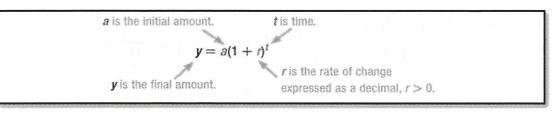
## Lesson 7.6 Notes (Growth and Decay)

## **Objectives:**

- Solve problems involving exponential growth.
- Solve problems involving exponential decay.

**Exponential Growth** – an initial amount increases at a steady rate (same percent) over time



- 1. The prize for a radio contest begins with a \$100 gift card. Each day, a name is announced. The winner has 5 minutes to call or the prize increases by 2.5% the next day.
  - Write an equation to represent the amount of the gift card in dollars after t days with no winners.

ers. 
$$y = 100(1 + .025)^t$$
  
 $y = 100(1.025)^t$ 

b. How much will the gift card be worth if no one wins after 10 days?

- 2. A college's tuition has risen 5% each year since 2000. The tuition in 2000 was \$10,850.
  - a. Write an equation for the amount of the tuition t years after 2000.

<u>Compound Interest</u> – interest earned on the initial investment and previously earned interest

**n** is the number of times the A is the current amount interest is compounded each year, and f is time in years. P is the principal r is the annual interest rate or initial amount. expressed as a decimal, r > 0.

3. Maria's parents invested \$14,000 at 6% per year compounded monthly. How much money will there be in the account after 10 years?

$$A = P(1 + \frac{1}{12})^{n+1}$$

$$= 14,000(1 + \frac{.06}{12})^{12(10)} = 14,000(1.005)^{120}$$

$$\approx (1.005)^{120}$$

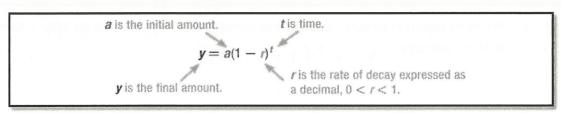
4. Determine the amount of an investment if \$300 is invested at an interest rate of 3.5% compounded monthly for 22 years.

$$A = P(1 + \frac{1}{12})^{nt}$$

$$= 300(1 + \frac{.035}{12})^{12(22)} = 300(1 + \frac{.035}{12})^{264}$$

$$\approx 5647.20$$

<u>Exponential Decay</u> – an initial amount decreases at a steady rate (same percent) over time Ex. Radioactive decay and depreciation



- 5. A raft for a pool is losing 6.6% of its air every day. The raft originally contained 4500 cubic inches of air.
  - a. Write an equation to represent the loss of air.  $y = 4500(1 .066)^{t} \implies y = 4500(.934)^{t}$
  - b. Estimate the amount of air in the raft after 7 days.

- 6. The population has been decreasing at an average rate of about 0.3% per year. In 2000, the population was 88,647.
  - a. Write an equation to represent the population since 2000.

$$Y = 88,647(1-.003)^{t} \Rightarrow Y = 88,647(.997)^{t}$$

b. If the trend continues, predict the population in 2010.