



<http://scratch.mit.edu>

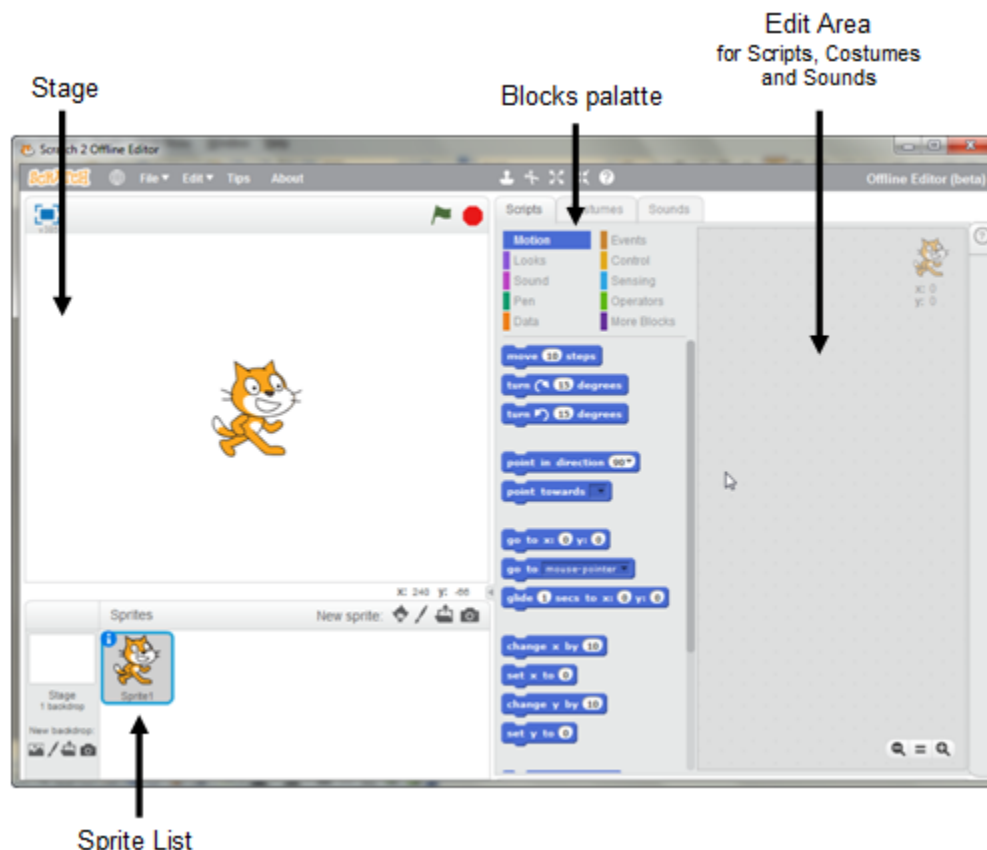
What is it?

Scratch is an interactive programming language developed by the Lifelong Kindergarten Group at the Massachusetts Institute of Technology (MIT) Media Lab. It is provided free of charge. Adults and kids around the world use Scratch to make, building games, animations, and create other fun things easily. It's a great introduction to what programming is about.

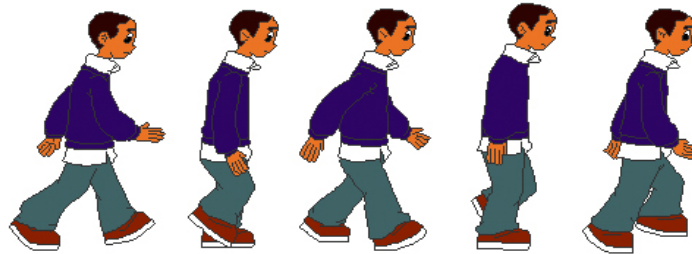
The Scratch website is a social media supported by a wide variety of educators who are technically savvy and competent. Depending on the age of students involved however, informing parents of its use in the classroom is advised.

What is it made up of?

