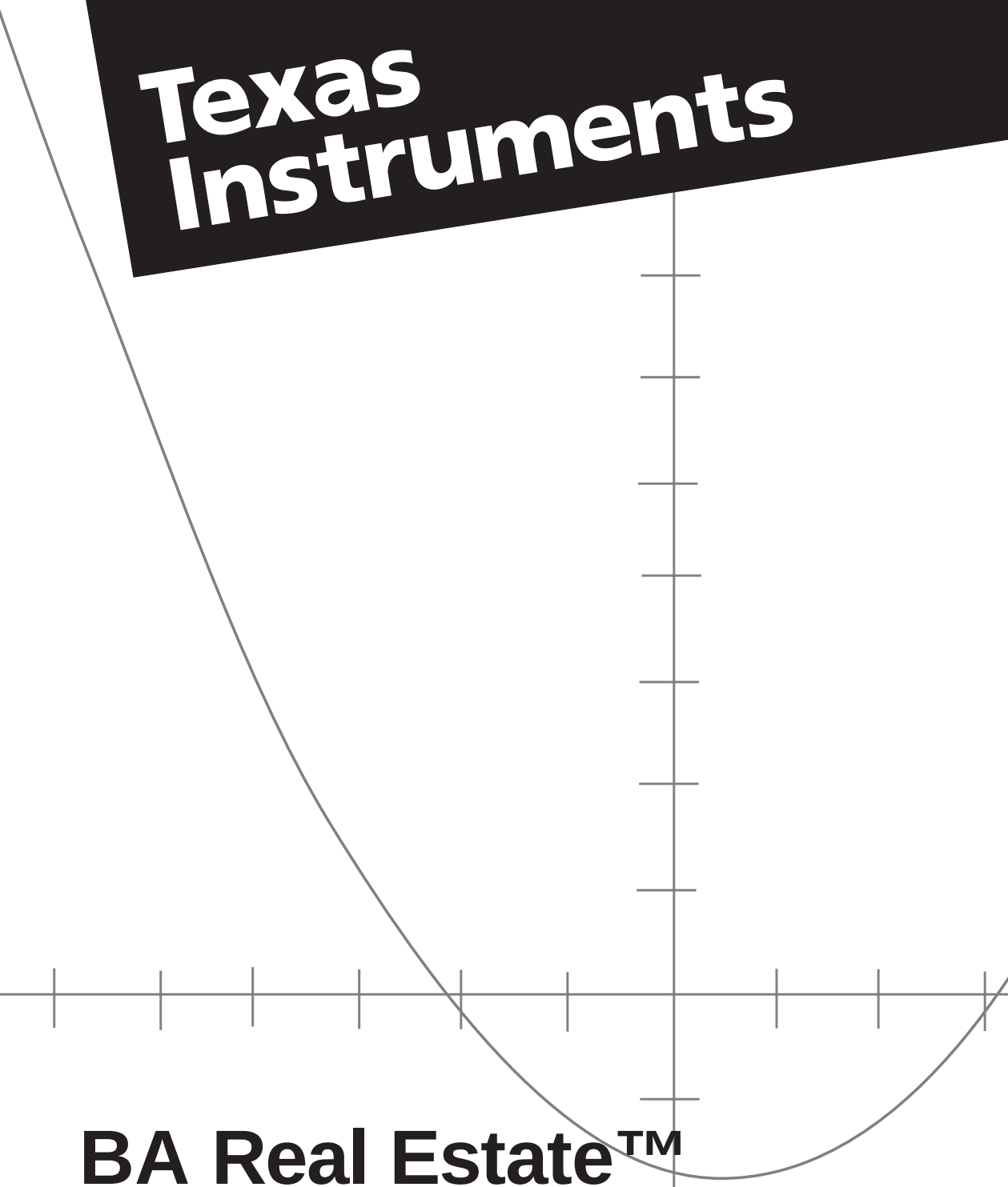
Texas Instruments

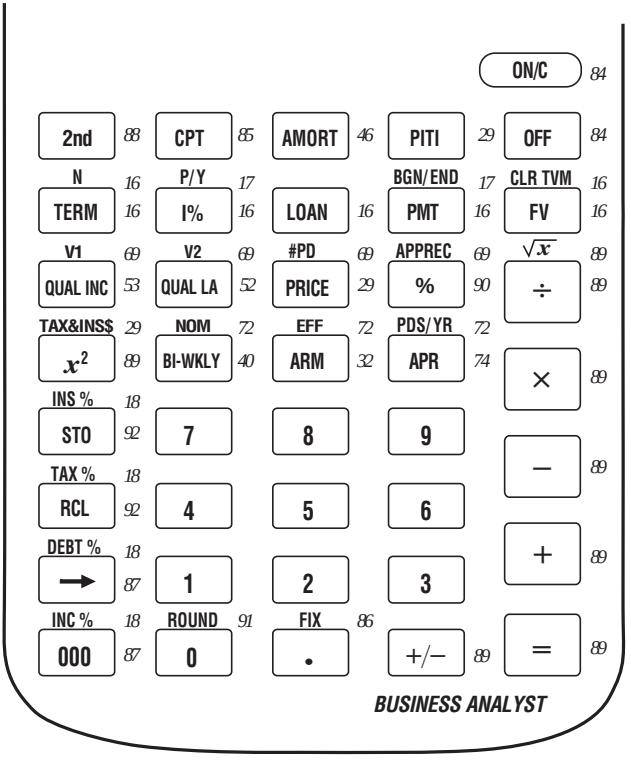


BA Real Estate™

Financial Calculator Guidebook

Key Index

To find information about a specific key, refer to the page number next to the key.



TEXAS INSTRUMENTS

BA Real Estate™

FINANCIAL CALCULATOR

GUIDEBOOK

Guidebook Developed by:
The staff of Texas Instruments Instructional Communications

With Contributions by:
Dave Caldwell
Charlotte Clark
Bob Fedorisko
Mike Keller
Jackie Quiram
Tammy Richards
Gary Rouse

Table of Contents

This guidebook begins with a section designed to help you quickly learn about the BA Real Estate™ calculator and its capabilities. The remainder of the book contains examples of and information about specific kinds of financial calculations. General calculator operation and service information are discussed in the Appendix.

The examples on the following eight pages introduce you quickly to the major features of the BA Real Estate™ calculator. Try working the examples to find out how easy it is to solve real estate calculations! Before starting, however, perform the settings shown on this page to ensure that the examples give the expected results.

Setting Beginning- or End-of-Period Payments

The [2nd] [BGN/END] key sequence lets you alternate between beginning-of-period and end-of-period payments. For example, a savings or lease situation may require payments at the beginning of each payment period, while most loans have payments at the end of each period. These settings affect how interest is calculated.

When the calculator is set to beginning-of-period, the BGN indicator is displayed. There is no indicator for the end-of-period setting.

Note: All of the examples in this section assume end-of-period payments.

To set the payment timing to end-of-period, press [2nd] [BGN/END] until the BGN indicator is turned off. (BGN/END is the second function of the [PMT] key.)

Setting Payment and Compounding Periods

The [2nd] [P/Y] key sequence lets you enter the number of payments (P/Y) per year and the number of compounding periods (C/Y) per year.

Most loans have an equal number of payment periods and compounding periods per year. Other Time Value of Money (TVM) situations, however, may have differing periods. For example, a savings account may receive regular monthly deposits (P/Y = 12), but have daily compounding (C/Y = 365).

All of the examples in this section have 12 payment periods and 12 compounding periods per year.

Before starting these examples, be sure that P/Y and C/Y are set to 12. Press [2nd] [P/Y] 12 [=] [=]. (P/Y is the second function of the [I%] key.)

Setting the Number of Decimal Places

All of the examples in this section (and, in general, throughout the guidebook) are shown with the decimal set to two places. To set two decimal places, press [2nd] [FIX] 2.

Finding the Monthly Payment on a Loan

The TVM keys make it easy to enter at least three known values in a TVM (Time Value of Money) problem and then compute the unknown value. Suppose, for example, you want to know the monthly payment required for a 30-year, $130,000 mortgage loan at an annual percentage rate of 8%.

1. Clear any previous TVM values.

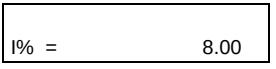
   Press [2nd] [CLR TVM].

2. Enter the term of the loan (30 years).

   Press 30 [TERM].

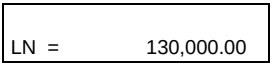
3. Enter the 8% interest rate (annual percentage rate).

   Press 8 [I%].



4. Enter the $130,000 loan amount.

   Press 130 [000] [LOAN].



5. Compute the payment amount.

   Press [CPT] [PMT].

Note: PMT is displayed as a negative number because it is a cash outflow (an amount you pay).

Calculating Total Payment (PITI)

Monthly house payments often include not only principal and interest (the payback on the loan), but also property taxes and insurance. Using the data you entered in the previous example, you can compute the total payment including principal, interest, taxes, and insurance (PITI).

Assume that the local property-tax rate is 1.5% annually and the annual insurance rate is 0.5%. If the selling price of the house is $153,000, what will be the total monthly payment?

1. Enter the local property-tax rate.

   Press 1.5 [2nd] [TAX%].

   TX%= 1.50

2. Enter the annual insurance rate.

   Press .5 [2nd] [INS%].

   IS% = 0.50

3. Enter the selling price.

   Press 153 [000] [PRICE].

   PRC= 153,000.00

4. Compute PITI.

   Press [CPT] [PITI].

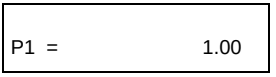
   PITI= -1,208.89

Note: The P&I payment was calculated on the previous page. The property tax rate ([TAX%]) and the insurance rate ([INS%]) will remain in the calculator until you change them or remove the batteries. Turning the calculator off does not clear this information.

Amortization for the First Year

The Amortization model prompts you for the starting and ending payment numbers to define a range of payment periods. You can then use the TVM values you entered earlier to find the loan balance after the last payment and the total principal and interest paid in the range. Find the balance, principal, and interest after 12 payments.

1. To start Amortization, press [AMORT].

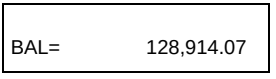


2. Enter the number of the first payment period (P1).

   Press 1 [=] to enter the value for P1 and advance to P2.

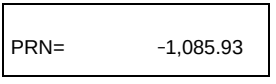
3. Enter the number of the last payment (P2), and compute balance, principal, and interest.

   Press 12 [=] to change P2 and start the list of results. The loan balance after P2 is displayed.



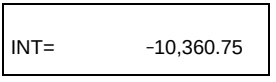
4. Advance to the amount of principal paid in the first 12 payments.

   Press [=].



5. Advance to the amount of interest paid in the first 12 payments.

   Press [=].

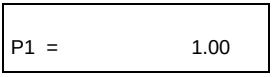


To leave Amortization, press [ON/C].

Finding a Pay-off Balance

If the property is sold after 3.5 years, what amount will be required to pay off the loan? Use the Amortization model to find the balance after 3.5 years of payments.

1. To start Amortization, press [AMORT].

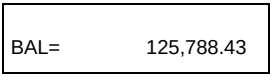


2. Enter the number of the first payment period (P1).

   Press 1 [=] to enter the value for P1 and advance to P2.

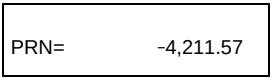
3. Calculate the number of payments in 3½ years , enter as P2, and compute balance, principal, and interest.

   Press 12 [×] 3.5 [=] to calculate and enter P2 and start the list of results. The loan balance after P2 is displayed.



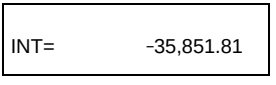
4. Show the amount of principal paid in 3½ years.

   Press [=]



5. Show the amount of interest paid in 3½ years.

   Press [=].



To leave Amortization, press [ON/C].

Changing the Conditions of the Loan

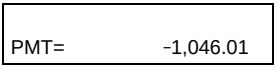
You can change any of the TVM values and then compute a new value. Using the values you entered on page 6, find the monthly payment at 9% interest. Then find the monthly payment at 9.5% for a 15-year loan.

1. Change the interest rate to 9%.

   Press 9 [I%].

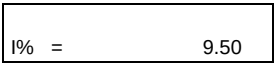
2. Compute the new payment at the higher interest rate.

