

```
on start
  set cherry to sprite of kind Food
  set cherry position to x pick random 0 to 160 y pick random 0 to 120
```

```
let cherry = sprites.create(img, SpriteKind.Food)
cherry.setPosition(Math.randomRange(0, 160), Math.randomRange(0, 120))
```

Microsoft MakeCode

< Instructor Name >

< Title >

How to create an Arcade Game





Microsoft MakeCode



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makecode.com

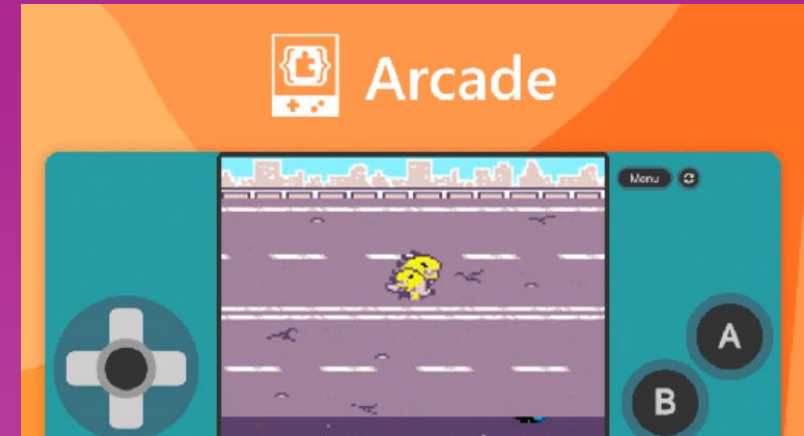
Three Main Code Editors



Physical Computing with micro:bit

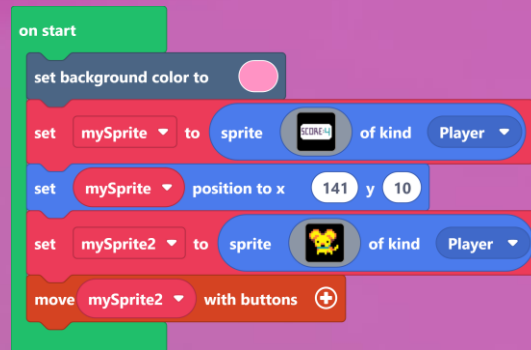


Mods in Minecraft

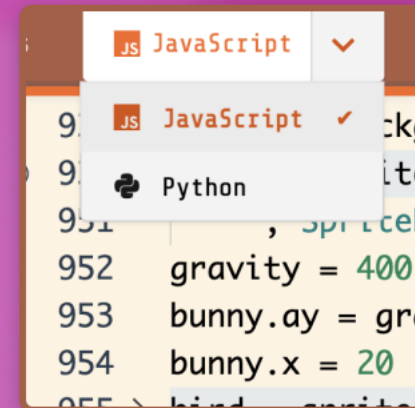


Retro Arcade Games

Blocks



Text



What is an Arcade game?

History of Arcade Games

An arcade game is a coin-operated video game machine installed in a public place like a restaurant, or an amusement park. Arcade games rose to popularity in the 1970's and 1980's.



The two paddles return the ball back and forth. The score is kept by the numbers (0 and 1) at the top of the screen.

The first successful Arcade game was called Pong, created by Atari in 1972.

Examples of Arcade Games?

Pac-Man



Space Invaders

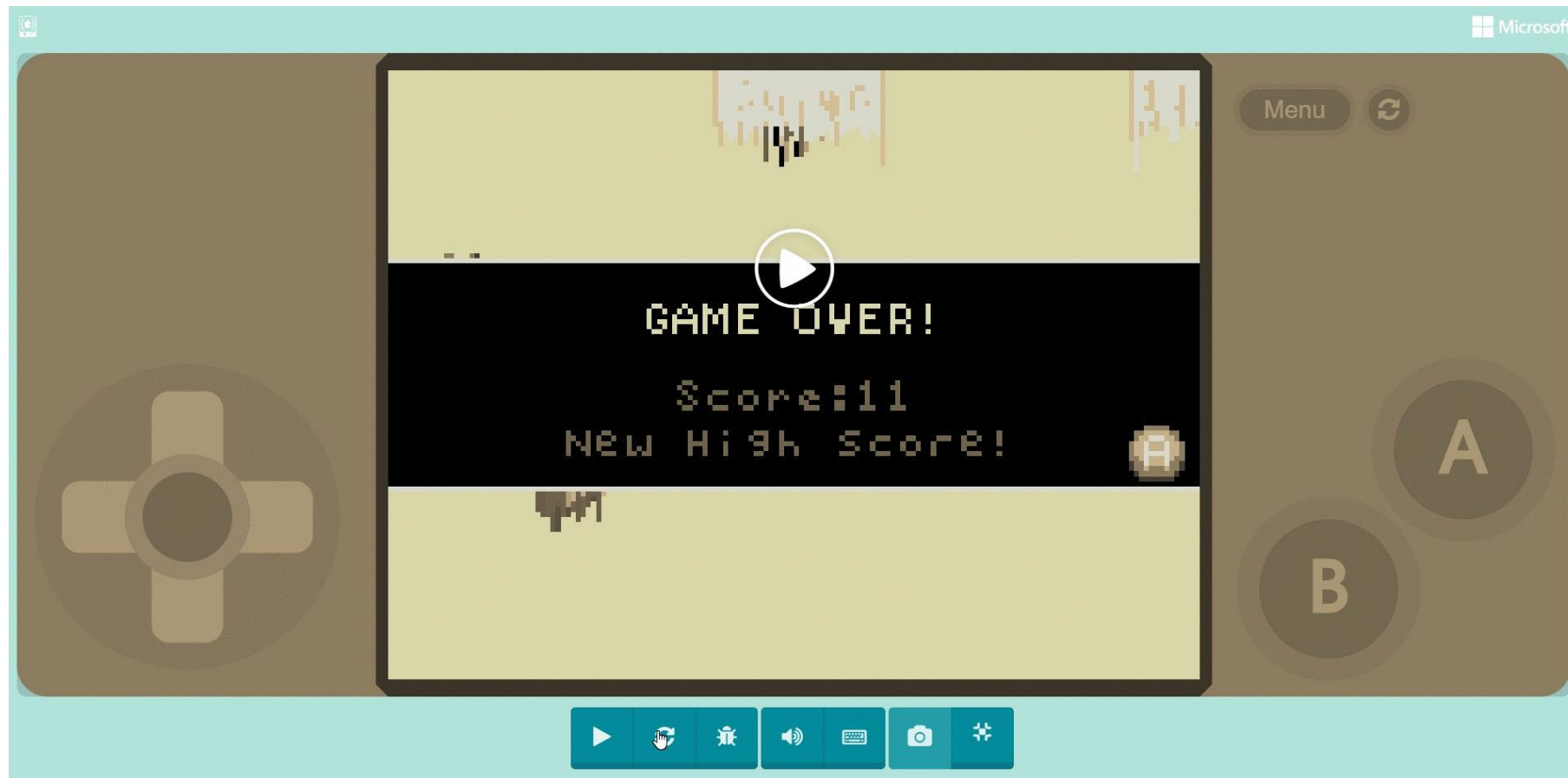


Donkey Kong



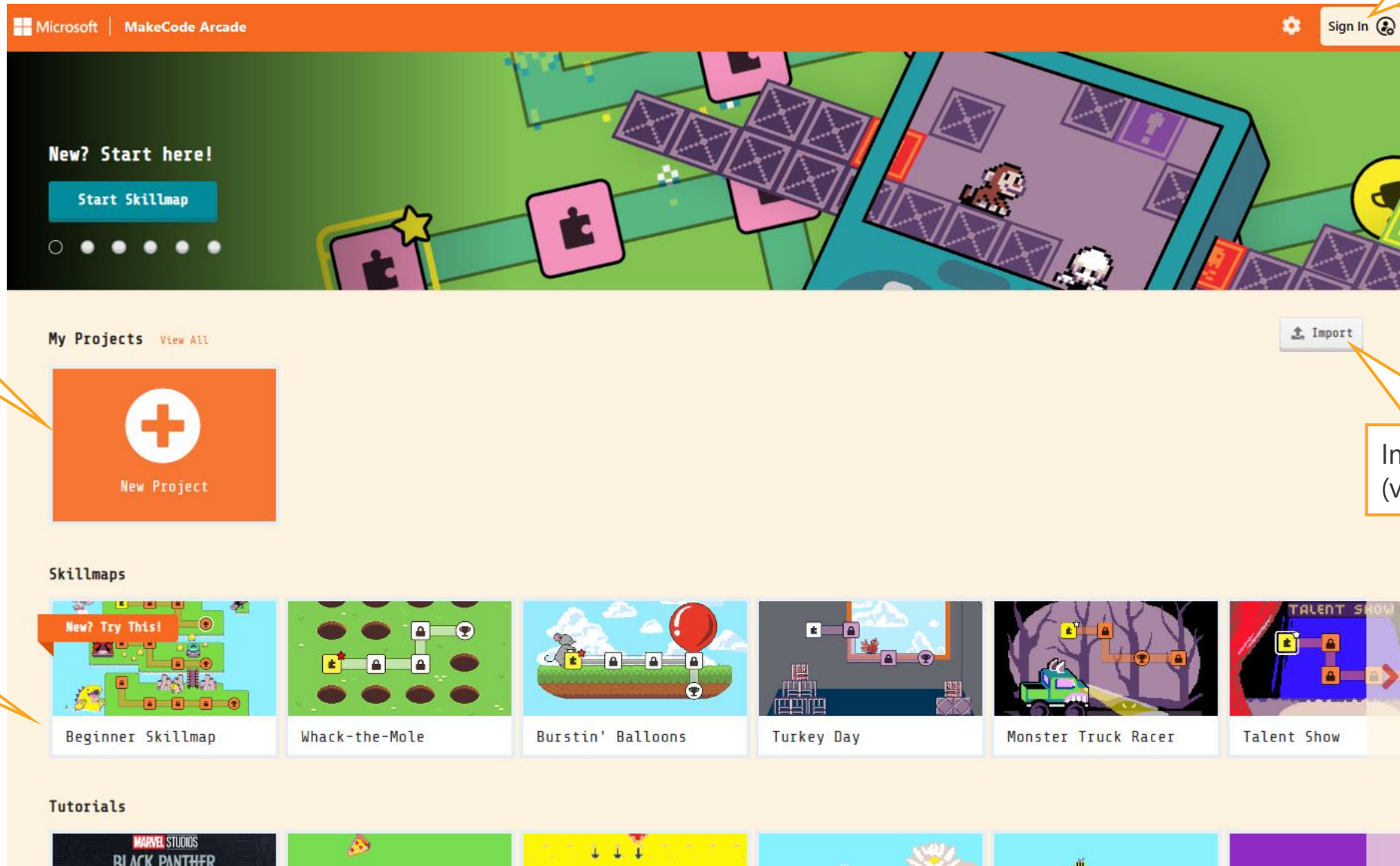
Let's code a game!

