Unit 5.4 Exponential Growth & Decay (continued)

Identify if the application is exponential growth or decay. Then use the exponential growth and decay model to write a function and complete each problem below. $A(t) = a(1 \pm r)^t$

13.) Suppose you deposit $2,000 in a savings account that pays interest at an annual rate of 4% where no money is added or withdrawn.

a.) Growth or Decay $+r$

b.) Function: $A(t) = a(1+r)^t$

$a = 2000$

$r = 4\% \rightarrow .04$ $A(t) = 2000(1+.04)^t$

c.) How much will be in the account after 3 years? $t = 3$

$A(t) = 2000(1.04)^3$

$A(t) = 2249.728$

You will have $2249.73 after 3 yrs.

d.) How many years will it take for the account to contain $3,000?

$A(t) = 3000$

$3000 = 2000(1.04)^t$

$y = a \cdot b^x$

Use the calculator and put the right side $a \cdot b^x$ in $Y=$. Then use use the TABLE to find when "x" gives 3000.

It will be about 11 yrs to get $3000.

14.) A population of 752,000 decreases 1.4% per year.

a.) Growth or Decay $-r$

b.) Function: $A(t) = a(1-r)^t$

$r = 1.4\% \rightarrow .014$

$a = 752{,}000$ $A(t) = 752{,}000(1-.014)^t$

c.) What the population after 18 years? $t = 18$

$A(t) = 752{,}000(.986)^{18}$

$= 583448.207$

The population will be 583,448 in years.

15.) A new truck sells for $29,000 depreciates 12% each year.

a.) Growth or Decay $-r$

b.) Function: $A(t) = a(1-r)^t$

$a = 29{,}000$

$r = 12\%$ $A(t) = 29{,}000(1-.12)^t$

$.12$

c.) What is the value of the truck after 7 years? $t = 7$

$A(t) = 29000(.88)^7$

The truck is worth $11,851.59 after 7 years.

16.) The price of a new home is $350,000. The value of the home appreciates 2% each year.

a.) Growth or Decay $+r$

b.) Function: $A(t) = a(1+r)^t$

$a = 350{,}000$

$r = 2\%$ $A(t) = 350{,}000(1+.02)^t$

$.02$

c.) How much will the home be worth in 10 years? $t = 10$

$A(t) = 350{,}000(1.02)^{10}$

The house will be worth $426,648.05 after 10 yrs.

17.) An investment of $75,000 increases at a growth rate of 1.125 per year. * Already $1+r$ → $1+.125$

a.) Growth or Decay

b.) Function: $A(t) = a(1.125)^t$

$a = 75000$

$A(t) = 75000(1.125)^t$

c.) What is the value of the investment after 30 years? $t = 30$

$A(t) = 75000(1.125)^{30}$

The value of the investment will be $2,568,247.87

18.) In 2009, there were 1570 bears in a wildlife refuge. In 2010, the population had increased to approximately 1884 bears. $r = \frac{A(t) - a}{a}$

a.) Growth or Decay $+r$

$a = 1570$ $A(t) = 1884$ $r = \frac{1884 - 1570}{1570}$ $r = .2$

b.) Function:

$A(t) = 1570(1+.2)^t$

c.) If this trend continues, how many bears will there be in 2018?

$A(t) = 1570(1.2)^9$

$t = 2018 - 2009 = 9$

There will be about 8100 bears in 2010.

19.) The value of a piece of equipment has a decay factor of 0.80 per year. After 5 years, the equipment is worth $98,304.

a.) Growth or Decay $-r$

b.) Function: $A(t) = a(1-r)^t$

$A(t) = 98{,}304$ $t = 5$ $r = ?$ $a = ?$

c.) What was the rate that the equipment depreciated?

$1 - r = .8$

$-1 \quad -1$

$-r = -.2$ $r = .2$

20%

d.) What was the original value of the equipment?

$98{,}304 = a(1-.2)^5$

$\frac{98{,}304}{(.8)^5} = \frac{a(.8)^5}{(.8)^5}$

$a \approx \$300{,}000$