Algebra 2 CC
Exponential Applications

Name ______________________________

1.) Using the formula below, determine the monthly payment on a 5-year car loan with a monthly percentage rate of 0.625% for a car with an original cost of \$21,000 and a \$1000 down payment, ***to the nearest cent***.

$$P_n = PMT\left(\frac{1-(1+i)^{-n}}{i}\right)$$

$$\begin{array}{rl} 21{,}000 & \text{value} \\ -1000 & \text{down payment} \\ \hline 20{,}000 & \text{loan} \end{array}$$

P_n = present amount borrowed

n = number of monthly pay periods

PMT = monthly payment

i = interest rate per month

$5 \cdot 12 = 60$ monthly payments

$$20{,}000 = PMT\left(\frac{1-(1+.00625)^{-60}}{.00625}\right)$$

$$\frac{20{,}000}{49.9\ldots} = \frac{PMT(49.9\ldots)}{49.9\ldots}$$

$$\boxed{\$400.76 = PMT}$$

b. An affordable monthly payment for your budget is \$300, over the same time period. Determine an appropriate down payment, ***to the nearest dollar***.

$$P_n = 300(49.9\ldots)$$

$$P_n = 14{,}972$$

$$\begin{array}{r} 21{,}000 \\ -14{,}972 \\ \hline \boxed{\$6028} \end{array}$$

2.) Jim is looking to buy a vacation home for \$172,600 near his favorite southern beach.

The formula to compute a mortgage payment, M, is $M = P \bullet \frac{r(1+r)^N}{(1+r)^N - 1}$ where P is the principal amount of the loan, r is the monthly interest rate, and N is the number of monthly payments. Jim's bank offers a monthly interest rate of 0.305% for a 15-year mortgage.

$15 \cdot 12 = 180$ payments

With no down payment, determine Jim's mortgage payment, ***rounded to the nearest dollar***.

$$M = 172{,}600 \cdot \left(\frac{.00305(1+.00305)^{180}}{(1+.00305)^{180} - 1} \right)$$

$$M = 172{,}600(.007\ldots)$$

$$\boxed{M = \$1247}$$

b. Algebraically determine and state the down payment, ***rounded to the nearest dollar***, that Jim needs to make in order for his mortgage payment to be \$1100.

$$\frac{1100}{.007\ldots} = \frac{P(.007\ldots)}{.007\ldots}$$

$$152{,}193 = P$$

$$\begin{array}{r} 172{,}600 \\ -152{,}193 \\ \hline \boxed{\$20{,}407} \end{array}$$