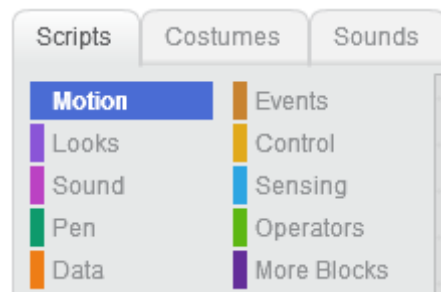
A Scratch program lives on a **Stage**. The active characters of a Scratch program are called **Sprites**. **Scripts** are where you make things happen! They are made up of sequences of action (blocks) that affect the Stage or any Sprite.



Sprites can change their appearance just by changing its costume. Costume changes can be putting on a hat or moving a leg. So by changing a Sprite's Costume you can make it look like it's moving -- like drawing frames of a cartoon character in motion. Below is an example of five costumes for a Sprite named Boy. If you changed the costume from one to the next it would look like the Boy was walking.



What kind of actions can you include in a Script?



There are several different kinds of actions that a Sprite can do in Scratch: **Motion**, **Appearance**, **Sound**, **Drawing**, **Data**, **Events**, **Control**, **Sensing**, **Operations**, and **Define a Block**. A Script is made of blocks and variables. Scripts are started by something happening. The first block in a Script is called the **Hat Block**. This block tells the script when it should start, for example “when the green flag is pressed”, or “when someone clicks on this”.

After starting your script with a **Hat block**, you can drag other items from the *Blocks Palette* into your script area. Action blocks are connected when they 'snap' together and are performed in the exact order they are listed.

*Note: All Sprites can perform their Script **at the same time**. A script runs when the event in its Hat Block happens. Any one event may cause many different scripts to run simultaneously.*

MOTION

In the Motion section you can have a Sprite move (or glide) to a place on the stage, change the direction it's facing, turn, or take some steps. You can have a Sprite bounce off the edge of the stage, reversing its direction.

LOOKS (APPEARANCE)

A Sprite can hide or become visible (after hiding) with Hide and Show. You can change the Sprite's costume or color, and apply filters to the Sprite like ghost (fade away), or pixelate (become blocky). Your Sprite can have word balloons with messages.

SOUND

You can play sound clips as part of your Scripts.

PEN (DRAWING)

You can have your Sprite draw pictures by putting a pen down or up then moving. The pen color and size are under your control as well.

DATA

Sometimes you may want your Sprite to do something based on a formula you calculate. This data can be saved in a Variable or a List.

EVENTS

The way you start a Script is with an Event. Something happens then run this script. An example of some of the possible events are, "When the green flag is clicked", "When a certain key is pressed", or "When a Sprite is clicked on".

CONTROL

This section is how you control your Sprite. You can repeat a set of things a number of times or forever. You can do a set of things IF something is true, you can wait for a length of time, and you can stop what this Sprite or all Sprites are doing.

SENSING

This section is where you ask questions about your Sprites. You can test to see if your Sprite is touching another Sprite, or if it's touching another color, or if a key has been pressed. You can also ask a question and script user to type in an answer you can use in another part of the script.

OPERATIONS

Here is where you find the arithmetic operations, +, -, *, /, as well as other mathematical functions.

(MAKE) MORE BLOCKS

You can create a group of actions and give them a name and refer to this block in other parts of your scripts.

Sprite Communication

Sprites can talk to one another by sending a Broadcast message. The Sprite that is waiting for a message will have a Script that starts with a hat block “When I receive this message”. The Sending and Receiving Sprites agree on what the message is. Additional information can be put in a Variable that is available to All Sprites.

