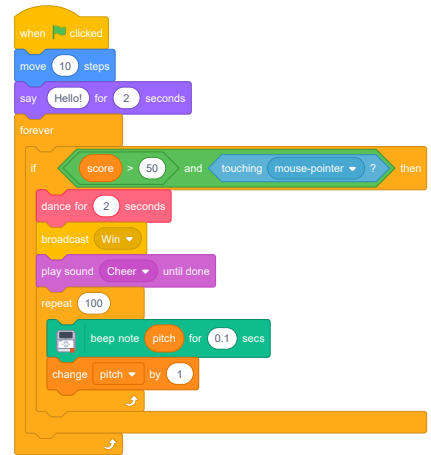


In total, there are eight Hat Blocks, five C Blocks, 34 Reporter Blocks, 14 Boolean Blocks, two Cap Blocks and 62 Stack Blocks, for a total of 125 blocks. (Block numbers do not include extensions.)

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An example of a script.

Block Shapes

There are six different block shapes: Hat, Stack, Boolean, Reporter, C and Cap.

Hat blocks

Main article: Hat Block

Hat blocks are the blocks that start every script. They are shaped with a rounded top and a bump at the bottom — this is so that a user can only place blocks below them. There are eight Hat blocks in the Scratch editor, six of which are in the Events category, one in the Control category, and one in the category My Blocks (if one has created one custom block).



The shape of a Hat block.

Stack blocks



The shape of a Stack block.

Main article: Stack Block

Stack blocks are the blocks that perform specific commands. They are shaped with a notch at the top and a bump on the bottom — this is so blocks can be placed above and below them. There are 62 Stack blocks — the most common block shape.

Boolean blocks

Main article: Boolean Block

Boolean blocks are conditions — they are either true or false. Think of them as "yes-no" questions. For example, if you asked a computer "does 2 + 2 = 4?", it would either tell you "True" or "False". With a hexagonal shape, there are 14 of these blocks.



The shape of a Boolean block.

Reporter blocks



The shape of a Reporter block.

Main article: Reporter Block

Reporter blocks are the values. Reporter blocks can hold numbers and strings. It is like asking a friend, for example, "What is 2 + 2?", and they would answer "4". It can also report a variable. For example, "What is your age?" and they may answer: "15". Shaped with rounded edges, there are 34 of these blocks — not counting the theoretically infinite amount of Reporter blocks that can be made for each variable and list.

C blocks

Main article: C Block

C blocks are blocks that take the shape of "C"s". Also known as "Wrap blocks", these blocks loop the blocks within the Cs or check if a condition is true. There are five C blocks, and they can be found in the Control category. C blocks can be bumped at the bottom, allowing blocks to be attached below, or capped, which does not allow any blocks to be placed below.



The shape of one of the C blocks.

Cap blocks



The shape of a Cap block.

Main article: Cap Block

Cap blocks are the blocks that end scripts. They are shaped with a notch at the top and a flat bottom — this is so you cannot place any blocks below them. There are two Cap blocks, which can both be found in the Control category.

Block Categories

Main article: Block Categories

Blocks are divided into 9 categories: Motion, Looks, Sound, Events, Control, Sensing, Operators, Variables, and My Blocks. Each category has blocks that perform a different function. There are also 11 extension categories that can be added to the block list by selecting them, and 3 Raspberry Pi extensions that are not available on other versions of Scratch. The block categories appear in the categories to the left of the Block Palette, and extensions will appear there when they are added.

List of Blocks








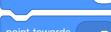
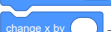

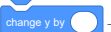

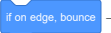
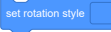



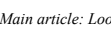
There are 125 normal blocks in Scratch 3.0 (not including extensions or hidden blocks). There are 80 extension blocks (not including Raspberry Pi blocks). There are also many Hidden Blocks that cannot be accessed normally.

Motion blocks

Main article: Motion Blocks

Motion blocks are the blocks that control a Sprite's movement. There are 17 Motion blocks in Scratch 3.0. The stage has no motion blocks, as it cannot move.