   Press [CPT] [PMT].



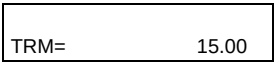
3. Change the interest rate to 9.5%.

   Press 9.5 [I%].



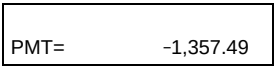
4. Change the term to 15 years.

   Press 15 [TERM].



5. Compute the new payment amount (15-year loan).

   Press [CPT] [PMT].

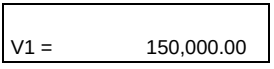


Estimating Appreciation

You are buying a $150,000 home that is expected to appreciate for the next five years at 3% per year. Estimate the value of the house at the end of five years.

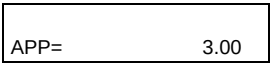
1. Enter the current price of the home (starting value).

   Press 150 [000] [2nd] [V1].



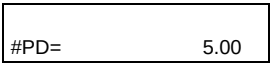
2. Enter the expected annual appreciation rate.

   Press 3 [2nd] [APPREC].



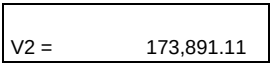
3. Enter the number of periods (years).

   Press 5 [2nd] [#PD].



4. Calculate the expected value at the end of five years.

   Press [CPT] [2nd] [V2].



Qualifying a Buyer for a Loan

You have a buyer who has a total income of $6,200 per month, with monthly debts of $580. Assuming a 20% down payment at 7.5% annual interest for 30 years, a tax rate of 1.5%, an insurance rate of .5%, and an income/debt ratio of 28/36, what is the maximum sales price this buyer can consider?

1. Clear any previous TVM values.

   Press 2nd [CLR TVM].

   0.00

2. Enter income percent.

   Press 28 2nd [INC%].

   IN% = 28.00

3. Enter debt percent.

   Press 36 2nd [DEBT%].

   DB%= 36.00

4. Enter the property-tax rate.

   Press 1.5 2nd [TAX%].

   TX%= 1.50

5. Enter the annual insurance rate.

   Press .5 2nd [INS%].

   IS% = 0.50

6. Enter the term of the loan.

   Press 30 TERM.

   TRM= 30.00

7. Enter the interest rate.

   Press 7.5 I%.

   I% = 7.50

8. Start the qualification.

   Press QUAL LA.

   INC=

9. Enter monthly income amount.

   Press 6200 =.

   INC= 6,200.00

   DBT=

10. Enter monthly debt amount.

    Press 580 [=].

DBT=	580.00

DN%=	

11. Enter down payment percent and compute PITI.

    Press 20 [=].

DN%=	20.00

PITI=	–1,652.00

12. Compute loan payment.

    Press [=].

PMT=	–1,272.77

13. Compute loan amount.

    Press [=].

QLA=	182,028.97

14. Compute sales price.

    Press [=].

QPR=	227,536.21

15. Compute down payment amount.

    Press [=].

DN$ =	45,507.24

The buyer should consider a maximum sales price of $227,536.21 and a maximum loan of $182,028.97.

Note: The income rate [INC%] and the debt rate [DEBT%] will remain in the calculator until you change them or remove the batteries. Turning the calculator off does not clear this information.

The BA Real Estate calculator contains built-in financial formulas, or "models," designed to solve common financial and real estate calculations. The remaining chapters in this book explain how to use the models. If you need to review general calculator operation, refer to the Appendix.

Permanent and Temporary Models

The calculator permanently stores some values you enter; others are retained only while you are using a particular model. INS %, TAX %, DEBT %, INC %, TAX&INS$, and the TVM values are stored permanently until you clear them, change them, or remove the batteries.

Values in the other models share temporary storage space. To prevent conflicts, only one temporary model can be active at a time.

Temporary Financial Model	Keys
Amortization	AMORT
Buyer Qualification	QUAL INC, QUAL LA
Interest Conversion	NOM, EFF, PDS/YR
Annual Percentage Rate	APR
Adjustable Rate Mortgage	ARM
Percent Change/Appreciation	APPREC, V1, V2, #PD
Bi-Weekly Mortgage Payments	BI-WKLY

Activating a Temporary Model

Entering a value into a temporary model makes it the active model. If the model was not already active, the remaining values are set to their defaults.

- The model remains active until you store a value in another model or perform a TVM calculation.
- While a model is active, you can store its values to memory or to the TVM values.
- Attempting to use RCL or CPT with an inactive model causes an error.

Worksheets for Real Estate Use

A set of worksheets based on these models is enclosed to use when working with clients. For most of the examples in this book, a completed worksheet is included after the keystroke solution to show how a worksheet can be used.

You may copy the worksheets for your personal use with clients and customers. However, the worksheets may not be reproduced in any other publication without the written consent of Texas Instruments.

Chapter 1: Mortgages and Amortization

This chapter describes real estate models relating to mortgages and amortization.

Chapter Contents

The Time-Value-of-Money (TVM) Model

The TVM model lets you solve problems involving regularly occurring, even payments, such as loans. When you enter TVM values and settings, they are kept in memory locations reserved specifically for them. Using the other financial models does not affect these values and settings.

Cash Inflows (+) and Outflows (-)

The formulas for the TVM and Amortization models distinguish between inflows (cash you receive) and outflows (cash you pay out).

- You must enter inflows (money you receive) as positive values.
- You must enter outflows (money you pay out) as negative values.
- The calculator displays computed inflows as positive values and computed outflows as negative values.

Entering TVM Values

Key Sequence	Function
2nd [CLR TVM]	Sets TVM values to zero and displays zero. This key sequence does not affect the BGN/END, P/Y, or C/Y settings.
TERM, 2nd [N] *	Enters or computes the term of a loan in years (TERM), or the number of payments (N) required to repay the loan amount.
I%	Enters or computes the annual interest rate (I%).
LOAN	Enters or computes the loan amount.
PMT	Enters or computes the payment amount (PMT).
FV	Enters or computes the future value (FV).

Example: Set the term of a loan to 30 years.

30 TERM TRM= 30.00

* To avoid conflicting values for N and TERM, the calculator automatically adjusts one when you enter or compute the other. If you change the P/Y (payments per year) setting after entering the term in years, N is automatically adjusted to avoid a discrepancy.

Changing TVM Settings

You can vary settings that affect TVM and Amortization calculations. These settings allow you to customize the calculation for the specific loan or savings situation you are evaluating. The calculator retains the settings until you change them (or until batteries are replaced).

Selecting Beginning- or End-of-period Payments

The [2nd] [BGN/END] key sequence lets you alternate between beginning-of-period and end-of-period payments. For example, a savings or lease situation may require payments at the beginning of each payment period, while most loans have payments at the end of each period. These settings affect how interest is calculated.

When the calculator is set to beginning-of-period, the BGN indicator is displayed. The factory setting is end-of-period payments (no indicator).

Setting P/Y and C/Y

The [2nd] [P/Y] key sequence lets you enter the number of payments (P/Y) per year and the number of compounding periods (C/Y) per year.

The factory default setting is 12 for both P/Y and C/Y; that is, 12 payment and compounding periods per year. Some TVM calculations may require that you change these settings. For example, a savings program may have regular monthly deposits (P/Y = 12), but daily compounding (C/Y = 365).

When you press [2nd] [P/Y], the display shows **P/Y = nn**, where **nn** is the current setting. You can press [=] to accept the P/Y value, or enter or calculate a new value (from 1 through 999) and press [=].

The calculator temporarily displays the new P/Y setting, copies the P/Y value into C/Y, and advances the display to show **C/Y = nn**. You can then press [=] to accept the C/Y value, or enter or calculate a new value (from 1 through 999) and press [=]. This sets C/Y, temporarily shows the new C/Y value, and then exits.

Note: You can exit either prompt by pressing [ON/C]. If you want to exit after starting to enter a new value for P/Y or C/Y, press [ON/C] twice.

Setting Default Rates for Your Area

The calculator permanently stores the income/debt ratios and local tax and insurance rates you enter. These settings are used as defaults in your buyer-qualification and PITI calculations.

Setting the Qualifying Ratios

Be sure that you have entered the income/debt ratios before calculating any buyer qualifications.

1. Enter the income percent used by lenders in your area for the most commonly used mortgages. For example, if the qualifying ratio is 28/36, enter 28 for the income percent.
2. Press [2nd] [INC%].
3. Enter the debt rate used by lenders in your area. For example, if the qualifying ratio is 28/36, enter 36 for the debt percent.
4. Press [2nd] [DEBT%].

Setting Tax and Insurance Rates

These settings are useful for finding the general range of total PITI payments. Later, when you know the tax and insurance amounts for a specific property, you can override these settings.

1. Press [ON/C] to turn the calculator on.
2. Enter the property-tax rate as an annual rate. For example, enter 1.5 for 1.5%.
3. Press [2nd] [TAX%].
4. Enter the insurance rate as an annual rate. For example, enter .5 for .5%.
5. Press [2nd] [INS%].

Entering an annual tax and insurance dollar amount with the [2nd] [TAX&INS $] key sequence overrides these settings. For example, if you enter 1825 [2nd] [TAX&INS $], the calculator uses this value instead of the rates entered as TAX% and INS%.

Calculating Down Payments

Mortgage loans are usually stated as 80% loans, 90% loans, etc. The down payment percentage is the difference between the stated percentage and 100%. The down payment percentage is applied to the sales price of the property to find the down payment amount.

Calculating a Down Payment Amount

If you know the sales price of a property and the down payment percentage, you can easily compute how much the down payment will be.

For example, suppose a client is buying a house for $135,000 on an 80% loan. How much will the down payment be?

Steps	Keystrokes	Display
Calculate the down payment amount.	135 [000] [−] 80 [%] [=]	27,000.00

Calculating Down Payment When Sales Price is Not Known

You may need to calculate a down payment when the original sales price of the property is not known. If you have the loan amount and percentage, you can calculate the sales price and down payment amount.

Assume that a client borrowed $125,000 on an 85% loan some years ago. What was the original sales price and down payment amount?

Steps	Keystrokes	Display
Divide loan amount by loan percent to find sales price.	125 [000] [÷] 85 [%] [=]	147,058.82
Calculate the down payment amount.	[×] 15 [%] [=]	22,058.82

Computing a Monthly Mortgage Payment

Find the monthly payment on a home priced at $130,000 if the buyer makes a 10% down payment and finances the balance with a 30-year mortgage at 9.125% annual interest. If you are preparing a report for a client, fill in the worksheet as you calculate the results.

Solution

Press [2nd] [BGN/END] until the BGN indicator disappears.

Steps	Keystrokes	Display	
Clear TVM values.	[2nd] [CLR TVM]		0.00
Set P/Y and C/Y to 12.	[2nd] [P/Y] 12 [=]	P/Y =	12.00
		C/Y =	12.00
	[=]		12.00
Enter term in years.	30 [TERM]	TRM=	30.00
Enter interest rate on the loan.	9.125 [I%]	I% =	9.13
Enter price less down payment.	130 [000] [−] 10 [%] [=] [LOAN]	LN =	117,000.00
Compute monthly payment.	[CPT] [PMT]	PMT=	-951.95

Find the monthly payment if the term of the loan is 15 years instead of 30.

Steps	Keystrokes	Display	
Change term to 15 years.	15 [TERM]	TRM=	15.00
Compute payment.	[CPT] [PMT]	PMT=	-1,195.41

Mortgage Payment—Principal and Interest

1. Clear TVM values (if not already cleared).	2nd [CLR TVM]		
2. Enter sales price.		$130,000	
3. Subtract down payment.	−	10	%
4. Calculate and enter loan amount.	=	$117,000	LOAN
5. Enter term of loan (in years).		30	TERM
6. Enter interest rate.		9.125	I%
7. Compute payment amount.	CPT PMT	$-951.95	

Finding the Unpaid Balance on a Mortgage

Consider a mortgage loan of $250,000 that is to terminate in 25 years. At 8.5% annual interest rate, what will the unpaid balance be in 15 years?

Solution

Press [2nd] [BGN/END] until the BGN indicator disappears.

