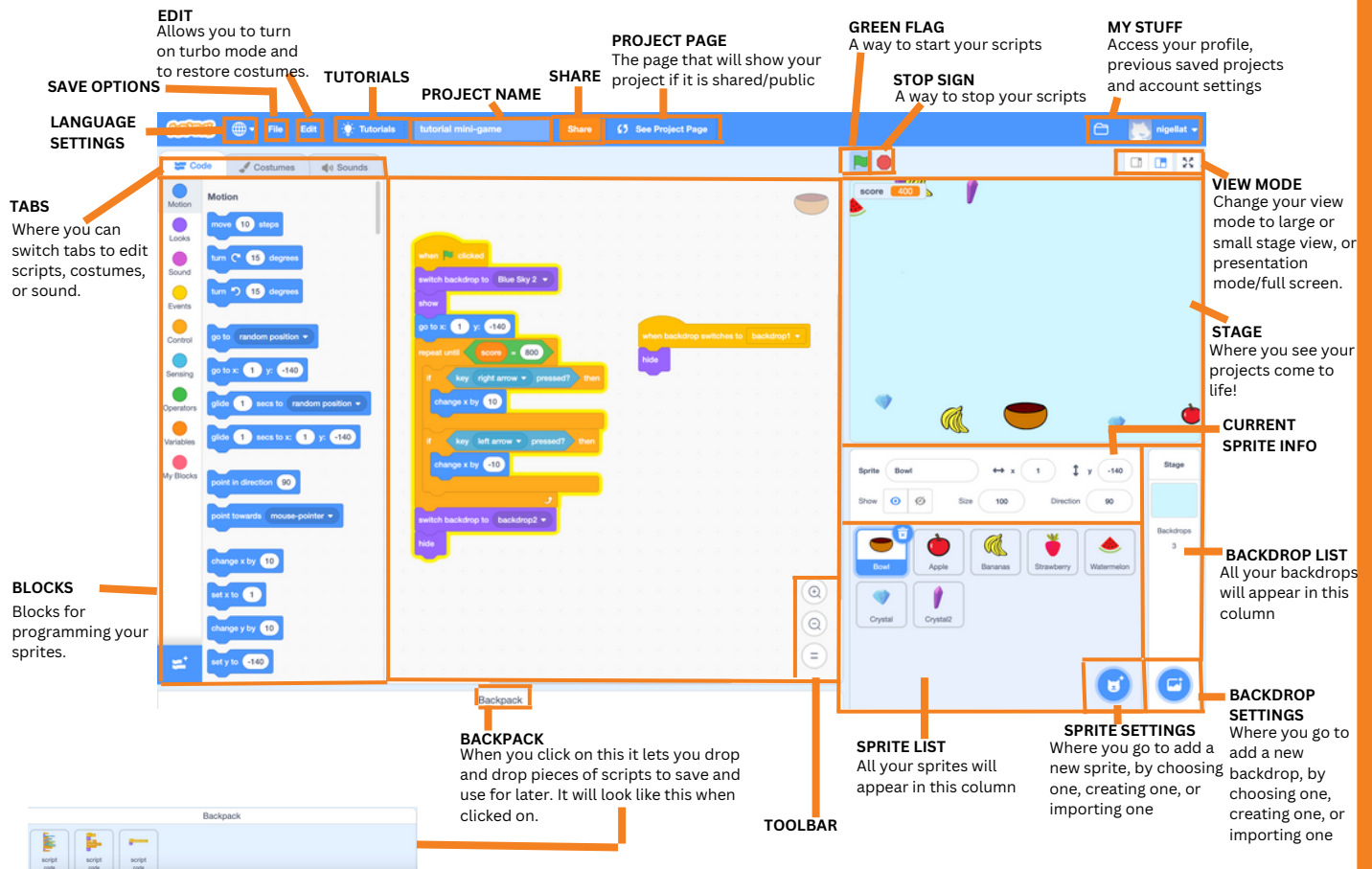# Reference Guide

SCRATCH

INTRODUCTION

The Reference Guide gives you a helping hand when you're using Scratch. It has an overview of everything you need to know when you're using Scratch.

Scratch projects are made up of objects called sprites, you give them instructions using the blocks of code. You can tell the Sprite to move, or react to other sprites, or even play sounds and music. To tell the sprite what to do, you snap together the blocks of code to create a script. When you click on a script or the green flag button (the go/start button), Scratch will run the blocks from top to bottom and the sprite will do what the script says.

SCRATCH INTERFACE

EDIT
Allows you to turn on turbo mode and to restore costumes.

SAVE OPTIONS

LANGUAGE SETTINGS

TUTORIALS

PROJECT NAME

SHARE

PROJECT PAGE
The page that will show your project if it is shared/public

GREEN FLAG
A way to start your scripts

STOP SIGN
A way to stop your scripts

MY STUFF
Access your profile, previous saved projects and account settings

TABS
Where you can switch tabs to edit scripts, costumes, or sound.

VIEW MODE
Change your view mode to large or small stage view, or presentation mode/full screen.

STAGE
Where you see your projects come to life!

CURRENT SPRITE INFO

BLOCKS
Blocks for programming your sprites.

BACKDROP LIST
All your backdrops will appear in this column

BACKPACK
When you click on this it lets you drop and drop pieces of scripts to save and use for later. It will look like this when clicked on.

SPRITE LIST
All your sprites will appear in this column

SPRITE SETTINGS
Where you go to add a new sprite, by choosing one, creating one, or importing one

BACKDROP SETTINGS
Where you go to add a new backdrop, by choosing one, creating one, or importing one

**TOOLBAR**

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STAGE

The stage is where your sprites move and interact.

The stage is made up of an x-y gride, with the (0,0) point being in the center. The dimensions of the stage are 480 units wide and 360 units tall.

You can see what the x and y position of the the sprite you have selected by checking the x-y display that is found within the current sprite information section. ↔ x -255 ↕ y -140

x:-240 y:180 x:240 y:180
x:0 y:0 y
x:-240 y:-180 x:240 y:-180
x
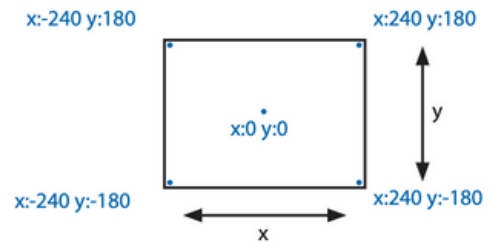
To change your view mode, you can use these buttons. The two left-most buttons change the view mode from large to small stage view. The right-most button puts it in presentation mode or full-screen view.

NEW SPRITES

When starting a new scratch project, you will start off with one cat sprite. You can create new sprites in four different ways

Importing a photo from Google or your desktop.
Letting scratch pick the sprite for you.
Drawing your own sprite using a paint editor.
Picking a sprite directly from scratch

To delete a sprite you click on the sprite you want to delete and click the garbage can icon that appears in the top right corner

SPRITE LIST
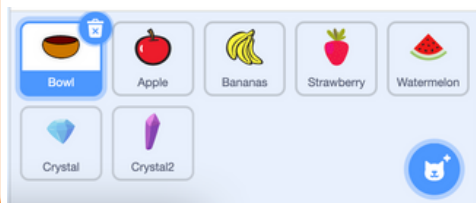
The sprite list displays all the sprites in your project. To select a sprite, you can either click on them in the list or click on the sprite itself on the stage. You can rearrange the sprites by dragging and dropping the sprite in the list to a new spot.

Reference Guide

To edit the appearance of your sprites, you can select the one you want to edit, then change the tab in the top left corner from "Code" to "Costumes."
Once that is changed, you can add a new costume or edit the previous ones you already have.

Show [show/hide buttons]
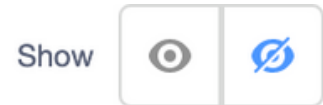
To show or hide your sprite on the stage, you can use the hide and show buttons that are found in the current sprite information.
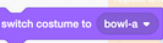
BLOCKS AND SCRIPT AREA

To program a sprite, drag and drop the blocks into the script area, and click on the blocks within the script area to play them.

You can create new scripts (programs) by snapping the block code together, and when clicked, the whole script will run from top to bottom. When you drag a block into the script area to add a block to a script, a shadow will appear to show where the block can be placed.

If you want to move a stack of block codes, drag it from the top block, if you drag it from the middle block, the code beneath it will move with it.

If you want to copy a stack of code, you can either right-click the top block and select duplicate or drag the stack of code into your backpack and drag and drop the code from there when you want to use it next.

Certain blocks will have spots within them where you can type values (such as move 10 steps) or select names of sprites or other objects in your code in a drop-down menu (such as switch costume to bowl-a). To change the values of blocks, you can click on the value you want to change and delete that and type the new one. You can also put rounded blocks within the value spots if you would like.

You can also add comments to your code by double/right clicking your code or the empty space in the script area and selecting comment, then, you can type on that yellow notepad to create your comments. Comments are helpful for jotting down ideas or what specific scripts of code may do for future reference.
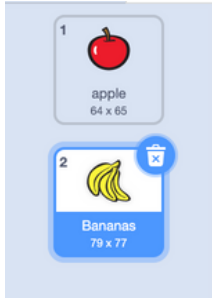
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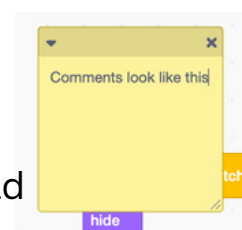
COSTUMES

A costume is used to give your sprites a new look. All you need to do is click on the costumes tab in the top left corner and then you can edit your sprite's costumes.

This sprite has two costumes, the apple and the bananas costumes. If you want to edit one of the costumes, click on the one you want to change and you can choose how you want to edit it. You can use the Paint editor, import a photo from your desktop or from Google, or choose a sprite provided by scratch.

Each costume has a costume number (the number in the top left corner). You can rearrange the order by dragging the thumbnails and the costume numbers will update to their new order.

Scratch recognizes many different file types JPG, BMP, PNG, and GIF (including animated GIF) are a few of them.

SOUNDS

If you click on the sounds tab, you can see and edit your selected sprites sounds. You can record new sounds, import sound files or pick sounds from scratch.

You can use MP3 files and uncompressed WAV, AIF, and AU files for sound.

CURRENT SPRITE INFO

Current Sprite info shows the sprites name, its x and y position, its direction, if it's visible or not, and its size. You can change all of the theses values by typing in each text box or clicking on the buttons provided. You can give the sprite a new name or change it to a bigger size, for example.
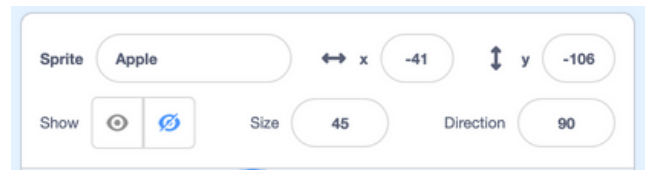
The direction indicates which way the sprite is facing and will move if you run a move block (0=up, 90=right, 180=down, -90=left). The blue line in the circle shows the direction of the sprite as well, you can change the direction by either clicking in the text box and changing the value or dragging the blue lien to a new spot.
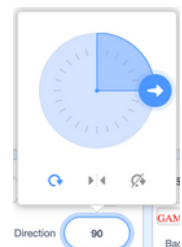
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To change the x and y position of the sprite, all you have to do is click on the text boxes holding the x or y values and manually change them. You can also drag the sprite around on the stage to change its x and y position.
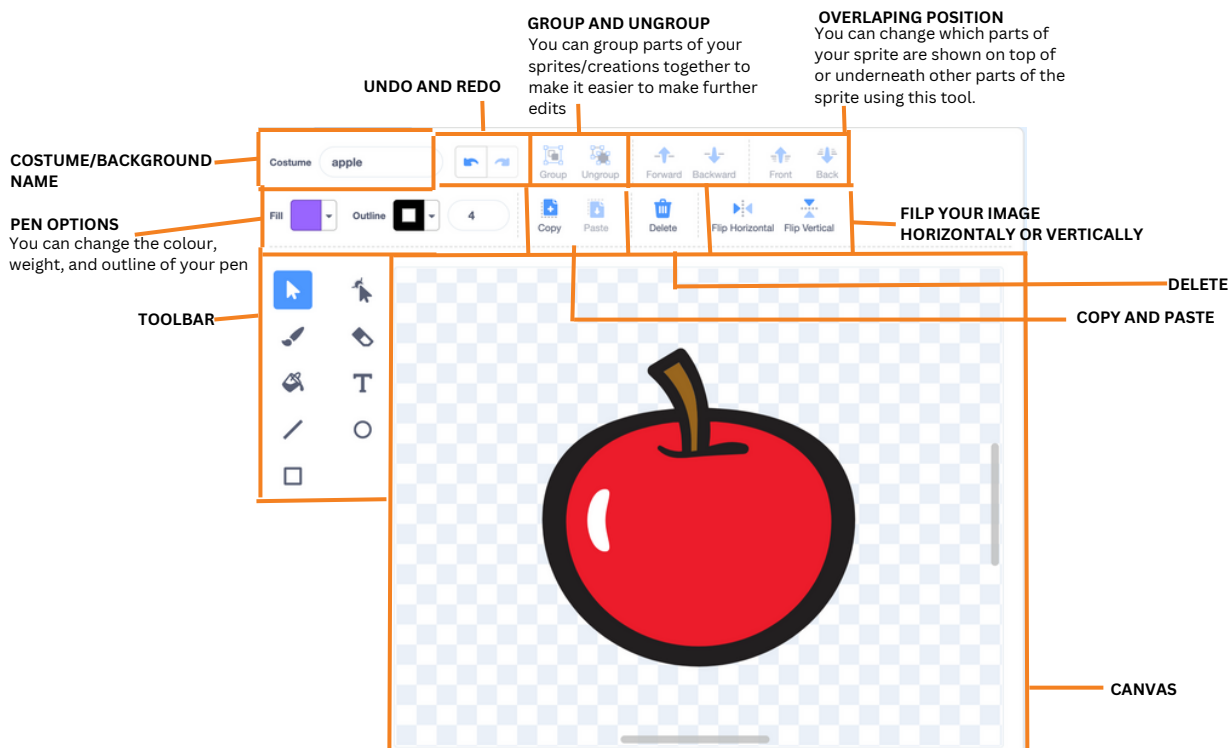
If you want to hide your sprite from view and "hide" it, all you need to do is click the ⊘ button and if you have it hidden and you want to "show" the sprite, all you need to do is click the ⊙ button.

GREEN FLAG

The green flag (when 🚩 clicked) is the most convenient and most common way to start a script. It allows you to start multiple scripts at the same time while only clicking one button, the green flag button (in the top-right corner of the stage), to be specific.

PAINT EDITOR

The scratch paint editor can be used to edit or create your own backdrops and sprites.

GROUP AND UNGROUP
You can group parts of your sprites/creations together to make it easier to make further edits

OVERLAPING POSITION
You can change which parts of your sprite are shown on top of or underneath other parts of the sprite using this tool.

UNDO AND REDO

COSTUME/BACKGROUND NAME

Costume   apple

Group   Ungroup   Forward   Backward   Front   Back

PEN OPTIONS
You can change the colour, weight, and outline of your pen

Fill   Outline   4

Copy   Paste   Delete   Flip Horizontal   Flip Vertical

FILP YOUR IMAGE HORIZONTALY OR VERTICALLY

DELETE

COPY AND PASTE

TOOLBAR

CANVAS

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The scratch paint editor has a lot of tools, most of which are self-explanatory in how they work.

The toolbar within the paint editor has many tools, the paintbrush, eraser, fill the bucket, shapes (rectangle, line, circle), selection and text.

Paintbrush: You can paint freehand using this tool. When you click on the tool, there are options to change the brush size and colour.

Eraser: You can erase with freehand strokes, the areas you erase will disappear. If you click on this tool, you have the option to change the eraser size.

Fill: This tool can help you fill connected areas with a solid colour. When you click this tool, you have the option to pick the colour.

Shapes: Helps you create basic shapes like a rectangle/square, circle and even a line. When you click on this tool, you just click on the work area and drag your mouse to make the sheep the desired proportions.

Selection: This tool is helpful for selecting certain parts of your sprite/backdrop and helps with editing it further.

There is also a + icon in the center of each element you add to the sprite, this can help you center the thing you are adding in as there is also a + icon in the center of the work area, and it will click into place if you bring the center of a sprite to the center of the work area.

To change the size of items or icons that you created or imported into the work area, all you need to do is click on the item you want to change and re-size it using the blue outline dragging in or out from the top right corner.

To flip the sprite/canvas content, you can use the Flip buttons (horizontal or vertical)

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
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SCRATCH BLOCKS

TYPES OF BLOCKS

There are three main types of blocks in Scratch.

Stack Blocks: These blocks have notches on the top and bumps on the bottom that allow them to stack together and create scripts. Some stack blocks have input areas within them, you can type a number (like this block `move 10 steps`) or choose an item from a drop-down menu (like this block `switch costume to bowl-a ▾`). Some stack blocks have a spot where you can insert other stack blocks (like this one `repeat 10`).

Hats: Hat blocks have a round top like this block `when ⚑ clicked` . These blocks are placed at the top of stacks and wait for an event to happen like the green flag is pressed, and then they run the blocks underneath them.

Reporters: Reporter blocks (like this block `x position` and `pick random -240 to 240`) are used to fill input areas of other blocks. They have rounded ends and typically report numbers or strings, they fit into blocks with rounded or rectangular holes (like this one `change x by ◯`). Some reporter blocks have pointed edges (like this one `touching Bowl ▾ ?`), these blocks report boolean values (true or false) and can fit inside any blocks with pointed or rectangular holes (like `if ⬡ then`).

Some reporters have a check box next to them (like this one `☐ speed`). If you click the check box, a display box will appear on your stage that will update automatically as the reporter's value changes. Typically this is used to display game scores using variable report blocks. This allows you to view and manipulate the values of the reporter blocks easier.

LISTS

Lists are very helpful to use when you have a lot of sprites, numbers, or strings of letters/characters that you want to group together. It can also help cut down on the amount of code you have to write because of this.

To create a list, you scroll down to the blocks section called variables, then you find and click the "Make a List" button. Then you can name the list and it will appear on your stage, you can click the "+" button and add all your objects to your list. If you want to hide the list and not show it on the stage just un select the check box beside the list.

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If you want to add to your list using the blocks, there is an add to list block (add thing to list) that you can use. You can also resize the list display that shows on the stage by dragging the bottom right corner.

STRINGS

Strings are made up of letters, characters or words (e.g. apple; bananas; strawberry). They can be stored in variables or lists and you can compare strings using ⬡ < ⬡ , ⬡ = ⬡ or ⬡ > ⬡ .

KEYBOARD INPUT

Keyboard input is when the user types a response, and that response will be stored in answer . You can use the prompt ask ⬡ and wait to ask a question that will appear on the scone, and the program waits until the user types their answer and presses the enter key or when the check mark is clicked.

The question appears in a voice balloon when used in a sprite.

The question appears at the bottom of the screen when used in the Stage.

The answers will be stored globally and change each time the prompt is run. If you want to save the current answer, you can store it within a list or a variable.
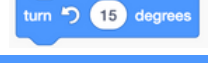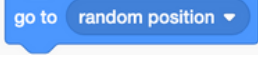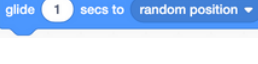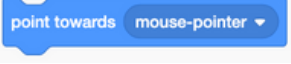
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BLOCK DESCRIPTIONS

Scratch blocks are organized into eight colour-coded categories (Motion, Looks, Sound, Events, Control, Sensing, Operators, Variables).

Motion	
move 10 steps	Moves sprite forwards or backwards.
turn ↻ 15 degrees	Rotates the sprite clockwise.
turn ↺ 15 degrees	Rotates the sprite counterclockwise.
go to random position ▾	Moves the sprite to a different position. (Random, mouse-pointer, or to another sprite)
go to x: -41 y: -106	Moves the sprite to a different set x and y position.
glide 1 secs to random position ▾	The sprite moves smoothly toward a different position. (Random, mouse-pointer, or to another sprite)
glide 1 secs to x: -41 y: -106	The sprite moves smoothly toward a different set x and y positions.
point in direction 90	The sprite points in a specified direction. (0=up, 90=right, 180=down, -90=left
point towards mouse-pointer ▾	The sprite points toward a specified object. (Mouse-pointer or another sprite)
change x by 10	Changes the sprite's x-position by a specified amount.
set x to -41	Set's the sprite's x-position to a specific value.

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change y by 10	Changes the sprite's y-position by a specified amount.
set y to -106	Set's the sprite's y-position to a specific value.
if on edge, bounce	Turns the sprite in the opposite direction when sprite touches edge of stage.
set rotation style left-right	This allows you to rotate and move your sprite in any direction you choose
x position	Reports the sprite's x-position.
y position	Reports the sprite's y-position.
direction	Reports the sprite's direction.

