When a couple's first child is born they invest $10,000 in an account that pays 8% interest annually. How much will be in the account when the child turns 18 years old?

$$10{,}000(1.08)^{18} = \boxed{39{,}960.19}$$

100% + 8%
108%

General Form of an Exponential Equation:

What values are allowed for each part of the equation?

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

Exponent
x = any real #

Coefficient
$a \neq 0$

Base
$b > 0, b \neq 1$

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

This equation represents Exponential Growth if $b > 1$

in this case b is called the Growth Factor

This equation represents Exponential Decay if $0<b< 1$

in this case b is called the Decay Factor

Does each exponential equation represent growth or decay?

1. $y = 4500(\underbrace{0.9983}_{0<b<1})^x$

Decay

2. $y = 0.045(\underbrace{1.00201}_{b>1})^x$

Growth

3. $y = 7\left(\underbrace{\frac{12}{13}}_{0<b<1}\right)^x$

Decay

4. $y = 12.06\left(\underbrace{\frac{42}{39}}_{b>1}\right)^x$

Growth

5. $y = 145(1.33)^{-x}$

You could consider this GROWTH where the negative exponent means you are moving back in time.
OR
You could say a negative exponent means to take the reciprocal of the base, thus changing it into a number less than one and consider this DECAY.

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

1. Each year there is 20% more. b = 1.2

   100% + 20% = 120% ÷ 100

2. Each day there is 5% less. b = 0.95

   100% − 5% = 95% ÷ 100

3. Each month there is 31.6% more. b = 1.316

   100% + 31.6% = 131.6% ÷ 100

4. Each week there is 17.3% less. b = 0.827

   100% − 17.3% = 82.7% ÷ 100

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. Every 20 minutes there is 31.6% more.
   x is # of 20 minute time periods

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

1. $800(0.816)^x$

   ×100

   81.6%

   − 100

   −18.4

   18.4% dec

2. $1.667(1.204)^x$

   ×100

   120.4%

   − 100

   20.4% inc

The number of a certain kind of bird in an area under development has been decreasing 6.1% every decade. The bird population in 2007 was 12,000.

$12{,}000(.939)^x$

100 − 6.1 = 93.9%

b = .939

Find the bird population in 2020.

x is # of 10 year periods (decades)

$x = \frac{13 \text{ years}}{10} = 1.3$

$y = 12{,}000(.939)^{1.3} \rightarrow \boxed{y = 11{,}057}$

You can now finish Hwk #14.   Practice Sheet Sec 8-1

Due Tomorrow