Creative Use of Images to Model the Real World

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Session 186, Kent C

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This handout can be downloaded at http://users.pfw.edu/lamaster/technology

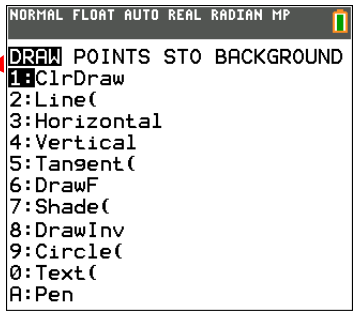
A related Webinar on this topic is at youtube.com/watch?v=ndJ0jGA9ZSQ

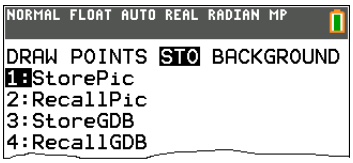
FAQ about Images

What is an Image Var? An Image Var is used as a **Background Image** in the graph area.

- You can store ten Image Vars (Image1-Image9, and Image0).
- There are five pre-loaded image vars (Image1 – Image5) on the calculator:
  1. Bridge
  2. Slide
  3. Flower
  4. Drinking Fountain
  5. Starfish.
- While you cannot create an Image Var on your calculator, you can use
  TI Connect CE™, TI Connect™ (both free downloads) or use
  TI-SmartView™ CE Emulator Software for the TI-84 Plus (for purchase)
  to make your own custom Image Vars and load them to the calculator or the TI-SmartView™ Calculator Emulator.

What is a Pic Var? In addition to graphs from the Y= menu or plots from the Stat Plot menu, you can produce drawings (or "drawn" objects) in the graph area on top of graphs or plots using instructions from the Draw Menu. While drawn objects are wiped clear when you display a graph again, they can be stored as a Pic Var with **StorePic**. The Pic Var will store the drawings and any graphs, plots and axes.





- Background Images are not part of the Pic Var layer.
  (The Background Image is like the *wall*; the Pic Var is like the *wallpaper*.)
- A Pic Var can not be used as a Background Image.
- You can store your drawing as a Pic Var right on the calculator.
  Press **2nd DRAW**, press ▶ to **STO**, select **1. StorePic** and type a number 0 through 9, i.e. `StorePic 1`. Then press ENTER.
- A Pic Var can be saved as a computer file with the file extension ***.8ci**.

What kind of digital files can be converted to Image Vars? Allowed file types are tiff, gif, png, jpg, or bmp. Do not use images with transparency (i.e. a gif or png). A transparent area will convert to a solid black color.

What are the pixel dimensions of an Image Var? Regardless of the dimensions of the original digital file, the conversion process will produce an Image Var that has pixel dimensions of 133 (width) by 83 (height).

- The aspect ratio of the original image will be maintained and centered. However, to gain more control of how your digital image will convert, you may want to edit your (pre-converted) tiff, gif, png, jpg, or bmp image to be proportional to 133 by 83.
- The conversion will use 16 bit color.
- An Image Var can be saved as a computer file with the file extension ***.8ca**. It is a good idea to change the name of the computer file to include a description of the image.

Will a higher resolution digital image convert better than a lower resolution image?
No. They all go through the meat grinder and come out as the same piece of sausage.
The appearance of the image matters more than the resolution. (See next page.)

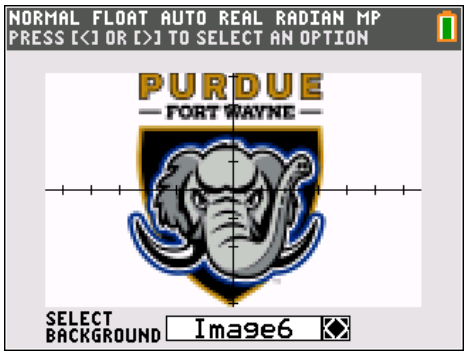
How to Create and Load an Image Var

TI Connect CE™ uses a different algorithm than TI Connect™ to create an Image Var.
Images containing large solid areas and clear boundaries convert well with TI Connect CE™ or TI Connect™. Both TI Connect CE™ and TI Connect™ are free downloads at the sites below.

