## Loans and Mortgages

A loan is a contract that defines the terms for repayment of a sum of money lent at interest. A mortgage confers an interest in a property as security for repayment of a loan.

Objectives:

- Determine the monthly payment for a vehicle that is financed at a fixed interest rate for a certain amount of time.
- Given the monthly payment that can be paid over a certain amount of time at a fixed interest rate, determine the amount of money that can be borrowed.

Example 1:

What are the monthly payments to finance a $18,000 car at 11% interest for 5 years?

1. Press ⌂on, and select **New** to start a new document. Select **Add Calculator**.

   Note: To round computations to two decimal places, change the Display Digits setting in the Documents Settings to **Fix 2**.

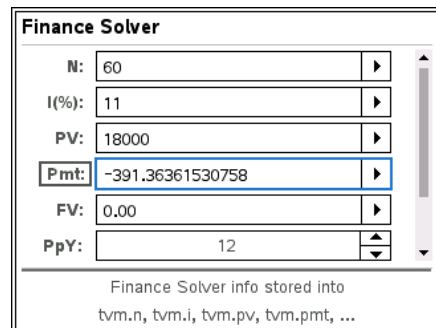2. Press **Menu > Finance**. Select **Finance Solver**.

   To move from row to row in the Finance Solver, press tab.

3. Enter N = 60, I(%) = 11, PV = 18000, FV = 0, PpY = 12, and CpY = 12.

   Note that N is 60 because there are 12 payments per year for five years. PV is entered as a positive number because the $18,000 is received from the finance company.
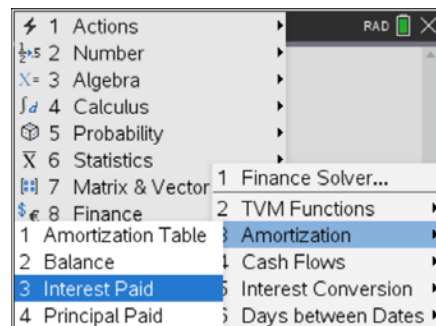
4. Place the cursor in the Pmt row. Press enter to calculate the payment.

The payment, -391.36, is negative because that is the amount paid to the finance company each month.

Example 1 indicates that $391.36 must be paid monthly. An interesting question considers how much interest will be paid on the loan for the car.

1. Press esc to exit the Finance Solver.

2. On the Calculator page, press **Menu > Finance**, and select **Amortization > Interest Paid**.

The syntax for **ΣInt** is

ΣInt(NPmt1, NPmt2, N, I, PV, [Pmt], [FV], [PpY], [CpY], [PmtAt], [roundValue]).
The defaults for PpY, CpY, and PmtAt are 1, 1, and End, respectively.
roundValue specifies the number of decimal places for rounding. The default is 2.

3.   Enter 1 $\boxed{,}$ 60 $\boxed{,}$ 60 $\boxed{,}$ 11 $\boxed{,}$ 18000 $\boxed{,}$ tvm.pmt $\boxed{,}$ 0 $\boxed{,}$ 12 $\boxed{,}$ 12 and
     press $\boxed{\text{enter}}$.

     Note: Select **tvm.pmt** from the $\boxed{\text{var}}$ menu.

The amount $5,481.93 is the interest that was paid over five years.

What was the principal that was repaid? It should be $18,000.

4.   Select Principal Paid. (The **ΣPrn(** command is found on the same menu as
     ΣInt(command.)

     The syntax for **ΣPrn** is
     ΣPrn(NPmt1, NPmt2, N, I, PV, [Pmt], [FV], [PpY], [CpY], [PmtAt], [roundValue]).

5.   Enter 1 $\boxed{,}$ 60 $\boxed{,}$ 60 $\boxed{,}$ 11 $\boxed{,}$ 18000 $\boxed{,}$ tvm.pmt $\boxed{,}$ 0 $\boxed{,}$ 12 $\boxed{,}$ 12 and
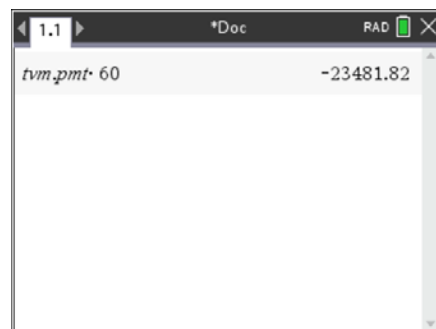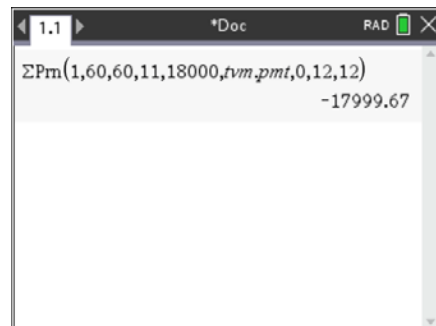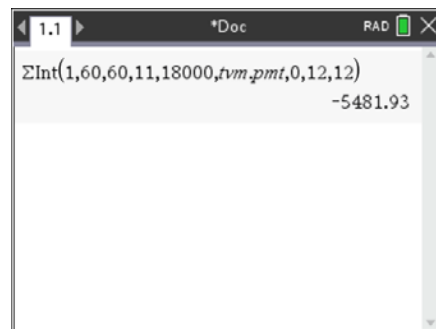   press $\boxed{\text{enter}}$.

This shows the total principal as $17,999.67.

     Note: The difference of $0.33 is the round off error in the payment.

Some comments are appropriate regarding the calculated value of the total
principal. Clearly the ΣPrn(1,60) should not be 17,999.67; however, the internal
calculations were rounded to 2 places. ΣPrn(1,60,4) will round internal
calculations to 4 places. Banks usually round internal calculations to 3 decimal
places.

Multiply the payment (Pmt) by 60 (the number of payments). The out-of-pocket
money for this $18,000 loan for 5 years was $23,481.82.

     Note: Select **tvm.pmt** from the $\boxed{\text{var}}$ menu.

Example 2:

What is the highest priced car that a young professional can afford if she is willing to pay monthly car payments of $450 for the next 7 years with the interest rate at 7.5%?

1. Press [⌂ on], and select **New** to start a new document. Select **Add Calculator**. Press **Menu > Finance**. Select **Finance Solver**.

2. Enter N = 84, I(%) = 7.5, Pmt = -450, FV = 0, PpY = 12, and CpY = 12.

3. Place the cursor in the Present Value (PV) row. Press [enter] to calculate the Present Value.

She can buy a car costing $29,338.37.

Finance Solver

N:	84
I(%):	7.50
PV:	29338.369208448
Pmt:	-450
FV:	0.00
PpY:	12

Edit Present Value, PV