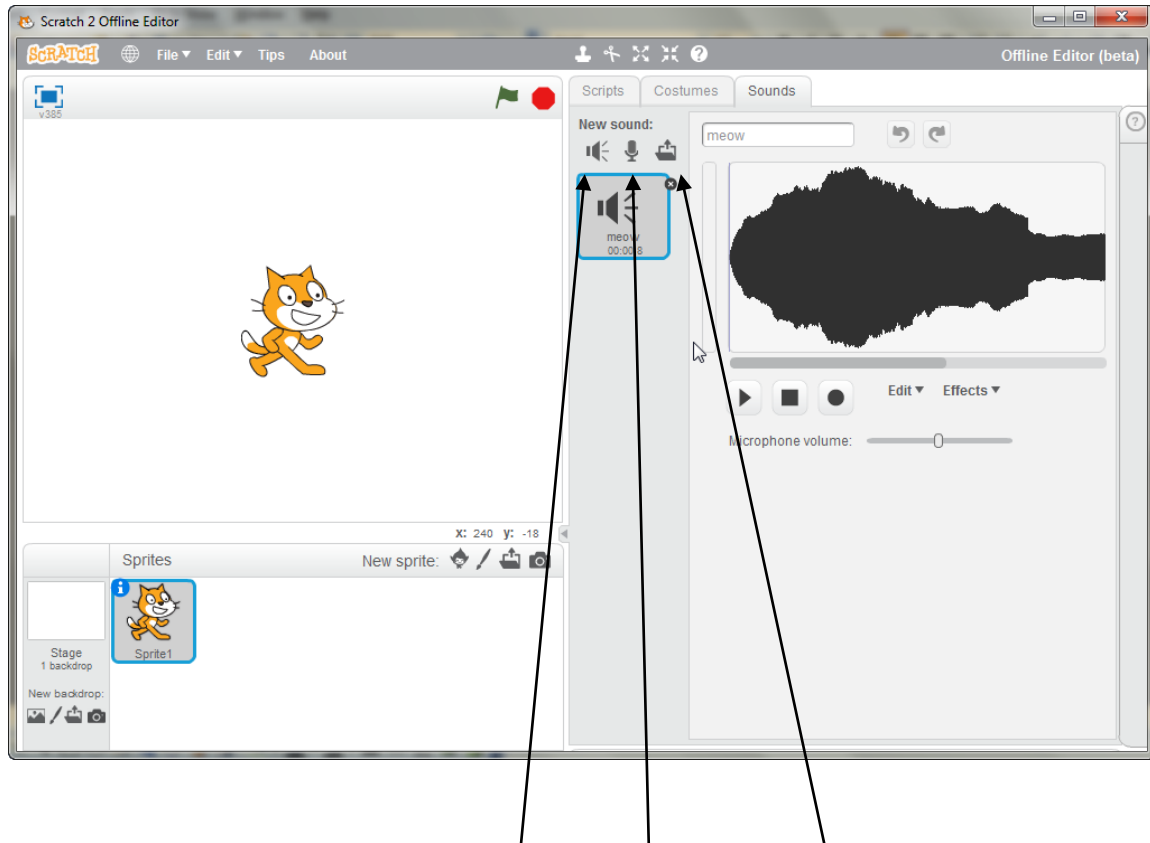
Social Programming

You can run Scratch on the MIT website (<http://scratch.mit.edu>) or you can get a standalone version to run on your Windows or Mac PCs. One of the fun things about running on the website is you can look at other people’s programs, share programs with your friends, leave comments, likes, and questions about programs. You can also get another person’s shared program to create your own **remix** of it.

Appendix A

How to add pictures/sound to Scratch

Loading Sounds



New sounds may be Imported from Library, Record now or Upload. Once a sound is loaded Into Scratch, it may be modified using 'Effects'.

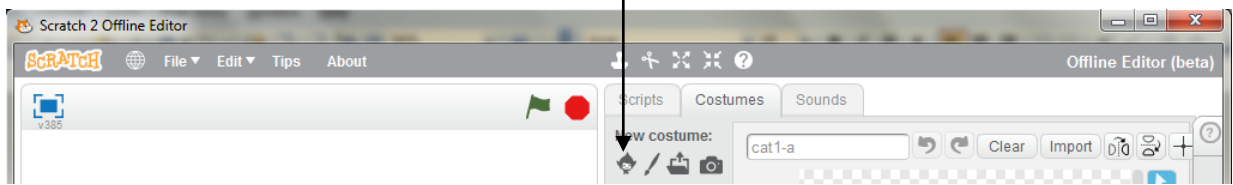
A fun effect is 'reverse'! Click on Import from Library and look for and double-click on 'meow' to import a second copy of 'meow'. By default, the new copy will be caled 'meow2'. Modify the Effects of 'meow2' by first Edit/select all to highlight the sound to be modified. Once highlighted, click on Effects/reverse and see that the sound reverse from right to left! Play these to hear the difference!