Eat the Fruit – move your sprite around the screen and eat as much fruit as you can before the time runs out!



Open Browser: arcade.makecode.com

Optionally sign in to save to projects cloud



Create a New blank Project

Import Projects (via a File, or URL)

Step-by-step Skillmaps and Tutorials

Create a New Project

Microsoft | MakeCode Arcade

Sign In

New? Start here!

Start Skillmap

My Projects [View All](#)

Import

Your project needs a name 😊 😊

Give your project a name.

eat fruit!

Create ✓

Skillmaps

New? Try This!

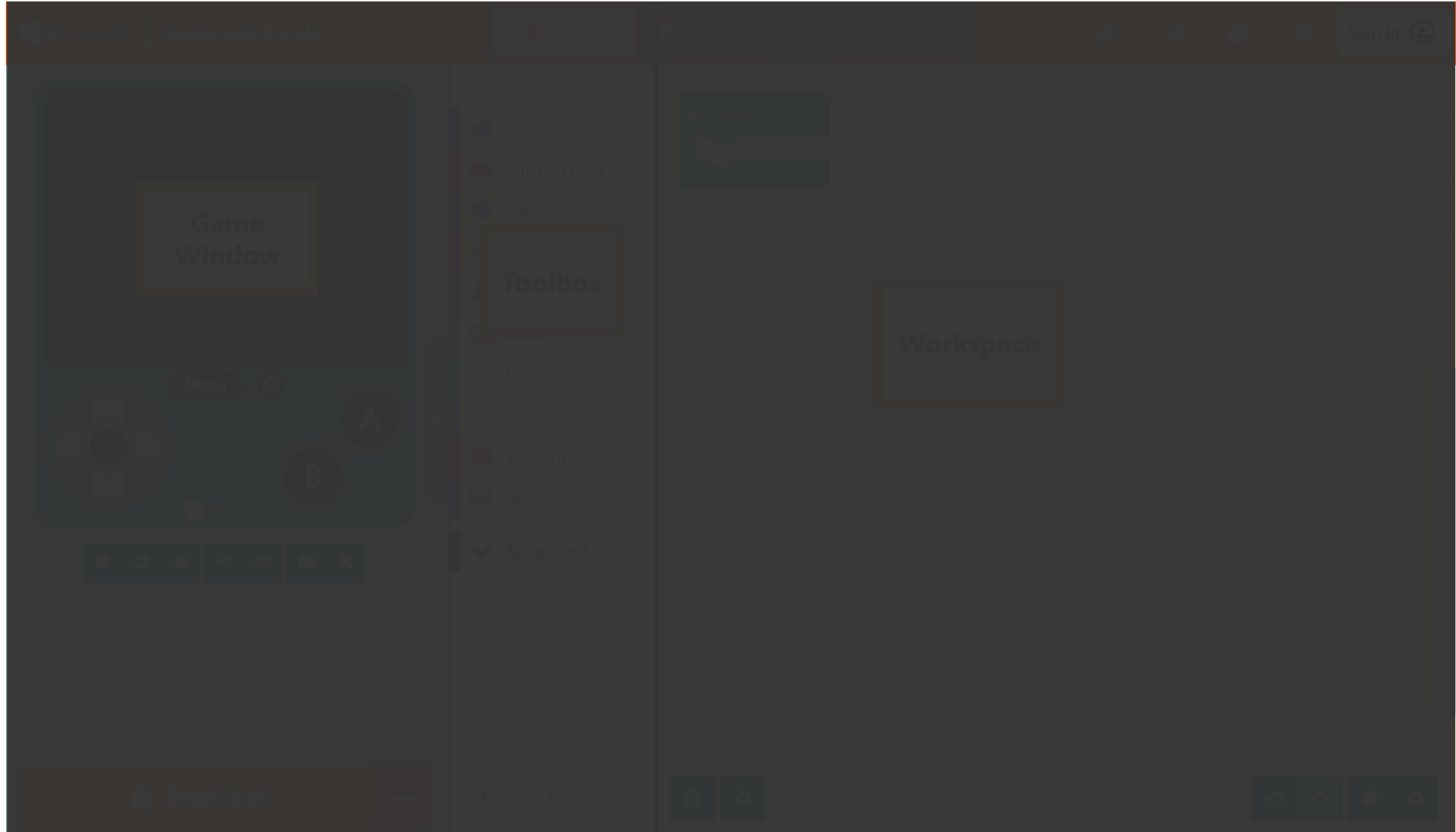
Beginner Skillmap Whack-the-Mole Burstin' Balloons Turkey Day Monster Truck Racer Talent Show

