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 → false

- **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 drag 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 script 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” Sprite 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

Resources: Scratch website