

Introductions: Introduction to the TI-89

Lesson 1

This lesson introduces you to the TI-89. You will learn how to:

- set up your calculator to begin
- use the Home Screen
- use the “with” command
- edit an entry line

Setting up your calculator to begin.

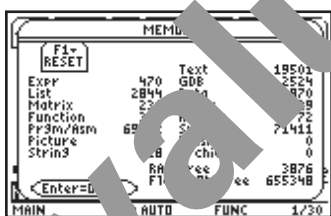
It is a good idea to begin each new problem with the following procedure. The **NewProb** command clears the Home Screen and removes the values that you have stored in any single-letter variable. Also, functions that you have entered and/or data plots that have been defined are turned off (not deleted).

TECH-TIPS **NewProb Command**

- Turn on your TI-89 by pressing the **ON** key.
- Press **2nd** **F1**, which is **[F6]**, to access the Clean Up menu.
- Use the down cursor direction key, **⏴** to highlight option 2: NewProb.
- Press **ENTER** to paste that command on the Edit Line of the Home Screen.
- Press **ENTER** again so that the command is executed.

Calculator Settings

Press **2nd** **6** (which is **[MEM]** shown in yellow above the **6** key).



This screen shows the amount of space occupied by (data stored in) each memory category. Your calculator will display different values.

To restore all system variables and modes to their factory settings:

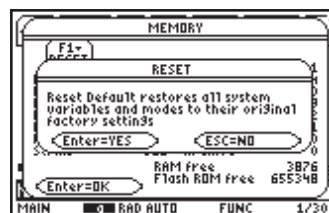
1. Press **F1**



2. Press **⏴**



3. Press **2**



Introductions: Introduction to the TI-89

ENTER



ENTER

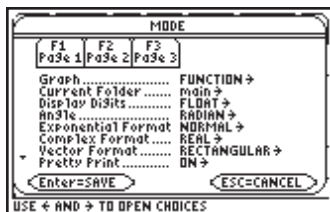


The Status Line indicates that your calculator is in Radian Mode and Auto Mode. You are working from the Main Folder and you have one command on the History Area out of 30 possible entries.

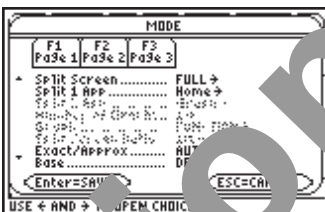
Mode Settings

Press **MODE** to view the other default settings.

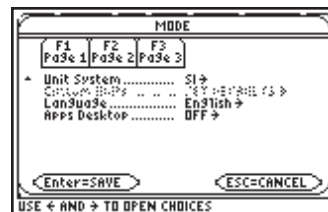
Press **F1** for Page 1



Press **F2** for Page 2



Press **F3** for Page 3

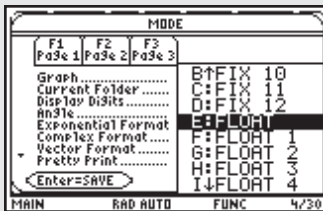
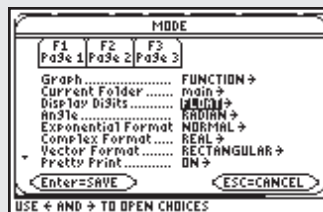


TECH-TIPS

Changing the Display Digits

- Press **MODE**
- Press **↓** to select and change the Display Digits
- Press **→** to see the menu of choices.
- Press **↓** until you find **FIX**.
- This mode displays the maximum number of digits for any calculation.
- Press **ENTER** **ENTER** to select this mode and return to the Home screen.

You may return to the Home screen from any screen by pressing the **HOME** key.



Introductions: Introduction to the TI-89

Lesson 1

Example:

The Student Government at Rah Rah High School has \$1,000 to invest for one year in a bank account. Every bank in town pays 8% interest, but they each compound the interest over different time intervals. Compare the value of the investment at the end of one year for the different banks.

Let A represent the value (in dollars) of the investment at the end of the year.

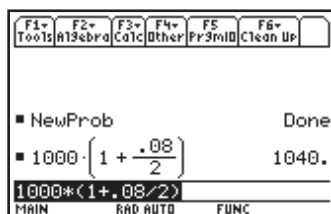
Always give your answer in correct units.

Bank A: Compounds once a year.

At the end of the year, the investment is worth the original amount plus 8%, which is the Annual Percentage Rate or APR.

$$A = 1,000 + 0.08(1,000) = 1000(1 + 0.08) = 1000 + 80 = \$1,080$$

Bank B: Compounds twice a year.



At the end of the first 6 months, the investment is worth the original amount plus 4%, which is the interest rate for one half of the year.

$$A = 1,000 + 0.04(1,000) = 1000\left(1 + \frac{0.08}{2}\right)$$

1. a. Use your calculator to find this value. _____
(Your entry should look like the one shown on the screen above.)

NOTE

It is best to use \square to indicate multiplication at all times. There is no implied multiplication on the TI-89.

For example:

ab is interpreted as one variable name.

$a(x)$ is interpreted as a function, a , of the independent variable x .