Appendix A

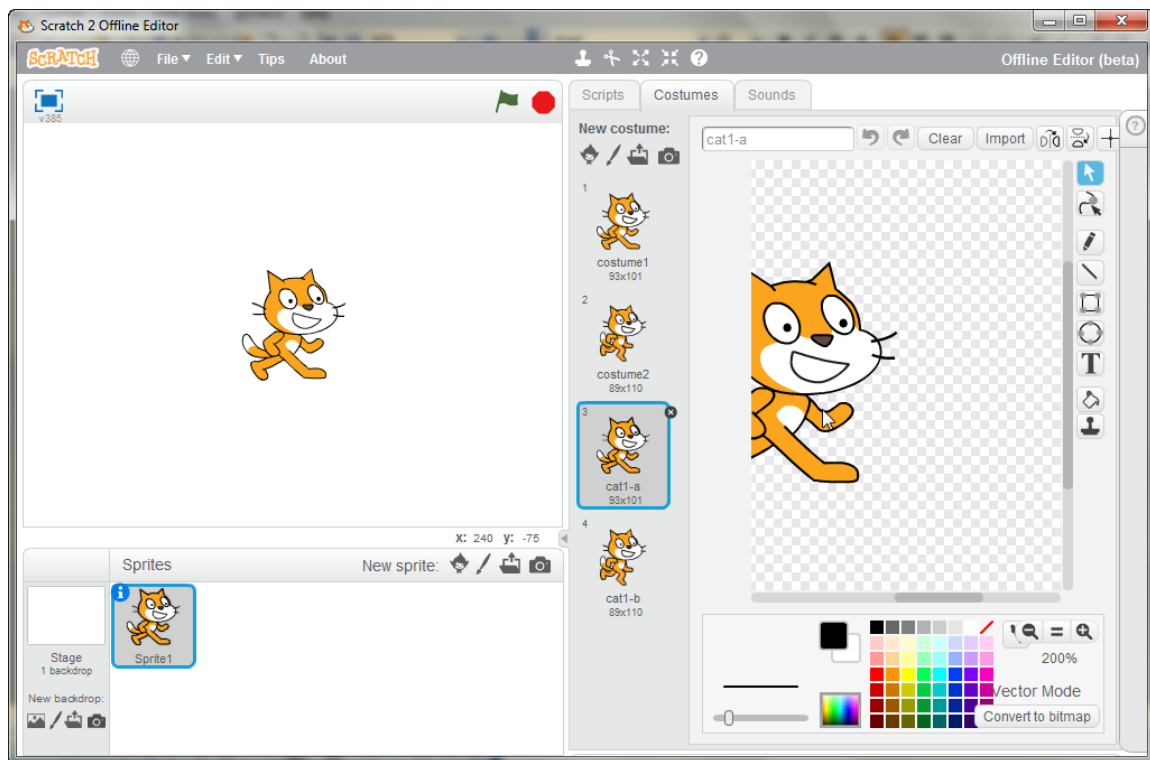
Loading Costumes

Use the costume block palette to add or modify costumes for your Sprite(s). In the script ABQ Dancing Cat, we added two costumes for the Cat sprite that are the left-right reverse of the ones already loaded.

Costume



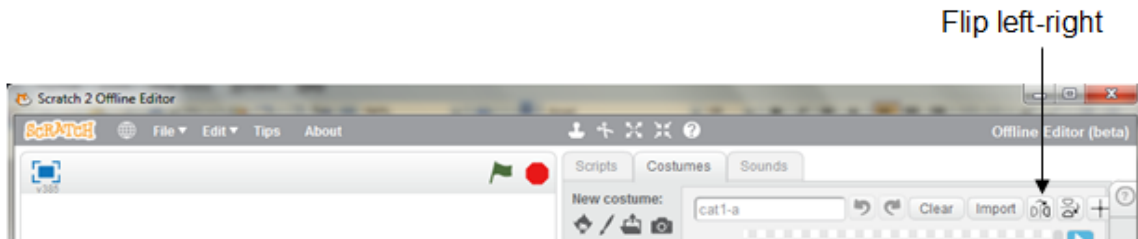
From the costume library, look for and double click on the cat1-a and cat1-b to add to the existing costumes.



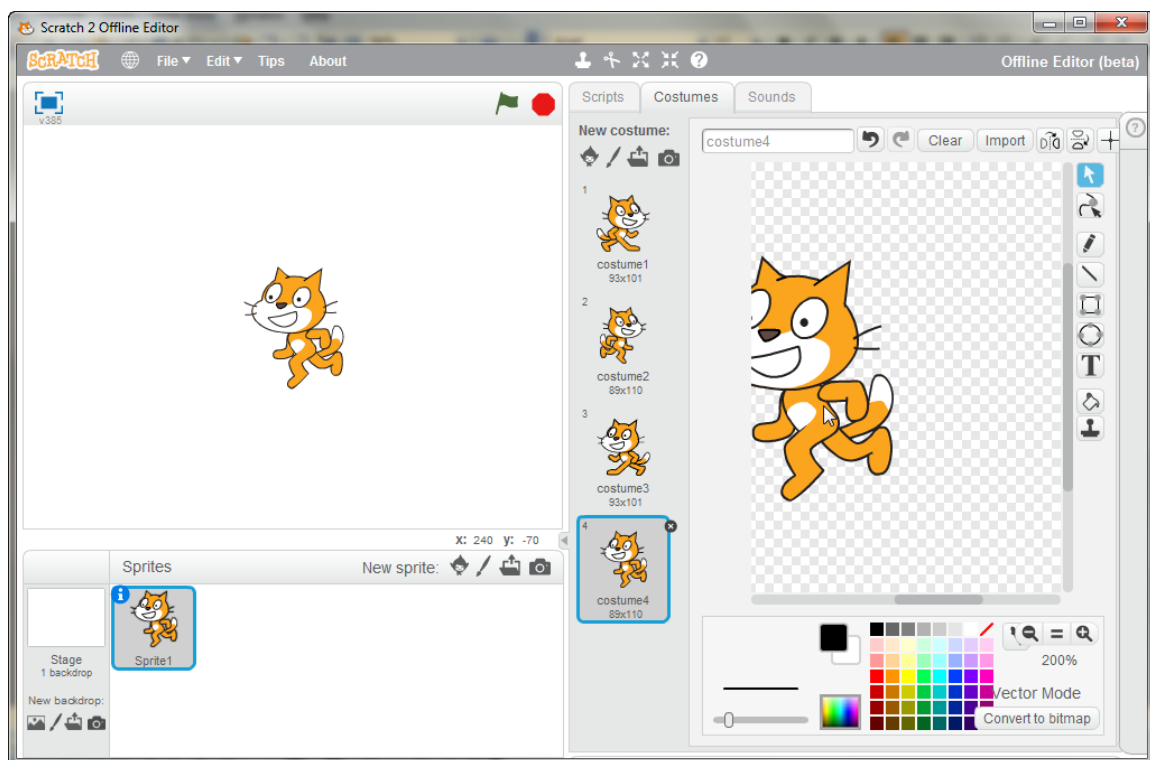
Appendix A

Modifying Costumes

Choose 'cat1-a' and Flip left-right. Do the same for 'cat1-b'.



We renamed these costumes to 'Costume 3' and 'Costume 4'.



Appendix A

Using Costumes

In our 'ABQ dancing cat' project, we alternate between the four costumes while playing 'Girls Just Want to Have Fun', a song that we uploaded.



Studio **CEYH 2014** URL: <http://scratch.mit.edu/studios/321001/>

Project **ABQ dancing cat** URL: <http://scratch.mit.edu/projects/16123034/>

Appendix B

Standalone download and use

Download URL: <http://scratch.mit.edu/scratch2download/>

The current version of the Scratch 2 Offline Editor is the Beta Version. It may be retrieved or downloaded from the URL above for both Windows and Mac PCs.



The screenshot shows the Scratch 2 Offline Editor (Beta Version) download page. At the top is a blue navigation bar with the Scratch logo and links for Create, Explore, Discuss, Help, a search bar, Join Scratch, and Sign in. Below the navigation bar is a white box with a grey header that reads "Scratch 2 Offline Editor (Beta Version)". The main content area is white and contains the following text:

The Scratch Team is pleased to announce that the beta version of the Scratch 2 Offline Editor is now available. This version will work on Mac, Windows, and some versions of Linux (32 bit).

