

Welcome to a new year of “Technology Tips.” We start this month with a tip from Dave Ebert, who reminds us how easy it can be to use presentation software to make customized review activities. John Hanna returns with a terrific memory-management tutorial for all TI-83 Plus users. He discusses grouping files and essential distinctions between RAM and ARCHIVE memory and includes information about what and why you need to know about both. Tips indicate how to employ efficient and convenient methods to back up data and programs using ARCHIVE memory techniques. The “Surfing Note” this month describes the DIG Stats site from the Central Virginia Governor’s School. It offers interesting activities and excellent visualizations for statistical concepts for beginning statistics students, as well as for advanced high school students or early college students.

It is my pleasure to introduce this year’s new coeditor, Karen Hollebrands. She teaches mathematics education courses at North Carolina State University, Raleigh, NC 27695-7801. She is particularly interested in learning and teaching mathematics in technology-intensive environments.

Using presentation software for review—continued

Mary Kathryn Geesaman’s “Technology Tip,” in the January 2000 issue of the *Mathematics Teacher*, discussed using Microsoft PowerPoint to create review activities. She described a “math Jeopardy” game in which the teacher uses a computer with an overhead projector screen.

I created my own “math Jeopardy” game and used it with my classes for review. My students enjoyed this activity, but I realized that the entire activity could be completed without a computer by simply using the board. I began to wonder whether I could accomplish more by using PowerPoint or other presentation software. Word-processing software allows for hyperlinking as well, but presentation software is geared specifically to slides and presentation “glamour” and seems more functional for activities like this one.

I created multiple-choice review questions using PowerPoint. Each question involves a combination of three different slides. The first slide asks the question and gives four possible answers. See **fig-**

ure 1 (Ebert). The second slide, shown in **figure 2 (Ebert)**, tells the user that the answer was incorrect and offers suggestions. The third slide, **figure 3 (Ebert)**, informs the user that the answer was the correct response and includes justification or steps for illustration.

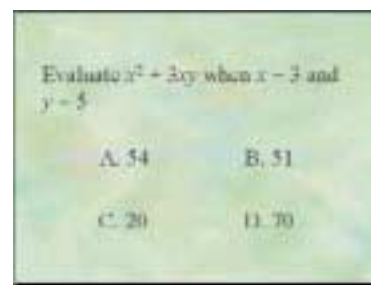


Fig. 1 (Ebert)

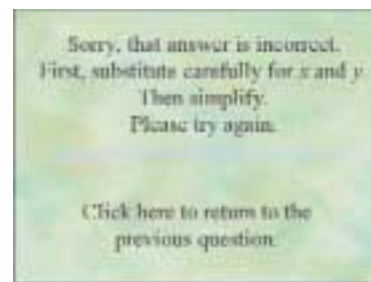


Fig. 2 (Ebert)

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This department offers a forum where teachers can share innovative classroom activities and ideas related to teaching and learning mathematics using technology. Ideas using all types of classroom technology are welcome.



Send tips to Paul Gosse at the address above.

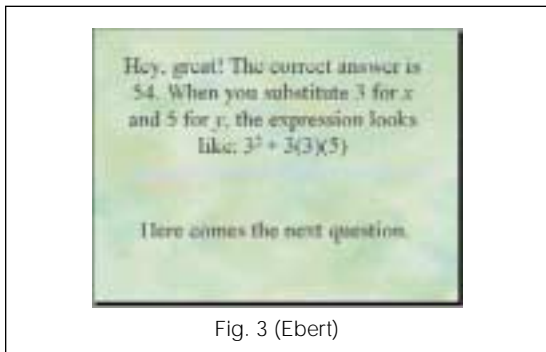


Fig. 3 (Ebert)

Each answer on the first slide is hyperlinked to one of the next two slides, depending on whether the student answers correctly. The second slide is hyperlinked back to the first one to take users back to the question so that they can try again.

Each review program contains twenty different questions, for a total of sixty slides. A series of such slides could easily be made for any topic or subtopic in mathematics or other subjects. In fact, the slides are so easy to make that the task could certainly be a small student project.

The entire program can be enhanced with animation, colorful backgrounds, sounds, and even with the teacher's voice (my students love that one!). Adjusting the timing on the answer slide in each question allows the next question to appear without clicking the mouse.

Each PowerPoint file can discuss a specific review topic and can be saved on a network or on disk and used with an entire class in a computer lab. Alternatively, the teacher can use this technique to allow students to review individually. I also inform all the special education teachers and teachers of at-risk students in my building, and they can then review with their students one-on-one.