Motion has 15 stack blocks and 3 reporter blocks:

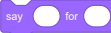



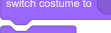
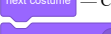

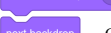
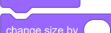




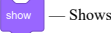
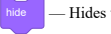





-  — Moves the sprite forward the number of steps in the direction the sprite is facing.
-  — Turns the sprite (clockwise) the specified amount.
-  — Turns the sprite (counter-clockwise) the specified amount.
-  — Moves the sprite to the mouse-pointer, a random position, or another sprite.
-  — Moves the sprite to the specified X and Y position.
-  — Glides the sprite to the mouse-pointer, a random position, or another sprite, taking as long as the specified amount of time
-  — Glides the sprite to the location, taking as long as the specified amount of time.
-  — Points the sprite in the direction.
-  — Points the sprite towards the mouse-pointer or another sprite.
-  — Changes the sprite's X position by the amount.
-  — Sets the sprite's X position to the specified amount.
-  — Changes the sprite's Y position by the specified amount.
-  — Sets the sprite's Y position to the amount.
-  — If touching the edge of the screen, the sprite's direction flips over
-  — Sets the rotation style of a sprite.
-  — The X position of the sprite.
-  — The Y position of the sprite.
-  — The direction of the sprite.

Looks blocks

Main article: Looks Blocks


Looks blocks are the blocks that control how a sprite looks. There are 23 Looks blocks in Scratch 3.0. Three of the 19 sprite Looks blocks have a counterpart for the Stage.

Looks has 18 stack blocks and 3 reporter blocks:

-  — A speech bubble appears over the sprite and stays for the specified amount of time.
-  — A speech bubble appears over the sprite and will only go away if the sprite says or thinks something else.
-  — A thought bubble appears over the sprite and stays for the specified amount of time.
-  — A thought bubble appears over the sprite and will only go away if the sprite says or thinks something else.
-  — Changes the sprite's costume to the specified one.
-  — Changes the sprite's costume to the next one in the costume list.
-  — Changes the stage's backdrop to the specified one.
-  — Like the Switch to Backdrop () block, though it waits until all of the hat blocks triggered by this have completed. (Stage only)
-  — Changes the stage's backdrop to the next one in the costume list
-  — Changes the sprite's size by the amount.
-  — Sets the sprite's size to the amount.
-  — Changes the specified effect by the amount.
-  — Sets the specified effect to the amount.
-  — Clears all graphic effects on the sprite.
-  — Shows the sprite.
-  — Hides the sprite.
-  — Puts a sprite in the front or back.
-  — Changes the sprite's layer value by the amount.
-  — The number or name of the sprite current costume in the list.
-  — The number or name of the Stage's current backdrop in the list



The block categories.








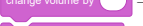

-  — The sprite's size.

Sound blocks

Main article: Sound Blocks

Sound blocks are the blocks that control sound. There are 9 Sound blocks in Scratch 3.0. The note blocks in 3.0 have been moved to the Music Extension.

Sound has 8 stack blocks and 1 reporter block:









-  — Plays a sound and pauses the script until it finishes.
-  — Plays a sound without pausing the script.
-  — Stops all playing sounds.
-  — Change the pan left/right or pitch by the amount.
-  — Set the pan left/right or pitch to the amount.
-  — Clears any sound effects currently in place.
-  — Changes the volume by the amount.
-  — Sets the volume to the amount.
-  — The volume.

Events blocks

Main article: Events Blocks

Events blocks are blocks that control events and the triggering of scripts. There are 8 Event blocks in Scratch 3.0.

Events has 6 hat blocks and 2 stack blocks:





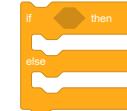





-  — When the flag is clicked, the script activates.
-  — When the specified key is pressed, the script activates. The event will only be triggered again after the event is released.
-  — When the sprite is clicked, the script activates.
-  — When the backdrop switches to the one chosen, the script activates.
-  — When the first value is greater than the second value, the script activates.
-  — When the broadcast is received, the script activates.
-  — Sends a broadcast throughout the Scratch program, activating When I Receive () blocks that are set to that broadcast.
-  — Like the Broadcast () block, but pauses the script until all scripts activated by the broadcast are completed.


