

SCRATCH for Budding Computer Scientists

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Loops

In programming, a **loop** can induce multiple executions of statements. In Scratch, any block whose label begins with "forever" or "repeat" is a looping construct.

One such block is:



This construct allows us, for instance, to instruct a sprite to meow every other second:



A repeat block allows you to loop a specific number of times:



A repeat until block allows you to loop until some condition is true:



Sometimes, you want execute some statement multiple times, each time varying your behavior ever so slightly.

"if," "when," or "until"

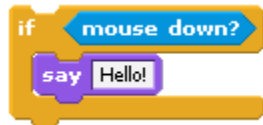
Conditions

In programming, a **condition** is something that must be true in order for something to happen. A condition is thus said to "evaluate to true" or "evaluate to false." In Scratch, any block whose label says "if," "when," or "until" is a sort of conditional construct.

One such block is:



The construct above is generally known as an "if construct." With it can we instruct a sprite to say hello only if, say, the user has depressed the mouse button:



A related construct is the "if-else construct":



With the above construct can we instruct a sprite to say hello or goodbye, depending on whether the user has depressed the mouse button:



Realize that these constructs can be nested to allow, for example, for three different conditions:



The above construct could be called an "if-else if-else construct".

Another conditional block is:



Yet another such block is:



Sometimes, you want one or more statements to be executed multiple times in a row. To implement this behavior, we turn our attention to [loops](#).

Variables

In programming, a **variable** is a placeholder for some value, much like x and y are popular variables in algebra. In Scratch, variables are represented with blocks shaped like elongated circles, uniquely labeled by you. Variables, generally speaking, can be **local** or **global**. In Scratch, a **local variable can be used by just one sprite**; a **global variable can be used by all of your sprites**.

Variables allow us, for instance, to instruct a sprite to count up from 1:




A variable that only takes on a value of true (*i.e.*, 1) or false (*i.e.*, 0), incidentally, is called a **Boolean variable**.

Lists:

<https://www.youtube.com/watch?v=qozgSqeGdV4>

List



inventory	
1	ruby
2	crystal
3	shovel
4	shoes
5	pan
6	emerald
+ length	6 =

An image of a list and example content

A **list** (also called an **array** in other programming languages) is a tool that can be used to store multiple pieces of information at once. It can also **be defined as a variable containing multiple other variables**. A

list consists of a numbers paired with [items](#). Each item can be retrieved by its paired number. List [blocks](#) can be found in the [Data blocks](#) palette.

Contents

List Blocks

Main article: [List Blocks](#)

The following blocks can be used to program lists:

- `addthingtolist` — Adds an item to a list
- `deleteloflist` — Deletes a chosen item of a list
- `insertthingatloflist` — Inserts an item at a chosen point in a list
- `replaceitemloflistwiththing` — Replaces an item in a list with a new item
- `list` — A reporter block with few uses; however, this can be used as a [Stage Monitor](#)
- `itemloflist` — A [reporter block](#) that reports what text an item in a list contains
- `item#ofthinginlist` — Reports the index in a list where an item first appears
- `lengthoflist` — A reporter block that reports how many items a list contains
- `listcontainsstring?` — A [boolean block](#) that checks if a list contains a given [string](#).
- `showlistlist` — Shows the specified list's stage monitor
- `hidelistlist` — Hides the specified list's stage monitor

Items



An image of an empty list

Items can be added to or deleted from a list manually or by programming. Holding down shift and pressing enter on a list results in a new entry above the previously selected entry, and pressing enter without the shift key creates a list entry below the previously selected one. They can also be added by right-clicking the list, clicking 'import', and selecting a plain `.txt` or [Comma Separated Values](#) file. Each line in the file will become a new item in the list.

They can also be exported in the same way; however, it is not possible to do so if the list has a name which is unsupported in the user's operating system. In Windows, lists using question marks, asterisks (*), angle brackets (< >), pipes (|), a colon (:), a space (), or any ASCII control character cannot be exported with Scratch. The first time the export button is pressed for this type of list, nothing will happen; following the second click, the import/export menu will close.^{[1][2]} The allowed characters will vary between operating systems.

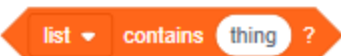
Scratch 3.0 has the following 7 List Stack blocks:

-  add thing to list
-  delete 1 of list
-  delete all of list
-  insert thing at 1 of list
-  replace item 1 of list with thing
-  show list list
-  hide list list

Scratch 3.0 has the following 4 List Reporter blocks:

-  list
-  item 1 of list
-  item # of in list
-  length of list

Scratch 3.0 has the following 1 Boolean block:

-  list contains thing?