- For TI Connect CE™, see education.ti.com/en/products/computer-software/ti-connect-ce-sw
- For TI Connect™, see education.ti.com/en/products/computer-software/ti-connect-sw

For example, the school logo looks the same using *either* software.

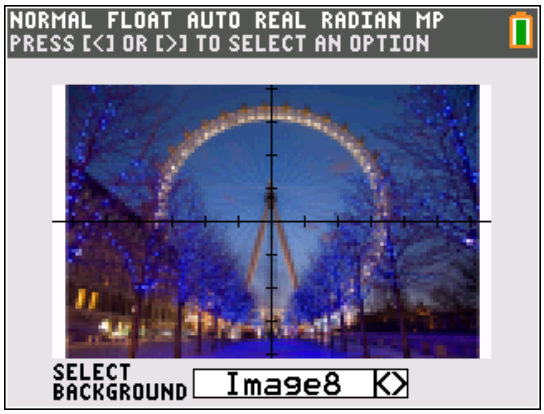
The above is a *.jpg image file.



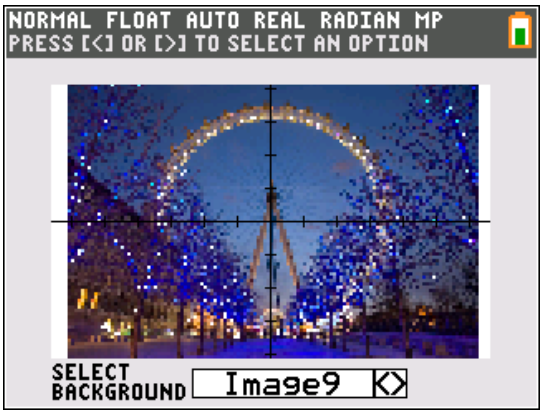
The above is a *.8ca Image Var.

However, if you have an image like upload.wikimedia.org/wikipedia/commons/b/b4/London_Eye_Twilight_April_2006.jpg of the London Eye (containing holiday lights which have pointillistic areas with small dots), then TI Connect™ will give you better results than TI Connect CE™.

The above is a .jpg image file.



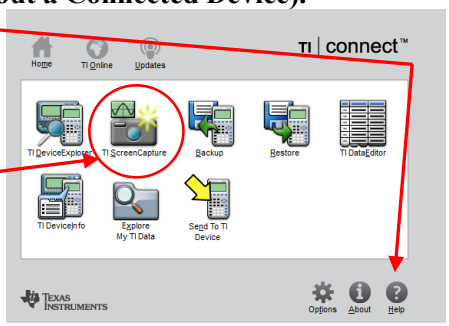
The above is a *.8ca Image Var converted using *TI Connect*™software.



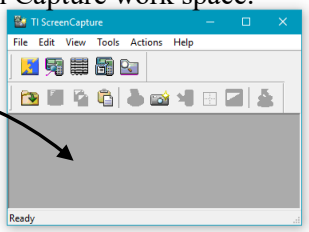
The above is a *.8ca Image Var converted using *TI Connect CE*™software.

How to Use *TI Connect*™ for the PC to Create an Image Var (Without a Connected Device).