Control blocks

Main article: Control Blocks

Control blocks are the blocks that control scripts. There are 11 Control blocks in Scratch 3.0.

Control has 1 hat block, 3 stack blocks, and 5 C blocks:

-  — Pauses the script for the amount of time.
-  — A loop that repeats the specified amount of times.
-  — A loop that will never end unless the Stop Sign is pressed or the script is stopped by the Stop () block.
-  — Checks the condition so that if the condition is true, the blocks inside it will activate.
-  — Checks the condition so that if the condition is true, the blocks inside the first C will activate and if the condition is false, the blocks inside the second C will activate.
-  — Pauses the script until the condition is true.
-  — A loop that will stop once the condition is true.
-  — Stops the scripts chosen through the drop-down menu. Can also be a stack block when "other scripts in this sprite" is chosen.
-  (sprites only) — This hat block is triggered whenever a clone is created, and will only be run by that clone.
-  — Creates the specified clone.




















-  (sprites only) — Deletes a clone.

Sensing blocks

Main article: Sensing Blocks

Sensing blocks are the blocks that detect things. There are 18 Sensing blocks in Scratch 3.0.

Sensing has 3 stack blocks, 5 boolean blocks, and 10 reporter blocks:



















-  — The condition for checking if the sprite is touching the mouse-pointer or another sprite.
-  — The condition for checking if the sprite is touching a specific color.
-  — The condition for checking if a color on the sprite is touching a specific color.
-  — The distance from the sprite to the mouse-pointer or another sprite.
-  — An input box appears — you type the value in and it stores the value in the  variable.
-  — The most recent input with the Ask () And Wait block.
-  — The condition for checking if the specified key is being pressed.
-  — The condition for checking if the mouse is down.
-  — The mouse-pointer's X position.
-  — The mouse-pointer's Y position.
-  — Sets the sprite to draggable or not draggable.
-  — How loud the noise is that the microphone is sensing.
-  — How much time has passed since the Scratch program was opened or the timer reset.
-  — Resets the timer.
-  — The X position, Y position, direction, costume, size or volume of the Stage or a sprite.
-  — The specified time unit selected.
-  — The number of days since 2000.
-  — The username of a user.

Operators blocks

Main article: Operators Blocks

Operators blocks are the blocks that perform math functions and string handling. There are 18 Operators blocks in Scratch 3.0.

Operators has 7 boolean blocks and 11 reporter blocks:

-  — The value of the addition.
-  — The value of the subtraction.
-  — The value of the multiplication.
-  — The value of the division.
-  — Picks a random number between the two limits.
-  — The condition for checking if a value is greater than the other.
-  — The condition for checking if a value is less than the other.
-  — The condition for checking if two values are equal.
-  — True if both conditions are true.
-  — True if either condition is true.
-  — Makes the condition checked if it is false, not true, or true, not false.
-  — The two values put right next to each other.
-  — The specified character of the value.
-  — The length of the value.
-  — Checks if the first parameter's text contains the second parameter's text — if it does, the block returns true.
-  — The remainder of the division.
-  — Rounds the value to the nearest whole number.
-  — The absolute value (abs), square root (sqrt), sine (sin), cosine (cos), tangent (tan), asine (asin), acosine (acos), atangent (atan), natural logarithm (ln), logarithm (log), exponential function (e^x), or base 10 exponential function (10^x) of a specified value.






Right-clicking some of the blocks will yield more choices of its type.

Variables blocks

Main article: Variables Blocks

Variables blocks are the blocks that hold variables and lists. There are 5 Variables blocks and 11 list blocks in Scratch 3.0.













Variables has 4 stack blocks and one reporter block for each variable created:

-  — The variable's value.
-  — Sets the specified variable to the amount.
-  — Changes the specified variable by the amount.
-  — Shows the variable's Stage Monitor.
-  — Hides the variable's Stage Monitor.