Installation Instructions

Click **INSTALL NOW** (below) and follow the directions. It will install the Adobe AIR runtime system if you need it, then install the Scratch 2 application.

When installing, click "Yes" or "Allow" when the browser asks for permission. (In Chrome, look for the question at the top of the browser window.) Click "Open" when asked if you want to save or open the .air file.

The file is large (23MB), so please be **patient** while it downloads, especially on slow connections.

* If you get an error message when installing, delete any previous Scratch 2 Offline Editor app and try again. Or, see **Optional Download**, below.

On a Mac, after installation, the program will be located in your **Applications** folder.

At the bottom of the white box is a button with the Scratch 2 logo and the text "INSTALL NOW".

Click on INSTALL NOW to start download. There are two parts: Adobe Air and Scratch Installer. These should install automatically. However, if you don't see any messages indicating the download progress, scroll down this webpage a little further to:

Optional Download

If you prefer to download the installers to your local drive:

(1) If you don't have it, download and install the latest [Adobe AIR 3.x](#). For Linux, use [AIR 2.6.0 for Linux](#) (15MB).

Note: For older Mac OSx 10.5 or below, use: [Adobe AIR 2.6.0 Mac](#) (18MB).

(2) And then download and install the [Scratch installer](#).

Appendix C

Block Summary

Scripts Costumes Sounds

Motion

- move 10 steps
- turn 15 degrees
- turn 15 degrees
- point in direction 90
- point towards
- go to x: 0 y: 0
- go to mouse-pointer
- glide 1 secs to x: 0 y: 0
- change x by 10
- set x to 0
- change y by 10
- set y to 0
- if on edge, bounce
- set rotation style left-right
- x position
- y position
- direction

Scripts Costumes Sounds

Sound

- play sound meow
- play sound meow until done
- stop all sounds
- play drum 1 for 0.25 beats
- rest for 0.25 beats
- play note 60 for 0.5 beats
- set instrument to 1
- change volume by 10
- set volume to 100 %
- volume
- change tempo by 20
- set tempo to 60 bpm
- tempo

Scripts Costumes Sounds

Operators

- + - * /
- < > =
- pick random 1 to 10
- < > =
- and or not
- join hello world
- letter 1 of world
- length of world
- mod
- round
- sqrt of 0

Scripts Costumes Sounds

Events

- when clicked
- when space key pressed
- when this sprite clicked
- when backdrop switches to backdrop
- when loudness > 10
- when I receive message1
- broadcast message1
- broadcast message1 and wait

Scripts Costumes Sounds

Looks

- say Hello for 2 secs
- say Hello
- think Hmm for 2 secs
- think Hmm
- show
- hide
- switch costume to costume2
- next costume
- switch backdrop to backdrop1
- change color effect by 25
- set color effect to 0
- clear graphic effects
- change size by 10
- set size to 100 %
- go to front
- go back 1 layers
- costume #
- backdrop name
- size

Scripts Costumes Sounds

Sensing

- touching ?
- touching color ?
- color is touching ?
- distance to
- ask What's your name? and wait
- answer
- key space pressed?
- mouse down?
- mouse x
- mouse y
- loudness
- video motion on this sprite
- turn video on
- set video transparency to 50 %
- timer
- reset timer
- x position of Sprite1
- current minute
- days since 2000
- username

Scripts Costumes Sounds

Control

- wait 1 secs
- repeat 10
- forever
- if then
- if then else
- wait until
- repeat until
- stop
- when I start as a clone
- create clone of myself
- delete this clone

Scripts Costumes Sounds

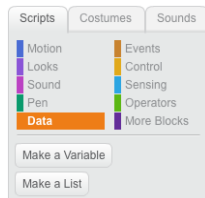
Pen

- clear
- stamp
- pen down
- pen up
- set pen color to
- change pen color by 10
- set pen color to 0
- change pen shade by 10
- set pen shade to 50
- change pen size by 1
- set pen size to 1