Steps	Keystrokes	Display
Clear TVM values.	[2nd] [CLR TVM]	0.00
Set P/Y and C/Y to 12.	[2nd] [P/Y] 12 [=]	P/Y = 12.00
		C/Y = 12.00
	[=]	12.00
Calculate original mortgage payment.	25 [TERM]	TRM= 25.00
	8.5 [I%]	I% = 8.50
	250 [000] [LOAN]	LN = 250,000.00
	[CPT] [PMT]	PMT= -2,013.07
Enter the number of payments made in 15 years.	15 [×] 12 [=]	180.00
	[2nd] [N]	N = 180.00
Calculate unpaid balance.	[CPT] [FV]	FV = -162,362.91

Note: You also can use the Amortization model to calculate unpaid balance. The answer may be slightly different, due to rounding differences between the two methods.

Calculating Unpaid Balance on an Existing Mortgage

1. Clear TVM values (if not already cleared).	2nd [CLR TVM]		
2. Enter original term of loan (in years).		25	TERM
3. Enter interest rate.		8.5	I%
4. Enter original loan amount.		$250,000	LOAN
5. Compute payment.	CPT PMT	$-2,013.07	
6. Enter number of payments made.		180	2nd [N]
7. Compute unpaid balance.	CPT FV	$-162,362.91	

Paying Off a Loan with Larger Payments

A client has just borrowed $125,000 for 30 years at 7.75%. If she is able to increase her payment amount by $100 per month, how quickly can she pay the note off?

Solution

Press [2nd] [BGN/END] until the BGN indicator disappears.

Steps	Keystrokes	Display	
Clear TVM values.	[2nd] [CLR TVM]		0.00
Set P/Y and C/Y to 12.	[2nd] [P/Y] 12 [=]	P/Y =	12.00
		C/Y =	12.00
	[=]		12.00
Enter term in years.	30 [TERM]	TRM=	30.00
Enter interest rate.	7.75 [I%]	I% =	7.75
Enter loan amount.	125 [000] [LOAN]	LN =	125,000.00
Compute payment.	[CPT] [PMT]	PMT=	-895.52
Add extra payment amount as a negative value.	[+] 100 [+/−]		-100
Calculate and enter new payment amount.	[=] [PMT]	PMT=	-995.52
Compute new term.	[CPT] [TERM]	TRM=	21.56

Your client can pay off the loan in about 21.6 years.

Paying Off a Loan Early by Making Larger Payments

1. Clear TVM values (if not already cleared).	2nd CLR TVM		
2. Enter term of loan (in years).		30	TERM
3. Enter interest rate.		7.75	I%
4. Enter loan amount.		$125,000	LOAN
5. Compute monthly payment.	CPT PMT	$-895.52	
6. Add extra payment amount (as a negative amount).	+	$100	+/–
7. Calculate and enter new, larger payment.	= PMT	$-995.52	
8. Compute new term.	CPT TERM	21.56	

Calculating a Balloon Payment

You are buying a $75,000 lake house. With a 10% down payment, the interest rate will be 9.25% amortized over a 30-year period. However, the loan will be due and payable at the end of 15 years. How much will the balloon payment be at the end of 15 years?

Solution

Press 2nd [BGN/END] until the BGN indicator disappears.

Steps	Keystrokes	Display	
Clear TVM values.	2nd [CLR TVM]		0.00
Set P/Y and C/Y to 12.	2nd [P/Y] 12 =	P/Y =	12.00
		C/Y =	12.00
	=		12.00
Enter TVM values; compute and enter loan amount.	30 TERM	TRM=	30.00
	9.25 I%	I% =	9.25
	75 000 − 10 %		7,500.00
	= LOAN	LN =	67,500.00
Compute payment and round the result.*	CPT PMT	PMT=	–555.31
	2nd [ROUND] PMT	PMT=	–555.31
Enter number of payments made in 15 years.	15 × 12 =		180.00
	2nd [N]	N =	180.00
Compute unpaid balance.	CPT FV	FV =	–53,953.92
Add monthly payment to find total balloon payment.	+ RCL PMT =		–54,509.23

Note: The balloon payment includes both the unpaid balance and the final monthly payment. You could, of course, estimate the balloon payment simply by calculating the unpaid balance. The only difference between the two results is the amount of the final monthly payment.

* The calculator performs its internal computations to 13 digits. The balloon payment should be computed using the actual amount paid in dollars and cents. Pressing 2nd [ROUND] rounds the internal value to the displayed value.

Calculating a Balloon Payment to Retire a Mortgage

1. Clear TVM values (if not already cleared).		2nd [CLR TVM]	
2. Enter term of loan (in years).		30	TERM
3. Enter interest rate.		9.25	I%
4. Enter loan amount.		$67,500	LOAN
5. Compute payment amount and round the result.	CPT PMT	$-555.31	2nd [ROUND] PMT
6. Enter the number of payments made.		180	2nd [N]
7. Compute unpaid balance.	CPT FV	$-53,953.92	
8. Add payment computed in line 5.	+ RCL PMT	$-555.31	
9. Calculate the balloon payment.	=	$-54,509.23	

Finding the Payment for a Mortgage with a Balloon

You are making a $70,000 loan at 8% over 30 years, with a balloon payment of $20,000 due at the end of the loan. How much will your monthly payment be?

Solution

Press [2nd] [BGN/END] until the BGN indicator disappears.

Steps	Keystrokes	Display	
Clear TVM values.	[2nd] [CLR TVM]		0.00
Enter term in years.	30 [TERM]	TRM=	30.00
Enter interest rate.	8 [I%]	I% =	8.00
Enter loan amount.	70 [000] [LOAN]	LN =	70,000.00
Enter balloon amount as a negative.	20 [000] [+/–] [FV]	FV =	-20,000.00
Compute payment.	[CPT] [PMT]	PMT=	-500.22

Calculating Monthly Payment for a Mortgage with a Balloon Payment

1. Clear TVM values (if not already cleared).	[2nd] [CLR TVM]		
2. Enter term of loan (in years).		*30*	[TERM]
3. Enter interest rate.		*8*	[I%]
4. Enter loan amount.		*$70,000*	[LOAN]
5. Enter amount of balloon payment, as a negative value.		*$20,000*	[+/–] [FV]
6. Compute monthly payment.	[CPT] [PMT]	*$-500.22*	

Total Payment Including Taxes and Insurance (PITI)

You can compute the total monthly payment including principal, interest, local property taxes, and insurance (PITI).

Values Used to Calculate PITI

The PITI calculation uses the selling price, the TVM values, and the values you have entered for the tax rate ([2nd] [TAX%]) and the insurance rate ([2nd] [INS%]), or the actual annual tax and insurance amounts ([2nd] [TAX&INS $]).

If you omit the selling price when calculating PITI with tax and insurance percentages, PITI will be calculated on the loan amount, which may underestimate PITI.

Procedure Using Selling Price

1. Press [2nd] [CLR TVM] to clear the TVM values.
2. If you have not set the tax and insurance rates for your area, follow the instructions on page 18 before proceeding.
3. Enter the sales price ([PRICE]) of the property.
4. Use the TVM keys to enter TERM, I%, and LOAN.

   Note: If the borrower's mortgage requires private mortgage insurance, that rate (for example, 1/4% to 3/8%) should be added to the annual interest rate.
5. Press [CPT] [PITI] to display the result (PITI).

Procedure Using Tax and Insurance Amounts

1. Press [2nd] [CLR TVM] to clear the TVM values.
2. Add the actual annual tax and insurance amounts, and enter the total with [2nd] [TAX&INS $] to override the settings for tax rates.
3. Use the TVM keys to enter TERM, I%, and LOAN.

   Note: If the borrower's mortgage requires private mortgage insurance, that rate (for example, 1/4% to 3/8%) should be added to the annual interest rate.
4. Press [CPT] [PITI] to display the result (PITI).

Computing Total Payment (PITI)

A couple is interested in a small lake-front property, for which the owner is asking $85,000. The buyers need to know the approximate amount of their total payment on the property.

Background

You know that the property taxes and insurance rates for the lake area average 2.38% and 0.78% respectively. The couple has $20,000 to use as a down payment. With a 30-year note at 9%, what will their mortgage payment (PMT) and total monthly payment (PITI) be?

Solution

Press 2nd [BGN/END] until the BGN indicator disappears.

Steps	Keystrokes	Display	
Clear TVM values.	2nd [CLR TVM]		0.00
Set P/Y and C/Y to 12.	2nd [P/Y] 12 =	P/Y =	12.00
		C/Y =	12.00
	=		12.00
Enter local tax rate.	2.38 2nd [TAX%]	TX%=	2.38
Enter insurance rate.	.78 2nd [INS%]	IS% =	0.78
Enter price of property.	85 000 PRICE	PRC=	85,000.00
Enter term in years.	30 TERM	TRM=	30.00
Enter interest rate.	9 I%	I% =	9.00
Enter price less down payment.	85 000 − 20 000 = LOAN	LN =	65,000.00
Compute mortgage payment (principal and interest).	CPT PMT	PMT=	-523.00
Compute total monthly payment (PITI).	CPT PITI	PITI=	-746.83

Note: If you do not enter a value for sales price, the tax and insurance percentages will compute PITI based on the loan amount. The result will be a smaller PITI payment than expected.

PITI—Principal, Interest, Tax, and Insurance Based on Tax and Insurance Percents

1. Clear TVM values (if not already cleared).	2nd [CLR TVM]		
2. Enter local property-tax rate (if not already entered).		2.38	2nd [TAX%]
3. Enter local insurance rate (if not already entered).		0.78	2nd [INS%]
4. Enter price.		$85,000	PRICE
5. Enter term of loan (in years).		30	TERM
6. Enter interest rate.		9	I%
7. Enter loan amount.		$65,000	LOAN
8. Compute payment (principal and interest).	CPT PMT	$-523.00	
9. Compute PITI.	CPT PITI	$-746.83	

Adjustable-Rate Mortgage (ARM)

The ARM model lets you find the payment amount for each range of payments in an adjustable-rate mortgage.

ARM Values

To calculate information on an ARM, set up the mortgage terms in the TVM model, and then press [ARM] to start the ARM model.

Name	Meaning
P1 =	The first payment number in a range of payments (initial value=1).
P2 =	The ending payment number in the range.
I% =	The interest rate within the range P1 to P2. Initially, this is a copy of the TVM I% value.
PMT=	The payment amount within the range P1 to P2.
BAL=	The loan balance after the last payment in the range P1 to P2.

The model starts with P1=1, and the calculator updates P1 automatically for each range of payments. Attempting to enter a value for P1 exits the ARM model. Press [=] repeatedly to display the results and to repeat the sequence for the next range.

At each repetition, the calculator updates P1 and P2 automatically. If the span between P1 and P2 is different from the previous range, you must enter the new P2 value manually. You cannot change P1.

Notes on the ARM Model

- I% and PMT are not the TVM I% and PMT values, although I% is initially a copy of the TVM I% value. Using this model does not change any TVM values.
- Because a change in the FIX setting would affect accuracy, the [2nd] [FIX] key is ignored until you exit the model.
- Pressing [ON/C] at any time, except when entering a value, exits the model and leaves the last displayed value in the display, with no label.
- You can store a displayed value to memory or to TVM. Storing to TVM, however, exits the ARM model.

Finding Periodic Payments for an ARM

A bank is lending $100,000 on an adjustable rate, 30-year mortgage at 6% annual interest with an annual cap on the interest rate of 2% and a lifetime cap of 6%. Find the payment amount for each adjustment period assuming it accelerates by the maximum amount at each adjustment period.

Solution

Press [2nd] [BGN/END] until the BGN indicator disappears.

