

```
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



Inspiring new generations of technology creators
through immersive, hands-on computing education

Learn more
makecode.com

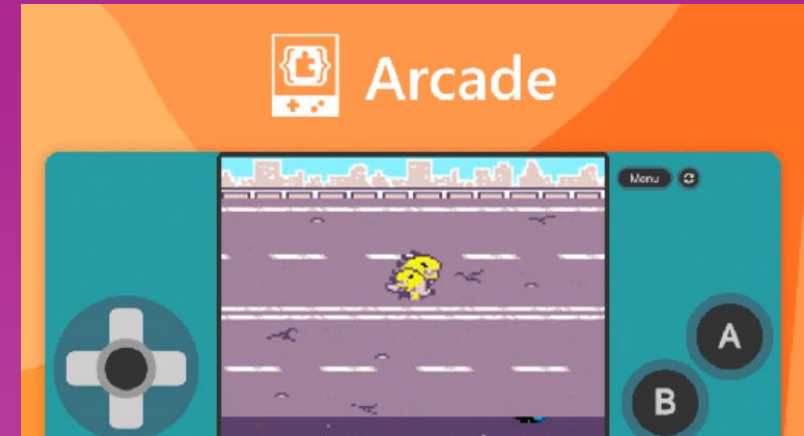
Three Main Code Editors



Physical Computing with micro:bit

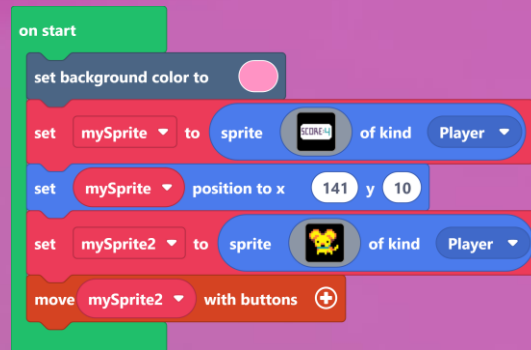


Mods in Minecraft

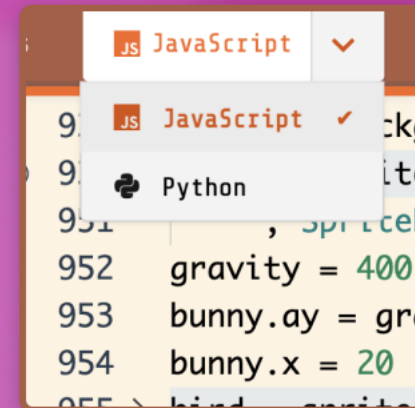


Retro Arcade Games

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