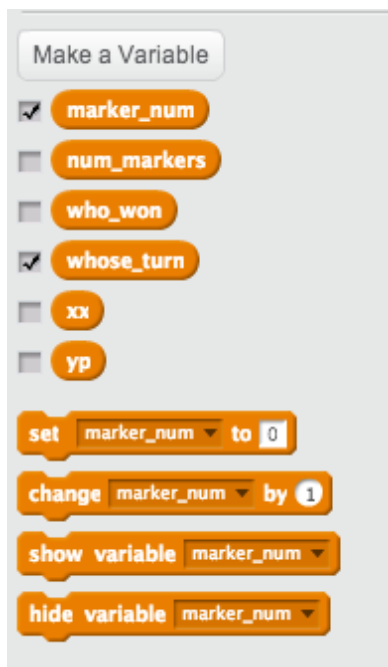
Appendix C

Block Summary

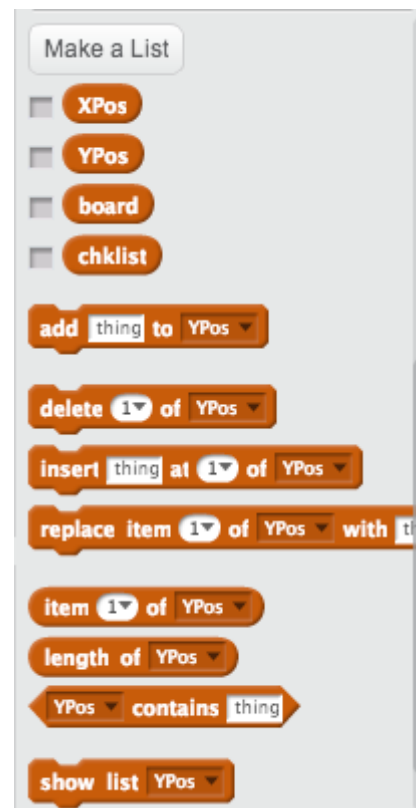
Until variables or lists are created in the Data block, no options are listed.



Once variables are created, options like the following will appear:



Once lists are created, options like the following will appear:



Appendix D

Teacher Resources

This **Scratch Quick Start Guide**:

<http://www.505access.com/wp-content/uploads/2014/03/ScratchQuickStart.pdf>

Tutorial Madness (sponsored by scratch.mit.edu):

<http://scratch.mit.edu/studios/244523/>

ScratchEd is an online community where Scratch educators share stories, exchange resources, ask questions and find people:

<http://scratch.mit.edu/educators/>

<http://scratched.media.mit.edu/>

Hour of Code Faire:

<http://scratched.media.mit.edu/stories/hour-code-faire>

<https://code.org/educate/hoc>

Create sounds with Audacity^(R), a free, open-source, cross-platform software for recording and editing sounds:

<http://audacity.sourceforge.net/>

Selected science music videos:

Nasa Johnson Style Official Music Video (parody):

<http://www.youtube.com/watch?v=hC14JryMMTU>



Space Oddity sung by Commander Chris Hadfield onboard the International Space Station:

<http://www.youtube.com/watch?v=KaOC9danxNo>

The Cell Song:

<http://www.youtube.com/watch?v=rABKB5aS2Zg>

Glossary

action	Actions are parts of a Scratch script that affect sprites or stages
hat block	Hat blocks are events in a Scratch script. These events include clicking the mouse on a specific area, pressing a specific key on an alphanumeric keyboard or upon receipt of a specific message. Scripts must start with a hat block.
remix	<p>A remix is a modification of an existing Scratch script. This may be accomplished by first loading a project in Scratch, clicking on  then on  to create a copy.</p> <p>The copy will have the same name followed by "remix-2". Note that both the See inside and Remix buttons are near the upper right corner of the Scratch window. If the user is not logged in, she will be prompted to do so.</p>
script	A collection of sequential actions associated with a sprite or stage. Note that a script may consist of multiple lists of sequential actions. Each of these lists executes simultaneously.
sprite	A character in a Scratch project.
stage	The background or backdrop associated with a Scratch project.
standalone	A version of Scratch -- or any software -- that does not require connection to another computer or network.