# How to Graph Motion

Squeak provides the tools for making graphs that draw in real time and make it possible to analyze the motion and behavior of objects you create. Using these graphs you can see how "math" works. Once you know how to make a graph you may want to use graphs to look at all kinds of functions and phenomena.

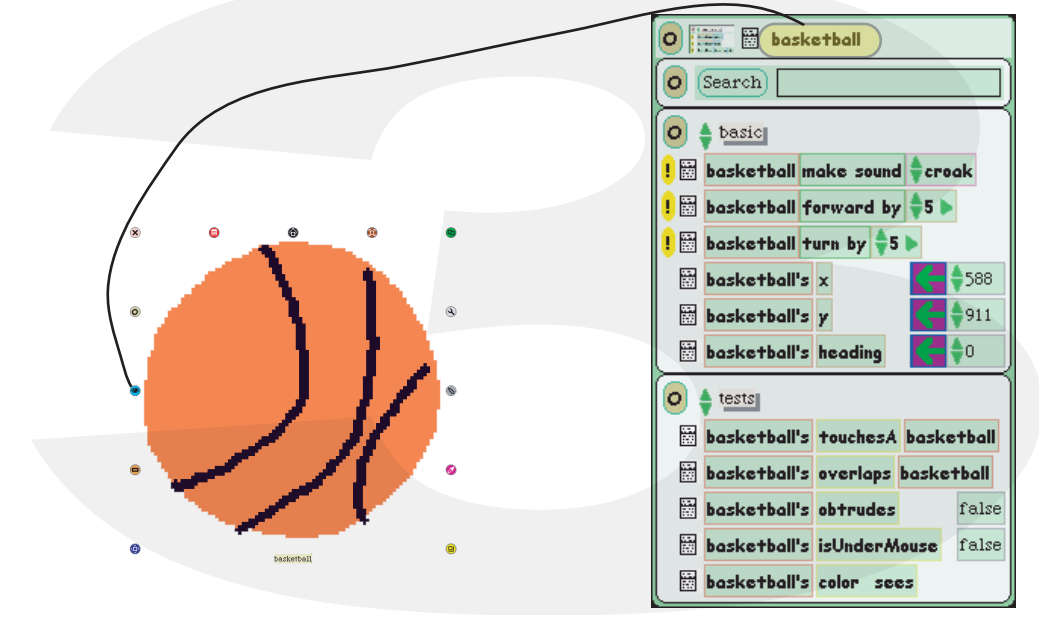This project will be easier if you have some experience with:

- drawing objects
- moving objects
- scripting

Paint an object to graph:

Pull the paint utility from the navigation flap. Paint an object whose motion you want to graph. (We made a basketball.)
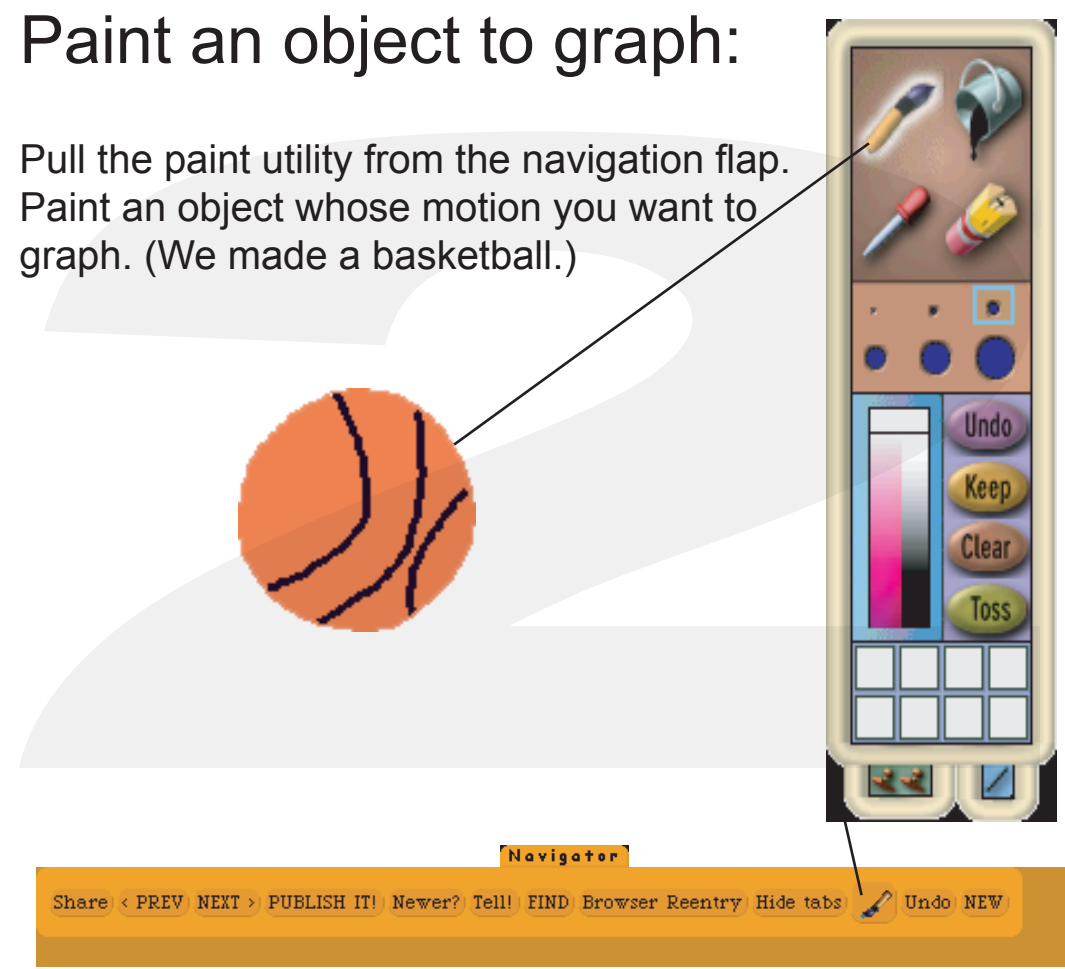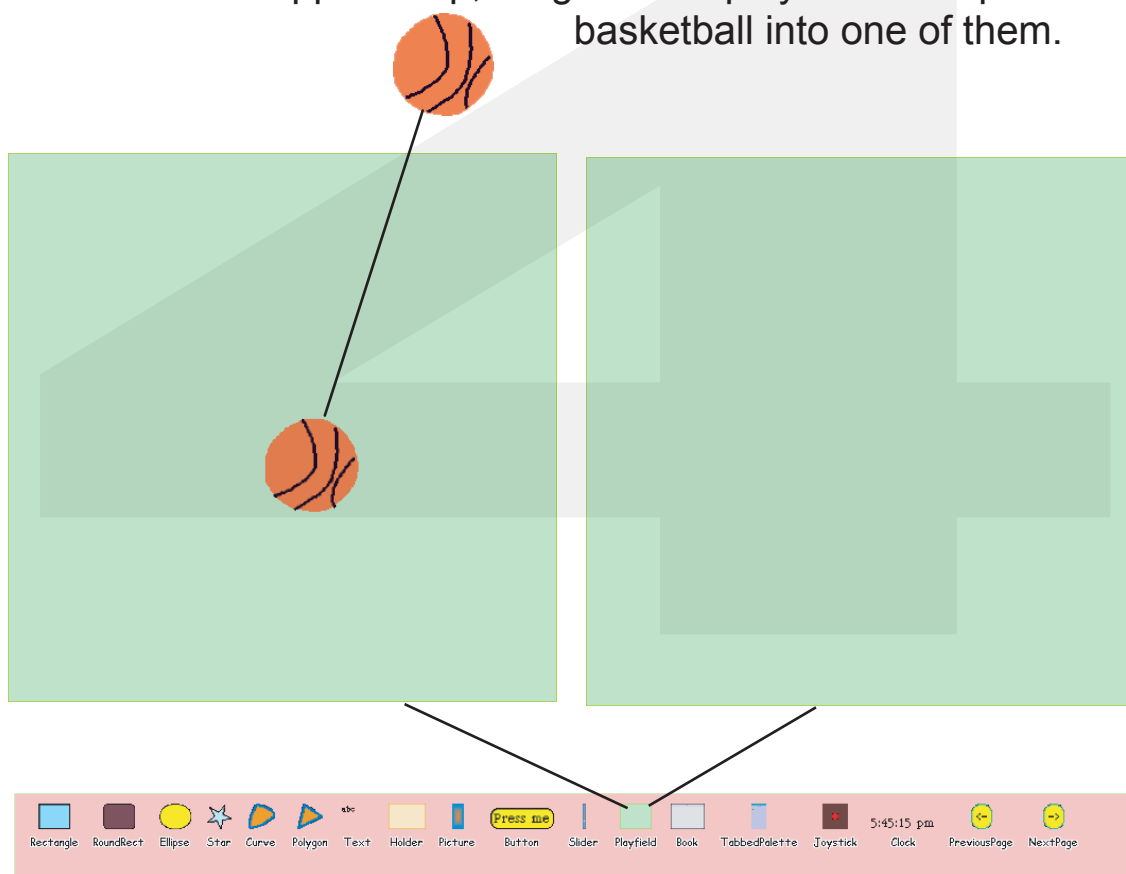
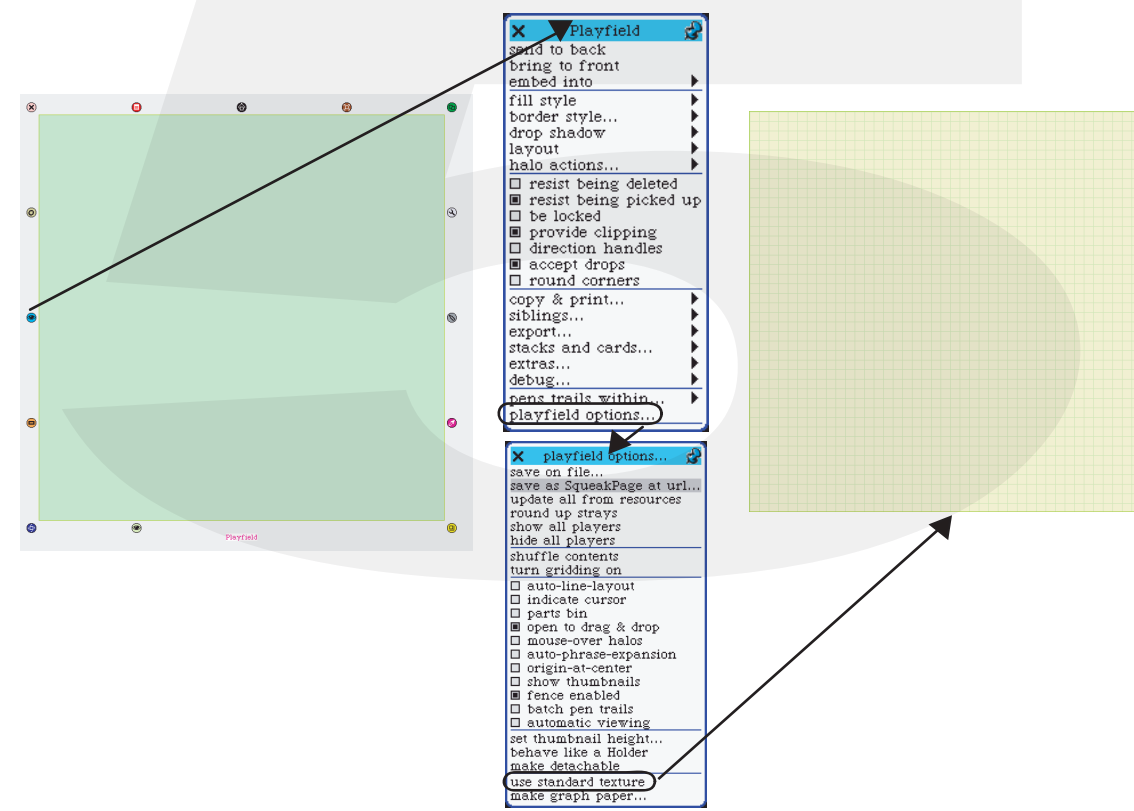Bring up a viewer for your object and rename it:

Set up a Graph:

We have and object, now we must set up a way to graph it. Go to the supplies flap, drag out two playfields. Drop the basketball into one of them.

Bring up the "Halo of Handles" on the other playfield and click on the menu handle. From the menu that appears, select "playfield options". From the submenu that appears select "use standard texture". This will give you a pale yellow and blue graph-paper background.

Bring out the paint box and paint a simple black dot. "Keep" it and drop it onto your graph-paper.
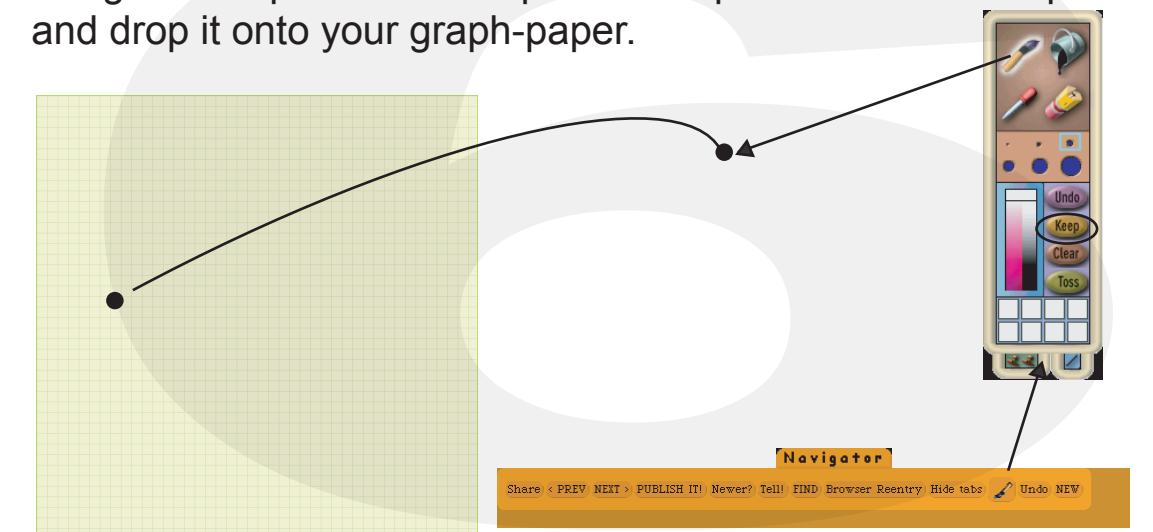
Bring up a viewer for the black dot and rename it. (we took a vote and named ours "grapher" though the name "Jerry" got a lot of votes.)
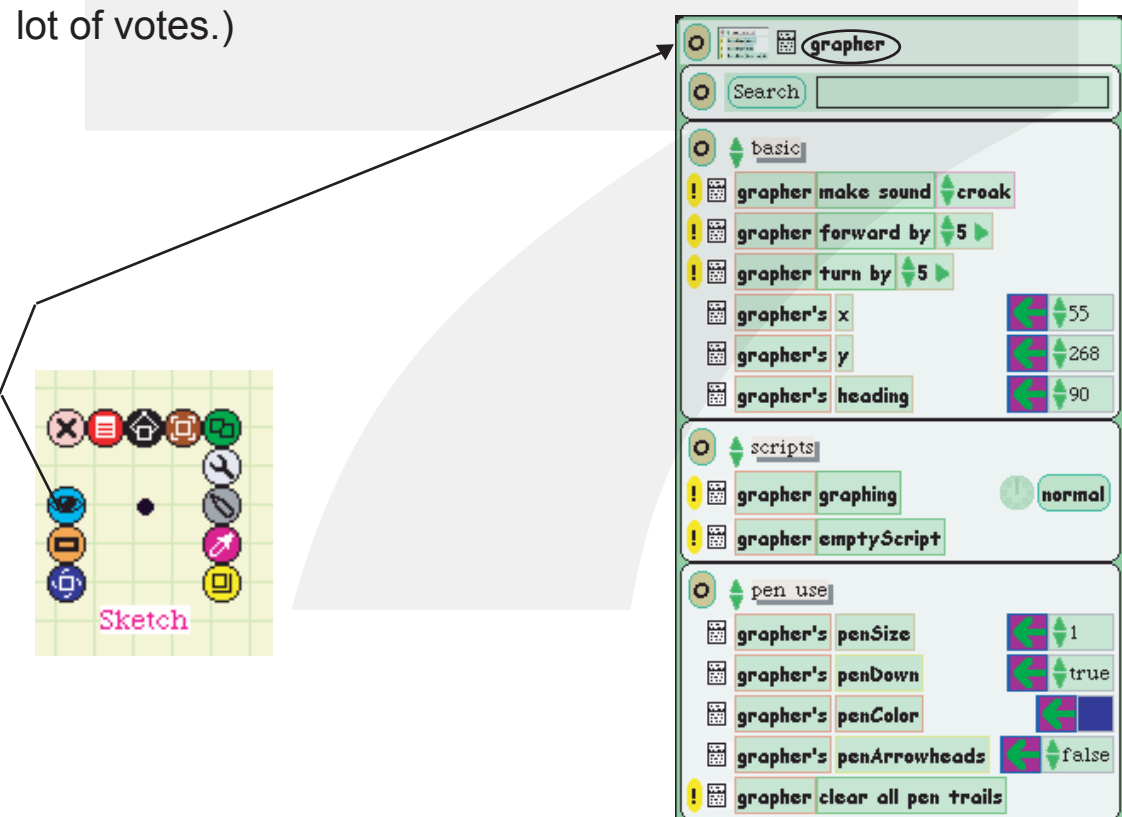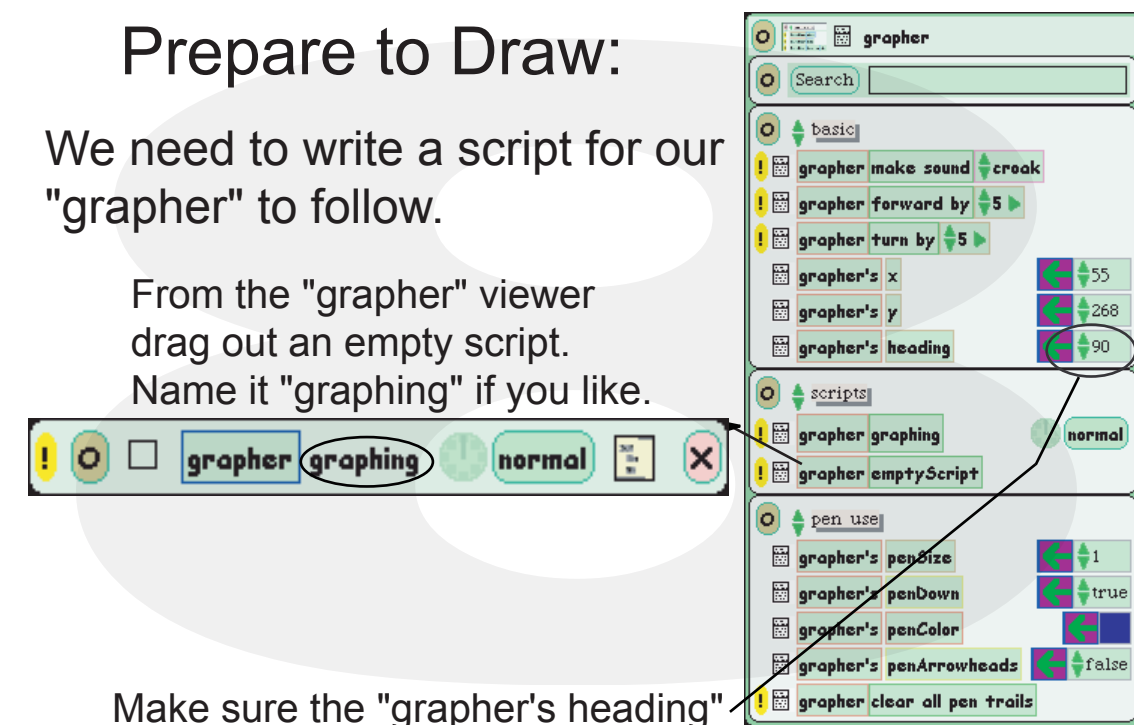
Prepare to Draw:

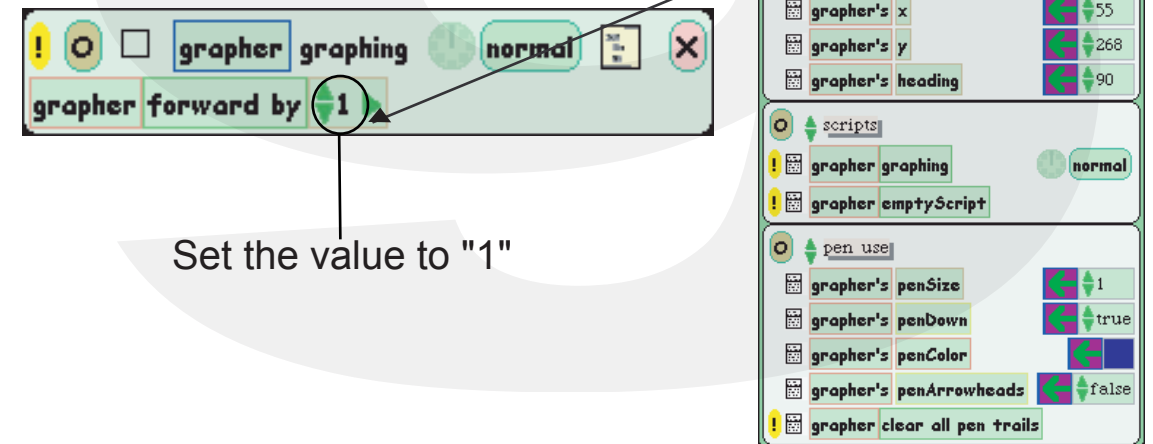We need to write a script for our "grapher" to follow.

From the "grapher" viewer drag out an empty script. Name it "graphing" if you like.
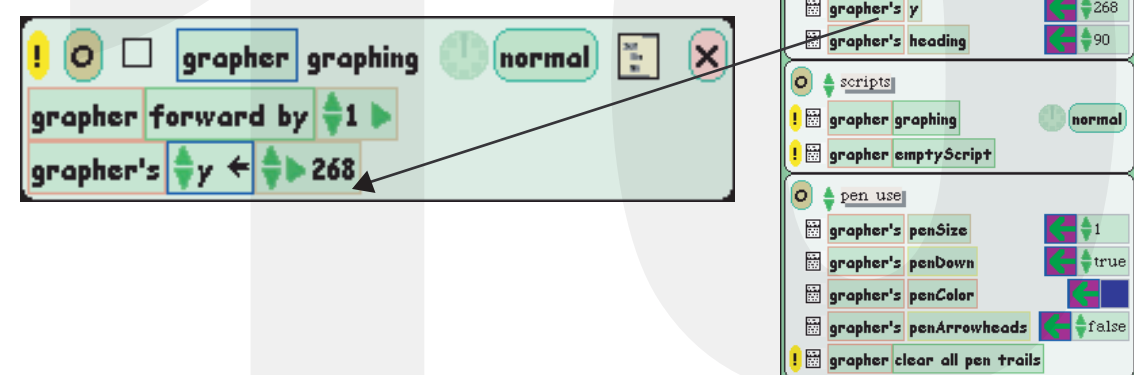
Make sure the "grapher's heading" is set to 90.

Drag out a "grapher forward by" tile and drop it on the "graphing" script.
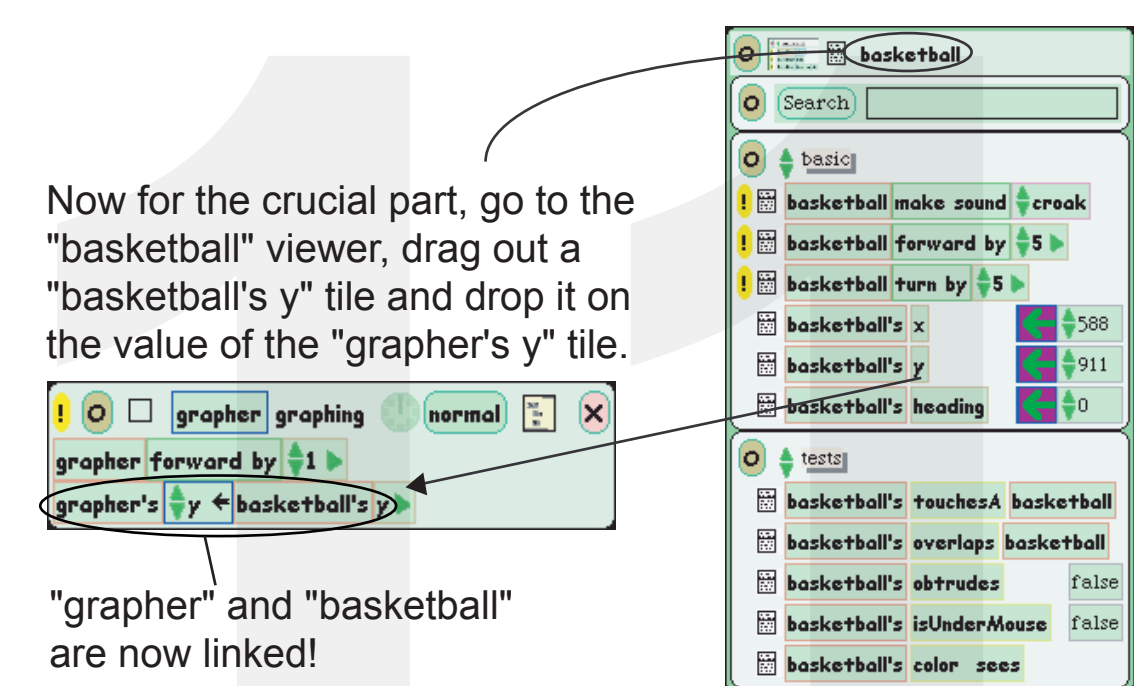
Set the value to "1"

Drag out a "grapher's y <=" tile and drop it on the "graphing" script.

Now for the crucial part, go to the "basketball" viewer, drag out a "basketball's y" tile and drop it on the value of the "grapher's y" tile.
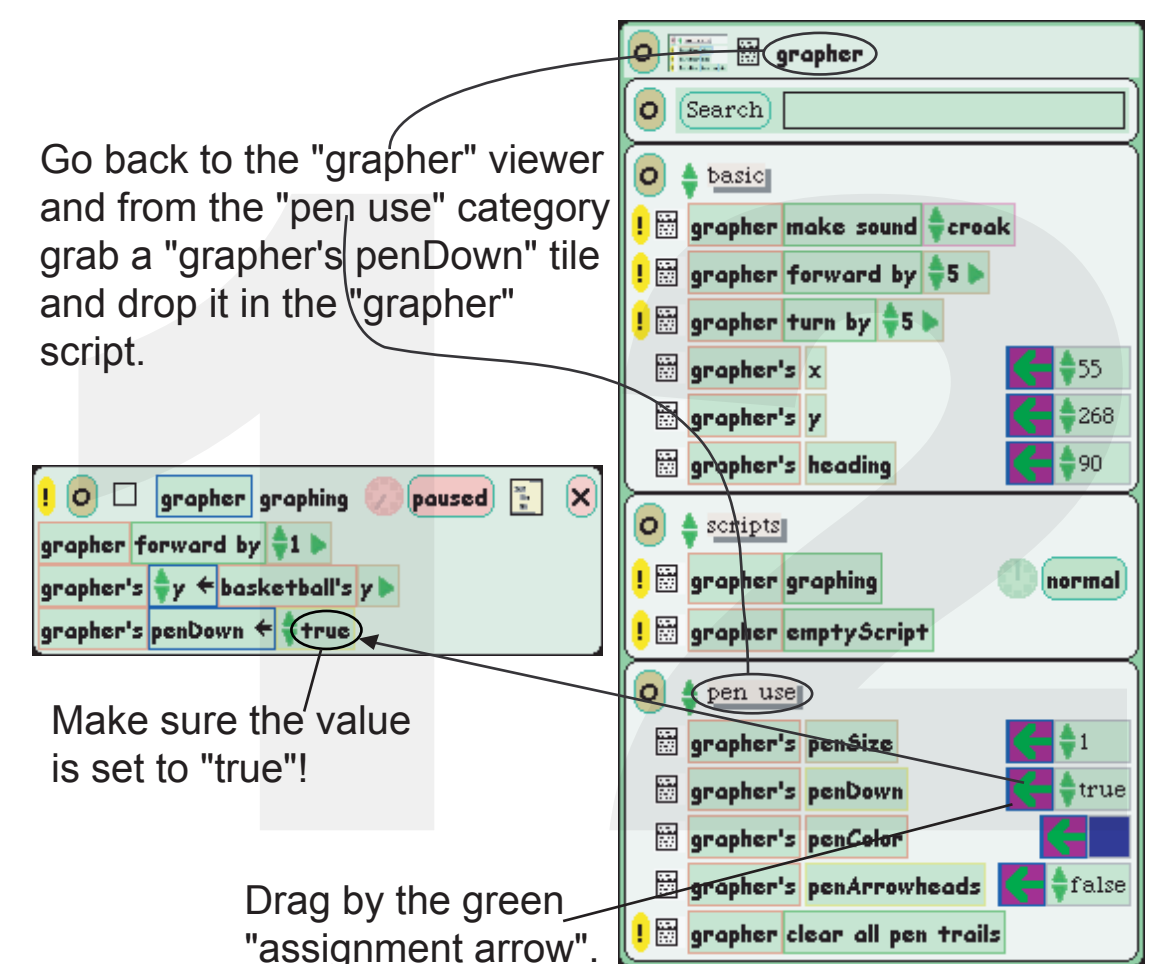
"grapher" and "basketball" are now linked!

Go back to the "grapher" viewer and from the "pen use" category grab a "grapher's penDown" tile and drop it in the "grapher" script.
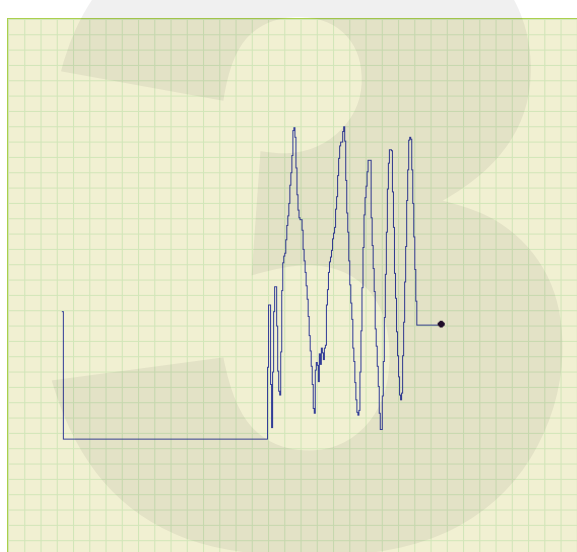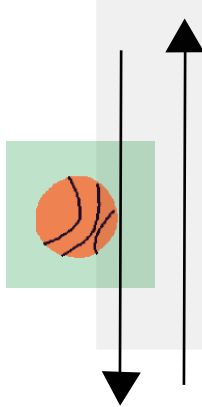
Make sure the value is set to "true"!

Drag by the green "assignment arrow".

Draw a graph:

Click the "graphing" ticker to run the script.

Move the basketball up, down and around with your mouse.

Note that "basketball's" y axis motion is being graphed for future analysis.

CHALLENGES:

Now you have enough information to begin making all kinds of graphs.

Can you graph motion on the "x" axis?

Can you graph speed?

Heading?

Try it and don't forget to have fun!