Steps	Keystrokes	Display	
Clear TVM values.	[2nd] [CLR TVM]		0.00
Set P/Y and C/Y to 12.	[2nd] [P/Y] 12 [=]	P/Y =	12.00
		C/Y =	12.00
	[=]		12.00
Enter the loan values.	30 [TERM]	TRM=	30.00
	6 [I%]	I% =	6.00
	100 [000] [LOAN]	LN =	100,000.00
Start ARM and accept initial P1.	[ARM] [=]	P1 =	1.00
		P2 =	1.00
Change P2 to 12 and show previous I%.	12 [=]	P2 =	12.00
		I% =	6.00
Show PMT and BAL for first year.	[=]	PMT=	-599.55
	[=]	BAL=	98,772.00
Accept range for second year and show previous I%.	[=]	P1 =	13.00
	[=]	P2 =	24.00
	[=]	I% =	6.00
Increase I% by 2%; show PMT and BAL for second year.	8 [=]	I% =	8.00
		PMT=	-730.86
	[=]	BAL=	97,870.87
Accept range for third year and show previous I%.	[=]	P1 =	25.00
	[=]	P2 =	36.00
	[=]	I% =	8.00
Increase I% by 2%; show PMT and BAL for third year.	10 [=]	I% =	10.00
		PMT=	-869.05
	[=]	BAL=	97,199.12

(continued)

Solution (Continued)

Steps	Keystrokes	Display	
Accept range for fourth year and show previous I%.	[=] [=]	P1 = P2 = I% =	37.00 48.00 10.00
Increase I% to the cap for the loan, and show PMT and BAL for fourth year.	12 [=] [=]	I% = PMT= BAL=	12.00 -1,012.28 96,688.17
Exit ARM.	[ON/C]		96,688.17

The payment for the remainder of the loan is $1,012.28.

Note: The worksheet on the next page omits step 1, clearing the TVM values, due to page size restrictions.

Adjustable Rate Mortgage

2. Set number of payments per year and number of compounding periods per year (if not already set).	2nd [P/Y]	12 12	= =
3. Enter term of loan (in years).		30	TERM
4. Enter interest rate.		6	I%
5. Enter loan amount.		$100,000	LOAN
6. Start ARM.	ARM		
7. Accept the number of the initial payment (P1).		1	=
8. Enter the number of the ending payment (P2) for the first adjustment period.		12	=
9. Accept the initial interest rate.		6.00	=
10. View monthly payment amount for this adjustment period.		$-599.55	
11. View balance at end of this adjustment period.	=	$98,772.00	
12. Return to P1 and accept updated P1 as beginning payment of second adjustment period.	=	13.00	=
13. Accept the updated P2, or enter the number of the ending payment of the second adjustment period.		24.00	=
14. Enter the interest rate for this period.		8	
15. View payment amount for this adjustment period.	=	$-730.86	
16. View balance at end of this adjustment period.	=	$97,870.87	
17. Return to P1 and accept updated P1 as the number of the beginning payment of the new adjustment period.	=	25.00	=
18. Accept updated P2 as the number of the ending payment of the new adjustment period.		36.00	=
19. Enter the interest rate for this period.		10	
20. View payment amount for this adjustment period.	=	$-869.05	
21. View balance at end of this adjustment period.	=	$97,199.12	

Repeat steps 17 through 21 until the maximum interest rate has been reached.

Comparing an ARM to a Fixed-Rate Mortgage

For a loan of $145,000, you are comparing a fixed-rate mortgage of 7.5% for 30 years to a 30-year ARM. The ARM has an initial rate of 5% with a 2% maximum adjustment for each 12-month period and a maximum lifetime adjustment of 6%. Find the breakeven point.

Situation

You are trying to help a buyer decide whether to use a fixed-rate mortgage or an adjustable-rate mortgage. You want to compare the fixed-rate term to the best one-year adjustable loan you have found. Using the figures given above and assuming a maximum adjustment at each period, at what point would the savings from the adjustable-rate mortgage become exhausted?

Solution

Before performing this comparison, complete the *Adjustable Rate Mortgage* worksheet to obtain the ARM monthly payments for each adjustment period.

Adjustment Period	Rate	Payment
Initial	5.00%	$778.39
Second	7.00%	$960.21
Third	9.00%	$1,153.34
Fourth (maximum)	11.00%	$1,354.86

Steps	Keystrokes	Display	
Clear TVM values.	2nd [CLR TVM]		0.00
Enter term.	30 [TERM]	TRM=	30.00
Enter fixed-rate interest.	7.5 [I%]	I% =	7.50
Enter amount of loan.	145 [000] [LOAN]	LN =	145,000.00
Compute amount of fixed-rate payment.	[CPT] [PMT]	PMT=	–1,013.86
Calculate monthly savings/costs by subtracting amount of initial ARM payment from fixed-rate payment.	[+/–] [–] 778.39 [=]		235.47
Multiply monthly savings/costs by number of months in this ARM period and store.	[×] 12 [=] [STO] [1]	MEM=	2,825.65

ARM vs. Fixed-Rate Mortgage

Steps	Keystrokes	Display
Calculate monthly savings/costs by subtracting amount of second period ARM payment from fixed-rate payment.	RCL PMT +/− − 960.21 =	53.65
Multiply monthly savings/costs by number of months in this ARM period.	× 12 =	643.81
Add to stored savings/costs and store.	+ RCL 1 = STO 1	MEM= 3,469.46
Calculate monthly savings/costs by subtracting amount of third period ARM payment from fixed-rate payment	RCL PMT +/− − 1153.34 =	–139.48
Multiply monthly savings/costs by number of months in this ARM period.	× 12 =	–1,673.75
Add to stored savings and store.	+ RCL 1 = STO 1	MEM= 1,795.72

Continue the comparison until the accumulated savings in the last column are reduced to or below zero. That is the breakeven point in the comparison. Once it is apparent that the savings will be exhausted in a given year, divide the monthly costs into the previous year's total savings. This will tell you how many months will occur during that period before the savings are exhausted. (See lines 19 to 22 in the worksheet example on page 39.)

Adjustable Rate Mortgage vs. Fixed-Rate Mortgage

1. Use the Adjustable Rate Mortgage worksheet to calculate the payments for each adjustment period of the ARM and record those values in steps 4, 9, 15, and 21 respectively.
2. Use the Mortgage Payment—Principal and Interest worksheet to calculate the payment for the fixed-rate mortgage and record that value in steps 3, 8, 14, and 20.

3. Enter amount of fixed-rate payment.		$-1,013.86	+/−	
4. Subtract amount of initial ARM payment.	−	$778.39		
5. View monthly savings with ARM payment.	=	$235.47		
6. Multiply monthly savings/costs by the number of months in the initial ARM period.	× 12 =	$2825.65	STO 1	
7. Record total savings/costs during this period.				$2,825.65
8. Enter amount of fixed-rate payment.	RCL PMT	$-1,013.86	+/−	
9. Subtract amount of ARM payment for second period.	−	$960.21		
10. View monthly savings/costs during second period.	=	$53.65		
11. Multiply monthly savings/costs by number of months in this adjustment period.	× 12 =	$643.81		
12. Add to recorded savings/costs from step 7.	+ RCL 1	$2,825.65		
13. Record accumulated savings/costs.	= STO 1			$3,469.46

14. Enter amount of fixed-rate payment.	RCL PMT	$-1,013.86	+/-
15. Subtract amount of ARM payment for third period.	−	$1,153.34	
16. View monthly savings/costs during third period.	=	$-139.48	
17. Multiply monthly savings/costs by number of months in this adjustment period.	× 12 =	$-1,673.75	
18. Add to recorded savings/costs from step 13.	+ RCL 1	$3,469.46	
19. Record accumulated savings/costs.	= STO 1		$1,795.72
20. Enter amount of fixed-rate payment.	RCL PMT	$-1,013.86	+/-
21. Subtract amount of ARM payment for fourth period.	−	$1,354.86	
22. View monthly savings/costs during fourth period.	=	$-341.00	
23. Multiply monthly savings/costs by number of months in this adjustment period.	× 12 =	$-4,091.99	
24. Add to recorded savings/costs from step 19.	+ RCL 1	$1,795.72	
25. Record total savings/costs.	=		$-2,296.27

Continue the comparison until the accumulated savings in the last column are reduced to or below zero. That is the breakeven point in the comparison. Once it is apparent that the savings will be exhausted in a given year, divide the monthly costs into the previous year's total savings. This will tell you how many months will occur during that period before the savings are exhausted. For example, line 19 divided by line 22 equals 5.27 months.

Bi-Weekly Mortgage Payments

You can find the effect of making bi-weekly payments (26 half-payments per year) instead of monthly payments.

Values Used by the Model

To calculate bi-weekly payments, set up the current mortgage in the TVM model and then press [BI-WKLY]. The calculator uses the TVM values to compute the results.

Name	Meaning
PMT=	The bi-weekly payment required.
N =	The total number of bi-weekly payments required.
YRS=	The number of years required to retire the loan.
SAV=	The interest saved (rounded to the nearest dollar) in comparison with monthly payments.

Press [=] repeatedly to display each result. Press [=] or [ON/C] at the end of the list to exit the model.

Note: The first result, PMT, is not a copy of the TVM PMT value. This PMT tells you what the bi-weekly payment would be.

Benefits of Bi-weekly Payments

Making bi-weekly payments instead of monthly payments allows you to pay off a loan more quickly and thus reduce the amount of interest paid. This is because the payments are more frequent and you are making 13 full monthly payments annually instead of 12.

For example, consider a $115,000 loan at 8% for 30 years. The monthly mortgage payment would be $843.83.

Compare that payment to the payment for the same loan if you elected to pay off the loan with bi-weekly payments of $421.91. The loan would be paid off in less than 23 years, and you would save $54,498 in interest.

Calculating a Mortgage with Bi-Weekly Payments

You are borrowing $115,000 at 8% for 30 years. What will be the effects and savings if you pay off the loan with bi-weekly payments, instead of monthly payments?

Solution

Press [2nd] [BGN/END] until the BGN indicator disappears.

Steps	Keystrokes	Display	
Clear TVM values.	[2nd] [CLR TVM]		0.00
Set P/Y and C/Y to 12.	[2nd] [P/Y] 12 [=]	P/Y =	12.00
		C/Y =	12.00
	[=]		12.00
Enter the loan values.	30 [TERM]	TRM=	30.00
	8 [I%]	I% =	8.00
	115 [000] [LOAN]	LN =	115,000.00
Show bi-weekly payment amount, number of payments, years to pay off the loan, and interest saved.	[BI-WKLY]	PMT=	-421.91
	[=]	N =	590.84
	[=]	YRS=	22.66
	[=]	SAV=	54,498.00
Exit.	[=]		54,498.00

Bi-Weekly Mortgage Payments

1. Clear TVM values (if not already cleared).	2nd [CLR TVM]		
2. Enter term of loan (in years).		30	TERM
3. Enter interest rate.		8	I%
4. Enter loan amount.		$115,000	LOAN
5. Start Bi-Weekly and view the bi-weekly payment amount.	BI-WKLY	$-421.91	
6. View the number of bi-weekly payments (N) required to pay off loan.	=	590.84	
7. View the number of years (YRS) required.	=	22.66	
8. View the interest saved at the end of the term by making bi-weekly payments instead of monthly payments.	=	$54,498.00	

Finding the Balance on a Canadian Loan

A client is moving to Canada and will be living there for five years. She will purchase a home while she is there and will sell it when she returns to the U.S. She is looking at a $185,000 home at 8¼% for 30 years. She has $17,000 to put down. Find her mortgage payment and her remaining balance after the five-year period.

Solution

Press [2nd] [BGN/END] until the BGN indicator disappears.

Steps	Keystrokes	Display
Clear TVM values.	[2nd] [CLR TVM]	0.00
Set payment periods.	[2nd] [P/Y] 12	P/Y 12
Set compounding periods for Canadian loan.	[=] 2 [=]	C/Y = 2.00 2.00
Enter term of loan.	30 [TERM]	TRM = 30.00
Enter interest rate.	8.25 [I%]	I% = 8.25
Subtract down payment from price to compute loan.	185 [000] [−] 17 [000] [=] [LOAN]	LN = 168,000.00
Compute payment.	[CPT] [PMT]	PMT = −1,245.83
Enter number of payments during period and store as N.	5 [×] 12 [=] [2nd] [N]	N = 60.00
Compute balance after five years.	[CPT] [FV]	FV = −159,879.69

Note: If you do not normally solve Canadian mortgage problems, be sure to restore the compounding periods per year to 12.