Tutorials

MARVEL STUDIOS BLACK PANTHER

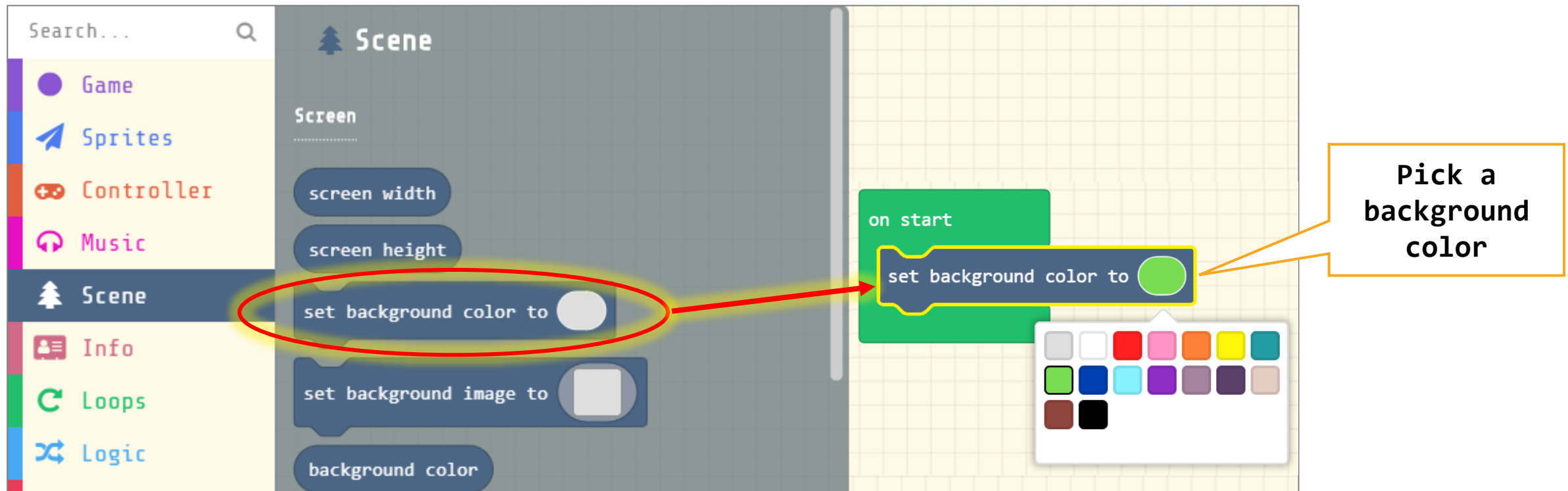
Click on
New Project →

Getting familiar with MakeCode Arcade



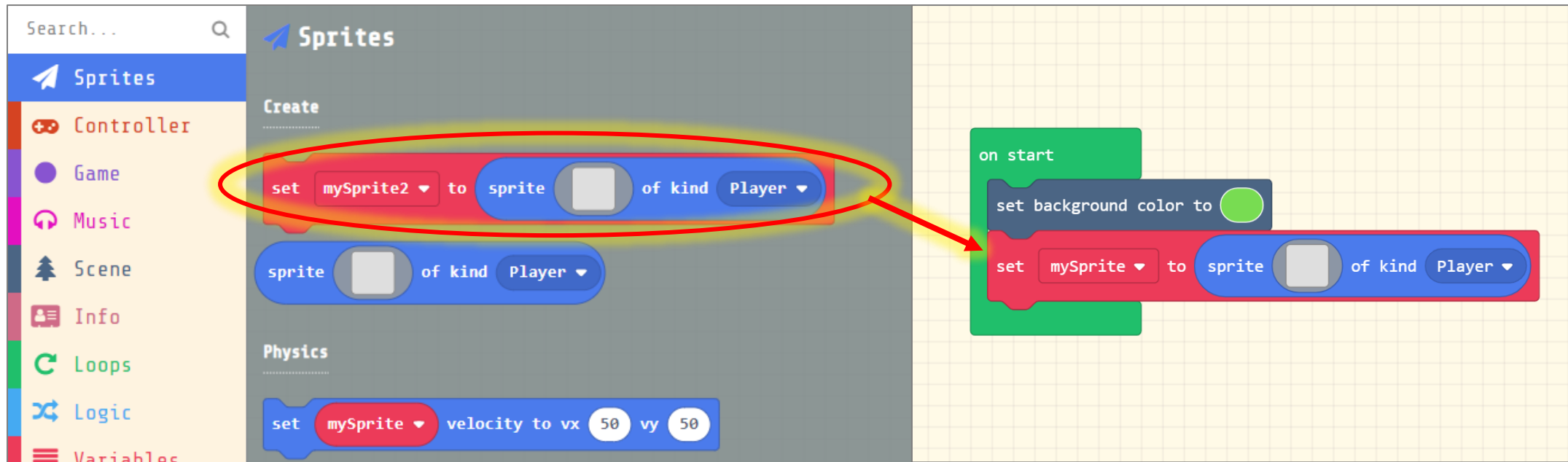
Set the background

- From the **Scene** Toolbox drawer, drag a **Set Background Color** onto the Workspace
- Drop into the **On Start** block



Create a Player Sprite

- From the **Sprites** Toolbox drawer, drag a **Set** sprite block onto the Workspace
- Drop into the **On Start** block after the **Set Background** block



Sprites



any object in a game that has properties and behaviors

Set Sprite block

The image shows a Scratch script starting with an 'on start' block. Inside this block, there are two other blocks: 'set background color to' with a green color picker, and 'set mySprite to sprite of kind Player'. The 'set mySprite to sprite of kind Player' block has a grey square icon for the sprite image and a dropdown menu for the kind.

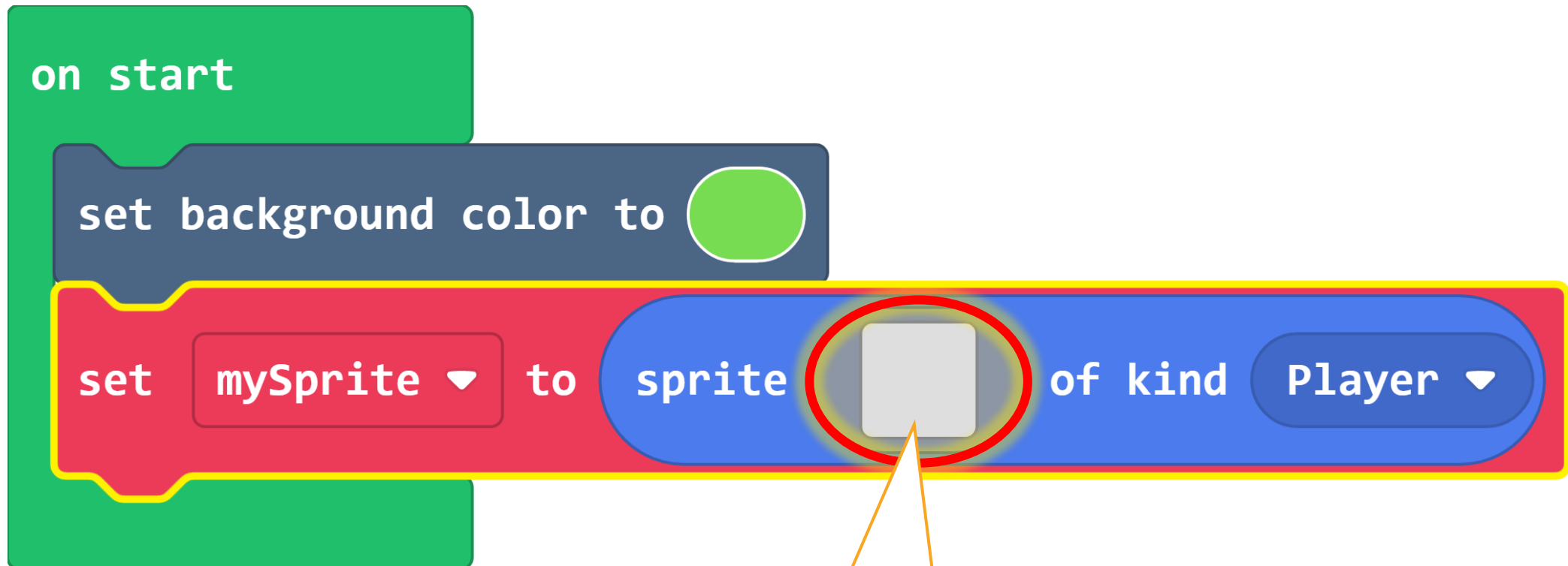
Whatever code is in the On Start block will run immediately when program starts

Sprite name

Sprite image

Sprite kind
(or the type of Sprite in your game)

