Want to Work for Pixar?
Start Here with TI-84 Animations!

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Oak Alley (Hilton) Thursday, April 10,2014, 9:45-11:00

Patricia Baggett
Dept. of Math Sci.
New Mexico State Univ.
Las Cruces, NM 88003-8001
baggett@nmsu.edu

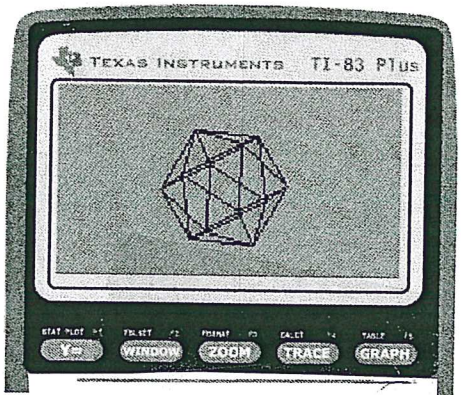
Andrzej Ehrenfeucht
Computer Science Dept.
University of Colorado
Boulder, CO 80309-0430
andrzej@cs.colorado.edu

http://www.math.nmsu.edu/breakingaway/

In this session we will learn to draw pictures and create 2-D and 3-D animations that we can enlarge or shrink, on our TI-84 calculators. We will work first with 2-D coordinates, and then transform our screen into 3-D by adding a z-axis. The goal is for you to be able to create your own little movies, especially of geometric shapes such as cubes and icosahedra.

Lesson plans with all instructions and programs (which you may type into your own calculator) are on our website at http://www.math.nmsu.edu/breakingaway/Lessons/TI83/TI83.html. During our workshop you will be given a calculator with all needed programs already loaded: DRAW, ROTATETW, ANIMATE, OCTAHEDR, and MATRICES. If you would like the programs to be sent to you via email in .8xp format, so that you can directly transfer the code into your calculator using the TI-GRAPHLINK silver cable and TI-Connect software, please email Pat Baggett (address above).

Plan for the session



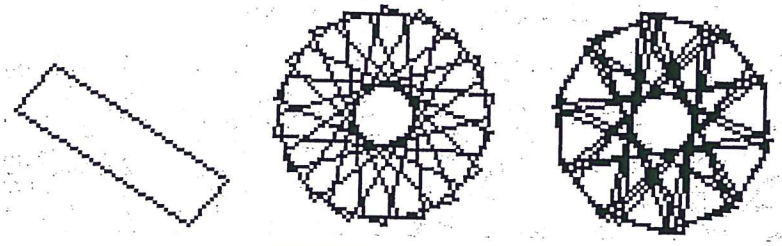
Animations on the TI-83

In this group of five units you will learn how to:

1. Draw pictures from line segments on the TI-83 (Pictures)
2. Rotate them by hand frame-by-frame (Rotations)
3. Animate them (Animations)
4. Make a rotating/animated octahedron and Icosahedron (Octahedron) (Icosahedron)
5. So you want to rotate a cube on your calculator? Here's how!

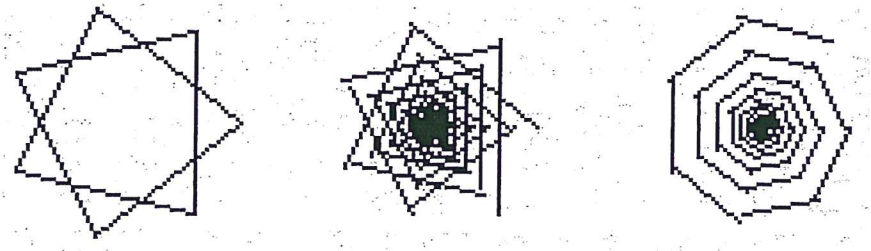
Pictures

Most computer drawings are made from segments. We will first learn some basic techniques of making such pictures on the screen of the TI-83/84 calculator. To create pictures we use analytic geometry. Each point will have two coordinates, x and y, and each segment will be determined by two points (its ends). We will set up two matrices, one with coordinates of points, and the other with connections among points, and then we run a program, DRAW.