Looks

say Hello! for 2 seconds	Displays a speed bubble for a specific amount of time.
say Hello!	Displays a speed bubble (You. can remove this by running this block without text).
think Hmm... for 2 seconds	Displays a thought bubble for a specific amount of time.
think Hmm...	Displays a thought bubble.
switch costume to apple	Changes a sprite's appearance by switching its costume.
next costume	Changes the sprite's costume to the next costume in the costume list. (If it's at the end of the list, it will loop around to the first costume).
switch backdrop to backdrop2	Changes the stage's appearance by switching backgrounds.

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Block	Description
next backdrop	Changes the background of the stage to the next background on the background list.
change size by 10	Changes the sprite's size by a specific amount.
set size to 100 %	Sets the sprite's size to a specific % of the original size.
change color effect by 25	Changes a visual effect on the selected sprite by a specified amount. (colour, fisheye, whirl, pixelate, mosaic, brightness, ghost).
set color effect to 0	Sets a visual effect on a sprite by a specific amount. (Most effects range from 0 to 100) (colour, fisheye, whirl, pixelate, mosaic, brightness, ghost)
clear graphic effects	Gets ride of the visual/graphic effects on the sprite.
show	Make a sprite appear on the stage.
hide	Make a sprite disappear from the stage.(when its hidden other sprites can't detect it)
go to front layer	Moves the sprite in front of all other sprites.
go forward 1 layers	Moves a sprite in front or behind all other layers/sprites by a specific amount.
costume number	Reports the sprite's current costume number.
backdrop number	Reports the stage's current background number.
size	Reports the sprite's size as a % of the original size.

Sound

Block	Description
start sound Chomp	Plays a sound and immediately goes on to the next block even if the sound is still playing.
play sound Chomp until done	Plays a sound and waits until the sound finishes before continuing onto the next block.

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Block	Description
stop all sounds	Stops any sounds that are currently playing.
change pitch effect by 10	It allows you to change the effects of the sound that you are playing.
set pitch effect to 100	Sets effects onto a sound you want to play.
clear sound effects	Gets rid of any sound effects you set previously.
change volume by -10	Changes the sprite's sound volume by a specific amount.
set volume to 100 %	Sets the sprite's sound volume to a specific value.
volume	Reports the sprite's sound volume.

Events

Block	Description
when 🏴 clicked	Runs the script below when the green flag is clicked.
when space key pressed	Runs the script below when a specific key is pressed.
when this sprite clicked	Runs the scripts below when the sprite is clicked.
when backdrop switches to Blue Sky 2	Runs the scripts below when the backdrop switches to a specific backdrop.
when loudness > 10	Runs the scripts below when the loudness or the timer is greater than a specific value.
broadcast message1	Sends a message to all the sprites, then continues with the next block without waiting for the triggered scripts.
broadcast message1 and wait	Sends a message to all sprites, triggering them to do something, and waits until they all finish before continuing with next block.

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Control

Block	Description
wait `1` seconds	Waits a specific number of seconds and then continues on with the next block.
repeat `10`	Runs the blocks inside a specific number of times.
forever	Runs the blocks inside over and over.
if `  ` then	If the condition is true, then it will run the blocks inside.
if `  ` then / else	If the condition is true, then it will run the blocks inside the if portion(first part), if the condition is false, it will run the blocks inside the else(second part).
wait until `  `	Waits until the condition is true, then continues with the next block.
repeat until `  `	Checks to see if the condition is false, if it is false, it runs the blocks inside and checks the condition again. If the condition is true, it goes on to the blocks that follow.
stop `all`	Stops all scripts in the sprite.
when I start as a clone	A clone creates an exact copy of your sprite. These blocks run the blocks below once the sprite creates a clone of itself.
create clone of `myself`	This block creates an exact copy of your sprite.
delete this clone	This block deletes a clone that you've previously created.
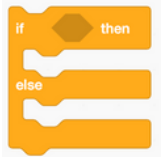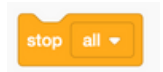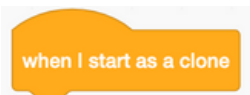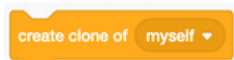
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Sensing