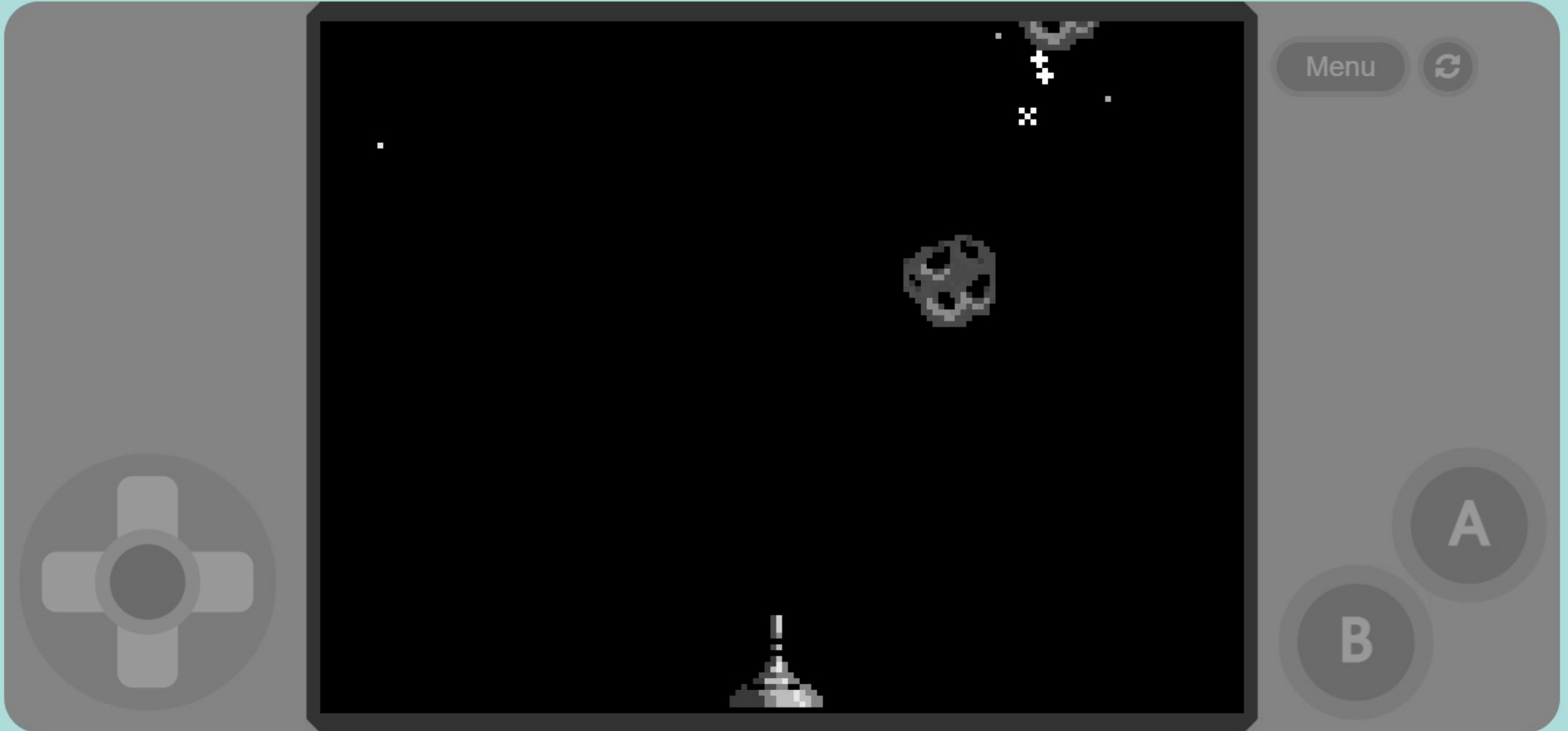
Space Invaders



Donkey Kong

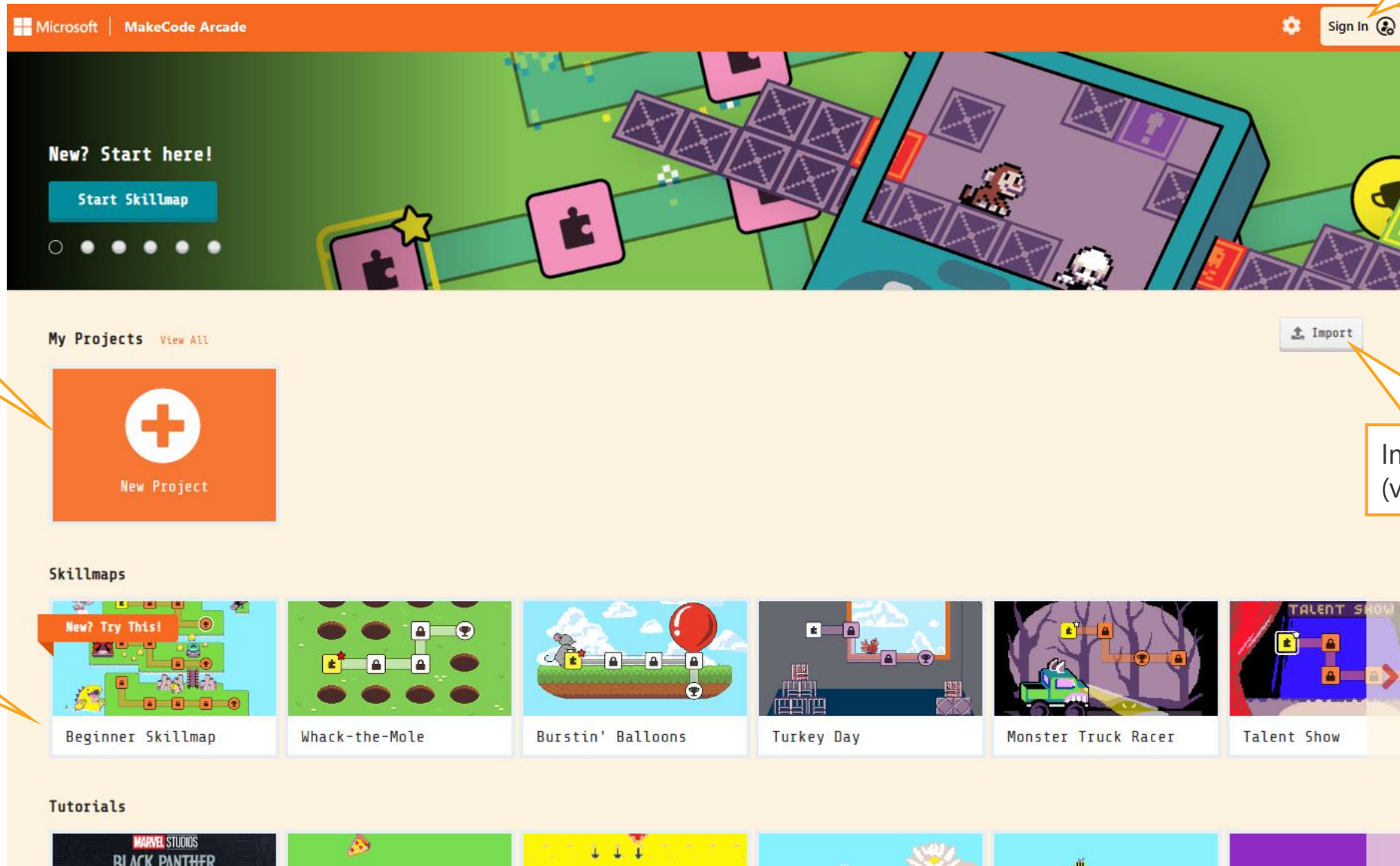


Space Game!



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)

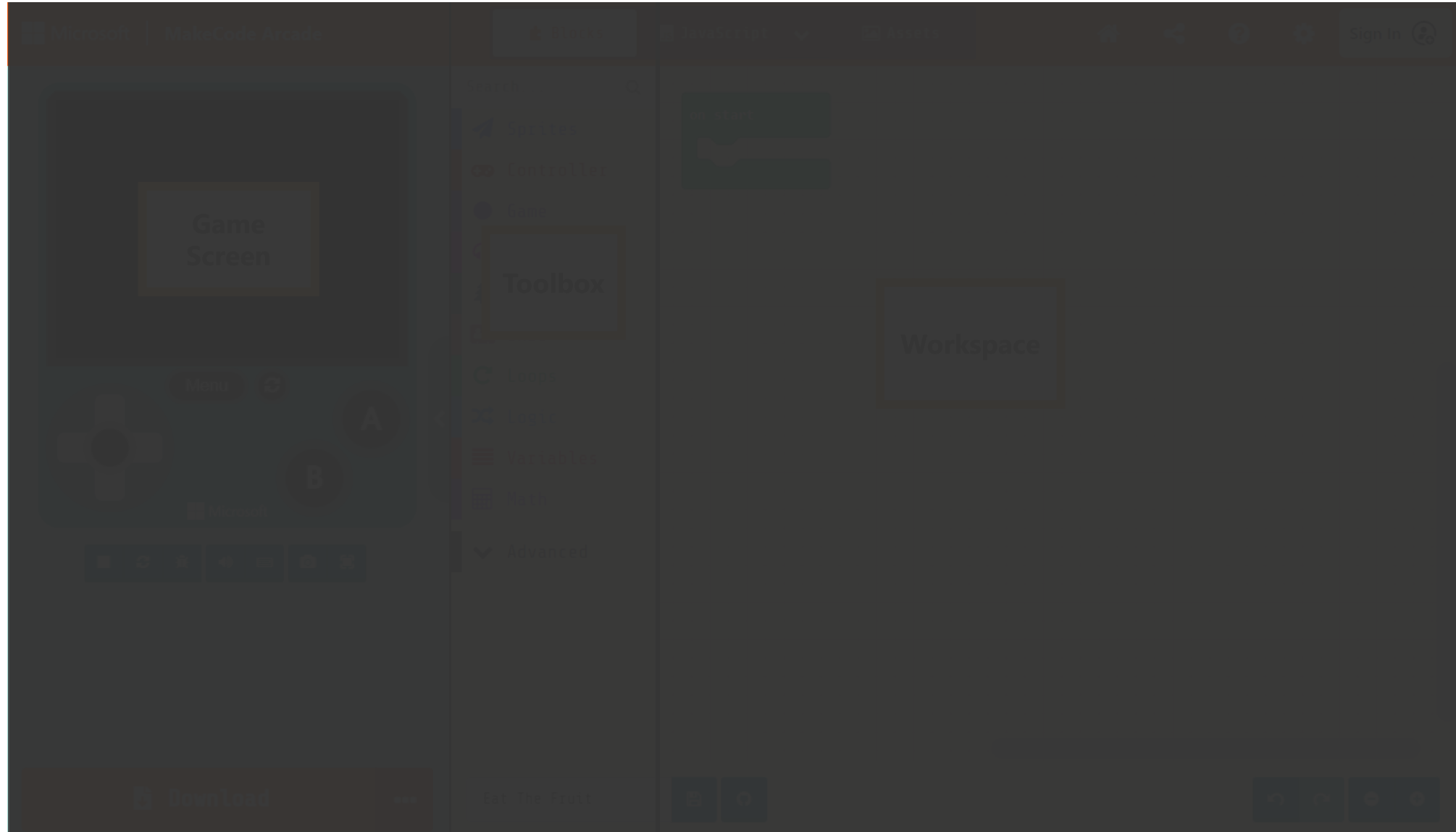
Step-by-step Skillmaps and Tutorials

Create a New Project

The screenshot shows the Microsoft MakeCode Arcade interface. At the top, there is a navigation bar with the Microsoft logo and 'MakeCode Arcade' text, along with a settings gear icon and a 'Sign In' button. Below the navigation bar is a large banner with the text 'New? Start here!' and a 'Start Skillmap' button. The main content area is divided into several sections: 'My Projects' with a 'View All' link and an 'Import' button; a 'New Project' button (an orange square with a white plus sign) circled in purple; 'Skillmaps' with a 'New? Try This!' banner and several project thumbnails including 'Beginner Skillmap', 'Whack-the-Mole', 'Burstin' Balloons', 'Turkey Day', 'Monster Truck Racer', and 'Talent Show'; and 'Tutorials' with a 'MARVEL STUDIOS BLACK PANTHER' thumbnail. A 'Create a Project' dialog box is open in the center, featuring a title bar with two smiley face emojis and a close button. The dialog contains the text 'Give your project a name.' followed by a text input field containing 'Space Game!'. Below the input field is a '> Code options' link and a green 'Create' button with a checkmark.