Payment and Remaining Balance on a Canadian Mortgage

1. Clear TVM values (if not already cleared).	2nd [CLR TVM]		
2. Enter number of payment periods per year.	2nd [P/Y]	12	=
3. Set compounding periods to semi-annual.		2	=
4. Enter term of loan (in years).		30	TERM
5. Enter interest rate.		8.25	I%
6. Enter loan amount.		$168,000.00	LOAN
7. Compute payment amount.	CPT PMT	$-1,245.83	
8. Enter number of payments made, and store as N.	5 × 12 =	60	2nd [N]
9. Compute balance at end of period.	CPT FV	$-159,879.69	

Amortization (AMORT)

You can calculate the principal and interest paid in a range of payments and the loan balance after the last payment in the range. The calculator prompts you for the starting and ending payment numbers and uses the TVM values to calculate the results.

Amortization Values

To calculate amortization, first enter the TVM values for the loan and then press [AMORT]. You can exit the Amortization model at any time by pressing [ON/C].

Name	Meaning
P1 =	Prompt for first payment in the range. Initial value=1.
P2 =	Prompt for ending period in the range. Initial value=1.
BAL=	Loan balance after payment P2 is made.
PRN=	Amount of principal paid in the payment range P1 through P2.
INT=	Amount of interest paid in the payment range P1 through P2.

Note: Do not change the fixed-decimal setting during amortization. A change can affect the accuracy of the results.

Notes on the Amortization Model

- Pressing [ON/C] at any time, except while entering a value, exits the model and leaves the last displayed value in the display, with no label.
- Initially, the display shows P1= 1. You can press [=] to accept the P1 value, or you can enter or calculate a new value and press [=]. The display temporarily shows the new value of P1 and then shows P2= 1.
- You can press [=] to accept the P2 value, or you can enter or calculate a new value and press [=]. The calculator shows the new value of P2 and then computes and displays the first item in the result list (BAL).
- Press [=] to display each result. Pressing [=] at the end of the list starts the sequence again, with P1 and P2 updated for the next range of payments. This feature helps you build an amortization schedule.

Finding the Principal and Interest Paid

You are buying a home with a 30-year, $105,000 mortgage with an annual interest rate of 9.125%. Assume that the first payment is due in May. Find the principal and interest you will pay on the loan during the first three tax years.

Solution: First Tax Year

The first tax year (May through December) includes payments 1 through 8.

Steps	Keystrokes	Display	
Clear TVM Values.	2nd [CLR TVM]		0.00
Set P/Y and C/Y to 12.	2nd [P/Y] 12 =	P/Y =	12.00
		C/Y =	12.00
	=		12.00
Enter known loan values.	30 TERM	TRM	=30.00
	9.125 I%	I% =	9.13
	105 000 LOAN	LN =	105,000.00
Calculate payment.	CPT PMT	PMT=	-854.31
Start amortization.	AMORT	P1 =	1.00
Set P2 for 1st year.	= 8	P2	8
Display balance, principal, and interest for the first tax year.	=	P2 =	8.00
		BAL =	104,540.93
	=	PRN=	-459.07
	=	INT =	-6,375.41

(continued)

Solution: Second Tax Year

The second tax year (January through December) includes payments 9 through 20 (12 payments).

Steps	Keystrokes	Display	
Accept updated P1, and advance to P2.	= =	P1 = P2 =	9.00 16.00
Enter new P2.*	20	P2	20.00
Display balance, principal, and interest for the second year.	= = =	P2 = BAL= PRN= INT=	20.00 103,798.03 –742.90 –9,508.82

*The calculator updates P1 to 9.00 and P2 to 16.00, assuming that the next range is also 8 months. Changing P2 to 20 establishes a 12-month range so the calculator can correctly update both P1 and P2 for successive years.

Solution: Third Tax Year

The third tax year (January through December) includes payments 21 through 32 (12 payments).

Steps	Keystrokes	Display	
Accept updated P1, and advance to P2.	= =	P1 = P2 =	21.00 32.00
Accept updated P2, and display balance, principal, and interest for the third year.	= = =	BAL= PRN= INT=	102,984.42 –813.61 –9,438.11

Note: The worksheet on the next page omits step 1, clearing the TVM values, due to page size restrictions.

2. Enter term of loan (in years).		30	TERM
3. Enter interest rate.		9.125	I%
4. Enter loan amount.		$105,000	LOAN
5. Compute payment (principal and interest).	CPT PMT	$-854.31	
6. Start Amortization.	AMORT		
7. Accept initial payment period (P1), or enter the number of the beginning payment period.		1	=
8. Accept ending payment period (P2), or enter the number of the ending payment period.		8	=
9. View balance remaining after P2.		$104,540.93	
10. View principal paid from P1 through P2.	=	$-459.07	
11. View interest paid from P1 through P2.	=	$-6,375.41	
12. Return to P1 and accept updated P1 as next beginning payment period.	=	9	=
13. Accept updated P2, or enter the number of the next ending payment period.		20	=
14. View balance remaining after P2.		$103,798.03	
15. View principal paid from P1 through P2.	=	$-742.90	
16. View interest paid from P1 through P2.	=	$-9,508.82	
17. Return to P1 and accept updated P1 as next beginning payment period.	=	21	=
18. Accept updated P2 as the ending period.		32	=
19. View balance remaining after P2.		$102,984.42	
20. View principal paid from P1 through P2.	=	$-813.61	
21. View interest paid from P1 through P2.	=	$-9,438.11	

Chapter 2: Buyer Qualification

This chapter describes real estate models relating to qualifying the buyer for a mortgage loan.

Chapter Contents

Buyer Qualification: Maximum Loan Amount

You can calculate buyer qualification in one of two ways: by determining the maximum amount the buyer can afford to borrow, or by calculating the minimum income a buyer must have. This page describes the model based on loan amount, while the following page discusses the model based on minimum required income.

Values Used by Qualifying Loan Amount Model

To calculate the maximum loan for which a buyer can qualify, first enter the term of the loan, the interest rate, the income/debt ratio used in your area, if not already entered (see page 18), and one of the following:

- The annual tax and insurance percentages applicable to the property ([2nd] [INS%] and [2nd] [TAX%]).
- The total annual tax and insurance dollar amount ([2nd] [TAX&INS $]).

Then press [QUAL LA] to start the model. You can exit the Buyer Qualification model at any time by pressing [ON/C].

Name	Meaning
INC=	Enter monthly income and press [=].
DBT=	Enter monthly debt and press [=].
DN%=	Enter the down payment amount, or enter a two-digit number for the down payment percent, and then press [=].*
PITI=	The total monthly payment including principal, interest, tax, and insurance.
PMT=	The monthly loan payment for which the buyer should qualify.
QLA=	The loan amount for which the buyer should qualify.
QPR=	The sales price for which the buyer should qualify.
DN$=	The down payment amount (useful if you entered down payment as a percent).

* The calculator accepts any number greater than 99 as a down payment dollar amount.

Buyer Qualification: Minimum Income Required

The Qualifying Income model lets you calculate the minimum income a buyer must have to qualify for a given sales price.

Values Used by Qualifying Income Model

To calculate the minimum income required to qualify for a loan, first enter the term of the loan, the interest rate, the income/debt ratio used in your area, if not already entered (see page 18), and one of the following:

- The annual tax and insurance percentages applicable to the property ([2nd] [INS%] and [2nd] [TAX%]).
- The total annual tax and insurance dollar amount ([2nd] [TAX&INS $]).

Then press [QUAL INC] to start the model. You can exit the Buyer Qualification model at any time by pressing [ON/C].

Name	Meaning
PRC=	Enter the sales price of the property and press [=].
DN%=	Enter the down payment amount, or enter a two-digit number for the down payment percent, and then press [=].*
DBT=	Enter monthly debt and press [=].
LN=	Loan amount.
PMT=	Monthly payment for the mortgage loan.
PITI=	Total payment including principal, interest, tax, and insurance.
QI=	Monthly income required to qualify for the loan.

* The calculator accepts any number greater than 99 as a down payment dollar amount.

Finding the Qualifying Loan Amount

In this example, you know the tax, insurance, and down payment percentages.

Situation

You are helping a couple find a home. They have a combined monthly income of $6,500, with one car payment of $320 and other monthly debts of $175. Assuming an 80% loan at 8% annual interest for 30 years, a tax rate of 1.5%, an insurance rate of .5%, and using 28/36 qualifying ratios, estimate the maximum loan amount and sales price this couple should consider.

Solution

Steps	Keystrokes	Display	
Clear TVM values.	2nd [CLR TVM]		0.00
Enter income percent.	28 2nd [INC%]	IN% =	28.00
Enter debt percent.	36 2nd [DEBT%]	DB%=	36.00
Enter tax percent.	1.5 2nd [TAX%]	TX%=	1.50
Enter insurance percent.	.5 2nd [INS%]	IS% =	0.50
Enter term.	30 TERM	TRM=	30.00
Enter interest rate.	8 I%	I% =	8.00
Start qualification.	QUAL LA	INC =	0.00
Enter monthly income amount.	6500 =	INC = DBT=	6,500.00 0.00
Enter monthly debt amount.	320 + 175 =	DBT= DN%=	495.00 0.00
Enter down payment percent and compute PITI.	20 =	DN%= PITI=	20.00 –1,820.00
Compute loan payment.	=	PMT=	–1,417.53
Compute loan amount.	=	QLA=	193,185.87
Compute sales price.	=	QPR=	241,482.34
Compute down payment.	=	DN$=	48,296.47

Finding Qualifying Loan Amount Based on Tax, Insurance, and Down Payment Percents

1. Clear TVM values (if not already cleared).		2nd [CLR TVM]
2. Enter income percent (if not already entered).	*28*	2nd [INC%]
3. Enter debt percent (if not already entered).	*36*	2nd [DEBT%]
4. Enter tax percent (if not already entered).	*1.5*	2nd [TAX%]
5. Enter insurance percent (if not already entered).	*.5*	2nd [INS%]
6. Enter term of loan (in years).	*30*	TERM
7. Enter interest rate.	*8*	I%
8. Start the qualification.		QUAL LA
9. Enter gross monthly income amount (total).	*$6,500*	=
10. Enter monthly debt amount (total).	*$495*	=
11. Enter down payment percent (0 to 99).	*20*	
12. Compute PITI.	= *$-1,820.00*	
13. Compute payment.	= *$-1,417.53*	
14. Compute qualifying loan amount.	= *$193,185.87*	
15. Compute qualifying sales price.	= *$241,482.34*	
16. Compute down payment amount.	= *$48,296.47*	

Finding the Minimum Income Required

A couple is interested in a home you are showing. The asking price is $250,000. Last year's taxes were $3,750 and insurance was $1,250. The couple's monthly debt is $635 and they are able to make a $50,000 down payment. If they get a 30-year loan at 8%, determine if their combined monthly income of $7,100 is enough for them to qualify.

Solution

Steps	Keystrokes	Display	
Clear TVM values.	2nd [CLR TVM]		0.00
Enter income percent.	28 2nd [INC%]	IN% =	28.00
Enter debt percent.	36 2nd [DEBT%]	DB%=	36.00
Add annual tax and annual insurance to calculate total tax and insurance.*	3750 + 1250 = 2nd [TAX&INS $]	T&I=	5,000.00
Enter term of loan.	30 TERM	TRM=30.00	
Enter interest rate.	8 I%	I% =	8.00
Start qualification.	QUAL INC	PRC=	0.00
Enter price.	250 000 =	PRC= DN%=	250,000.00 0.00
Enter down payment amount.	50 000 =	DN$= DBT=	50,000.00 0.00
Enter a monthly debt amount, and compute qualifying loan amount.	635 =	DBT= LN =	635.00 200,000.00
Compute payment.	=	PMT=	-1,467.53
Compute PITI.	=	PITI =	-1,884.20
Compute qualifying income.	=	QI =	6,997.78

* The calculator uses the TAX&INS$ amount, ignoring the TAX% and INS% settings. TAX% and INS% are used only when TAX&INS$ is zero.