- b. At the end of the year, the investment is equal to the sum of the amount at the end of the first 6 months (\$1040) plus the interest for the last half of the year. Use your calculator to find this value.

$$A = 1040 + 1040 \cdot \left(\frac{0.08}{2}\right) = 1040 \cdot \left(1 + \frac{0.08}{2}\right) = \underline{\hspace{10em}}$$

Substituting equivalent values, we can rewrite the value of this investment at the end of the year as:

$$A = 1040 + 1040 \cdot \left(\frac{0.08}{2}\right) = 1040 \cdot \left(1 + \frac{0.08}{2}\right) = \left[1000 \cdot \left(1 + \frac{0.08}{2}\right)\right] \cdot \left(1 + \frac{0.08}{2}\right) = 1000 \cdot \left(1 + \frac{0.08}{2}\right)^2$$

- c. Use your calculator to find $1000 \cdot \left(1 + \frac{0.08}{2}\right)^2$ _____

Introductions: Introduction to the TI-89

Lesson 1

NOTE

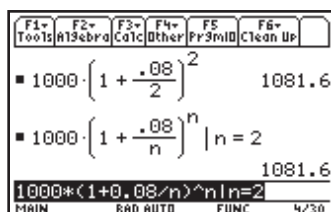
One very important use of technology is to verify your answers.

We have shown, in parts b and c above, that $1040 \cdot \left(1 + \frac{0.08}{2}\right) = 1000 \cdot \left(1 + \frac{0.08}{2}\right)^2$

- Explain the meaning of $\frac{0.08}{2}$, including the proper unit. _____
- Explain the meaning of the exponent, 2, including the proper unit. _____

Another way to enter the calculation is to use the “with” (|) operator. This operator is used for three basic purposes

- substitution
- interval constraints, and
- exclusions.



In this case, the “with” command can be used to substitute different values for n . This will facilitate the keystrokes needed to calculate the value of the investment for different banks with different compounding periods.

Let n = the number of compounding periods per year.

Enter the following expression in your calculator: $1000 \cdot \left(1 + \frac{0.08}{n}\right)^n | n=2$.

Your entry should look like the one shown in the screenshot above.

TECH-TIPS Using the “with” Operator (|), Using Alphabetic Characters

- Press the purple [2nd] key first to access the letters of the alphabet.
- Press the purple key that shows the alphabetical character you wish to choose. The letter n is above the [6] key. The letters [X], [Y], [Z], and [T] are primary keys on the keyboard since they are used so often. You do not need to press the [2nd] key first to access these letters.
- Press the “with” operator, [|], to the left of [7]. “| n=2” means that the expression will be executed with the value of 2 for n .

- $\frac{0.08}{2}$ is the interest rate per year, and 2 is the number of compounding periods per year, what does $\frac{0.08}{2}$ represent?

 - If r represents the interest rate per year, and n represents the number of compounding periods per year, what does $\frac{r}{n}$ represent?

When you use the “with” operator, you can perform each new calculation by simply changing the value of n . Notice that each time you press [ENTER] to execute a command, the previous entry is highlighted in the entry line.

Introductions: Introduction to the TI-89

Lesson 1

TECH-TIPS Editing the Entry Line

If you begin typing a new command, the highlighted entry will be replaced in the entry line.

If you only need to change part of a command, press either \leftarrow or \rightarrow to place the cursor at the end or the beginning of the entry.

- Press \rightarrow so that you can easily change the value of n .
- Press the back arrow, \leftarrow , to delete \square , then enter the new value of n .

5. Fill in the chart provided to compare the year-end value of your investment at different banks. The banks compound interest:

Bank A: annually

Bank B: semi-annually

Bank C: quarterly

Bank D: monthly

Bank E: weekly

Bank F: daily

Bank G: hourly

Bank H: every minute

a = the value of the investment at the end of one year (in dollars)

p = the initial value of the investment, or the principle amount

r = the annual interest rate (APR)

n = the number of compounding periods per year

t = the number of years of the investment

| Bank | Initial Value p | APR r | # Periods/Year n | # Years t | Final Value a (\$) | Calculated Value Show all digits |
|------|----------------------|------------|-----------------------|----------------|-------------------------|-------------------------------------|
| A | \$1,000 | 8% | 1 | 1 | | |
| B | \$1,000 | 8% | 2 | 1 | | |
| C | \$1,000 | 8% | | 1 | | |
| D | \$1,000 | 8% | | 1 | | |
| E | \$1,000 | 8% | | 1 | | |
| F | \$1,000 | 8% | | 1 | | |
| G | \$1,000 | 8% | | 1 | | |
| H | \$1,000 | 8% | | 1 | | |

6. If you found a bank that compounded interest every second, would that change the value of the investment at the end of the year?

Assume an APR of 8%. Justify your answer. _____

7. Answer the following questions based on your observations from questions 5 and 6.

a. As the number of compounding periods per year increases, what happens to the calculated value? _____

b. Compare the entries in the last column of the table showing all digits of the calculated values. How does the **amount** of increase for each succeeding value change as you move down the column? _____

c. Without the aid of your calculator, make a conjecture. Do you think that the value of an investment of \$1,000 at 8% annual interest would ever reach \$2,000.00 in one year? Why or why not? _____
