**Activity 5.7.5 What Car Can I Afford?**

In class discussion, you compared and contrasted the concepts of long term savings and long term loans. You saw that determining the schedule for paying back a mortgage is more complicated than creating a schedule for savings but there were some similarities.

**Connection:** In Activity 1 you saw the formula to find the future value of an annuity.

C = amount of regular deposit

r = annual interest rate (written as a decimal)

n = number of compounding periods per year

t = number of years

F = amount in the account after t years

Future Value of an Annuity (Savings)

$$F=C\left[\frac{\left(1+\frac{r}{n}\right)^{nt}-1}{\frac{r}{n}}\right]$$

Solve this formula for C, writing C as a product of F and a fraction.

The formula for calculating the monthly payment of a loan is

M = amount of monthly payment

r = annual interest rate (written as a decimal)

n = number of compounding periods per year

t = number of years

P = principal on the loan

Monthly Payment of a Loan

$$M=P\left[\frac{\frac{r}{n}\left(1+\frac{r}{n}\right)^{nt}}{\left(1+\frac{r}{n}\right)^{nt}-1}\right]$$

Compare this to the formula for finding the amount of the deposit for an annuity. Besides for using different variables, what is the only difference in the formula?

**Situation 1:** Renee is interested in taking out a loan to buy a car. She has saved $1000 for a down payment on the car. She is hoping to have a car payment that is no more than $350 per month. Her bank offers a loan for the purchase of a new car. The APR is 2.75% for a five year loan. She is looking at three different cars: a 2015 Toyota Corolla ($20,745), a 2015 Mini Cooper Paceman ($23,500), and a 2015 Ford Fusion ($22,000). For each car, determine Renee’s monthly payment if she takes a loan out from her bank. If the payment is over $350, determine how much more she would need to pay each month for the car.

**Situation 2:** Renee’s friend Santi is also buying a car. He has decided to look at used cars. He and Renee have the same bank. The bank offers a used car loan with a 6.75% APR for a 4 year term. He is intent on buying a 2008 Volkswagen Beetle for $13,998. He does not have any money saved for a down payment. How much will Santi be paying each month for his car payment?