Finding Qualifying Income Based on Tax, Insurance, and Down Payment Amounts

1. Clear TVM values (if not already cleared).			2nd [CLR TVM]
2. Enter income percent (if not already entered).		*28*	2nd [INC%]
3. Enter debt percent (if not already entered).		*36*	2nd [DEBT%]
4. Enter annual tax amount.		*$3,750*	
5. Add annual insurance amount, and enter total.	+	*$1,250*	= 2nd [TAX&INS $]
6. Enter term of loan (in years).		*30*	TERM
7. Enter interest rate.		*8*	I%
8. Start the qualification.	QUAL INC		
9. Enter price.		*$250,000*	=
10. Enter down payment amount.		*$50,000*	=
11. Enter monthly debt amount (total).		*$635.00*	
12. Compute qualifying loan amount.	=	*$200,000.00*	
13. Compute payment.	=	*$-1,467.53*	
14. Compute PITI.	=	*$-1,884.20*	
15. Compute qualifying income.	=	*$6,997.78*	

Finding the Maximum Allowable Debt

Assuming a sales price of $125,000, 10% down payment, 8% annual fixed rate, 30-year term, and an income/debt ratio of 28/36, determine the maximum debt a buyer can have and still qualify for the loan. Also assume that the annual tax rate is 1.5% and the annual insurance rate is 0.5%

Solution

Press [2nd] [BGN/END] until the BGN indicator disappears.

Steps	Keystrokes	Display	
Clear TVM values.	[2nd] [CLR TVM]		0.00
Enter income percent.	28 [2nd] [INC%]	IN% =	28.00
Enter debt percent.	36 [2nd] [DEBT%]	DB%=	36.00
Enter tax percent.	1.5 [2nd] [TAX%]	TX%=	1.50
Enter insurance percent.	.5 [2nd] [INS%]	IS%=	0.50
Enter term.	30 [TERM]	TRM=	30.00
Enter interest rate.	8 [I%]	I% =	8.00
Start qualification.	[QUAL INC]	PRC=	0.00
Enter price.	125 [000] [=]	PRC= DN%=	125,000.00 0.00
Enter down payment percent (0 to 99).	10 [=]	DN%= DBT=	10.00 0.00
Enter a zero for monthly debt amount, and compute qualifying loan amount.	0 [=]	DBT= LN =	0.00 112,500.00
Compute payment.	[=]	PMT=	-825.49
Compute PITI and store the result.	[=] [STO] [1]	PITI =	-1,033.82
Compute qualifying income.	[=]	QI =	3,692.21
Multiply by debt ratio.	[×] [RCL] [2nd] [DEBT%] [%] [=]		1,329.20
Calculate maximum debt.	[+] [RCL] [1] [=]		295.38

Finding Maximum Allowable Debt

1. Enter income percent (if not already entered).	*28*	2nd [INC%]
2. Enter debt percent (if not already entered).	*36*	2nd [DEBT%]
3. Enter tax percent (if not already entered).	*1.5*	2nd [TAX%]
4. Enter insurance percent (if not already entered).	*.5*	2nd [INS%]
5. Enter term of loan (in years).	*30*	TERM
6. Enter interest rate.	*8*	I%
7. Start the qualification. QUAL INC		
8. Enter price.	*$125,000*	=
9. Enter down payment percent (0 to 99).	*10*	=
10. Enter a zero for monthly debt amount (total).	*0*	
11. Compute qualifying loan amount.	= *$112,500.00*	
12. Compute payment.	= *$-825.49*	
13. Compute PITI and store it.	= *$-1,033.82*	STO 1
14. Compute qualifying income.	= *$3,692.21*	
15. Multiply by debt ratio. × RCL 2nd [DEBT%] % =	*$1,329.20*	
16. Calculate maximum debt. + RCL 1 =	*$295.38*	

Finding the Net Cost of Housing

A couple is considering an $84,000 mortgage to purchase a $105,000 home. What would their net cost of housing be if they were in the 28% tax bracket? Use a standard 30-year note and 8% interest for your example. Assume property tax and insurance rates are 1.5 and .35 respectively.

Solution

Press [2nd] [BGN/END] until the BGN indicator disappears.

Steps	Keystrokes	Display	
Clear TVM values.	[2nd] [CLR TVM]		0.00
Enter sales price.	105 [000] [PRICE]	PRC=	105,000.00
Enter tax percent.	1.5 [2nd] [TAX%]	TX%=	1.50
Enter insurance percent.	.35 [2nd] [INS%]	IS% =	0.35
Enter term in years.	30 [TERM]	TRM=	30.00
Enter interest rate.	8 [I%]	I% =	8.00
Enter loan amount.	84 [000] [LOAN]	LN =	84,000.00
Compute monthly payment.	[CPT] [PMT]	PMT=	–616.36
Recall loan amount.	[RCL] [LOAN]	LN =	84,000.00
Multiply by interest rate to find approximate annual interest amount.	[×] [RCL] [I%] [%] [=] [STO] [1]	MEM=	6,720.00
Add annual tax amount.	[RCL] [PRICE] [×] [RCL] [2nd] [TAX%] [%] [+] [RCL] [1] [=]		8,295.00
Multiply by income-tax rate.	[×] 28 [%]		0.28
Calculate annual savings.	[=]		2,322.60
Divide by 12 to find monthly savings and store the result.	[÷] 12 [=] [STO] [1]	MEM=	193.55
Compute PITI.	[CPT] [PITI]	PITI=	–778.24
Subtract monthly tax savings.	[–] [RCL] [1] [+/–]		–193.55
Calculate monthly cost of housing.	[=]		–584.69

Net Cost of Housing Based on Tax and Insurance Percents

1. Clear TVM values (if not already cleared).	2nd [CLR TVM]		
2. Enter sales price.		*$105,000*	PRICE
3. Enter tax percent (if not already entered).		*1.5*	2nd [TAX%]
4. Enter insurance percent (if not already entered).		*.35*	2nd [INS%]
5. Enter term of loan (in years).		*30*	TERM
6. Enter interest rate.		*8*	I%
7. Enter loan amount.		*$84,000*	LOAN
8. Compute payment.	CPT PMT	*$-616.36*	
9. Recall loan amount.	RCL LOAN	*$84,000.00*	
10. Multiply by annual interest rate (as a percentage) to find approximate annual interest.	× RCL I% % =	*$6,720.00*	STO 1
11. Add annual tax amount.	RCL PRICE × RCL 2nd [TAX%] % =	*$1,575.00*	
12. Calculate total tax-deductible items.	+ RCL 1 =	*$8,295.00*	
13. Multiply by homeowner's income-tax rate.	×	*28*	%
14. Calculate annual tax savings.*	=	*$2,322.60*	
15. Divide by 12 to find monthly tax savings, and store the result in memory.	÷ *12* =	*$193.55*	STO 1
16. Compute PITI.	CPT PITI	*$-778.24*	
17. Subtract monthly tax savings.	− RCL 1 +/−	*$-193.55*	
18. Calculate monthly net cost of housing.	=	*$-584.69*	

* Assumes the homeowner is not using the standard deduction.

Chapter 3: Other Financial Tools

This chapter describes various real estate and financial models that illustrate the varied capability of the BA Real Estate calculator.

Chapter Contents

Finding the Future Value of a Lump Sum

When you entered the real estate business, you took a $50,000 lump-sum distribution from your retirement program. You want to roll it over into an IRA that yields 7% compounded monthly. What will the account's value be in 20 years when you reach age 65?

Solution

Steps	Keystrokes	Display
Clear TVM values.	2nd [CLR TVM]	0.00
Set monthly compounding periods.	2nd [P/Y] 12 = =	C/Y = 12.00 12.00
Enter term of account (in years).	20 TERM	TRM= 20.00
Enter interest rate of account.	7 I%	I% = 7.00
Enter initial deposit.*	50 000 +/– LOAN	LN = –50,000.00
Compute the future value.	CPT FV	FV = 201,936.94

* You are "loaning" the bank $50,000. Since you are paying the money out, you must make the number negative.

Savings Account with One Deposit

1. Clear TVM values (if not already cleared).	2nd [CLR TVM]		
2. Enter number of compounding periods per year.	2nd [P/Y]	12	= =
3. Enter term of account (in years).		20	TERM
4. Enter interest rate of account.		7	I%
5. Enter initial deposit in account.		$50,000	+/– LOAN
6. Compute value of account at maturity.	CPT FV	$201,936.94	

Saving for the Future with Regular Deposits

You wish to invest $200 at the beginning of each month in a retirement plan that earns an annual interest of 7.5% compounded monthly. What will the account balance (FV) be at the end of 20 years if compounded monthly? If compounded quarterly?

Example 1: Compounded Monthly

Steps	Keystrokes	Display
Clear TVM values.	2nd [CLR TVM]	0.00
Set beginning-of-period payments.	2nd [BGN/END]	BGN 0.00
Set 12 payments per year.	2nd [P/Y] 12 =	BGN P/Y = 12.00 BGN C/Y = 12.00
Set 12 compounding periods per year.	=	BGN 12.00
Calculate future value of the account.	20 TERM	BGN TRM= 20.00
	7.5 I%	BGN I% = 7.50
	200 +/– PMT	BGN PMT= –200.00
	CPT FV	BGN FV = 111,438.31

Note: The quarterly compounding example is shown on page 68.

Savings Account with Regular Deposits

1. Clear TVM values (if not already cleared).	2nd [CLR TVM]		
2. Set beginning- or end-of-period payments.*	2nd [BGN/END]	(as necessary)	
3. Enter number of deposit periods per year.	2nd [P/Y]	12	=
4. Enter number of compounding periods per year.		12	=
5. Enter term of account.		20	TERM
6. Enter interest rate of account.		7.5	I%
7. Enter initial deposit in account.		0	LOAN
8. Enter subsequent regular deposits.		$200	+/– PMT
9. Compute value of account at maturity.	CPT FV	$111,438.31	

* Most savings accounts will be calculated with beginning-of-period payments.

Example 2: Compounded Quarterly

What would the final amount be if the interest were compounded quarterly?

Steps	Keystrokes	Display
Set 12 payments per year.	2nd [P/Y] 12 =	BGN P/Y = 12.00 BGN C/Y = 12.00
Set 4 compounding periods per year.	4 =	BGN 4.00
Calculate future value of the account.	CPT FV	BGN FV = 110,801.04
Clear display and restore to end-of-period payments.*	ON/C 2nd [BGN/END]	0.00
Restore C/Y to 12 per year.	2nd [P/Y] =12 =	C/Y = 12.00

* The calculator remains set to BGN or END until you change the setting.

Percent Change and Appreciation Model

A single model calculates both percent change and rate of appreciation (compound growth). You can enter any three of the model's values and compute the fourth.

Values Used by the Model

Key Sequence	Function
2nd [V1]	Enters the starting value.
2nd [V2]	Enters the ending value.
2nd [#PD]	Enters the number of compounding periods during the change from V1 to V2.
2nd [APPREC]	Enters the percent change from V1 to V2 (when #PD=1), or the rate of appreciation per period (when #PD > 1).

Note: #PD is automatically set to a value of 1 when you first activate this model.

A Note about Number of Periods

To calculate the total rate of change or appreciation, #PD must be set to 1.

When #PD is set to a value other than 1, the calculated rate of change or appreciation is the periodic rate.

Calculating Percent Change and Appreciation

Follow these examples to become familiar with the Percent Change and Appreciation model.

Example of Percent Change

Calculate the percent change from 125 to 135.

Steps	Keystrokes	Display	
Enter starting value.	125 [2nd] [V1]	V1 =	125.00
Enter ending value.	135 [2nd] [V2]	V2 =	135.00
Enter number of periods.	1 [2nd] [#PD]	#PD=	1.00
Calculate % change.	[CPT] [2nd] [APPREC]	APP=	8.00

What ending value would be required for a 10% change?

Steps	Keystrokes	Display	
Enter % change.	10 [2nd] [APPREC]	APP=	10.00
Compute ending value.	[CPT] [2nd] [V2]	V2 =	137.50

Example of Appreciation

If a $70,000 home appreciates at 2% per year, what will it be worth in 10 years?

Steps	Keystrokes	Display	
Enter starting value.	70 [000] [2nd] [V1]	V1 =	70,000.00
Enter number of periods.	10 [2nd] [#PD]	#PD=	10.00
Enter growth rate.	2 [2nd] [APPREC]	APP=	2.00
Compute ending value.	[CPT] [2nd] [V2]	V2 =	85,329.61

Appreciation

Total Percent Change/Appreciation Rate

1. Enter starting value or price.	*125*	2nd [V1]
2. Enter ending value or price.	*135*	2nd [V2]
3. Enter number of periods as 1.	*1*	2nd [#PD]
4. Compute appreciation rate. CPT 2nd [APPREC]	*8.00%*	

.
.
.

