

# Scratch Cheatsheet

## What is Scratch?

Scratch is a block-based visual programming language used to create animations, games, and interactive stories. Code blocks are dragged and placed together to create code.

## Key terms & sections

**Sprite:** an image that can be programmed to move, respond to events, and interact with other sprites (eg. game character, ball, paddle)

**Stage:** background of the project

**Code (Block Palette):** code blocks

**Costumes:** customize what Sprite looks like and/or create multiple costumes for the Sprite to change between

**Sounds:** add sounds to the project

## Block Palette

**Motion:** used to control Sprite's movement

**Looks:** used to define how the Sprite and background will look (set/ change size, change color, switch costumes/backgrounds)

**Sound:** used to control sounds in project (play/ stop sounds, change volume or pitch)

**Events:** used to define when blocks of code should run

**Control:** used to control Sprite under certain conditions with conditional statements, loops, and repeats

**Sensing:** used to determine the location of mouse-pointer, if a key is pressed, and whether a Sprite is touching a specific colour or another Sprite

**Operators:** used to compare variables and values with mathematical and logical operators

Logical operator:

- **AND**
  - true AND true → true
  - true AND false → false
  - false AND false → false
- **OR**
  - true OR true → true
  - true OR false → true
  - false OR true → true
- **NOT**
  - NOT true → false
  - NOT false → true

**Variables:** make your own variable (eg. number, text string, boolean TRUE or FALSE value)

**My Blocks:** make your own block by combining multiple blocks to create a single block

## Loops

What are Repeat loops?

- Allows you to repeat a set of actions a certain number of times

What are Forever loops?

- A loop that repeats the action inside it forever
- Useful for making something happen continuously

How to create a loop

- Using Repeat block
  - Go to Control and drag and drop the “repeat” block
  - Set the number of times you want the action to repeat
  - Place code blocks you want repeated inside the “repeat” block
- Using Forever block
  - Go to Control and drag and drop the “forever” block
  - Place the code blocks you want repeating indefinitely forever inside the “forever” block

## If statements

What is an If statement?

- Checks if a certain condition is true
  - If condition is met, the code inside the “if” block will run
  - Otherwise, the code inside the “if” block does NOT run and the program moves to the next set of code blocks after the “if” statement

What is an If-Else statement?

- Extends the “if” statement by providing an alternative set of code for the program to follow the condition is false
  - If the initial condition is true, the code inside the “if” block will run
  - Otherwise, the code in the “else” block runs

How to create an If statement

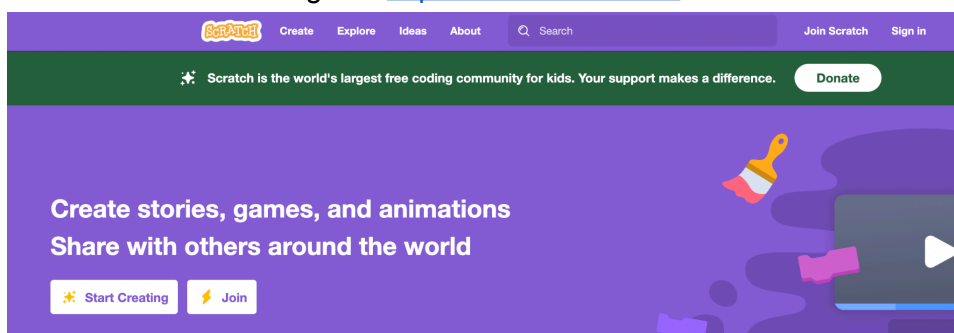
- Creating an If statement
  - Go to Control and drag and drop the “if” block
  - Place the condition you want to check inside the hexagonal space in the “if” block
  - Add the code blocks you want to run when the condition is true inside the “if” block
- Creating an If-Else statement
  - Go to Control and drag and drop the “if-else” block
  - Place the condition you want to check inside the hexagonal space in the “if” block
  - Add the code blocks you want to run when the condition is true inside first section of the “if” block
  - Add the code blocks you want to run when the condition is false inside second section of the “if” block (under “else”)

## Tips for creating a game

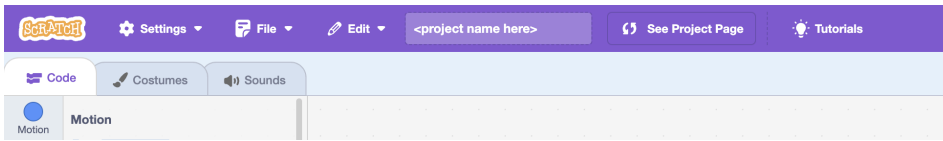
1. Player controls
  - Use “When green flag clicked” or “when key pressed” blocks to start game
  - Use the “forever” block to keep certain actions of behaviours ongoing throughout the game
  - Move sprites using “move”, “turn”, “go to” blocks
2. Collision detection
  - Use “if” and “touching” blocks to detect collision between sprites or if touching edge or mouse-pointer
3. Using mouse to control sprite
  - Go to Events and drag and drop the “when green flag clicked” block
  - Go to Control and put the “forever” block under the previous block
  - Go to Motion and place the “set x to” block inside the “forever” block
  - Go to Sensing and put the “mouse x” (to move horizontally) or “mouse y” (to move vertically) inside the hexagonal space in the “set x to” block
4. Generating a random number
  - Go to Operators and drag and drop the “pick random” block.
    - i. Enter the minimum and maximum value that you want the random number to generated between
5. Score keeping
  - Create a variable for the score and update using “change <variable> by <value>”
6. Stop game
  - Go to Control and drap and drop the “stop all” block
7. Game over
  - Use “if” block to check a game over condition and send game over message using “broadcast” block
8. Debug
  - Use the “say” block in your code to display variable values or messages to see the current state/value of variables or where the scripte is in your project
  - Use the stop sign to stop the program

## Getting started

1. Create an account or sign in: <https://scratch.mit.edu/>

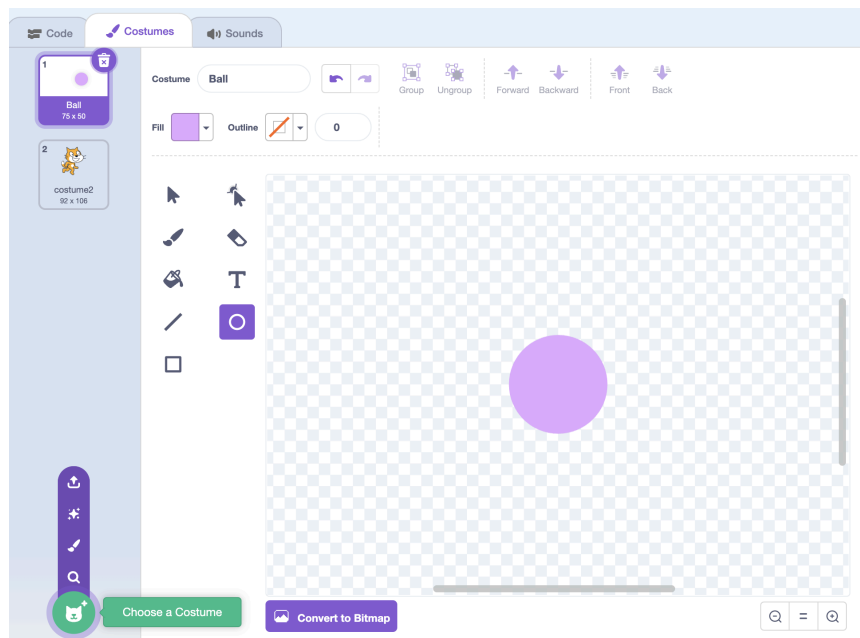


2. Click “Create” and name your project

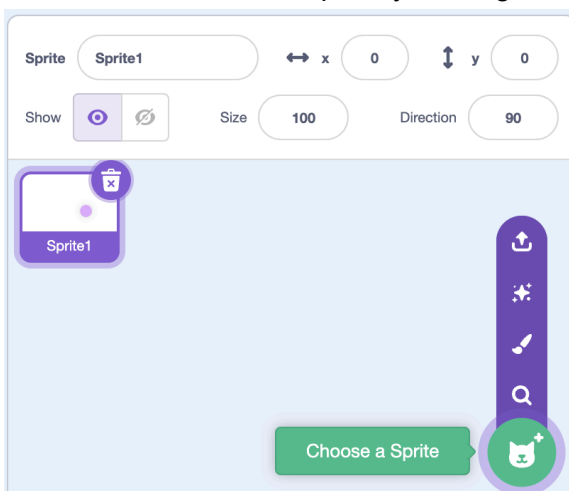


## Example: paddle game

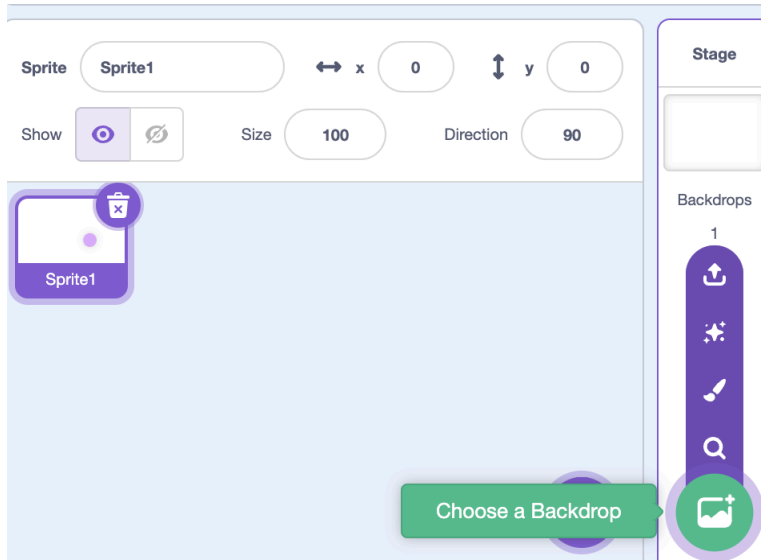
1. Click “Costume” to customize your Sprite
  - 1.1. Click the cat icon on the lower left to create a costume for your Sprite
  - 1.2. Using “Paint” or “Upload”, create a “Ball” Sprite and name it