List blocks

Main article: List Blocks

List has 7 stack blocks, 3 reporter blocks (one additional reporter block for each list created), and 1 boolean block:

-  — The list's value.
-  — Adds an item to the list (the item goes at the bottom of the list of items) with the specified content in it.
-  — Deletes the item of the list.
-  — Deletes all items of the list.
-  — Adds an item to the list (the item goes where you specify in the list of items) with the specified content in it.
-  — Replaces the item's content with the specified content.
-  — The item's value.
-  — Reports the index in a list where an item first appears.
-  — How many items there are in the specified list.
-  — The condition for checking if an item's content is the specified text.
-  — Shows a list.
-  — Hides a list.

My Blocks

Main article: My Blocks

My Blocks (also known as Custom Blocks), are user-made custom blocks. There are 4 different, unique kinds of My Blocks in Scratch 3.0. Scratch 3.0 has the following My Blocks Hat block:

-  — Defines a custom block.


Scratch 3.0 has the following My Blocks Stack block:

-  — A custom block.

Scratch 3.0 has the following My Blocks Boolean block:

-  — A true/false value.

Scratch 3.0 has the following My Blocks Reporter block:

-  — An input for a value, set by the definition My Block.

Extensions

Main article: Extension




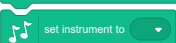
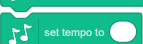
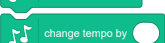

Scratch 3.0 has a number of extensions that can be added to the block list. To choose an extension, press the blue button below the regular block sections.

Music Extension

Main article: Music Extension

The Music extension allows one to play MIDI Notes with different instruments. There are seven Music extension blocks in Scratch 3.0.





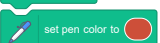


Scratch 3.0 has six Music stack blocks and one Music reporter block:

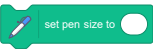
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Pen Extension

Main article: Pen Extension

The Pen extension allows one to draw on the stage with the pen. Scratch 3.0 has nine Pen stack blocks:

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- 
- 
- 
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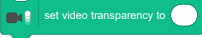
-  set pen size to

Video Sensing Extension

Main article: Video Sensing Extension

The Video Sensing extension lets projects interact with a webcam. There are four Video Sensing blocks in Scratch 3.0.

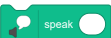
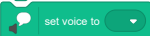

Scratch 3.0 has one Video Sensing hat block, one reporter block, and two stack blocks:

-  when video motion >
-  video on
-  turn video
-  set video transparency to

Text to Speech Extension

Main article: Text to Speech Extension

The Text to Speech extension allows text to be read aloud. Scratch 3.0 has three Text to Speech stack blocks:

-  speak
-  set voice to
-  set language to

Translate Extension

Main article: Translate Extension

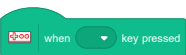
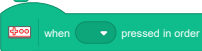
The Translate extension allows text to be translated to other languages. Scratch 3.0 has two Translate reporter blocks:

-  translate to
-  language

Makey Makey Extension

Main article: Makey Makey Extension

The Makey Makey extension lets projects interact with the Makey Makey. Scratch 3.0 has two Makey Makey hat blocks:

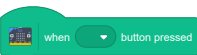


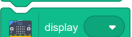
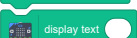



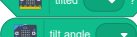
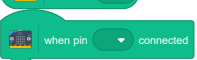
-  when key pressed
-  when pressed in order

micro:bit Extension

Main article: micro:bit Extension

The micro:bit extension lets projects interact with the micro:bit. There are 10 micro:bit blocks in Scratch 3.0.

Scratch 3.0 has four micro:bit hat blocks, three stack blocks, two boolean blocks, and one reporter block:

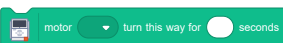
-  when button pressed
-  button pressed?
-  when
-  display
-  display text
-  clear display
-  when tilted
-  tilted?
-  tilt angle
-  when pin connected

LEGO MINDSTORMS EV3 Extension

Main article: LEGO Mindstorms EV3 Extension

The LEGO MINDSTORMS EV3 extension lets projects interact with the LEGO MINDSTORMS EV3. There are 11 EV3 blocks in Scratch 3.0.