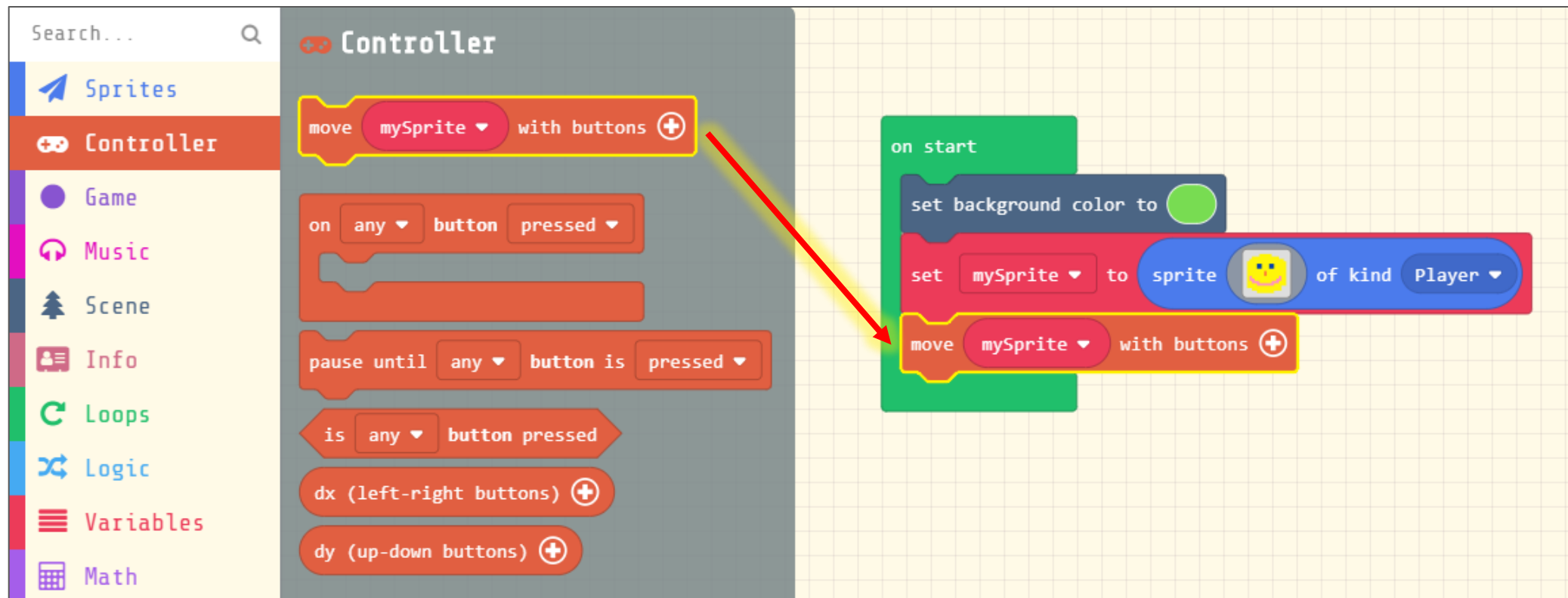
Set Sprite block



Click to draw Image of your main character

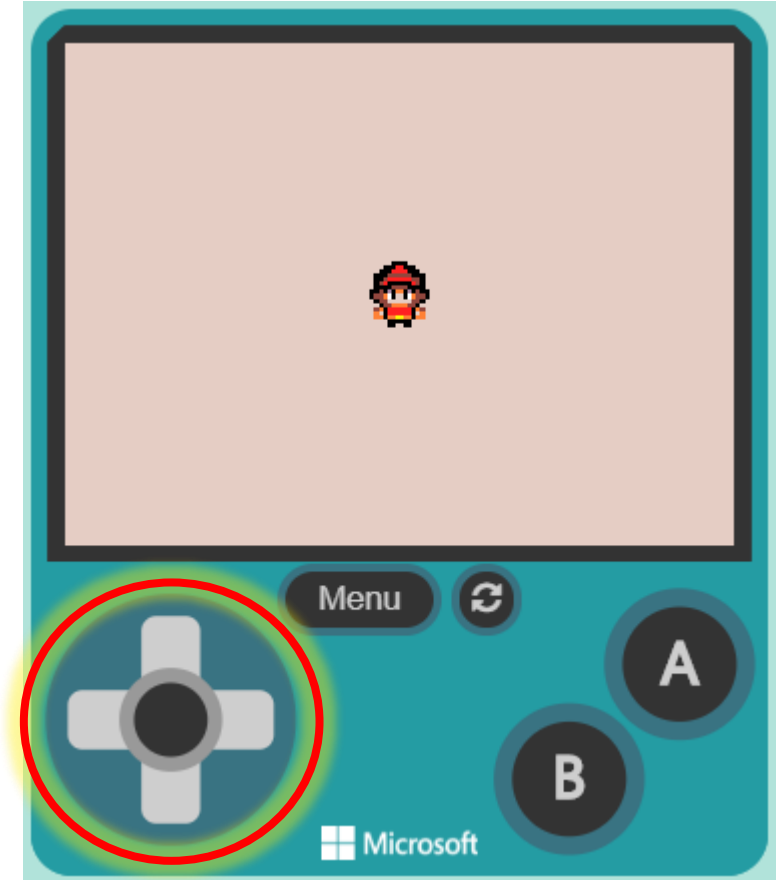
Control the movement of your Sprite

- From the **Controller** Toolbox drawer, drag a **Move** block onto the Workspace
- Drop into the **On Start** block after the **Set** sprite block



Try it out in Simulator

- Click on the joystick buttons in the Simulator to move your Sprite around the screen
- Or use the arrow keys on the keyboard (make sure the mouse is hovered over the Game window to activate controls)



Keep Sprite in Screen

The image shows the Scratch interface with a sprite named 'mySprite'. The 'Effects' palette on the left contains several blocks for the sprite. The 'on start' script on the right includes several blocks, with a red arrow pointing from the 'stay in screen' block in the 'Effects' palette to the 'stay in screen' block in the 'on start' script.

Effects Palette:

- mySprite start spray effect
- clear effects on mySprite
- destroy mySprite
- mySprite say ":)"
- set mySprite stay in screen ON
- set mySprite bounce on wall ON
- set mySprite auto destroy OFF

on start Script:

- set background color to [green circle]
- set mySprite to sprite [smiley face] of kind Player
- move mySprite with buttons
- set mySprite stay in screen ON

Set Score

The image shows the Scratch IDE interface. On the left is a sidebar with a search bar and categories: Sprites, Controller, Game, Music, Scene, Info (highlighted), Loops, Logic, Variables, and Math. The 'Info' panel on the right lists variables: score, high score, and a 'set score to 0' block highlighted with a yellow border. A red arrow points from this block to a script in the workspace. The script is an 'on start' block containing: 'set background color to' (green circle), 'set mySprite to sprite (Pikachu) of kind Player', 'move mySprite with buttons (+)', 'set mySprite stay in screen (ON)', and a 'set score to 0' block highlighted with a yellow border.

Search...

- Sprites
- Controller
- Game
- Music
- Scene
- Info
- Loops
- Logic
- Variables
- Math

Info

Score

- score
- high score
- set score to 0
- change score by 1
- on score 100

on start

- set background color to (green)
- set mySprite to sprite (Pikachu) of kind Player
- move mySprite with buttons (+)
- set mySprite stay in screen (ON)
- set score to 0

Start Countdown

The image displays the Scratch development environment. On the left, a sidebar lists various categories: Sprites, Controller, Game, Music, Scene, Info (highlighted), Loops, Logic, Variables, Math, Extensions, and Advanced. The main workspace shows a 'Countdown' object with several blocks: 'on life zero', 'countdown', 'start countdown 10 (s)', 'change countdown by 0 (s)', 'stop countdown', and 'on countdown end'. A yellow box highlights the 'start countdown 10 (s)' block, with a red arrow pointing to a similar block in the 'on start' script area on the right. The 'on start' script includes: 'set background color to' (green), 'set mySprite to sprite of kind Player' (with a character icon), 'move mySprite with buttons' (with a plus icon), 'set mySprite stay in screen' (with an 'ON' flag), 'set score to 0', and 'start countdown 10 (s)' (highlighted with a yellow box).

Create a flying fruit Sprite every 1/2 second

- From the **Game** Toolbox drawer, drag a **On Game Update Every** block onto the Workspace (put this anywhere)

The image shows the Scratch Game workspace. On the left is the 'Game' toolbox drawer with categories: Sprites, Controller, Game, Music, Scene, Info, Loops, Logic, Variables, and Math. The 'Game' category is selected. In the workspace, there are several blocks: 'on game update', 'on game update every 500 ms', 'time since start (ms)', and 'reset game'. A red arrow points from the 'on game update every 500 ms' block in the workspace to a callout box. The callout box contains the text: 'Code in this block will execute on a given time interval (500ms = 1/2 second)'. To the right of the workspace, there is a script area with an 'on start' block containing: 'set background color to green', 'set mySprite to sprite of [Pineapple]', 'move mySprite with buttons +', 'set mySprite stay in screen ON', 'set score to 0', and 'start countdown 10 (s)'.

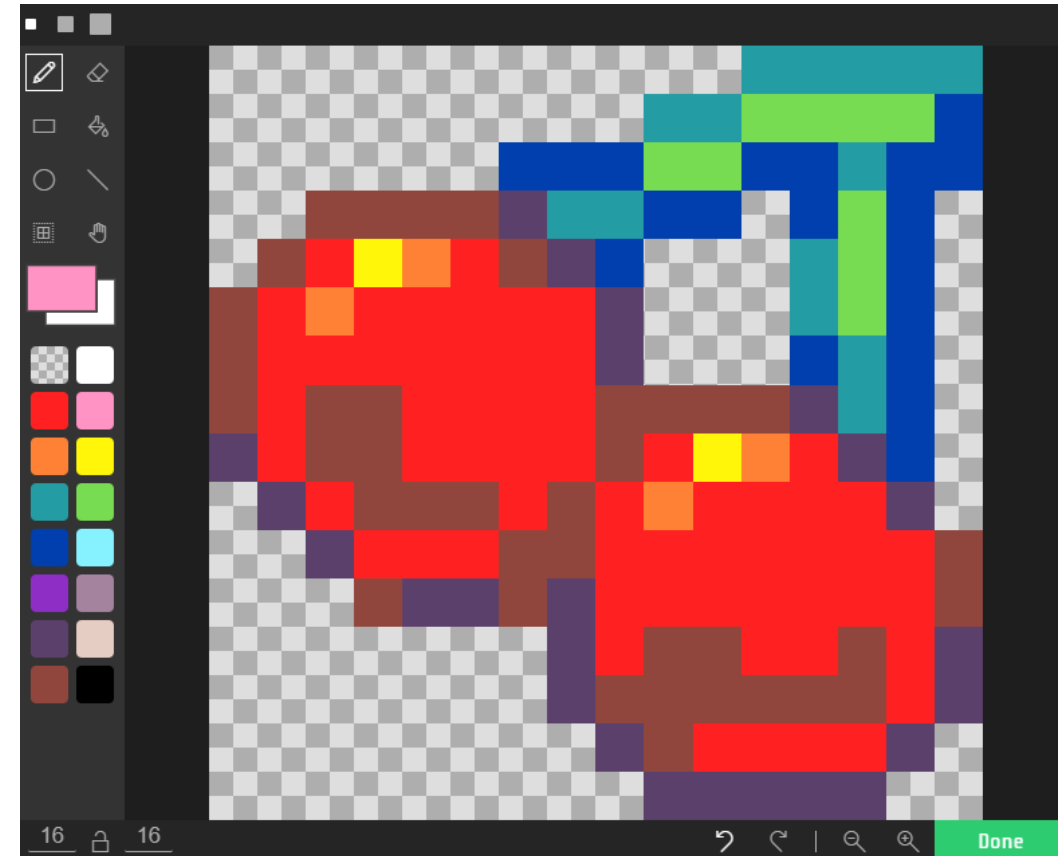
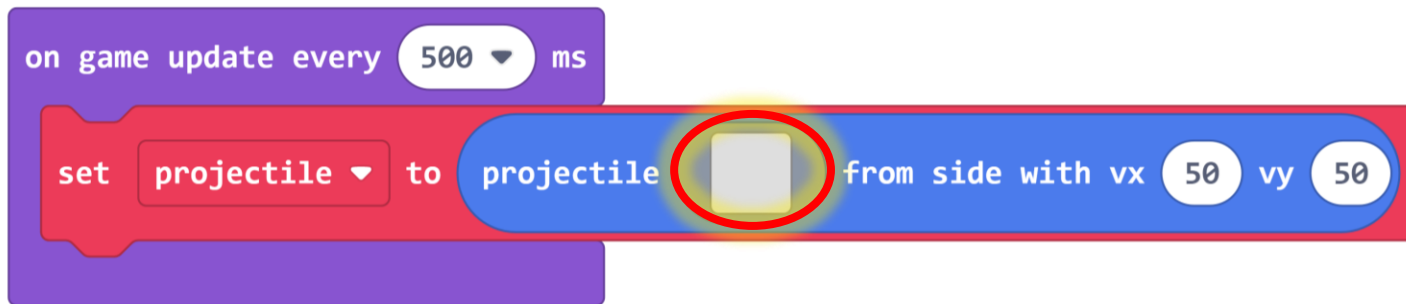
Create a flying fruit Sprite