Another advantage for schools on the Web is the ease with which a collection of PowerPoint slides can be put on the Internet, thereby allowing students to access the review without actually needing the CD or being on-site in school. This capability could also support parents who are interested in working with their children on review. For that matter, a child who has experienced difficulty in beginning algebra might take advantage of the review package to prepare for future courses.

As teachers tailor sets of slides for their particular circumstances, they can build a substantial resource and broaden the support network for their students at all levels while allowing parents and others greater access and encouraging more involvement with students' learning.

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Memory management on the TI-83 Plus

The TI-83 Plus graphing calculator is equipped with Flash memory: this special hardware allows users to upgrade the operating system and extends the useful life of the calculator.

In addition to Flash memory for the operating system, the memory of the calculator is divided into two sections: RAM and ARCHIVE. ARCHIVE memory is a powerful management tool. This "Technology Tip" explains two ways—archiving and grouping—to back up your work by using the ARCHIVE memory of the calculator.

Two types of memory

RAM, an acronym for *random access memory*, is the working memory for most of the things that you do on the calculator: programs, lists, matrices, functions, and other data are kept in RAM. Each of these "things" that you work with in RAM is called a *variable*. Each variable has three properties: a name, a type, and a value. The TI-83 Plus has about 24k bytes of RAM, which can rapidly be consumed by programs and data sets.

ARCHIVE memory is a separate, but connected, portion of memory used for Apps (applications), groups, and "safe" storage (archiving) of your RAM variables. The TI-83 Plus has about 160k bytes of ARCHIVE memory. The Silver Edition has 1500k bytes of ARCHIVE memory.

Understanding memory management on the TI-83 Plus is important because you may need to free up RAM to make room for other data or programs. This activity involves moving back and forth between RAM and ARCHIVE memory.

Memory manager

Press [MEM] (2nd +) to access the MEMORY main menu, shown in **figure 1 (Hanna)**.



Fig. 1 (Hanna)

MEMORY item 2:Mem Mgmt/Del..., is used for deleting and moving variables between the RAM and ARCHIVE areas of memory.

When a variable is in RAM, it is usable. That is, the variable is available for general use as a "normal" variable. For example, you can operate on it

from the home screen, in editors and so on. When the variable is in ARCHIVE memory, it is not available for “normal” use.

Why put a variable in ARCHIVE? One main reason is to free up RAM for something else without deleting any variables. Programs and lists are usually put into ARCHIVE because these variables take up the most memory.

Editor Paul Gosse adds that if you save your data after working with a CBL or CBR, work with large data sets, or have many programs on your calculator, you can rapidly occupy the available RAM and run out of room to host additional programs or data.

Press [MEM] 2:Mem Mgmt/Del... to see a screen like that shown in **figure 2 (Hanna)**. Then select 1:All... to see a screen similar to the one shown in **figure 3 (Hanna)**, which displays all the variables in your calculator, beginning in this example with L1. Your RAM and ARC values, as well as the archived state of variables, may differ from those shown.

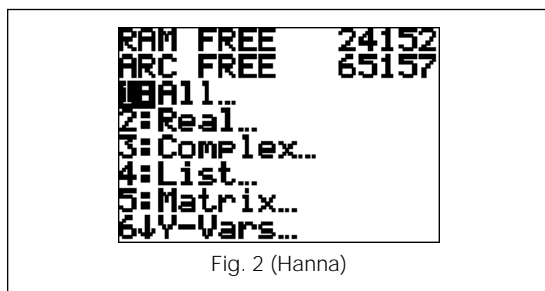


Fig. 2 (Hanna)

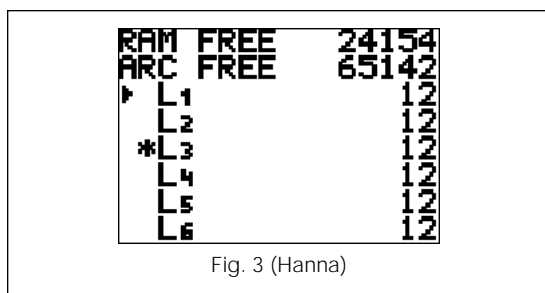


Fig. 3 (Hanna)

This variable list screen contains a lot of information. The two numbers at the top, RAM FREE and ARC FREE, are the numbers of bytes available in each memory section: RAM and ARCHIVE. On the left side of the screen is the selection pointer, which points to a particular variable. Move the selection pointer down or up with the cursor control keys, \blacktriangledown and \blacktriangle . Just to the left of the variable names is the indicator that tells you whether a variable is in RAM or ARCHIVE. A blank space indicates that it is in RAM, and an asterisk (*) indicates that it is in ARCHIVE. **Figure 3 (Hanna)** indicates that L3 is currently in ARCHIVE on this calculator.