The following steps are taken from the Help document, available here

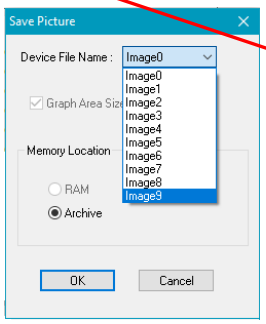


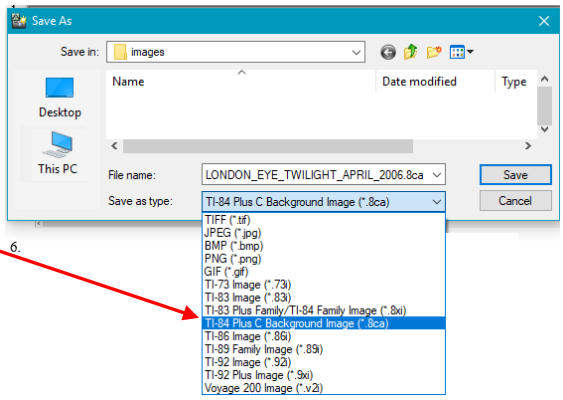
1. Choose the image you want to convert to an 8ca Image Var. Allowed file types are tiff, gif, png, jpg, or bmp. We will use **London_Eye_Twilight_April_2006.jpg** as an example.
2. Open ***TI Connect*™** software.
3. Open Screen Capture.
4. Drag the jpg file into the Screen Capture work space.



5. Click **File > Save As**.

6. Choose the directory where you want to save the file.
7. Choose TI-84 Plus C Background Image (.8ca) as the file type.
8. Click **Save**.
9. Select an Image#.



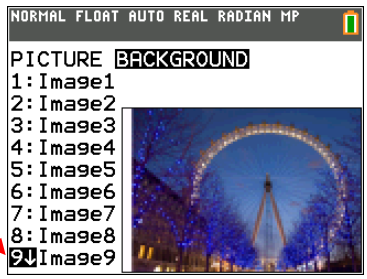


6.

TI Connect™ will append the Image # to the file name of the Image Var, i.e., **LONDON_EYE_TWILIGHT_APRIL_2006_Image9.8ca**.

This will be the name of the Image Var on the TI-84 Plus CE in the Background menu on the TI-84CE or SmartView emulator.

Press **Vars**, select **4. Picture & Background** then press ▶.

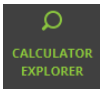


Note: you can override any Image Var # location when loading the Image Var into the calculator or TI-SmartView™

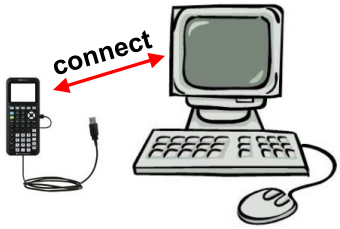
Similar steps exist for the Mac®. See the Help documentation in TI Connect™ for specific instructions.

How to Use *TI Connect CE*™ for the PC to Create and Load an Image Var.
The following steps are taken from the Help document available under the TI Connect CE™ Help menu.
Note: These steps will not only create an Image Var, it will transfer the Image Var to your calculator.

1. Open the ***TI Connect™ CE*** software.

2. Press 

to choose the Calculator Explorer workspace.



3. Connect the TI-84 Plus CE to the computer using the black **Standard A to Mini-B USB Connectivity** cable.

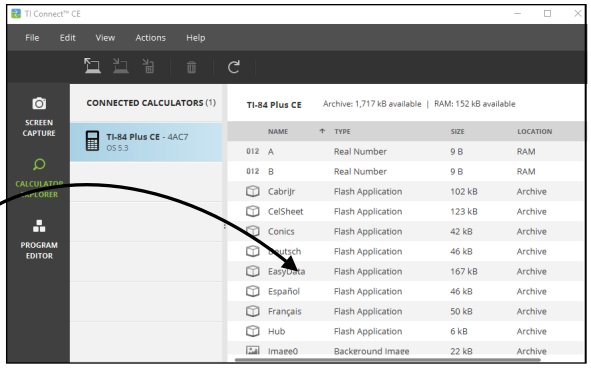
(The TI SilverLink cable is not supported in TI Connect™ CE.)

4. Turn on the TI-84 Plus CE. You will see the connected calculator on the list as well as the contents of the calculator.

5. Choose the digital image you want to convert.

6. Drag the digital image.

Proportional-to-83by133.jpg



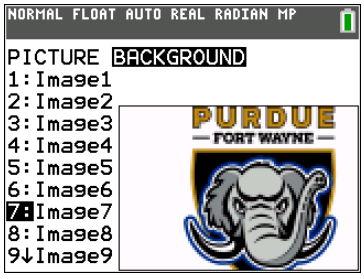
7. Release the mouse button.