- From the **Sprites** Toolbox drawer, drag a **Set Projectile from side** block into the **On Game Update Every** block

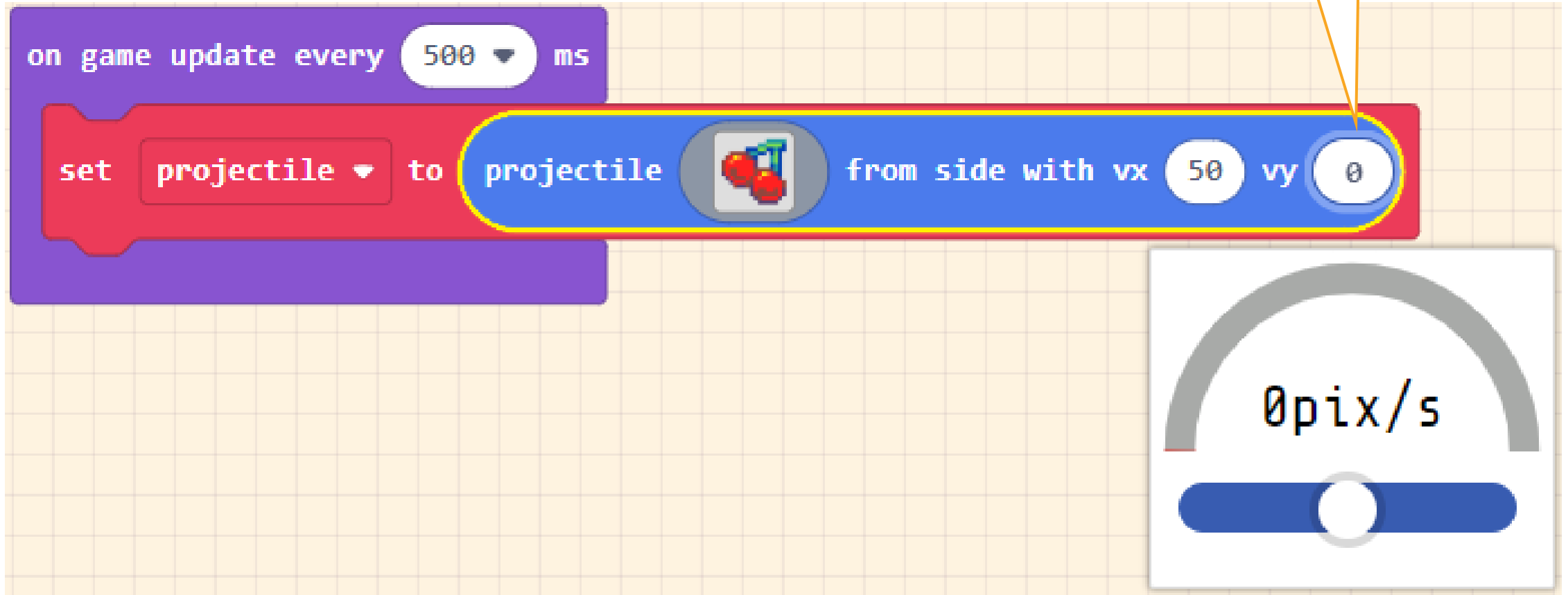
The screenshot shows the Sprites toolbox on the left with categories: Sprites, Controller, Game, Music, Scene, Info, Loops, Logic, Variables, and Math. The main workspace contains three 'set mySprite' blocks: 'stay in screen' (ON), 'bounce on wall' (ON), and 'auto destroy' (OFF). Below these is the 'Projectiles' section with two 'set projectile to projectile from side with vx 50 vy 50' blocks. The bottom block is highlighted with a yellow border and a red arrow points to a zoomed-in view of it.

The zoomed-in view shows an 'on game update every 500 ms' block containing the 'set projectile to projectile from side with vx 50 vy 50' block. The 'set projectile to projectile from side with vx 50 vy 50' block is highlighted with a yellow border.

Draw a Fruit Sprite



Set the Velocity



The image shows a Scratch code block on a grid background. The code block is purple and contains the following text: "on game update every 500 ms". Inside this block is a red "set" block. The "set" block has a dropdown menu showing "projectile" and the text "to projectile from side with vx 50 vy 0". A yellow callout box points to the "vy 0" input field with the text "Set vy = 0". Below the code block is a velocity gauge. The gauge is a semi-circle with a blue needle pointing to the right. The text "0pix/s" is displayed in the center of the gauge.

```
on game update every 500 ms  
set projectile to projectile from side with vx 50 vy 0
```

Set $v_y = 0$

0pix/s

Velocity = speed and direction

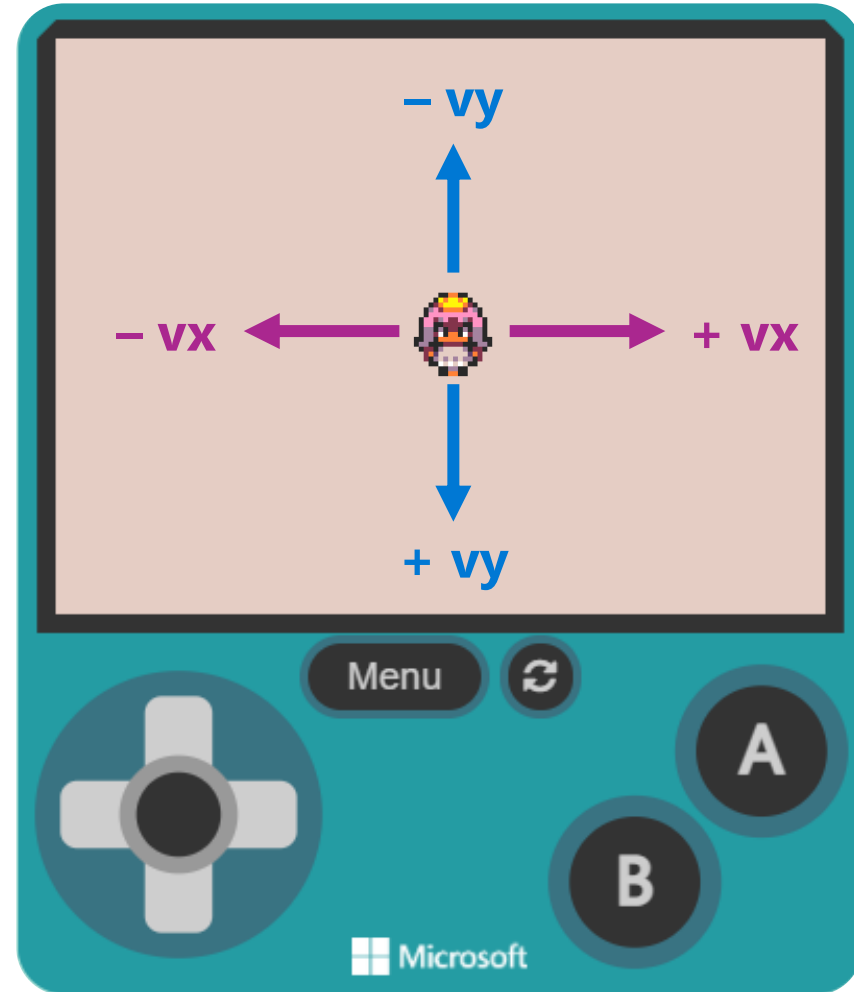
vx = horizontal movement

- positive value = left to right
- negative value = right to left

vy = vertical movement

- positive value = top to bottom
- negative value = bottom to top

from side with vx 50 vy 0



Set the fruit starting position

- From the **Sprites** Toolbox drawer, drag a **Set Position** block into the **On Game Update Every** block
- Change mySprite variable to **projectile**

The image shows a screenshot of the Scratch Sprites toolbox on the left and a code block on the right. The toolbox has a search bar and a list of categories: Sprites, Controller, Game, Music, Scene, Info, Loops, Logic, Variables, Math, and Extensions. Under the Sprites category, there are two sections: 'Create' and 'Physics'. In the 'Create' section, there are two 'set mySprite2 to sprite of kind Player' blocks. In the 'Physics' section, there are three blocks: 'set mySprite velocity to vx 50 vy 50', 'set mySprite position to x 0 y 0', and 'set mySprite x to 0'. A yellow box highlights the 'set mySprite position to x 0 y 0' block. A red arrow points from this block to the 'set projectile position to x 0 y 0' block in the code block on the right. The code block is an 'on game update every 500 ms' block containing two 'set' blocks. The first 'set' block is 'set projectile to projectile from side with vx 50 vy 0'. The second 'set' block is 'set projectile position to x 0 y 0'. A red circle highlights the 'projectile' variable in the second 'set' block. A dropdown menu is open below the 'set projectile position to x 0 y 0' block, showing a list of variables: 'mySprite', 'projectile' (with a checkmark and a red circle), 'New variable...', 'Rename variable...', and 'Delete the "projectile" variable'.