The number on the right is the size of the variable in bytes. Now for the cool part:

Archiving is the act of moving a variable from RAM to ARCHIVE.

To move a variable between RAM and ARCHIVE, press **ENTER** when the selection pointer is pointing to the variable. **ENTER** switches the location of the variable and places or removes the asterisk indicator.

As you move a variable, notice that the numbers at the top of the screen change to indicate the new memory-free values. When you move a variable from RAM to ARCHIVE, the RAM FREE value increases by the size of the variable and the ARC FREE value decreases.

The MEMORY MANAGEMENT variable list screen is also used for deleting variables, although deleting variables on the TI-83 Plus is seldom necessary. To delete a variable, make sure that the selection pointer is pointing to it, then press **DEL**.

Programs automatically offer one last chance to change your mind when you begin to delete them: “Are You Sure?” appears, as shown in **figure 4 (Hanna)**. To finally delete the variable, select 2. If you decide not to delete the variable, press **ENTER** or select 1.

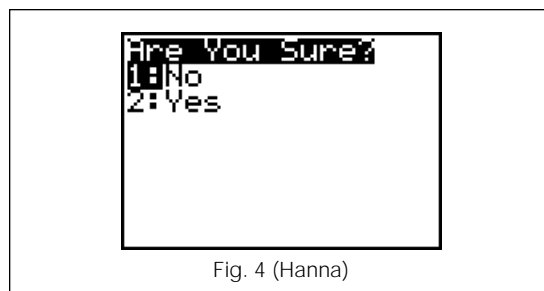


Fig. 4 (Hanna)

When a variable is in ARCHIVE, an asterisk appears to the left of its name in its own menu, too. For example, **figure 5 (Hanna)** shows a picture of the [LIST] NAMES menu with one archived list, L3. You are also provided one last chance to change your mind: “Are You Sure?” appears when you try to delete archived variables.

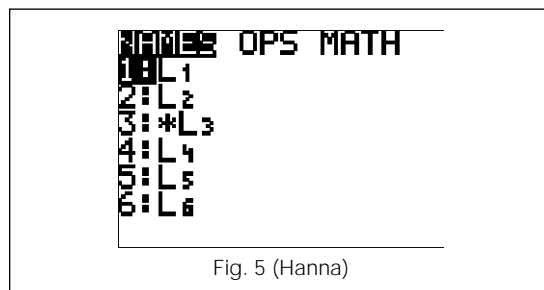


Fig. 5 (Hanna)

Since L3 is in ARCHIVE memory, it is not available for regular use. For example, if you try to make a stat plot using L3 while it is in ARCHIVE, you get the error message:

```
ERR:ARCHIVED
1:Quit
```

This error message appears whenever you try to use, that is, recall or operate with, an archived variable. If you need to use an archived variable, you must move it from ARCHIVE back to RAM by using the Memory Management tool ([MEM] 2).

Archiving is thus an effective way to prevent accidental erasure of a variable either by your own hands or by the hands of a current user.

Grouping

A second useful memory-management tool in the TI-83 Plus is the ability to group variables into a GROUP file. This activity is identical to grouping variables into a single file (*.8xg files) on the computer using TI-Graph Link or TI Connect software, but no computer is used.

Editor Gosse notes that the October 2001 tip from Al Coons, "Grouping to save work on a TI-83 Plus," is a nice explanation of grouping and ungrouping files. It gives some additional points and suggestions regarding grouping.

Grouping makes a file in the calculator that contains copies of the variables that are grouped. Grouping does not free up memory. The GROUP file resides in ARCHIVE, so it does not use any additional RAM. And GROUP files can have convenient names that reflect the content of the group. This handy tool allows you to back up your calculator variables (since these files are copies), especially programs and lists, which often have generic names.

Figure 6 (Hanna) shows that two lists, L4 and L6, have been selected for a GROUP file. Note the square marks at the left edge of the screen. Also note that Y1 and window settings appear as items available to be included in this group. Normally, programs, graph databases, lists, matrices, equations, App variables, window settings, and table settings appear as available to be grouped—of course, only those variables that exist, that is, those that have been created or that hold some value, can be grouped.

When you have selected all your variables and finished making the GROUP file, the home screen displays the following message:

```
Copying Variables to Group: AAAA (your group file name)
```

It then displays Done on the right side of the screen. The key word again is Copying; your variables are undisturbed in RAM. The GROUP file con-

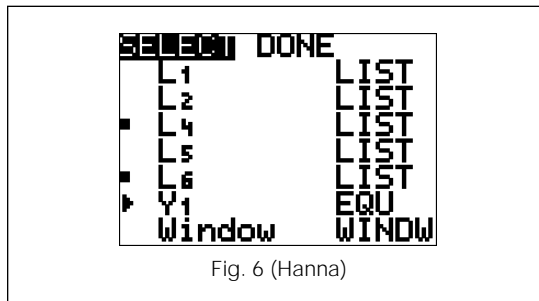


Fig. 6 (Hanna)

tains copies of the selected variables, just as linking transmits copies of your variables to another calculator.