Scratch 3.0 has four EV3 stack blocks, three hat blocks, three reporter blocks, and one boolean block.

-  motor turn this way for seconds

- motor set power %
- motor position
- when button pressed
- when distance <
- when brightness <
- button pressed?
- distance
- brightness
- beep note for secs

LEGO BOOST Extension

Main article: LEGO BOOST Extension

The LEGO BOOST extension lets projects interact with the LEGO BOOST. There are 12 LEGO BOOST blocks in Scratch 3.0.

Scratch 3.0 has seven Lego BOOST stack blocks, two reporter blocks, two hat blocks, and one boolean block:

- turn motor for seconds
- turn motor for rotations
- turn motor on
- turn motor off
- set motor speed to %
- set motor direction
- motor position
- when brick seen
- seeing brick?
- when tilted
- tilt angle
- set light color to

LEGO Education WeDo 2.0 Extension

Main article: LEGO Education WeDo 2.0 Extension

The Lego Education WeDo 2.0 extension lets projects interact with the LEGO WeDo Construction Set. There are 11 blocks in Scratch 3.0.

Scratch 3.0 contains six Lego Education WeDo 2.0 stack blocks, two hat blocks, two reporter blocks, and one boolean block:

- turn on for seconds
- turn on
- turn off
- set power to
- set direction to
- set light color to
- when distance <
- when tilted
- distance
- tilted ?
- tilt angle

Go Direct Force & Acceleration Extension

Main article: Go Direct Force & Acceleration Extension


The Go Direct Force & Acceleration Extension allows users to interact with the Go Direct force sensor.

Scratch 3.0 contains 4 Go Direct Force & Acceleration reporter blocks, three hat blocks, and two boolean blocks.

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- when force sensor
- force
- when tilted
- tilted ?
- tilt angle
- falling?
- spin speed
- acceleration

Raspberry Pi Only Extensions



This article or section documents something only available on the Raspberry Pi version of Scratch 3.0.

Main article: *Raspberry Pi*

There are also three extensions that are only available on the Raspberry Pi version of Scratch.

Raspberry Pi GPIO Extension

Main article: *Raspberry Pi GPIO Extension*

Scratch 3.0 contains 2 Raspberry Pi GPIO stack blocks, one hat block, and one boolean block.

- when gpio 0 is high
- gpio 0 is high ?
- set gpio 0 to output high
- set gpio 0 to input pulled high

Raspberry Pi Sense HAT Extension

Main article: *Raspberry Pi Sense HAT Extension*

Scratch 3.0 contains ten Raspberry Pi Sense HAT stack blocks, three hat blocks, one boolean block, and six reporter blocks.

- display text Hello!
- display character A
- display
- display sprite
- display stage
- clear display
- set colour to
- set background to
- set pixel x 0 y 0 to
- set rotation to 0 degrees
- when joystick pushed up
- joystick pushed up ?
- when shaken
- when tilted forward
- temperature
- pressure
- humidity
- roll
- pitch
- yaw

Raspberry Pi Simple Electronics Extension

Main article: *Raspberry Pi Simple Electronics Extension*

Scratch 3.0 contains two Raspberry Pi Simple Electronics stack blocks, one boolean block, and one hat block.

- when button 0 is pressed
- button 0 is pressed ?
- turn LED 0 on

Scratch Block Plugin

Main article: Block Plugin

The Block Plugin allows one to write blocks and scripts to appear on the Scratch Forums and Scratch Wiki, as well as other websites with the included JavaScript. It is written by the Scratcher blob8108. The dedicated forum topic for testing this plugin out can be found [here](#).

In Other Programming Languages

Scratch is one of the original languages ever to use blocks, inspiring other languages to inherit the idea. Scratch modifications contain many new blocks typically that are not present in Scratch. MIT, where Scratch is made, has also created other languages using blocks such as the MIT App Inventor (<http://appinventor.mit.edu/explore/>). Stencyl (<http://www.stencyl.com>) is a highly-professional language that features an entire block interface for programming real-time apps and online games. Scratch Jr also has blocks which are even more friendly for younger children to understand.

See Also

- Edit Block Colors

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