Coordinates

The Arcade game screen dimensions are:

160 pixels wide x **120** pixels high

x is horizontal

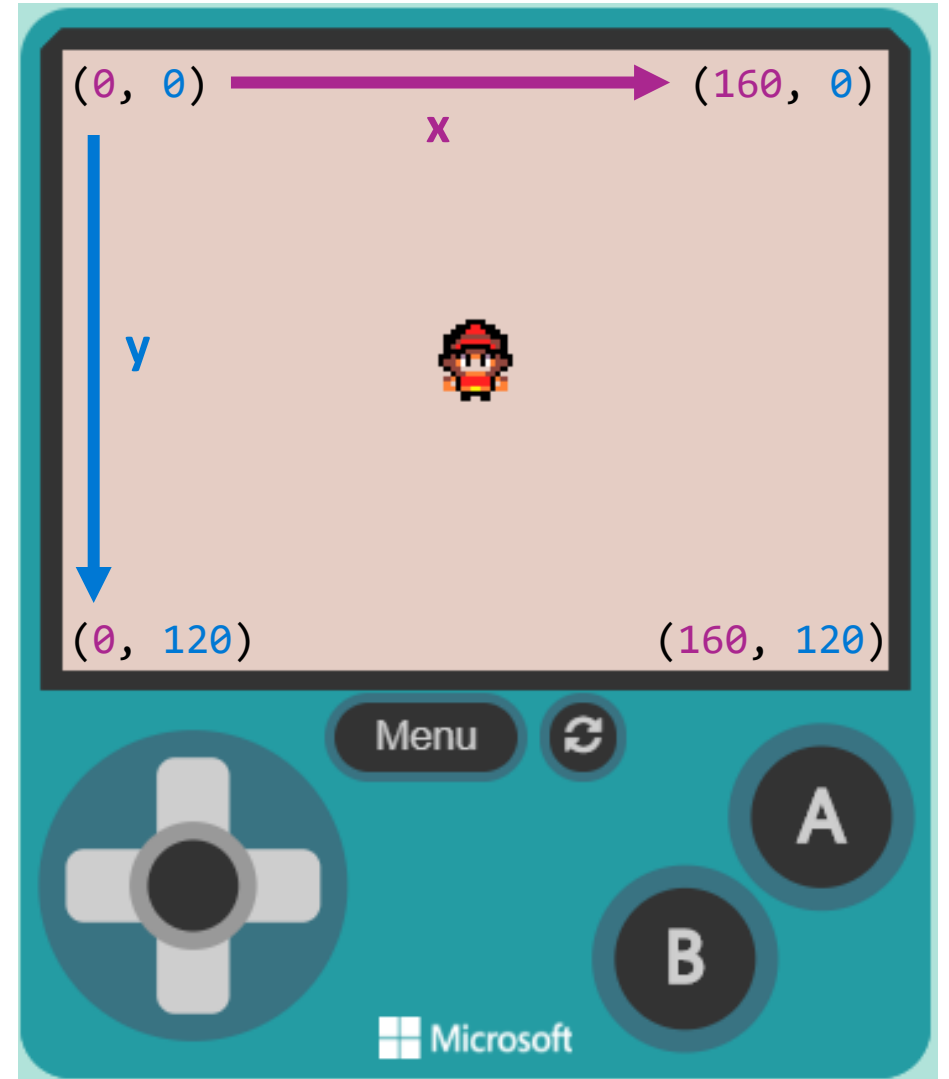
y is vertical

position to x

0

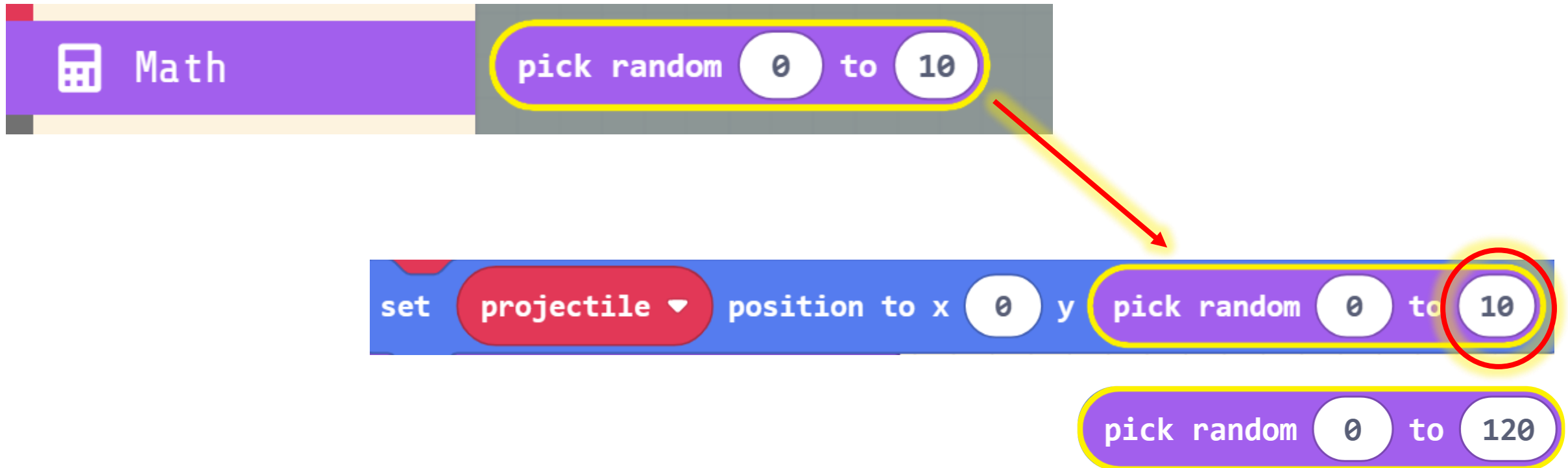
y

0



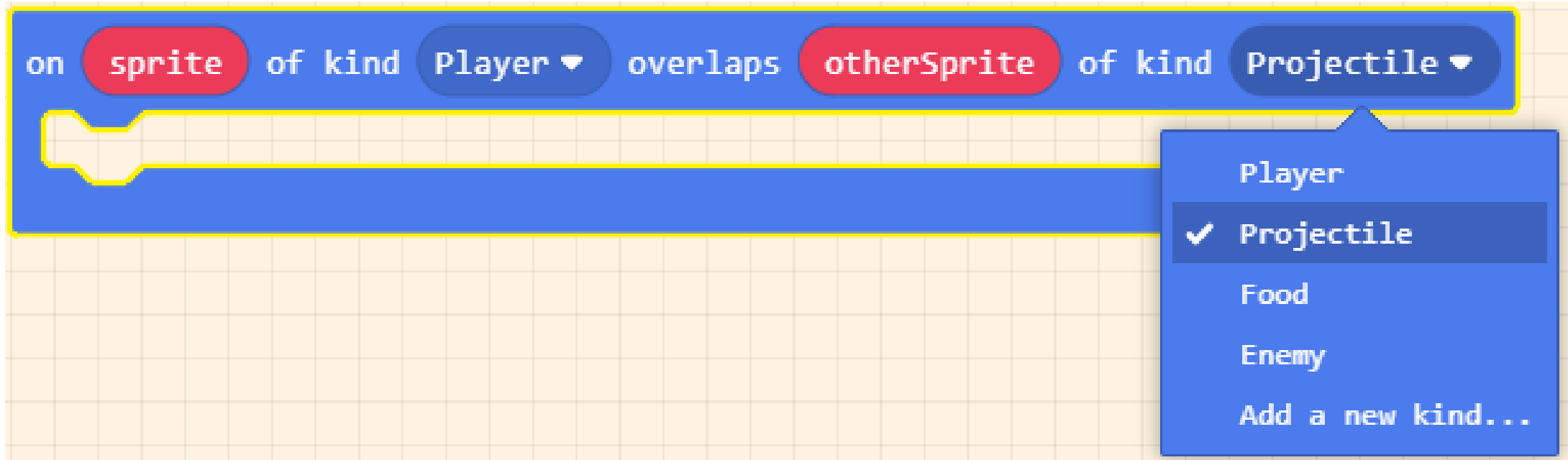
Start from the left at random heights

- From the **Math** Toolbox drawer, drag a **Pick Random** block, and drop into the **y** field of the **Set Position** block
- In Pick Random block, change maximum value to **120**



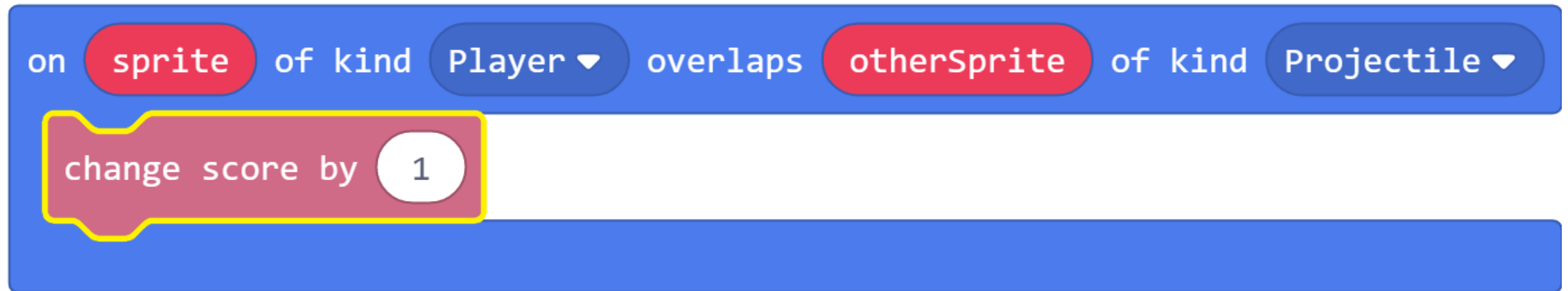
Add a point when you eat fruit

- From the **Sprites** Toolbox drawer, under the **Overlaps** category, drag an **On Sprite Overlaps** block onto the Workspace
- Change the second sprite kind to **Projectile**



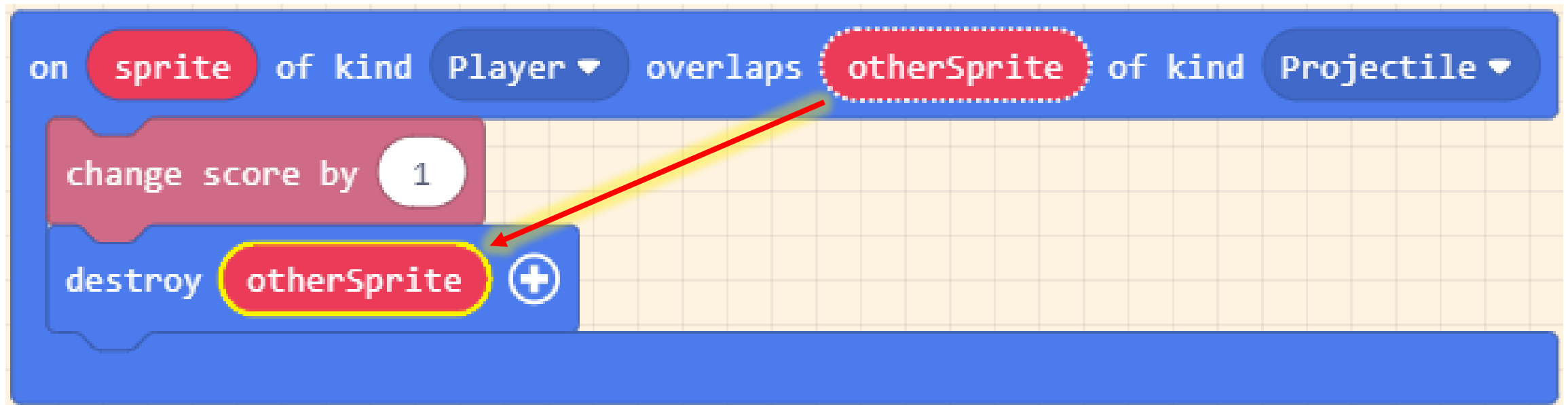
Add a point when you eat fruit

From **Info** Toolbox drawer, add **Change Score** block



Destroy the Fruit

- From the **Sprites** Toolbox drawer, Add **Destroy mySprite** block
- Drag the **otherSprite** local variable block into the **Destroy** block







Add effects and music


- In the **Destroy** block, click the plus (+) icon
- Select an effect to show when our fruit is destroyed
- From the **Music** Toolbox drawer, drag a **Play Sound** block into the **On Sprite Overlaps** block

The image shows a Scratch 'On Sprite Overlaps' block. The block is blue and contains three sub-blocks: a 'change score by 1' block, a 'destroy otherSprite with hearts effect for 100 ms' block, and a 'play sound ba ding until done' block. A red arrow points to the 'destroy otherSprite' block. A red oval highlights the 'with hearts effect for 100 ms' block. A yellow glow surrounds the 'destroy otherSprite' block. A callout box with an orange border and a white background points to the '100 ms' field, containing the text: 'Change the duration of the effect to 100 milliseconds'.

```
on sprite of kind Player overlaps otherSprite of kind Projectile  
  change score by 1  
  destroy otherSprite with hearts effect for 100 ms  
  play sound ba ding until done
```

Complete Program

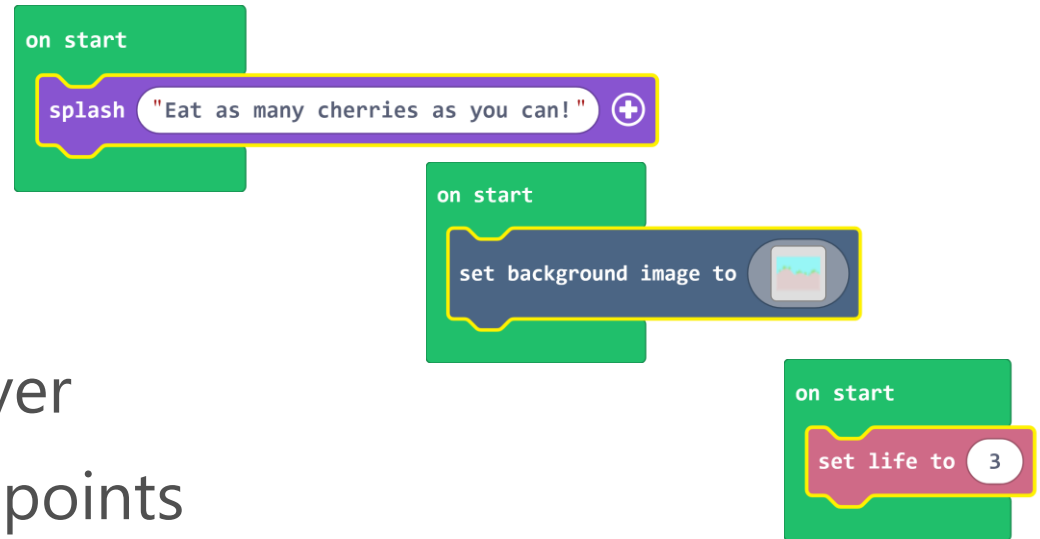
```
on start
  set background color to 
  set mySprite to sprite  of kind Player
  move mySprite with buttons 
  set mySprite stay in screen 
  set score to 0
  start countdown 10 (s)
```

```
on game update every 500 ms
  set projectile to projectile  from side with vx 50 vy 0
  set projectile position to x 0 y pick random 0 to 120
```

```
on sprite of kind Player overlaps otherSprite of kind Projectile
  change score by 1
  destroy otherSprite with hearts effect for 100 ms
  play sound ba ding until done
```

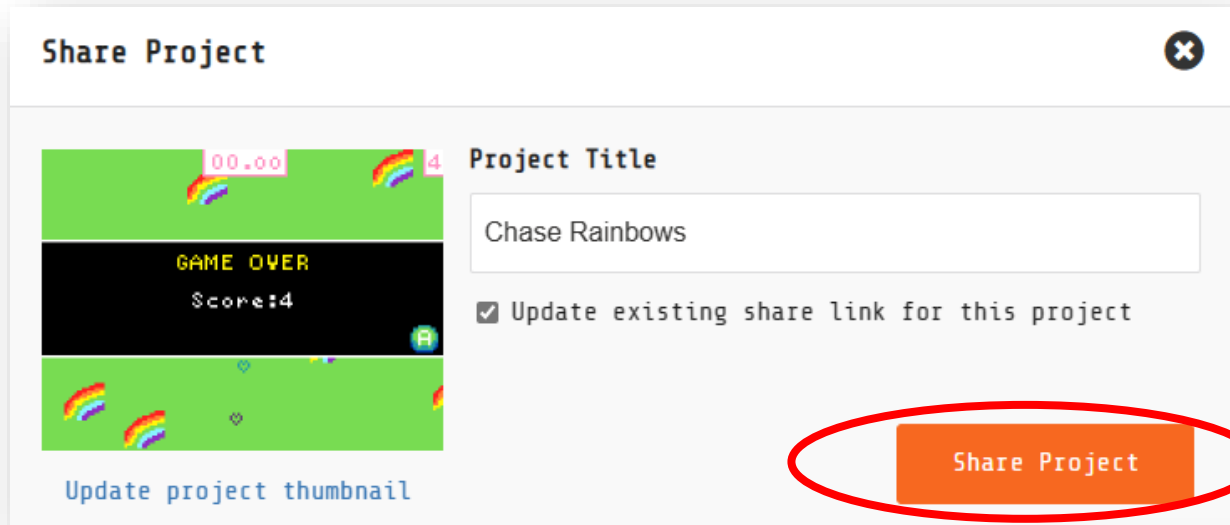
Try modding your game

- Add a beginning Splash screen
- Add a background image
- Add Life count instead of countdown
- Change the speed of the food or player
- Add other types of Fruit for different points
- Add “junk food” Enemy Sprites that remove points
- Add more sounds and effects
- Change how often each type of food appears
- Change the direction of the food sprites
- Add Animations



Share your game!