Ungrouping

Ungrouping is the act of putting copies of the variables in a GROUP file back into RAM. The GROUP file remains intact. Copies of the variables are placed back into RAM.

GROUP notes:

- You cannot put an archived variable into a GROUP file. Unarchive it first, then make the GROUP file.
- After a GROUP file has been established, it cannot be modified; it can only be ungrouped or deleted. You cannot add variables to a group file after creating it.
- When linking to a computer, you cannot make a group file on the computer containing a group file from the calculator. In other words, you cannot group GROUP files.

Advantages to grouping

At times, you may wish to group a program, as well as some lists, in one file. You can group mixed data types, for instance, some lists, some programs, and some matrices.

For example, suppose that you have a data set from a ball-bounce activity. You have chosen a reasonable window and have run a regression model on the data. If you wanted to save the raw data, you could group the lists L1 and L2, say, into a group called "Ball." You could also include the window settings and even the regression equation once stored in Y1. Grouping holds an advantage over graph databases in this instance, since GDBs do not store stat plot information or list data, although they do hold window settings.

Grouping can also be convenient if you have several programs or data sets that you have prepared for a unit of work. Students could be sent, for example, the "Unit2" group file, that contained the programs or data that they need, or they could use TI-Graph Link or TI Connect to obtain it.

Another grouping tip is to make a GROUP file of all your programs. Doing so prevents loss caused by inadvertent resets. Since GROUP files reside in ARCHIVE, a normal RAM reset, [MEM] 7: 1: 2:, does not disturb them. Should your programs be lost because of a RAM reset or because a user deleted them, just UNGROUP the programs group. This action copies the programs back into RAM. When you add programs to your calculator that you want to keep, delete the existing programs group, then make the group again.

To delete a group

[MEM] 2:Mem Mgmt/Del... C:Groups... gives the list of GROUP files. Press **DEL** next to one of them to delete it, and press **ENTER** at the Are You Sure? menu.

A special caution: do not confuse [MEM] 8, which is for grouping and ungrouping, with [MEM] 2: C:, which is for viewing the size of GROUP files and deleting them. When the ARCHIVE gets full, consider putting your large GROUP files on a computer, and then delete them from the calculator.

To manage the variables in a group

To manage the variables in a group, send the group to the computer and use TI Connect's GroupExplor-

er to add or remove variables, then send it back to the TI-83 Plus.

Important final note

On the [MEM] menu, two items are 5:Archive and 6:UnArchive. These items are used in programs so that the program can manipulate the locations of specific variables. For example, a program may contain the statement

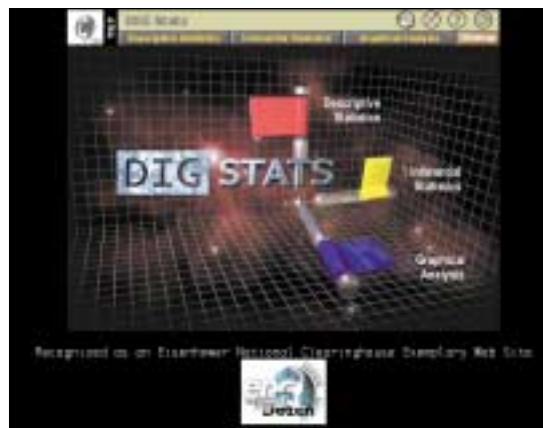
```
:Archive L1, L2, L3, L4, L5, L6
```

to move these six lists from RAM to ARCHIVE. You do not need to use these two commands unless you are programming.

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Surfing note



DIG Stats
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The Central Virginia Governor's School is a dynamic educational community that explores technology. The idea for DIG Stats was generated by faculty members Tom Morgan and Steve Howard with two goals: to teach statistics without using simple canned data sets and to integrate data visualization activities into the school curriculum. The result is this resource for integrating statistics and data visualization into mathematics and science courses in secondary schools, community colleges, and undergraduate programs. Modules cover concepts from descriptive statistics, inferential statistics, two-dimensional graphical analysis and three-dimensional data visualization. Although this site is not comprehensive, it certainly does offer some interesting activities and excellent visualizations for statistical concepts that support beginning statistics students, in addition to advanced high school students or early college students. **MT**