8. Select an Image# name from the drop-down menu (Image0 - Image9). This will be the name of the image on the TI-84 Plus CE. **WARNING**: Pre-loaded images are stored in Image1 - Image5. Use other Image# to avoid overwriting the pre-loaded images on your calculator.

9. Click **Send**.

   Note: The Image# will be the name of the Image Var on the TI-84 Plus CE in the Background menu on the TI-84CE.

   Press **Vars**, select **4. Picture & Background** then press  .

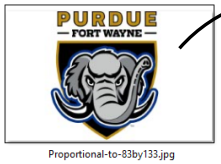


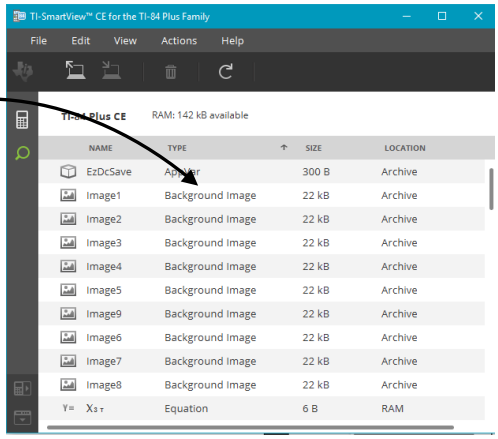
10. To store this image on your computer, drag the file from the Explorer Workspace to a folder on your computer.

    TIP: Rename the computer file with a descriptive title and include the Image# as part of the file name for identification when you want to send or share this file.

How to Use *TI-SmartView™ CE Emulator Software for the TI-84 Plus* to Create and Load an Image Var.
The following steps are taken from the Help document available under the software Help menu.
Note: These steps will not only create an Image Var, it will transfer the Image Var to the Emulator.

1. Open the ***TI-SmartView™ CE Emulator Software for the TI-84 Plus*** software.
2. Press  to choose the Calculator Explorer workspace.
3. Choose the digital image you want to convert.
4. Drag the digital image into the Explorer workspace

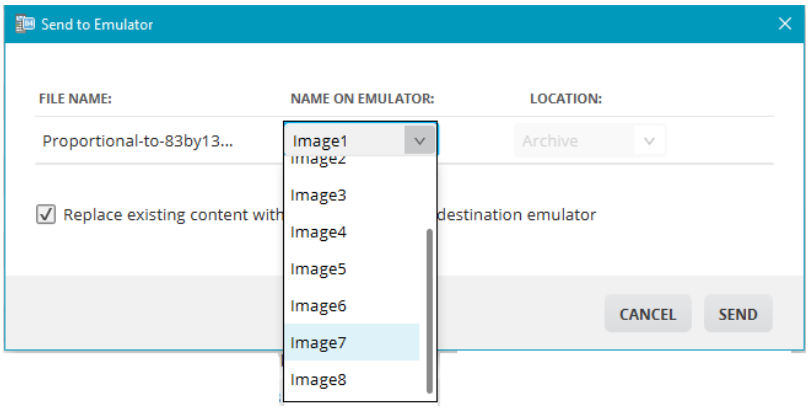




5. Release the mouse button.

6. Select an Image# name from the drop-down menu (Image0 - Image9). This will be the name of the image on the TI-84 Plus CE.

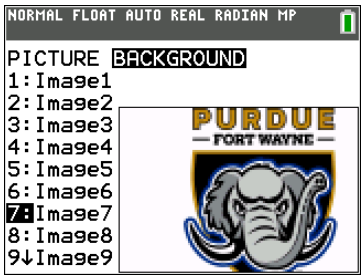
   WARNING: Pre-loaded images are stored in Image1 - Image5.
   Use other Image# to avoid overwriting the pre-loaded images on your Emulator.



7. Click **Send**.

   Note: The Image# will be the name of the Image Var on the Emulator in the Background menu.

   Press **Vars**, select **4. Picture & Background** then press  .



8. To store this image on your computer, drag the file from the Explorer Workspace to a folder on your computer.

   TIP: Rename the computer file with a descriptive title and include the Image# as part of the file name for identification when you want to send or share this file.

