

## More About Loans with the TI-82/83

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**Part I:** Suppose you plan to borrow \$11,000 to buy a car. The bank tells you their annual interest rate (APR) is 10.8%, but it's up to you to choose the term (how many months you take to repay the loan). You want to know specifically, what your monthly payment would be, and also the total of all your payments, for various terms from 2 years to 6 years. (Six years is the maximum most banks will allow on a new car loan.) Rather than do all the calculations separately, let's let the calculator speed up the process.

We can solve for a shortcut formula for a loan payment:

$$R = \frac{Pi}{1 - (1 + i)^{-n}}$$

In this case we know the values of P (the loan amount) and i (the monthly interest rate), but we haven't chosen the number of payments n, so n is our variable. Let's make a table with the calculator.

Car Payment  $Y = \frac{Pi}{1 - (1 + i)^{-x}}$  where x is the number of monthly payments, ie

$$Y = \frac{11,000(\quad)}{1 - (\quad)^{-x}}$$

Fill in the appropriate values of i and 1 + i and input the equation in the function list by pressing the (Y=) key on your calculator.

Now, let's make a table. Press 2<sup>nd</sup> TblSet, and since x is in months, let's use 24 as TblMin and 6 as ΔTbl. (Why? \_\_\_\_\_)  
Press 2<sup>nd</sup> TABLE, and record the results.

| No. of Months<br>x | Car Payment<br>Y <sub>1</sub> |
|--------------------|-------------------------------|
| 24                 | _____                         |
| 30                 | _____                         |
| 36                 | _____                         |
| 42                 | _____                         |
| 48                 | _____                         |
| 54                 | _____                         |
| 60                 | _____                         |
| 66                 | _____                         |
| 72                 | _____                         |

Suppose you wanted your car payment to be under \$300 a month. What is the shortest term you could choose? \_\_\_\_\_

Now add a third column to the table. Head it "Total of Payments". Since the total of the payments is the number of payments  $x$  multiplied by  $Y_1$ , we can let the calculator do the multiplying for us. Return to the (Y=) key and  $\blacktriangledown$  down to  $Y_2$ . Let's create a function for the total of payments  $Y_2 = X \cdot Y_1$ . To type in the function  $Y_1$ , press 2<sup>nd</sup> Y-VARS on the TI-82 or press VARS on the TI-83 and  $\blacktriangleright$  over to Y-VARS. Then, on either calculator, press ENTER ENTER. Return to the table and the third column,  $Y_2 =$  total of payments, should be complete. Record the results now.

As the number of months increases, the monthly payment \_\_\_\_\_.

As the number of months increases, the total of the car payments \_\_\_\_\_.

What is the total amount of interest paid with a 24-month loan? \_\_\_\_\_  
a 36-month loan? \_\_\_\_\_  
a 60-month loan? \_\_\_\_\_

**Part II:** Repeat this entire exercise for a \$9,000 loan at 13 ½%.

**Part III:** Write a short report (perhaps one or two paragraphs) explaining what you learned about auto loans: