

# **PicoBoard Kit Librarian Reference Manual**

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# PicoBoard Kit

## Assembly Instructions

- These instructions are for the assembly of the PicoBoard Kit: Librarian Reference Manual and one kit. If you want to add additional kits to your collection just multiply the amount. Keep in mind you only need one “PicoBoard Kit: Librarian Reference Manual”.

### Purchase:

- Pico Board Kit from SparkFun  
(<https://www.sparkfun.com/products/10311>)
- USB Mini-B Cable from SparkFun  
(<https://www.sparkfun.com/products/11301>)
- 1 Sterilite Large Clip Plastic Box Container with lid (14x11x3 1/2) - Sold by Target online ([www.target.com](http://www.target.com)) in sets of or in stores individually
- Book rings to assemble card packs. Available from Office Supply Store.
- A 1-inch binder available from Office Supply Store. Try to get one with pockets on the inside covers.
- One quart size resealable plastic bag.
  - Place the alligator clips from your Pico Kit in this bag. Put this bag in the Sterilite Large Clip Plastic Box

### Download, Print and Prepare:

- **This guide!** “PicoBoard Kit: Librarian Reference Manual”

- Put the first page (with the title) on the front of the binder.
  - Punch holes in the other sheets and place in the binder. If it will get a lot of use you could always skip punching the holes and place them in plastic sheet protectors and add them to the binder that way.
- **Labels for the Pico Kit**
  - Cut out the labels once printed. The larger one states “You need a computer to use this kit” should go on the top of the plastic Sterilite container. The others should be taped on the sides that will be visible to users when the kits are stacked on shelves. Adhere these to the kit with clear packing tape.
- **PicoBoard Kit: User Guide**
  - Print one to be placed in the kit and one to add to include in the “PicoBoard Kit: Librarian Reference Manual”
  - Laminate and Bind with spiral attachment
- **Getting Started with PicoBoards**

[http://www.picocricket.com/pdfs/Getting\\_Started\\_With\\_PicoBoards.pdf](http://www.picocricket.com/pdfs/Getting_Started_With_PicoBoards.pdf)

  - Print one for the kit and one to include in the “PicoBoard Kit: Librarian Reference Manual”
  - Laminate and bind with spiral attachment.
- **Scratch Getting Started Guide** - <http://bit.ly/16QSozy>
  - Print one for the kit and one to include in the “PicoBoard Kit: Librarian Reference Manual”
  - Laminate and bind with spiral attachment.
- **Scratch Cards** - <http://bit.ly/1dPuwn4>

- o Print and assemble one for the kit and one to include in the PicoBoard Kit: Librarian Reference Manual
- o Print, cut out and fold in half. Tape or glue each card together, place in order from 1 to 12. Laminate. Punch a hole in the upper left corner and then secure together with a book ring.

## **Catalogue**

- Add to catalogue as kit
- Take a photo of the kit with the lid off.
- Attach photo to the kit with a note that says, “Please let your librarian know if any of these items are missing.” Cover the photo and note with plastic packing tape.

## What is the Pico Board?

The PicoBoard is a piece of hardware called a sensor board that can be combined with a programming environment, like Scratch, to allow the programs you create to react and respond to events happening outside of the computer. A sensor is a device that detects, or senses, and measures the presence of or absence of something. The sensors included on the PicoBoard include a light sensor, sound sensor, a button and a slider. It also includes four additional inputs that can sense electrical resistance through the included cables. For example, you can create a game in Scratch and then use your PicoBoard to make the sprite, or character, you created slide across the screen.

The PicoBoard incorporates a light sensor, sound sensor, a button and a slider, as well as 4 additional inputs that can sense electrical resistance via included cables. Designed for educators and beginners, the PicoBoard is a good way to get into the very basics of programming and reading sensors.

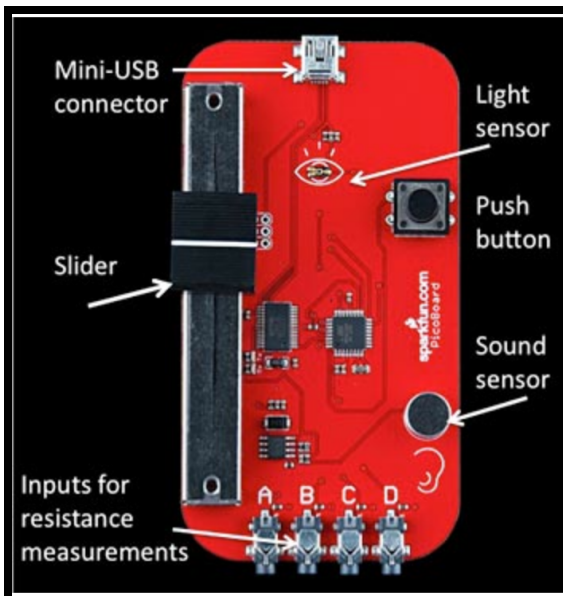


Photo from:

[http://www.sciencebuddies.org/science-fair-projects/project\\_ideas/scratch-picoboard.shtml](http://www.sciencebuddies.org/science-fair-projects/project_ideas/scratch-picoboard.shtml)

## Scratch Programming (v 1.4 only)

- Scratch is essential to using the PicoBoard. Currently, the PicoBoard only works with Scratch 1.4. You can download this for free at:

[https://scratch.mit.edu/scratch\\_1.4/](https://scratch.mit.edu/scratch_1.4/)

- Scratch is currently available in version 2.0 - an on-line version. Unfortunately, the PicoBoard does not work with this version. If you go to <http://scratch.mit.edu>. The screen will look like the image below:

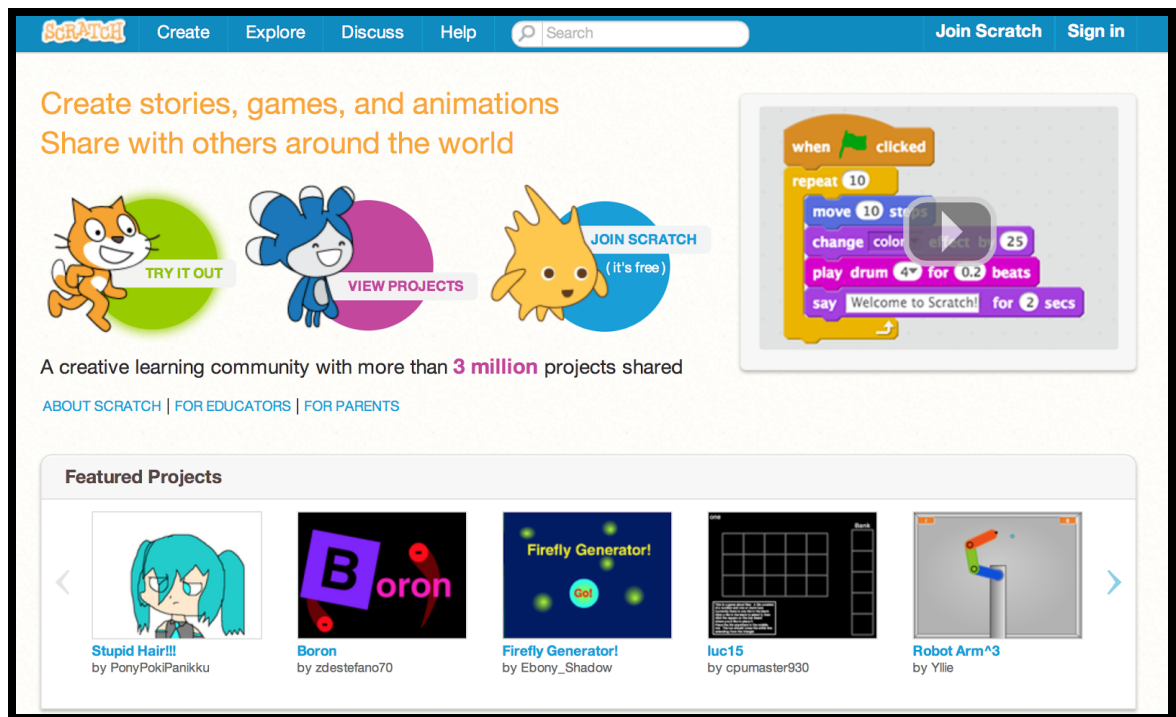


Image from: <http://scratch.mit.edu>

- Join Scratch so you can save the cool projects you are going to create. It's FREE! Here, you can still learn all about Scratch and how to use its features. Scratch 1.4 is slightly different.

- Next go to the “Try it Out” section. Take the copy of the “Getting Started with Scratch” booklet included in this binder. It will walk you through what to do step by step.
- Grab the Scratch cards that are also in this binder. They will help you create some really cool projects while you are getting familiar with the site.
- If you are a visual learner Scratch has also developed a series of videos to consult. Go to this link to check it out: [http://info.scratch.mit.edu/Video\\_Tutorials](http://info.scratch.mit.edu/Video_Tutorials)
- Once you are familiar with Scratch you can start using your PicoBoard along with it. Take the “Getting Started with PicoBoards” Guide from this manual to lead you through it!

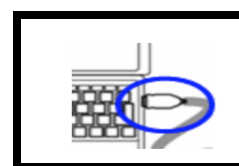
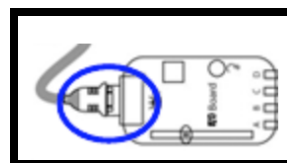
## Set Up

These steps are also included in the PicoBoard Kit: User Guide that is included in every kit. This is a quick reference guide in the event that a patron has a question or needs additional assistance.

Step 1: Turn on your computer.

Step 2: Open the Internet browser you use. Go to the following address: <http://www.sparkfun.com/FTDI> and click on link corresponding to your machine. FTDI drivers are necessary for the computer to communicate with the PicoBoard. Note: You will need administrative privileges on your machine for the setup process.

Step 3: After you’ve completed the FTDI driver installation, take the USB Cable from the kit and connect the USB Cable to the USB port on your computer. Connect the other part of the USB cable into the USB port of the Pico Board.





Step 4: Go to <http://scratch.mit.edu>. You will see an image like this:

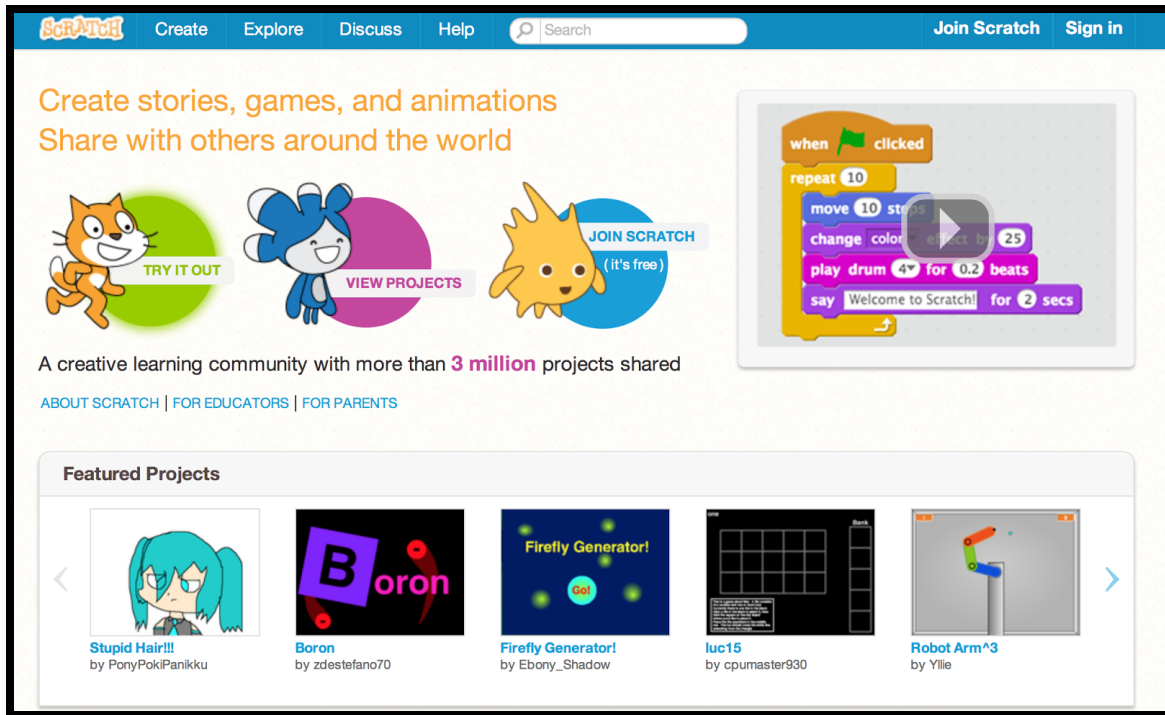


Image from <http://scratch.mit.edu>

From now on when this guide says Scratch it means to go to this site. You can sign up for a free account. Click on the “Join Scratch” image in the middle of the screen or in the upper right corner. Once you have joined you can save the cool projects you are going to create, just make sure you check with your parents first if you are not older than 18. Now you have two options:

- Option 1: Get familiar with Scratch now, this is the program that will be necessary to create your projects. Take the “Getting Started with Scratch” Booklet from your kit. It will take you through the necessary steps to use Scratch. Create a few

- projects just to get familiar with how it works.
- Option 2: Click on “Try it Out” and follow the directions that will display along the right of the screen. Create a quick project and then get back into the installation process to make sure your PicoBoard is working correctly.

Step 5: Now that you are a little more familiar with Scratch open a new project. In the middle of the screen under “Scripts” select the “Sensing” category. The various sensing blocks will now appear.

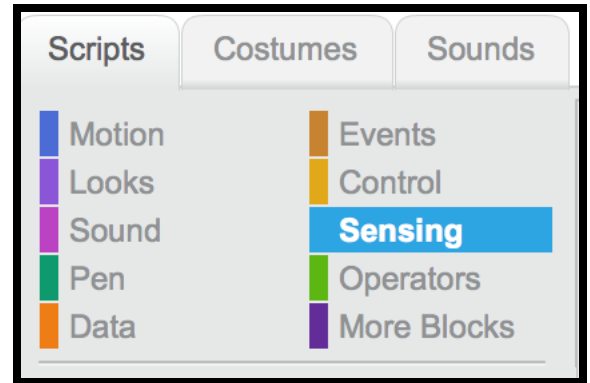


Image from <http://scratch.mit.edu>

Step 6: Click on the gray box in front of the “slider sensor value” block. Click and drag the block into the Scripts area. You should see a counter on the stage that says “slider sensor value” with the value. When you move the slider back and forth the sliders sensor value should change. If the values don’t change try to reconnect the PicoBoard. If they still don’t work check out the Troubleshooting section of this guide. There are also additional ideas to try in the “Getting Started with PicoBoards” booklet included in your kit. Otherwise you can email: [techsupport@sparkfun.com](mailto:techsupport@sparkfun.com)

Step 7: Now that you have the PicoBoard set up you are ready to start playing with it. The picture below illustrates each sensor on the PicoBoard.

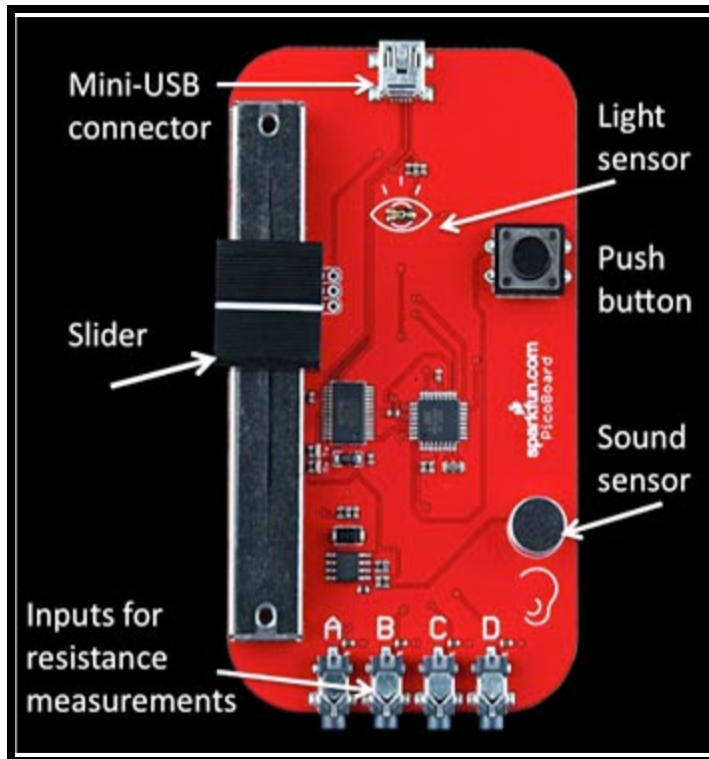


Image from: [http://www.sciencebuddies.org/science-fair-projects/project\\_ideas/scratch-picoboard.shtml](http://www.sciencebuddies.org/science-fair-projects/project_ideas/scratch-picoboard.shtml)

## Now What?

- Once your PicoBoard is set up and working properly take the “Getting Started with Scratch” Booklet from your kit. You may have already done this in Step 4: Option 1 in the “Getting Started” section above. It is always helpful to revisit to make sure you are really comfortable with Scratch. This way you will be able to create the most interesting and innovative projects possible.
- Take the “Getting Started with PicoBoards” Guide from your Kit. It will walk you through the steps to create all kinds of projects using your PicoBoard. Let your

imagination go crazy as you think about all kinds of different creations.

- Go to the following project that was created in Scratch:

<http://bit.ly/16QTL1h>

This will help you make sure your sensors are working, play a game and get a few ideas of your own. When the PicoBoard senses darkness a mouse crawls out of its hole. You can control the cat with your slider and button and if you catch the mouse you win.

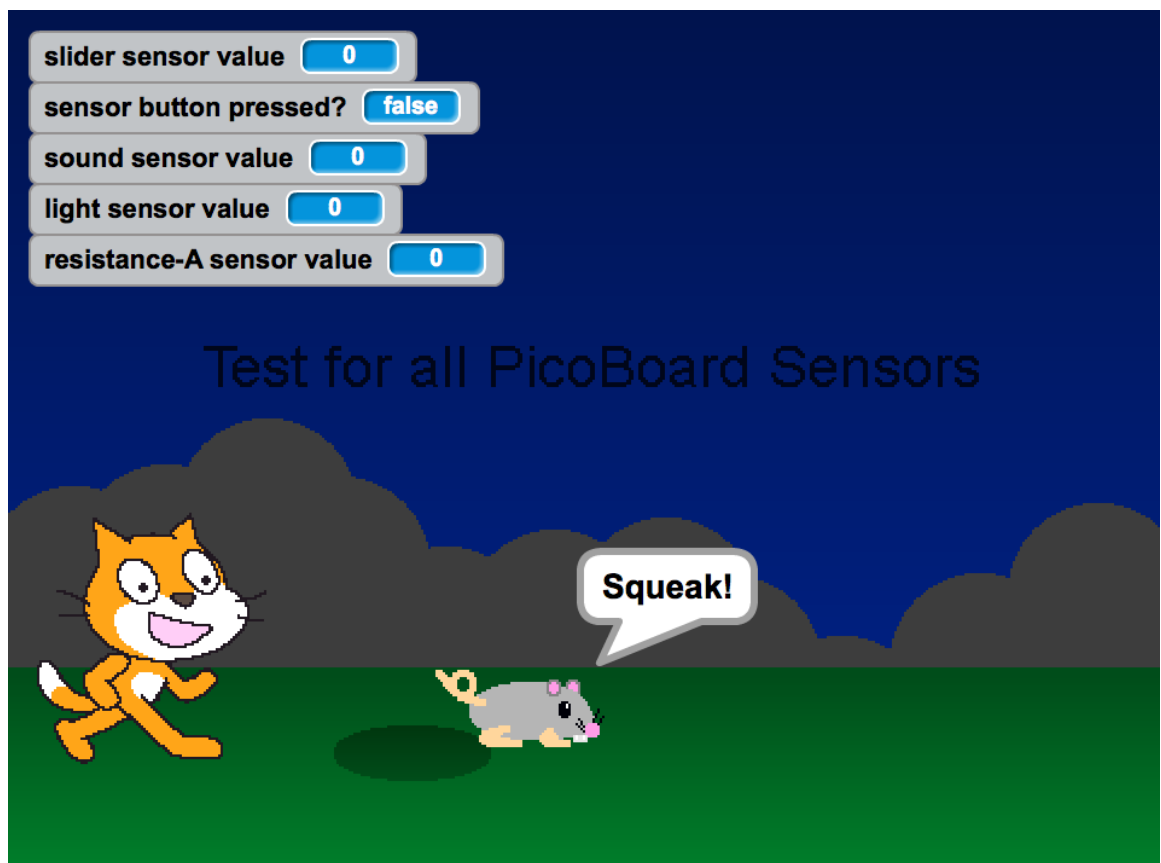


Image from <http://scratch.mit.edu>

- Check out the other SparkFun kits, activities and workshops your library has available.
- Visit [www.sparkfun.com](http://www.sparkfun.com) to learn more on your own and see what others are doing.

## Trouble Shooting

If you are having trouble getting your PicoBoard to work try these options:

- Make sure the USB cable is connected to the PicoBoard and the computer securely.
- Make sure that only one copy of Scratch is running.
  - Windows: Look at the Task Bar at the bottom of your Windows screen, make sure there is only one Scratch window open. If there is more than one, close all the Scratch windows and then restart Scratch.
  - Mac: Look at the Dock located along one of the edges of your screen. Do you see more than one cat? If so, quit from all the copies of Scratch that are running, then restart Scratch.
- Check for port conflicts.
- Have the drivers for the USB-serial cable been installed on your computer? This was included in Step 2.
- Unplug and replug the USB-serial cable. Note that you can also use a serial-to-serial cable.
- To check if USB-serial cable is properly installed, go to Control Panel>System. Find Device Manager, and look at “Ports (COM & LPT).” You should see the Prolific USB-serial cable listed there.
- Restart Scratch
- Restart you computer, then restart Scratch.
- If the entire Scratch screen goes white and does not respond to any mouse or keyboard commands it means that Scratch has gone into “standby mode” while it is communicating with your PicoBoard. Try to simultaneously hold down <ctrl>, <alt>, <delete> to

- open the Windows Task Manager. Select “End Task” to close Scratch. Unfortunately you will lose any unsaved work in Scratch. Then restart Scratch. To avoid this problem in the future, go to the Windows Control Panel and select “Power Options.” Change the settings to prevent Windows from entering standby mode.
- If you cannot solve your problem post a question to the “Sensor Boards” forum at [scratch.mit.edu/forms](http://scratch.mit.edu/forms)
  - A really basic test would be to just use the ScratchBoard watcher.
    - Plug in the board.
    - Start up Scratch.
    - Go to the "Sensing" category.
    - Right-click (or control-click on a Mac) the "slider sensor value" block.
    - Select "show ScratchBoard watcher" from the menu that appears.
    - A widget should appear on the stage that displays the state of the attached board.
  - If all else fails email: [techsupport@sparkfun.com](mailto:techsupport@sparkfun.com)

If you are having trouble with Scratch: <http://bit.ly/16QMIJ8>

If you've created a script and it doesn't perform the way you expected, you might have forgotten to put in some blocks or used the wrong blocks. Try one or more of the methods below to figure out what part of your script isn't working the way you anticipated.

1. If your script doesn't perform the way you expected, you can diagnose where the problem is by “stepping” through the project.
  - Under the "Edit" category, click on "Start Single Stepping." Now when you run your program, each block will be highlighted as the computer performs that instruction.
  - If you want to slow down how fast the blocks (instructions) are being executed, you can also choose "Set Single Stepping" and select "Flash blocks (slow)" from the Edit category. This will slow down the action (it's kind of like watching something in slow motion), so that you can better see what is happening in each part of the code and correct any problems.
  - Even with slow single stepping, it might be difficult at times to know "where you are at" and whether or not different scripts are being activated as you intended. To help keep track of this, you can add blocks to your scripts, like a "Say" block that says "hello" or "starting xyz script now," that can give you feedback about *when* a script is functioning.
2. If you had a script, or set of scripts, that *were* working, but stopped working after you added some additional blocks, you know that the problem lies somewhere in the new additions you made.
3. If you've saved an earlier version of your program (which is always a good idea!), you can go back to that and re-evaluate your changes.
4. If you don't have a saved working version, you can start breaking apart your script.
  - Break each script into smaller pieces and make sure they work as you expect.

- When you find a piece that doesn't do what you expected, you've figured out where the problem is and can start trying other solutions.
- 5. If you are using *variables* in your script (symbols that can take on different values), it can be helpful to know what the values of these variables are as your script executes.
  - o Under the Variables category, there is a "Show Variables" block that will allow you to see the values of different variables as the program runs.
  - o You can also use the "Say" block under the Looks category to "say" the value of the variable.

## **Finding the Solution to the Problem:**

Once you've figured out *where* your problem is, it might be obvious to you *what* the solution is. If so, great! At other times, you might be left scratching your head. If that's the case, it might be time to step away from the computer for a moment and grab a pencil and pad of paper. Write down what you want each of your scripts to do. Think about the kinds of blocks you'd need to execute the task. Once you have the theory straight in your head, go back and look at your program again. Did you miss something the first time? Check out the Scratch cards or the "Getting Started with Scratch" Booklet. They might provide some more insight.



## Staff Training

- As with any new addition to your collection it is important for your staff to become familiar with the content so they can help guide users to the resources you have available.
- This guide has been created as a step-by-step resource that can be consulted to help users explore basic computer programming and PicoBoards.
- Mini Workshop:
  - Briefly introduce the kit and explain it is designed for beginners but could also be used by those with experience in programming and electronics.
  - Work through the Scratch site as a group using the “Getting Started with Scratch” Booklet from the kit as a guide.
  - Divide the group into pairs and have them work with Scratch and the PicoBoard using the “PicoBoard Kit: User Guide” to help them get comfortable with the material.
  - Present the “PicoBoard Kit: Librarian Reference Manual” so they know where to find information to answer patrons questions.
- Self Guided Learning:
  - Briefly present the kit at a staff meeting along with the “PicoBoard Kit: Librarian Reference Manual”.
  - Ask staff members to take the kit home and explore it at their own pace using the materials included.

- The main goal is to have staff aware of this content in the collection to guide users who may be interested in learning more about these innovative additions.