2. Create a new “Paddle” Spite by clicking the cat icon on the lower right



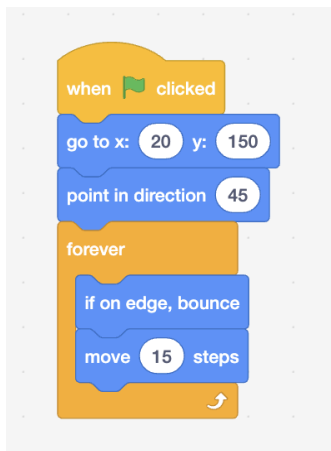
3. Add a backdrop by clicking the image icon lower right



4. Select the “Ball” Sprite

4.1. **Start the game:** Go to Events and drag the “when flag clicked” block

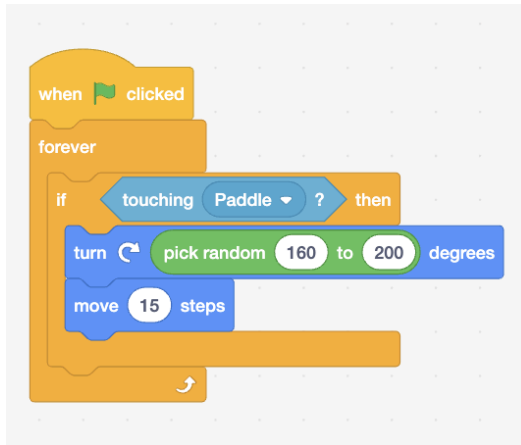
- 4.1.1. Go to Motion and drag the “go to x and y” and “point in direction” blocks to move the ball
- 4.1.2. Go to Control and drag the “forever” block and add “if on edge, bounce” and “move steps” inside the “forever” block
- 4.1.3. Changing the number of steps moved changes the speed of the ball
- 4.1.4. All code blocks inside that loop will run forever



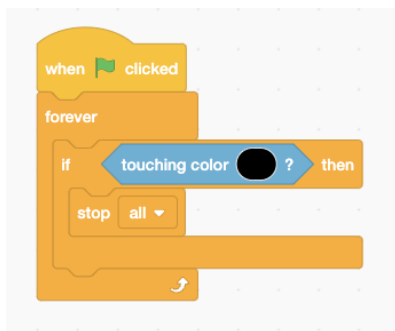
4.2. **Moving the ball once it hits the paddle:** Starting a new block of codes, drag and drop the “when flag clicked” block

- 4.2.1. Drag the “forever” block under the previous block
- 4.2.2. Go to Control and place the “if” block inside the “forever” block
- 4.2.3. Go to Sensing and place the “touching” block inside the hexagonal space in the “if” block and select “Paddle” from the “touching” block’s dropdown menu
- 4.2.4. Go to Motion and drag the “turn” block and place it inside the “if” block

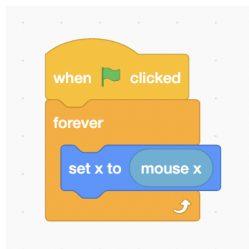
- 4.2.5. Go to Operators and put the “pick random” block inside the “turn” block, add the range for the random degree value
- 4.2.6. Go to Motion and place the “move” block under the “turn” block (keep the number of steps consistent)



- 4.3. **End game once the ball sits the floor:** Starting another new block of codes, drag and drop the “when flag clicked” block
  - 4.3.1. Drag the “forever” block under the previous block
  - 4.3.2. Drop the “if” block inside the “forever block”
  - 4.3.3. Go to Sensing and put the “touching color” block inside the hexagonal space in the “if block” and set the color to the color of the bottom of your background
  - 4.3.4. Go to Control and drag and drop the “stop all” block inside the “if” block



5. Select the “Paddle” Sprite
  - 5.1. **Move the paddle:** Drag the “when flag clicked” block
    - 5.1.1. Place the “forever” block under the previous
    - 5.1.2. Go to Motion and drop the “set x to” block inside the “forever” block
    - 5.1.3. Go to Sensing and put the “mouse x” block inside the “set x to” block



6. Start the game by pressing the green flag at the top right

