$

Last year, 2014 the TV you wanted cost $450. This year the price increased 12%.
Find the new price.
If each year the price increases 12%, how much will it cost in 2019?

$y = 450(1.12)(1.12)(1.12)(1.12)(1.12) = 450(1.12)^5 = \$793.05$

This situation is called Exponential Growth

In the year 2000 the population of a city was 210,000.
Each year the population decreased by 4%.
Find the population in 2001.

$100\% - 4\% = 96\%$

$(210,000)(.96) = 201,600$

In the year 2000 the population of a city was 210,000.
Each year the population decreased by 4%.
Find the population in 2002.

$y = 210000(.96)(.96)$

$= 193,536$

In the year 2000 the population of a city was 210,000.
Each year the population decreased by 4%.

Find the population in 2005.

$y = 210{,}000(0.96)(0.96)(0.96)(0.96)(0.96) = 210{,}000(0.96)^5$

This situation is called Exponential Decay

In the year 2000 the population of a city was 210,000.
Each year the population decreased by 4%.

100%-4% = 96% b = 0.96

Find the population in 2020.

$y = 210{,}000(.96)^{20} = 92{,}821$

Exponential Equations:

Standard Form: $y = a\,(b)^x$

- x: Number of time periods.
- a: Initial Amount
- b: Base which is either a growth factor or a decay factor

Find the base for each situation:

1. Each year there is 20% more. b = 1.2 100%+20%=120%, b = 1.20
2. Each day there is 5% less. b = 0.95 100%-5%=95%, b = 0.95
3. Each month there is 31.6% more. b = 1.316 100%+31.6%=131.6%, b = 1.316
4. Each week there is 17.3% less. b = 0.827 100%-17.3%=82.7%, b = 0.827

State the percent change each exponential equation represents and whether it's an increase or a decrease.

a) $y = 208(0.037)^x$ → 3.7% (×100)

% change = 96.3% (−100 = −96.3%)

inc or dec?

b) $y = 15.8(1.408)^x$ → 140.8% (×100)

% change = 40.8% (−100 = +40.8%)

inc or dec?

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 month there is 31.6% more. x is # of months
4. Each week there is 17.3% less. x is # of weeks

The value of a house in 2006 was $156,000. The value of the house has been decreasing 8.4% each year.

a) Model this situation with an exponential eq.

100%-8.4% = 91.6% → b =0.916 $y = 156{,}000(0.916)^x$

b) Find the value of the house in 2010.

x = 2010 - 2006 = 4 $y = 156{,}000(0.916)^4 = \$109{,}826.34$

c) Find the value of the house in 2001.

x = 2001 - 2006 = -5 $y = 156{,}000(0.916)^{-5} = \$241{,}906.33$

The population of a city has been increasing 3.7% every 2 years. The population in 2005 was 142,900.

x = # of two year periods

a. Find the population in 2011.

100%+3.7%=103.7%

b = 1.037

x = 2011-2005 = 6÷2 = 3

$y = 142{,}900(1.037)^3 = 159{,}356$

b. Find the population in 2016

x = 2016-2005 = 11÷2 = 5.5 $y = 142{,}900(1.037)^{5.5} = 174{,}508$