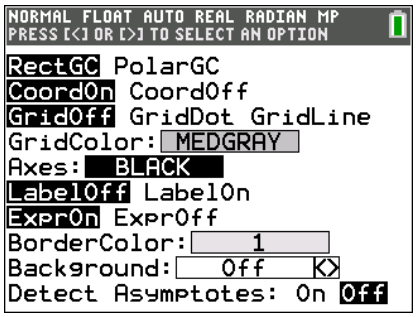
How to Set an Image Var as a Background Image.
Once you have loaded an Image Var on a calculator or the emulator, there are three ways you can display it as a Background Image.

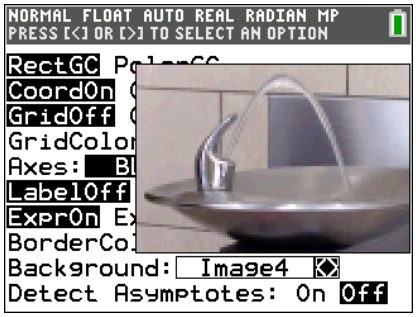
1. Use the **2nd [format]** Menu.

   a. Press **2nd [format]**.
   (Look at the top row above the **ZOOM** key.)
   b. Press ▼ to access the Background spinner.
   c. Press ▶ or ◀ to scroll through
   Image1, Image2, etc.

   Once you the image you wish appears,
   press ▼ or ▲ to move to another menu item.
   The image will be selected.

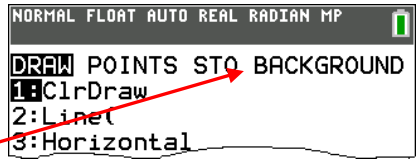
   d. Press **GRAPH** to see the Background.



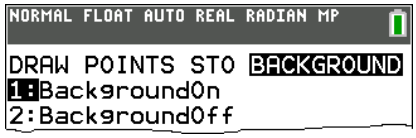


2. Use the **Draw** Menu (command driven). This requires you to know the Image# in advance. This is similar to storing a Pic Var. (See page 1.)

   a. Press **2nd [quit]** to reach the Home screen
   (or be anywhere *but* the Graph screen.)
   b. Press **2nd [draw]**.
   c. Press ▶ to access the Background menu.



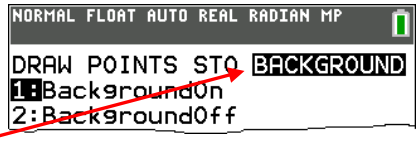
   d. Select **1: BackgroundOn.**
   The command will paste to the Home screen.
   Type a number 0 through 9,
   i.e. `BackgroundOn 1`
   Then press **ENTER**.



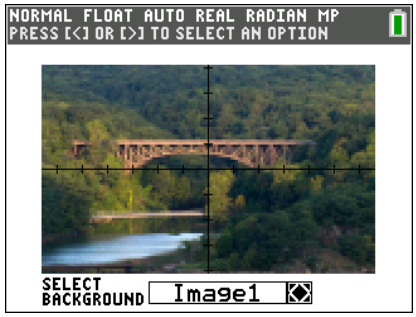
   e. Press **GRAPH** to see the Background.

3. Use the **Draw** Menu (menu driven or interactively).

   a. Press **Graph**.
   b. Immediately from the Graph Screen, press **2nd [draw]**.
   c. Press ▶ to access the Background menu.



   d. Select **1:BackgroundOn**. Image1 will display.
   e. Press ▶ or ◀ to scroll through the spinner.
   f. Press **ENTER** to select the Background Image.
   g. Press **GRAPH** to see the Background.