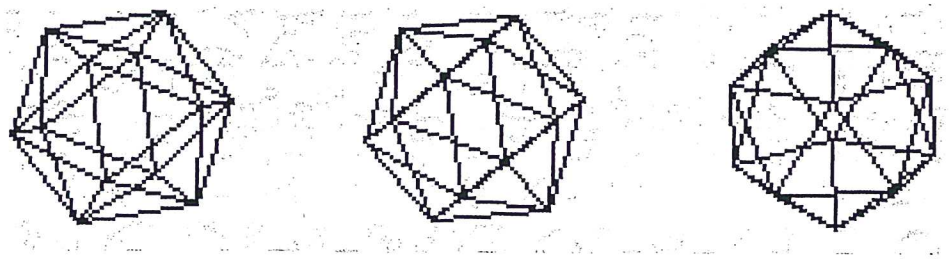
Rotations

With the program ROTATETW, you may rotate a 2-dimensional picture counterclockwise by an angle A (which you specify) around the origin. You may change the program if you like to erase the previous picture before the next one is drawn.



Animations

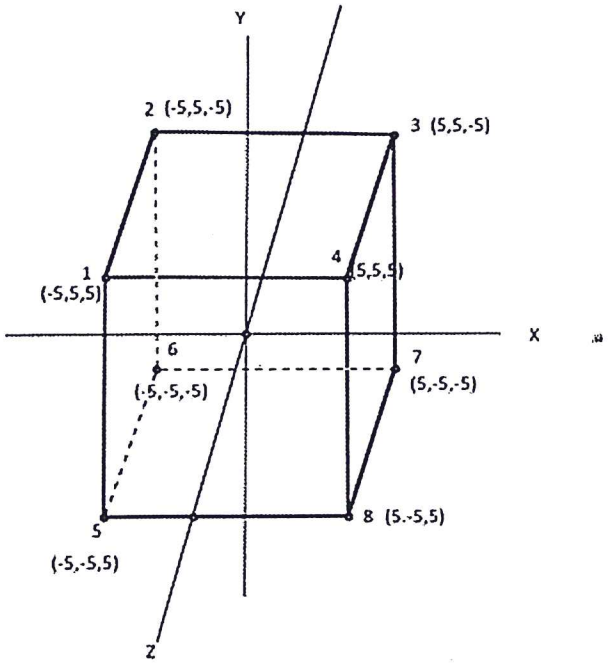
The program ANIMATE requires a matrix containing coordinates of points in your drawing, and a matrix containing pairs of points that are to be connected. And it requires the DRAW program. ANIMATE actually animates a rotation of the figure drawn by DRAW counterclockwise around angle A (which you specify) about the origin, with a ""growth" or "shrink" factor C. (If C>1, the drawing increases in size. If C<1, the drawing shrinks. If C=1, the drawing size does not change.) You see picture after picture in an animated sequence. There is a delay D (which you set) between each two pictures. You set D between 0 (fast) and 10 (slow).



Icosahedron

Students may make straw octahedra or icosahedra before doing these animations (see http://www.math.nmsu.edu/breakingaway/Lessons/straw/straw.html). We transform our calculator screen into 3D by adding a third axis, Z. Here is an example:

As before, we need one matrix with vertices of our object, and a second matrix indicating how segments are connected. We also tell the program three angles of rotation: x, y, and z. The program OCTAHEDR simulates movements of the shadow of our three dimensional object (octahedron or icosahedron or …) on the calculator screen. Students may use their straw models to see which position is represented on the calculator's display.



So you want to rotate a cube on your calculator? Here's how!
The diagram above shows a cube with 8 vertices numbered 1 through 8. We put their (x,y,z) coordinates into a matrix. And we put in a second matrix the ends of the segments that must be connected. We decide for each direction, x, y, and z, how many degrees we want the cube to rotate, and we set the window size, and AxesOff. We run the program MATRICES, and then OCTAHEDR. By pressing ENTER repeatedly, your cube should rotate.