2.1 Analyzing Loans with the TI83 Calculator Finance App

Learning Targets:

1. Demonstrate understanding of which types of problems can be solved with the Finance App and which cannot.
2. Use the Finance App to solve loan problems involving regular payments:
   a. Finding the periodic payment amount
   b. Determining how long it will take to repay a loan
   c. Calculating the interest paid on a loan
3. Comparing loan options.
4. Examining a home mortgage loan.

TI83 Finance App

The Finance App is a useful tool that can be used to solve many of the finance problems in Unit 1 and Unit 2. It can't, however, be used to solve any problems related to *simple interest*.

Lump-sum problems involving compound interest investments or loans can often be solved more easily using the compound interest formula rather than by using the Finance App.

TI83 Finance App

The Finance App is very useful when solving loan problems involving *regular payments*.

When using this Finance App, the compounding frequency and payment frequency do not need to match (like they did in order to use the regular payment formula for investments).

Loans with the TI83 Finance App

APPS
1:Finance...
1:TVM Solver...

N = total number of payments → use "payment frequency"

I% = the annual interest rate

PV = present value (principal) → loan amount

PMT = periodic payment amount

FV = future value → "0" for a loan paid in full

don't have to match

P/Y = payments made per year

C/Y = compounding periods per year

PMT: END BEGIN

Example #1: Finding the periodic payment amount

Nina purchased a $23,000 car through a finance company. She is paying 2.9% interest, compounded monthly, over a term of 6 years.

a) What is Nina's monthly payment on this loan?

b) How much interest will she pay over the term of this loan?

a)

N = $12 \times 6 = 72$

I% = 2.9

PV = 23 000

$\boxed{\text{PMT} = 0}$ → $348.43

FV = 0

P/Y = 12

C/Y = 12

b)

$$\begin{array}{r} 348.4265323 \\ \times 72 \\ \hline \$25\,086.71 \end{array}$$

$I = 25086.71 - 23000$

$= \$2086.71$

Example #2: Determining how long it will take to repay a loan

Jackie borrowed $5,500 to purchase a motorcycle. The bank loan is at 8.25% interest, compounded annually. Jackie intends to make monthly payments of $220.

a) How long will it take for Jackie to pay back this loan?

b) How much interest will Jackie pay for this loan?

a)

$\boxed{N = 0}$ → 27.42333268

I% = 8.25

PV = 5500

PMT = −220

FV = 0

P/Y = 12

C/Y = 1

$\underbrace{27}_{\text{full pmts}}.\underbrace{42333268}_{\text{partial pmt}}$ = 28 months to pay off this loan

b) (27.42333268)(220) − 5500

= $533.13 in interest

$$\text{Interest} = N \times PMT - PV$$

don't round here ... round after you finish the calculation

Example #3: Comparing loan options

Billie has been offered the following two loan options for borrowing $6000. Which should she choose and why?

Option A: She can borrow at 5.1% interest, compounded annually, and pay off the loan in payments of $1390.00 at the end of each year.

Option B: She can borrow at 5.1% interest, compounded weekly, and pay off the loan in payments of $125.00 per month.

Option A: She can borrow at 5.1% interest, compounded annually, and pay off the loan in payments of $1390.00 at the end of each year.

$\boxed{N = 0}$ → 4.998700993 → 5 years

I% = 5.1

PV = 6000

PMT = −1390

FV = 0

P/Y = 1

C/Y = 1

Interest = (4.998700993)(1390) − 6000

= $948.19

Option B: She can borrow at 5.1% interest, compounded weekly, and pay off the loan in payments of $125.00 per month.

$\boxed{N = 0}$ → 53.80882207 → 54 months

I% = 5.1 → $\frac{54}{12}$ = 4.5yrs

PV = 6000

PMT = −125

FV = 0

P/Y = 12

C/Y = 52

Interest = (53.80882207)(125) − 6000
= $726.10

Conclusion:

Loan B - it costs less interest

- it is paid off more quickly

Home mortgage loans:

Many real-estate purchases require large loans (called ***mortgages***). Mortgage loans on homes are almost never for 100% of the purchase price, which requires that the purchaser pay a portion of the purchase price in cash (called a ***down payment***), and the remainder of the purchase price is loaned to them via the mortgage.

Example #4: Home mortgage loan

Joe and Maxine are purchasing a home in Regina for $375,900. Their bank is offering a mortgage for 90% of the purchase price at a rate of 2.25% interest compounded semi-annually, with regular monthly payments for 25 years.

a) How much money will they need for the down payment?
b) How much will the principal of the mortgage be?
c) How much will their monthly payment be?
d) How much interest will they pay by the time they pay off the entire mortgage?
e) How long will it take before they have paid off half of the loan?

a) 10% of the purchase price

$(0.1)(375900) \doteq \$37\,590.00$ down payment (cash)

b) $\$375\,900 - 37\,590 = \$\,338\,310.00$ mortgage loan

Solution:

c) N = $12 \times 25 = 300$

I% = 2.25

PV = 338 310

$\boxed{\text{PMT} = 0}$ $\longrightarrow$ \$1473.72 monthly pmt

FV = 0

P/Y = 12

C/Y = 2

d) Interest $= (300)(1473.719294) - 338\,310$

$= \$103\,805.79$

e) $\boxed{N = 0}$ → 170.7080926 → 171 months

I% = 2.25

PV = 338 310

PMT = -1473.719294

FV = -169 155

P/Y = 12

C/Y = 2

$$\frac{171}{12} = 14.25 \text{ yrs}$$

Check your understanding:

Text pg. 93 - 95,
#7, 8, 9, 13, 16