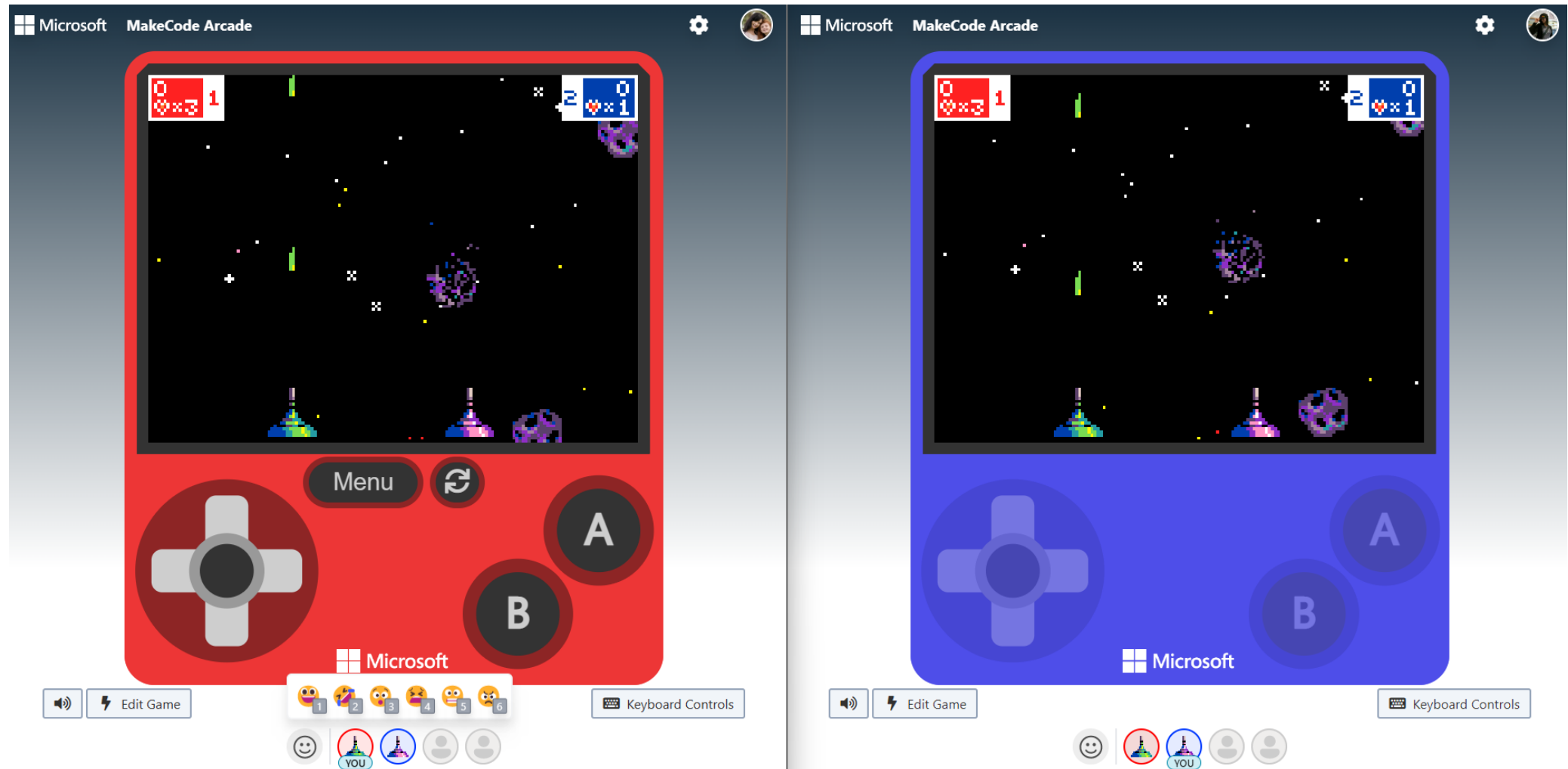
Click the Share button in the top left of the screen



Copy and Paste link
into Chat window



Playing games together



arcade.makecode.com/--multiplayer

Eat the Fruit – Multiplayer!



<https://arcade.makecode.com/S73249-29024-14612-80286>

Arcade Hardware

Boards

These boards run MakeCode Arcade games. Choose a board to find out more about it and where you can get one!



BrainPad Arcade

Learn how BrainPad Arcade lets you run games on a small handheld console.



Meowbit

A retro game console for STEM education from Kittenbot team.



Adafruit PyBadge

It's a badge, it's an arcade, it's a PyBadge.



Adafruit PyGamer

The upgraded PyBadge.



Kitronik ARCADE

ARCADE is a programmable gamepad for use with MakeCode Arcade.



Ovobot Xtron

A programmable microcomputer that can be used for making MakeCode Arcade games.



Adafruit EdgeBadge

It's the PyBadge with a zest of Machine learning.



Adafruit M4

Learn how to run your games on micro-controllers from Adafruit.



Adafruit Joy Bonnet

Learn how to run your games on Raspberry Pi Zero and Adafruit Joy Bonnet.

arcade.makecode.com/hardware



Arcade Cabinets & Controllers



Cardboard Panel

Turn a cardboard box into a tabletop arcade.



Arcade table

Turn an IKEA FLISAT table into an arcade.

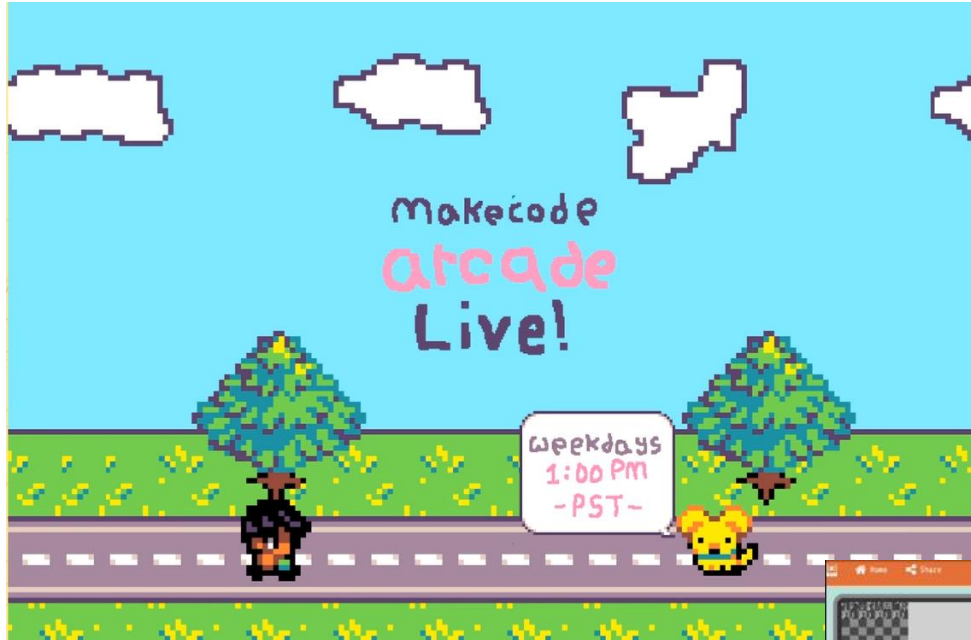


Arcade Kiosk Mode



arcade.makecode.com/hardware/kiosk

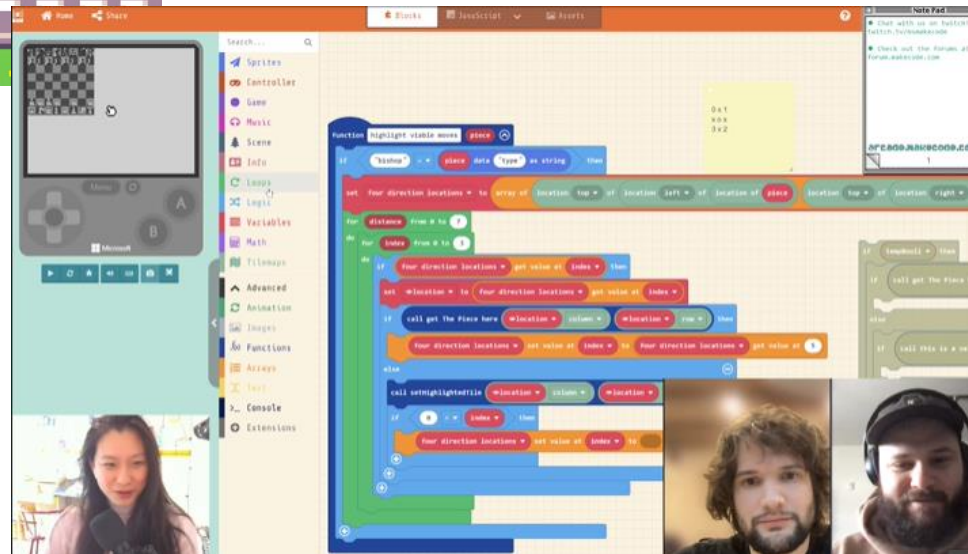
MakeCode Arcade Live Stream & Forum



1pm Pacific / 3pm Eastern MWF

twitch.tv/msmakecode

forum.makecode.com



MakeCode
Engineers

Thank You!

```
on start
  set cherry to sprite of kind Food
  set cherry position to x pick random 0 to 160 y pick random 0 to 120
```

```
let cherry = sprites.create(img'', SpriteKind.Food)
cherry.setPosition(Math.randomRange(0, 160), Math.randomRange(0, 120))
```