Estimate of Appreciated Value

1. Enter starting value or price.	*$70,000*	2nd [V1]
2. Enter total number of periods over which appreciation will occur.	*10*	2nd [#PD]
3. Enter expected appreciation rate per period.	*2*	2nd [APPREC]
4. Compute expected ending value or price. CPT 2nd [V2]	*$85,329.61*	

Interest Conversion Model

This model lets you convert between nominal (NOM) interest rates (the compound interest rates for the period) and annual effective (EFF) interest rates (the rates at which you actually earn or pay).

Values Used by the Model

Key Sequence	Function
2nd [NOM]	Enters the nominal interest rate (APR).
2nd [EFF]	Enters the annual effective interest rate.
2nd [PDS/YR]	Enters the number of compounding periods per year.

Note: PDS/YR is always an entered value. Attempting to compute PDS/YR causes an error.

Examples

What would the nominal rate with quarterly compounding have to be to yield an annual effective rate of 16%?

Steps	Keystrokes	Display	
Enter desired effective rate.	16 2nd [EFF]	EFF =	16.00
Enter periods per year.	4 2nd [PDS/YR]	PDS =	4.00
Compute nominal rate.	CPT 2nd [NOM]	NOM=	15.12

Convert a 15% nominal interest rate with quarterly compounding to the equivalent annual effective interest rate.

Steps	Keystrokes	Display	
Enter nominal rate.	15 2nd [NOM]	NOM=	15.00
Enter periods per year.	4 2nd [PDS/YR]	PDS =	4.00
Compute effective rate.	CPT 2nd [EFF]	EFF =	15.87

Interest Conversion

From Effective to Nominal

1. Enter effective rate.		16	2nd [EFF]
2. Enter number of compounding periods per year.		4	2nd [PDS/YR]
3. Compute nominal rate.	CPT 2nd [NOM]	15.12%	

From Nominal to Effective

1. Enter nominal rate.		15	2nd [NOM]
2. Enter number of compounding periods per year.		4	2nd [PDS/YR]
3. Compute effective rate.	CPT 2nd [EFF]	15.87%	

Annual Percentage Rate (APR)

You can compute the true APR of a transaction, taking into account the points and fees charged.

APR Values

To calculate APR, first enter the term and loan amount in the TVM model. Then press [APR] to start the model, and enter the appropriate values when prompted. You can exit the APR model at any time by pressing [ON/C].

Name	Meaning
I% =	The annual (nominal) interest rate of the loan.
PTS=	The number of points charged.
FEE=	The total fees (such as refinancing fees) charged.
APR=	The true annual percentage rate.

Note: Although the calculator proposes the same interest rate that is stored in the TVM I% value, entering I% in this model does not change the TVM I%.

Situation

Assuming a $125,000 loan, 8% fixed-term interest, 30-year term, and miscellaneous loan fees of $2,000 plus 2 points, find the APR.

Solution

Steps	Keystrokes	Display	
Clear TVM values.	[2nd] [CLR TVM]		0.00
Set P/Y and C/Y to 12.	[2nd] [P/Y] 12 [=]	P/Y =	12.00
		C/Y =	12.00
	[=]		12.00
Enter the term.	30 [TERM]	TRM=	30.00
Enter loan amount.	125 [000] [LOAN]	LN =	125,000.00
Start APR.	[APR]	I% =	0.00
Enter interest rate.	8 [=]	I% =	8.00
Enter points.	2 [=]	PTS=	2.00
Enter total fees.	2000	FEE	2,000
View actual APR.	[=]	APR=	8.39

Annual Percentage Rate Considering Points and Fees

1. Clear TVM values (if not already cleared).	2nd [CLR TVM]		
2. Enter term of loan (in years).		30	TERM
3. Enter loan amount.		$125,000	LOAN
4. Start APR.	APR		
5. Enter interest rate.		8	=
6. Enter number of points.		2	=
7. Enter total fees.		$2,000	
8. View actual annual percentage rate.	=	8.39%	

Finding the APR of a Refinanced Loan

Five years ago, you purchased a home with a 30-year, $104,000 mortgage loan at 12% annual interest. You can now refinance the loan balance at 8.5% annual interest, provided you pay 2 points plus a $500 fee. What is the new monthly payment and the APR of the new loan?

Solution

Press [2nd] [BGN/END] until the BGN indicator disappears.

Steps	Keystrokes	Display
Clear TVM values.	[2nd] [CLR TVM]	0.00
Set P/Y and C/Y to 12.	[2nd] [P/Y] 12 [=]	P/Y= 12.00
		C/Y= 12.00
	[=]	12.00
Enter the original loan values.	30 [TERM]	TRM= 30.00
	12 [I%]	I% = 12.00
	104 [000] [LOAN]	LN = 104,000.00
Compute payment.	[CPT] [PMT]	PMT = -1,069.76
Find loan balance after five years.	5 [TERM]	TRM= 5.00
	[CPT] [FV]	FV = -101,569.75
Replace original loan with FV and clear FV.	[+/-] [LOAN]	LN = 101,569.75
	0 [FV]	FV = 0.00
Enter original term and new rate.	30 [TERM]	TRM= 30.00
	8.5 [I%]	I% = 8.50
Compute new payment.	[CPT] [PMT]	PMT = -780.98
Start APR.	[APR] [=]	I% = 8.50
		PTS= 0.00
Enter points and fee; compute true APR.	2 [=]	PTS= 2.00
		FEE= 0.00
	500 [=]	FEE= 500.00
		APR= 8.78
Exit APR.	[ON/C]	8.78

Monthly Payment and APR of a Refinanced Loan

1. Clear TVM values (if not already cleared).	2nd [CLR TVM]		
2. Enter original term of loan (in years).		30	TERM
3. Enter interest rate.		12	I%
4. Enter face value of mortgage loan.		$104,000	LOAN
5. Compute payment amount.	CPT PMT	$-1,069.76	
6. Enter number of payment years.		5	TERM
7. Compute balance of original loan, and store as amount of refinanced loan.	CPT FV	$-101,569.75	+/– LOAN
8. Set FV to zero.	0 FV		
9. Enter term of refinanced loan.		30	TERM
10. Enter new interest rate.		8.5	I%
11. Compute new monthly payment.	CPT PMT	$-780.98	
12. Start APR.	APR		
13. Enter number of points.	=	2	=
14. Enter total fees.		500	=
15. View actual annual percentage rate.		8.78%	

Pricing a Note to Meet a Required Yield

You sold a house where the seller carried back a $25,000 second lien at 8% for ten years. After 36 payments, the seller contacts you to see if he can sell his note. You explain that you know an investor who might be interested, but requires a yield of 12% on investments.

Background

In a situation like this, the investor is buying the right to collect the stream of payments for the remaining term of the loan. Since both the interest rate and payment amount are set by the terms of the original contract, the only way to increase the yield is to discount the current unpaid balance.

Solution

Steps	Keystrokes	Display	
Clear TVM values.	2nd [CLR TVM]		0.00
Set P/Y and C/Y to 12.	2nd [P/Y] 12 = =	C/Y =	12.00 12.00
Enter original term.	10 TERM	TRM=	10.00
Enter interest rate.	8 I%	I% =	8.00
Enter amount of original note.	25 000 LOAN	LN =	25,000.00
Compute payment.	CPT PMT	PMT=	-303.32
Recall number of payments in original note and store.	RCL 2nd [N] STO 1	MEM=	120.00
Enter number of payments already made.	36 2nd [N]	N =	36.00
Compute current unpaid balance.	CPT FV	FV =	-19,460.72
Recall original number of payments	RCL 1	MEM=	120.00
Calculate number of remaining payments, and save as N.	− RCL 2nd [N] = 2nd [N]	N =	84.00
Set FV to zero and enter required yield.	0 FV 12 I%	I% =	12.00
Compute discounted present value.	CPT LOAN	LN =	17,182.55

Finding the Purchase Price of a Note to Meet a Required Yield

1. Clear TVM values (if not already cleared).	2nd [CLR TVM]		
2. Enter term of original note (in years).		10	TERM
3. Enter interest rate of original note.		8	I%
4. Enter amount of original note.		$25,000	LOAN
5. Compute original payment.	CPT PMT	$-303.32	
6. Recall total number of payments in original note, and store in memory.	RCL 2nd [N]	120.00	STO 1
7. Enter number of payments already made.		36	2nd [N]
8. Compute current unpaid balance.	CPT FV	$-19,460.72	
9. Recall original number of payments.	RCL 1	120.00	
10. Subtract number of payments already made to find number of remaining payments, and save as N.	− RCL 2nd [N] =	84.00	2nd [N]
11. Set FV to zero, and then enter required yield (for example, enter 10% as 10).	0 FV	12	I%
12. Compute discounted present value.	CPT LOAN	$17,182.55	

Calculating the Yield of a Discounted Mortgage

A person is holding a mortgage for $200,000 at 8% fixed-rate interest for 30 years. She has carried the note for three years and has offered it to you. If she accepts your offer of $180,000 for the note, what will be your yield?

Solution

Press [2nd] [BGN/END] until the BGN indicator disappears.

Steps	Keystrokes	Display
Clear TVM values.	[2nd] [CLR TVM]	0.00
Set P/Y and C/Y to 12.	[2nd] [P/Y] 12 [=]	P/Y = 12.00
		C/Y = 12.00
	[=]	12.00
Enter original term.	30 [TERM]	TRM= 30.00
Enter interest rate.	8 [I%]	I% = 8.00
Enter face value of mortgage.	200 [000] [LOAN]	LN = 200,000.00
Compute payment.	[CPT] [PMT]	PMT= -1,467.53
Enter discounted purchase price.	180 [000] [LOAN]	LN = 180,000.00
Enter number of payments paid and store in memory.	3 [×] 12 [=] [STO] [1]	MEM= 36.00
Enter number of remaining payments.	[RCL] [2nd] [N] [−] [RCL] [1] [=] [2nd] [N]	N = 324.00
Compute annual yield for remaining term.	[CPT] [I%]	I% = 8.89

Yield of a Discounted Mortgage

1. Clear TVM values (if not already cleared).	2nd [CLR TVM]		
2. Enter original term of loan (in years).		30	TERM
3. Enter interest rate.		8	I%
4. Enter face value of mortgage loan.		$200,000	LOAN
5. Compute payment amount.	CPT PMT	$-1,467.53	
6. Enter discounted purchase price.		$180,000	LOAN
7. Enter number of payments already made and store in memory.	3 × 12 = STO 1	36	
8. Calculate number of payments remaining, and store as N.	RCL 2nd [N] − RCL 1 =	324	2nd [N]
9. Compute annual yield for remaining term.	CPT I%	8.89%	

Finding the Net Selling Price after Commission

You have agreed to list a client's house. The client states that he must net at least $125,000 after the sale. You determine that this is a fair amount after evaluating the property. If your sales commission is 6%, what is the minimum selling price to satisfy your client's requirements? What is your commission for the sale?

The solution below uses the following formula to calculate the required selling price:

$$\text{Selling Price} = \frac{\text{Required Net}}{1 - \text{Sales Commission}^*}$$

* Example: 6% = .06

Solution

Steps	Keystrokes	Display
Compute the divisor (one minus the sales commission).	1 − 6 % = STO 1	MEM = 0.94
Compute the required selling price.	125 000 ÷ RCL 1 =	132,978.72
Compute the sales commission.	× 6 % =	7,978.72

Appendix

This appendix contains information about basic functions of the calculator, where to call if service is required, and the one-year limited warranty.

Appendix Contents

Effects of Turning the Calculator On and Off

If you do not press any key for several minutes, the APD™ Automatic Power Down feature turns the calculator off to conserve the batteries.

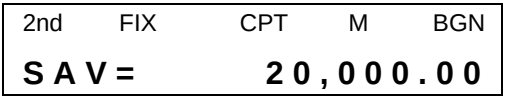
Effects

Key	Function
[ON/C]	When the calculator is off: • If you turned it off manually, [ON/C] turns it on and shows zero in the current fixed-decimal setting. • If the APD™ Automatic Power Down feature turned the calculator off, [ON/C] turns it on and shows the last-displayed information. When the calculator is on, you can use [ON/C] to clear the display, an incomplete calculation, or the error message. These are described on page 87.
[OFF]	Turns the calculator off and clears the display, any error condition, and any incomplete calculation. Pressing [OFF] does not clear the user memory, TVM values, or any settings.

