Name: _____   Date: _____

UNIT 5   **LESSON 9**

Do Now:

a. For each of the following exponential functions below, determine if it is a *growth* or *decay* model. Explain.

$$y = 500(1.2)^x \qquad\qquad\qquad y = 20(.25)^x$$

AIM: HOW DO WE SOLVE FOR EXPONENTIAL WORD PROBLEMS? (DAY 1)

The "YART" Formula for Exponential GROWTH

Y = final amount

A = initial amount

r = rate as a decimal

t = time

1. Jack has $500 to invest. The bank offers an interest rate of 6% compounded annually.

   a. How much money will Jack have after three years?

   b. What about after ten years?

2. Mr. Smith invested $2,500 in a savings account that earns 3% interest compounded annually. He made no additional deposits or withdrawals. Which expression can be used to determine the number of dollars in this account at the end of 4 years?

   1) $2500(1 + 0.03)^4$

   2) $2500(1 + 0.3)^4$

   3) $2500(1 + 0.04)^3$

   4) $2500(1 + 0.4)^3$

3. In 2005, the population of a city was 25,000. The population increased by 20% in the following year. If this rate of increase continues, what will be the population of the city in 2012?

4. A sum of $9,000 is invested at an annual percentage rate (APR) of 8.5% compounded annually. Find the balance in the account after 3 years. Round to the nearest dollar.

The "YART" Formula for Exponential DECAY
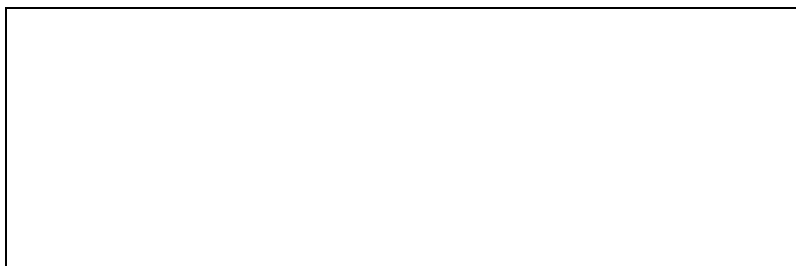
Y = final amount
A = initial amount
r = rate as a decimal
t= time

5. You purchase an I-Pod for $70. After you take it home from the store, the value of the I-Pod decreases 3% each year. What is the value of the I-Pod after 2 years? Round to the nearest cent.

6. Is the equation $A = 21000(1 - 0.12)^t$ a model of exponential growth or exponential decay, and what is the rate (percent) of change per time period?

   1)   exponential growth and 12%

   2)   exponential growth and 88%

   3)   exponential decay and 12%

   4)   exponential decay and 88%

7. Raymond buys a new car for $21, 500. The car depreciates by about 11% per year. What is the value of the car after 5 years? Round to the *nearest dollar.*

8. Kirsten invested $1000 in an account at an annual interest rate of 3%. She made no deposits or withdrawals on the account for 5 years. The interest was compounded annually. Find the balance in the account, to the *nearest cent*, at the end of 5 years.

9. A student invests $500 for 3 years in a savings account that earns 4% interest per year. No further deposits or withdrawals are made during this time. Which statement does not yield the correct balance in the account at the end of 3 years?

   1) $500(1.04)^3$

   2) $500(1-.04)^3$

   3) $500(1+.04)(1+.04)(1+.04)$

   4) $500 + 500(.04) + 520(.04) + 540.8(.04)$

10. Daniel's Print Shop purchased a new printer for $35,000. Each year it depreciates at a rate of 5%. What will its value be at the end of the fourth year?