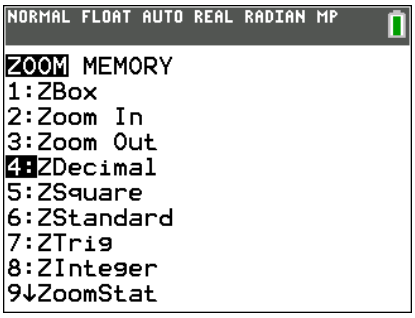


Tips for Working with Images

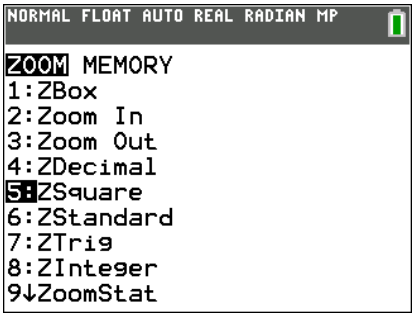
Mathematics and Art

- When mathematizing artwork, use a "square window" where there is a true geometric perspective, i.e., a circle appears as a circle, perpendicular lines appear perpendicular, and if tick marks are the same distance apart on both axes they appear to be the same distance.

- For a pre-built square window, press **ZOOM 4:ZDecimal**.

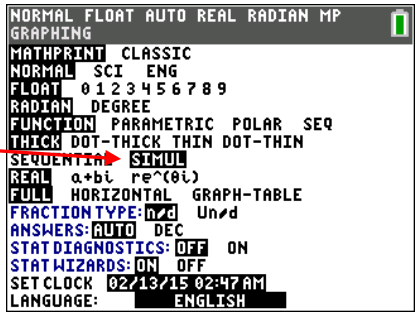


- You can also change any window to a square window by pressing **ZOOM 5:ZSquare**.

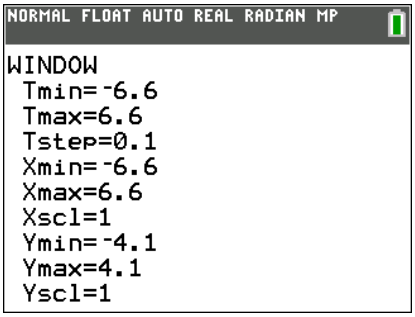


Mathematics and Animation

- When creating animation with images, use simultaneous graphing mode. Press **MODE** and select **SIMUL**.



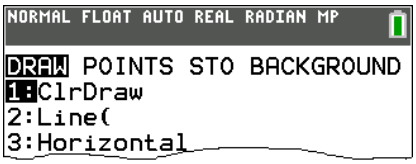
- Use parametric mode to provide opportunities for mathematical modeling with images.



- Parametric mode gives you more control of graphing speed. In function mode, the graphing increment, Δx, is dependent on Xmin and Xmax. But in parametric mode, the graphing increment is independent of the viewing window, and is determined by Tmin, Tmax, and Tstep.

- Parametric mode can be used at any grade level. The modeling can be teacher driven using TI-SmartView.

- Use **2nd [draw] 1:ClrDraw** to easily replay graphs.



Webinars Showcasing the Following Pre-loaded Images

Image01 Bridge

Creative Use of Images to Model the Real World
by John LaMaster and Stuart Moskowitz, Jan. 22, 2019
Play Webinar and Download Documents

Deep Dive into TI-84 Plus Technology Series No. 3: Using Images and Apps as Tools for Inquiry by John LaMaster and Karen Campe, Oct 23, 2018
Play Webinar and Download Documents

Image02 Slide

Deep Dive into TI-84 Plus Technology Series No. 3: Using Images and Apps as Tools for Inquiry
by John LaMaster and Karen Campe, Oct 23, 2018
Play Webinar and Download Documents

Image04 Drinking Fountain

Introduction to the TI-84 Plus C Silver Edition Graphing Calculator
by Fred Decovsky and John LaMaster, Feb. 2, 2013
Play Webinar and Download Documents

Bright Colors and More: See What the TI-84 Plus C Can Do
by John LaMaster, March 9, 2013
Play the video Download Document

TI-84 Plus Tips & Tricks for Working with Graphs
by Karen Campe and Ruth Case, Feb. 2, 2016
Play Webinar and Download Documents

Image05 Starfish

Bright Colors and More: See What the TI-84 Plus C Can Do
by John LaMaster, March 9, 2013
Play the video Download Document

Implementing Topics in the Common Core State Standards with the TI-84 Plus C SE
by Marilyn Parker and John LaMaster, Oct. 8, 2013
Play Webinar and Download Documents