The Display and Indicators

The calculator display shows a maximum of 10 digits. It also shows the labels of model values. When necessary, it automatically shows numbers in scientific notation with a 7-digit mantissa and a 2-digit exponent.

Display



Note: SAV= is typical of labels that identify displayed values. In this example, the interest saved by bi-weekly payments is $20,000.

Indicators

Indicator	Meaning
2nd	You have pressed the [2nd] key. The calculator will perform the alternate, or second, function of the next key you press (written above the key).
FIX	A fixed-decimal setting is in effect. The indicator stays on until you remove the fixed-decimal setting.
CPT	You have pressed the [CPT] key. The calculator will compute a value for the next financial key you press.
M	The user memory contains a value other than zero.
BGN	You have pressed [2nd] [BGN/END] to select beginning-of-period payments for Time-Value-of-Money (TVM) calculations. (For more information, see page 17.)

Note: At some viewing angles, you may see display indicators other than those listed here. Those other functions are not available on this calculator.

Setting the Fixed-Decimal Format

Although the calculator can display numbers with as many as 10 digits, you can set the number of displayed decimal places. The factory setting is two decimal places.

Setting the Format

Key Sequence	Function
2nd [FIX] n	(Where n = 0 through 9) Sets the number of decimal places displayed in results and turns on the FIX indicator. • If a number has more than n decimal places, it is rounded in the displayed result. • If a number has fewer than n decimal places, trailing zeros are added to the displayed result.
2nd [FIX] .	Removes the fixed-decimal setting and turns the FIX indicator off.

Note: Turning the calculator off does not change the fixed-decimal setting.

Example

Steps	Keystrokes	Display
Clear the display and remove the fixed-decimal setting.	ON/C 2nd [FIX] .	0.00 0.
Add 1 and .23456789.	1 + .23456789 =	1.23456789
Set decimal to 2 places.	2nd [FIX] 2	1.23

You can enter up to 10 digits in a number; the calculator ignores any extra digits. Commas are inserted automatically in numbers to make them easier to read.

Entering and Clearing Numbers

Key	Function
[000]	The [000] key makes it easy to enter numbers that are multiples of 1,000. To enter 120,000, for example, press 120 [000].
[→]	The [→] (backspace) key lets you correct a numeric entry by erasing one digit at a time from the end of the entry.
[ON/C]	• Pressing the [ON/C] (ON/Clear) key once while entering a number clears the display. The calculation in progress is not cleared. You can enter the correct number and continue the calculation. • Pressing [ON/C] twice clears the display and any incomplete calculation. Pressing [ON/C] does not clear the user memory, TVM values, or any settings.

If you press [ON/C] while viewing a list of results or a prompt for a value, the calculator removes the label from the display and exits the model. The value remains in the display and can be used in the next calculation.

Clearing Errors

An error condition, such as dividing by zero, causes the message Error to be displayed.

To clear the error and any calculation in progress, press [ON/C].

The BA Real Estate calculator evaluates expressions immediately for some functions. Other functions are evaluated in the order they are entered.

Immediate Functions

The [%], [x²], and [2nd] [√x] keys perform their functions immediately on the displayed number. For example, pressing 25 [×] 10 [x²] displays the square of 10, not the square of 25 times 10. For the square of 25 times 10, press 25 [×] 10 [=] [x²].

Other Functions

For other functions, such as [+] and [×], you can replace an incorrect keystroke by immediately pressing the correct key. For example, pressing 15 [×] [÷] 2 is the same as pressing 15 [÷] 2.

The [=] key completes all calculations.

Display of Results

All results are displayed to a maximum of 10 digits (or a maximum of 7 digits plus a 2-digit exponent for results shown in scientific notation). However, results are calculated and stored internally to 13 digits.

A result whose exponent is greater than 99 is treated as an overflow, and an error message is displayed. A result whose exponent is less than -99 is set to zero, with no error message.

Using the [2nd] Key

Pressing [2nd] tells the calculator to perform the alternate, or second, function of the next key you press. The second functions of keys are printed above the keys. The calculator displays the 2nd indicator to show that you are about to use a second function.

If the next key you press has no second function, that key performs its normal function and clears the 2nd indicator.

If you press [2nd] by mistake, press it again to cancel the second function.

Basic Arithmetic

All basic arithmetic calculations are completed in the order in which you enter them. For example, 2 + 5 x 4 = 28.

Basic Arithmetic Functions

Key Sequence	Function
[+], [−], [×], [÷]	Perform addition, subtraction, multiplication, and division. Example: 12 [×] 5 [+] 60 [÷] 3 [=] 40.00
[+/−]	Changes the sign (positive or negative) of the displayed number. The number can be either a result or a number you are entering. Example: 8 [+/−] [+] 12 [=] 4.00
[x²]	Squares the number in the display. Example: 6 [x²] [+] 4 [x²] [=] 52.00
[2nd] [√x]	Calculates the square root of the displayed number. (The number must be positive.) Example: 4 [+] 256 [2nd] [√x] [=] 20.00
[=]	Completes all calculations and displays the result.

Percent Calculations

You can calculate percentages, ratios, add-ons, and discounts.

Percent Functions

Operation	Function
Percentage: n ⊠ p % =	Finds p% of the displayed number n (or the displayed result after ⊠ is pressed). Example: 250 ⊠ 5 % 0.05 = 12.50
Ratio: n ÷ p % =	Calculates the number of which n (or the displayed result after ÷ is pressed) is p%. Example: 250 ÷ 5 % 0.05 = 5,000.00
Add-On: n + p % =	Finds p% of the displayed number n (or the displayed result after + is pressed) and adds it to the displayed number. Example: 250 + 5 % 12.50 = 262.50
Discount: n − p % =	Finds p% of the displayed number n (or the displayed result after − is pressed) and subtracts it from the displayed number. Example: 250 − 5 % 12.50 = 237.50

Rounding Results

The BA Real Estate calculator can round numbers to the fixed-decimal setting. This is useful for some financial calculations such as computing balloon payments.

Effect of Rounding

The [2nd] [FIX] key sequence (see page 86) lets you control the displayed form of results without affecting the value stored internally. However, [2nd] [ROUND] rounds the internal, 13-digit form of a displayed result to match the displayed form.

Keystrokes	Display	Internal Form
[2nd] [FIX] [.]	0.	0.000000000000
2 [2nd] [$\sqrt{x}$]	1.414213562	1.414213562373
[2nd] [FIX] 2	1.41	1.414213562373
[2nd] [ROUND]	1.41	1.410000000000

Note: See page 26 for an example of using the [ROUND] function.

You can store numbers, such as results of calculations, in the user memory or in the financial models. The calculator retains the values stored in memory until you change them (or until batteries are replaced).

Storing and Recalling Values

The calculator has one user memory. To specify the user memory, you must press [STO] [1] (to store) or [RCL] [1] (to recall).

Example: 28 [STO] [1] MEM= M 28.00

The M indicator is turned on when the user memory contains a nonzero value. To clear the user memory, press [ON/C] [STO] [1].

[STO] and [RCL] do not clear calculations, so you can store intermediate results and use recalled values within a calculation.

[STO] and [RCL] also can be used with the TVM keys (such as [PMT]) and keys of other financial models, if active. For example, [RCL] [PMT] recalls the current value of PMT.

Pressing the [STO] key is not necessary when storing to financial models. For example, pressing 340 [PMT] has the same effect as pressing 340 [STO] [PMT].

Keystrokes	Display	Comments
5 [STO] [1]	MEM= M 5.00	
[×] 12 [=]	M 60.00	
[2nd] [N]	N = M 60.00	[STO] key not required.
[RCL] [1]	MEM= M 5.00	
0 [STO] [1]	MEM= 0.00	Clear user memory.
[RCL] [2nd] [N]	N = 60.00	
[RCL] [2nd] [V1]	Error	Percent-change model not active.

Battery Information

The BA Real Estate calculator cannot hold data in memory when the batteries are removed or become discharged.

Type of Battery to Use

The calculator uses two of any of the following batteries.

- For up to 1000 hours of operation, use Panasonic LR-44, Ray-O-Vac RW-82, Union Carbide (Eveready) A-76, or equivalent battery types.
- For up to 2500 hours of operation, use Mallory 10L14 or D357, Union Carbide (Eveready) 357, Panasonic WL-14, Toshiba G-13, Ray-O-Vac RW-42, or equivalent battery types.

Replacing the Batteries

1. Remove slide cover. Place calculator face down.
2. Using a small Phillips screwdriver, remove screws from back case.
3. Pull off back case.
4. Remove discharged batteries.

   Caution: Avoid contact with other calculator components while changing batteries.
5. Install new batteries positive side up, as shown on diagram inside case.
6. Replace back case, and then replace screws.
7. Press [OFF] [ON/C] [ON/C].

Caution: Dispose of old batteries properly. Do not incinerate the batteries or leave them where a child can find them.

Product Support

Customers in the U.S., Canada, Puerto Rico, and the Virgin Islands

For general questions, contact Texas Instruments Customer Support:

phone: **1-800-TI-CARES (1-800-842-2737)**
e-mail: **ti-cares@ti.com**

For technical questions, call the Programming Assistance Group of Customer Support:

phone: **1-972-917-8324**

Customers outside the U.S., Canada, Puerto Rico, and the Virgin Islands

Contact TI by e-mail or visit the TI **calculator** home page on the World Wide Web.

e-mail: **ti-cares@ti.com**
Internet: **www.ti.com/calc**

Product Service

Customers in the U.S. and Canada Only

Always contact Texas Instruments Customer Support before returning a product for service.

Customers outside the U.S. and Canada

Refer to the leaflet enclosed with this product or contact your local Texas Instruments retailer/distributor.

Other TI Products and Services

Visit the TI **calculator** home page on the World Wide Web.

www.ti.com/calc

Refer to the leaflet enclosed with this product or contact your local Texas Instruments retailer/distributor.

Customers in the U.S. and Canada Only

One-Year Limited Warranty for Electronic Product

This Texas Instruments ("TI") electronic product warranty extends only to the original purchaser and user of the product.

Warranty Duration. This TI electronic product is warranted to the original purchaser for a period of one (1) year from the original purchase date.

Warranty Coverage. This TI electronic product is warranted against defective materials and construction. **THIS WARRANTY IS VOID IF THE PRODUCT HAS BEEN DAMAGED BY ACCIDENT OR UNREASONABLE USE, NEGLECT, IMPROPER SERVICE, OR OTHER CAUSES NOT ARISING OUT OF DEFECTS IN MATERIALS OR CONSTRUCTION.**

Warranty Disclaimers. ANY IMPLIED WARRANTIES ARISING OUT OF THIS SALE, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO THE ABOVE ONE-YEAR PERIOD. TEXAS INSTRUMENTS SHALL NOT BE LIABLE FOR LOSS OF USE OF THE PRODUCT OR OTHER INCIDENTAL OR CONSEQUENTIAL COSTS, EXPENSES, OR DAMAGES INCURRED BY THE CONSUMER OR ANY OTHER USER.

Some states/provinces do not allow the exclusion or limitation of implied warranties or consequential damages, so the above limitations or exclusions may not apply to you.

Legal Remedies. This warranty gives you specific legal rights, and you may also have other rights that vary from state to state or province to province.

Warranty Performance. During the above one (1) year warranty period, your defective product will be either repaired or replaced with a reconditioned model of an equivalent quality (at TI's option) when the product is returned, postage prepaid, to Texas Instruments Service Facility. The warranty of the repaired or replacement unit will continue for the warranty of the original unit or six (6) months, whichever is longer. Other than the postage requirement, no charge will be made for such repair and/or replacement. TI strongly recommends that you insure the product for value prior to mailing.

Software. Software is licensed, not sold. TI and its licensors do not warrant that the software will be free from errors or meet your specific requirements. **All software is provided "AS IS."**

Copyright. The software and any documentation supplied with this product are protected by copyright.

All Customers Outside the U.S. and Canada

For information about the length and terms of the warranty, refer to your package and/or to the warranty statement enclosed with this product, or contact your local Texas Instruments retailer/distributor.