Block	Description
touching mouse-pointer ?	Reports true if the sprite is touching the specified sprite, edge, or mouse pointer.
touching color ?	Reports true if the sprite is touching the specific colour.
color is touching ?	Reports true if the first colour (within a sprite) is thought in the second colour (in the background or another sprite).
ask and wait	Asks a question on the screen and stores the keyboard input in the "answer" variable. The program will wait until the enter key is pressed or the check mark is clicked.
answer	Reports keyboard input from the most recent use of the "ask _ and wait" block.
distance to mouse-pointer	Reports distance from the specified sprite or mouse-pointer.
key space pressed?	Reports true if the specified key is pressed.
mouse x	Reports the x position of the mouse.
mouse y	Reports the y position of the mouse.
set drag mode draggable	Changes the dragability of a sprite.
loudness	Reports the volume of sounds detected from the computer microphone.
timer	Reports the value of the timer.
reset timer	Rests the timer back to 0.
backdrop # of Stage	Reports a value (backdrop #, backdrop name, volume, or variables) of a sprite or the stage
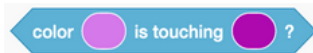
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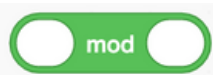
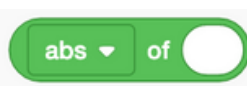|	
current year ▾	Reports the current time or date.
days since 2000	Reports how many days have passed since 2000.
username	reports the username of the sprite.

Opperators
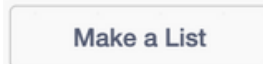
( ) + ( )	Adds two numbers.
( ) - ( )	Substracts the second number from the first number.
( ) * ( )	Multiplies two numbers.
( ) / ( )	Divides the first number by the second number.
pick random 1 to 10	Picks a random integer within the specified range.
( ) < ( )	Reports true if the first value is less than the second value.
( ) > ( )	Reports true if the first value is greater than the second value.
( ) = ( )	Reports true if two values are equal.
⬡ and ⬡	Reports true if both conditions are true.
⬡ or ⬡	Reports true if either of the conditions is true.
not ⬡	Reports true if the condition is false and reports false if the condition is true.
join apple banana	Combines the two strings.
letter 1 of apple	Reports the letter at the specified position in a string.

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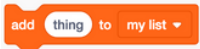|	
length of apple	Reports the number of letters in a string.
mod	Reports the remainder from the division of the first number by the second number.
round	Reports the closest integer to a number.
abs ▼ of	Reports the result of a selected function (abs, sqrt, sin, cos, tan, asin, acos, atan, ln, log, e^, 10^) applied to a specific number.

Variables

Make a Variable	Click to create and name a new variable. (When creating your first variable, the variable blocks will appear and you can choose whether the variable is for all sprites (global) or just for the one sprite (local)).
score	Reports the value of the variable. To delete a variable right, click this block and choose the delete option. Clicking the check box shows the variable of the stage, unselecting it hides it from the stage.
set score ▼ to 0	Set the variable of a specific value.
change score ▼ by 1	Change the variable by a specific value.
show variable score ▼	Show the variable on the stage.
hide variable score ▼	Hides the variable so it dose not show up on the stage
Make a List	Click on this to create and name a new list, when creating your first list the list blocks will appear and you can choose whether the list is for all sprites (global) or just for the one sprite (local)

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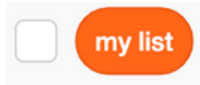
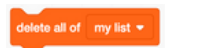| Block	Description
my list	Reports all the items in the list. To delete a list right, click this block and choose the delete option. Selecting the check box makes a list appear on the stage, and unselecting it makes it hide and not show on the stage.
add thing to my list	This adds a specific item to the end of the list.
delete 1 of my list	This deletes an item from the list
delete all of my list	This deletes all of the items in the list.
insert thing at 1 of my list	Inserts an item at a specific petition in the list.
replace item 1 of my list with thing	Replaces an item in the list in a specific spot with a specific new item.
item 1 of my list	Reports the value of a specific item in the list.
item # of thing in my list	Reports the item # of a specific item in the list.
length of my list	Reports how many items are in the list.
my list contains thing ?	Reports true is the list contains a specific item.
show list my list	Shows the list on the stage/screen.
hide list my list	Hides the list and dose not show it on the stage/screen.