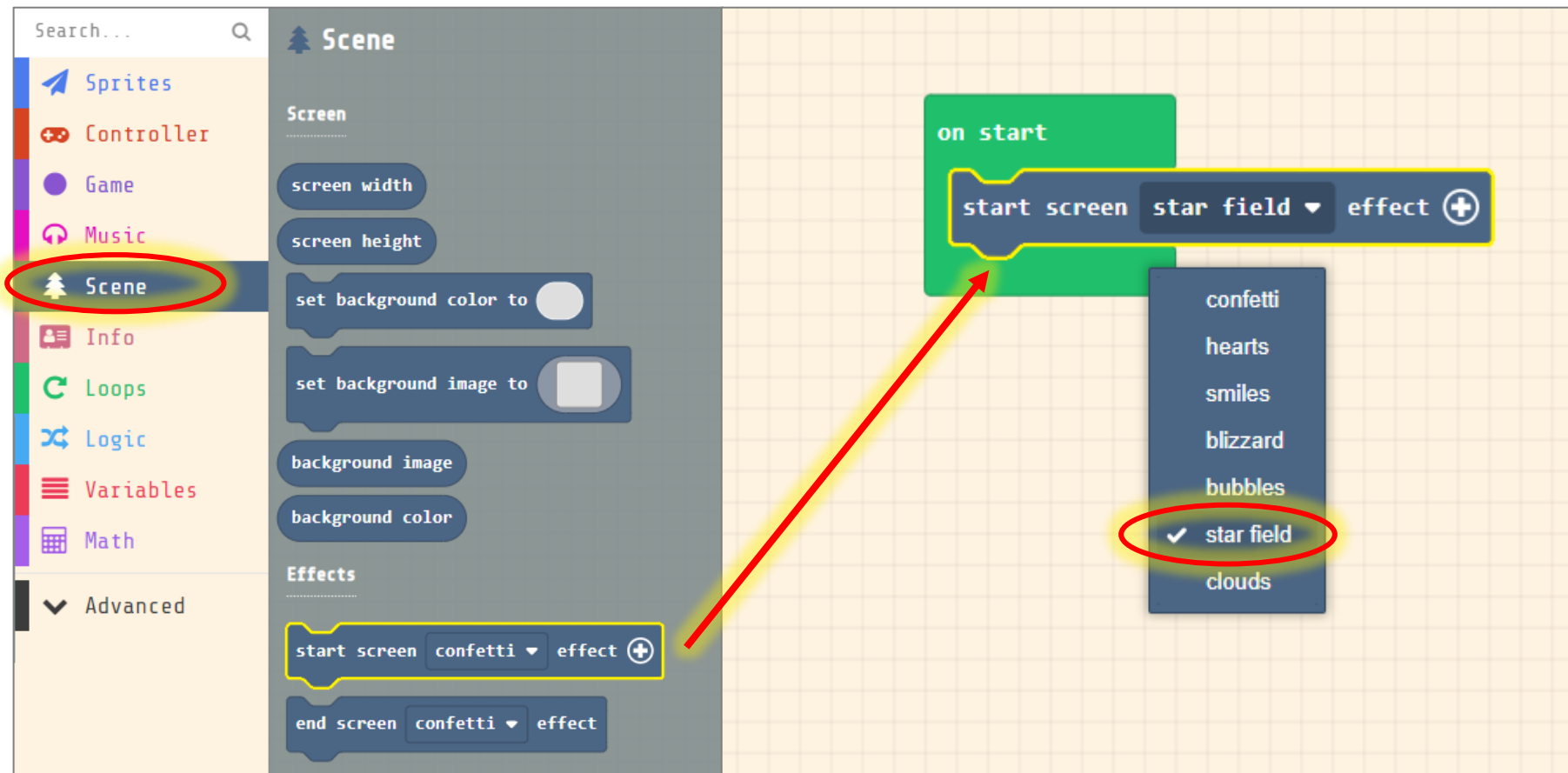
Click on
New Project

Getting familiar with MakeCode Arcade



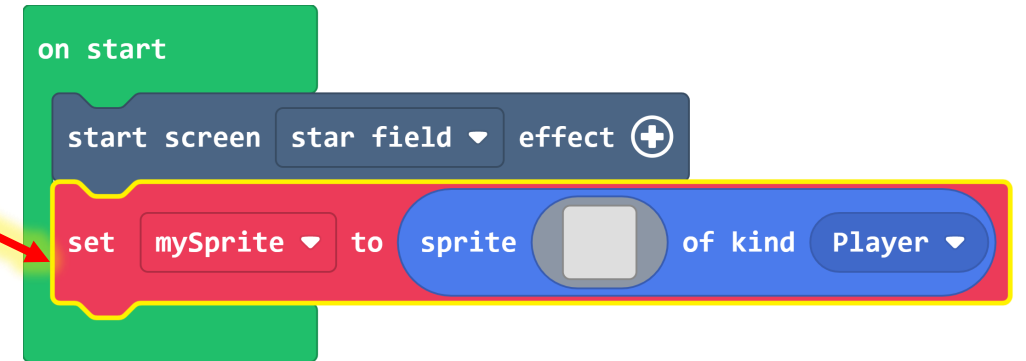
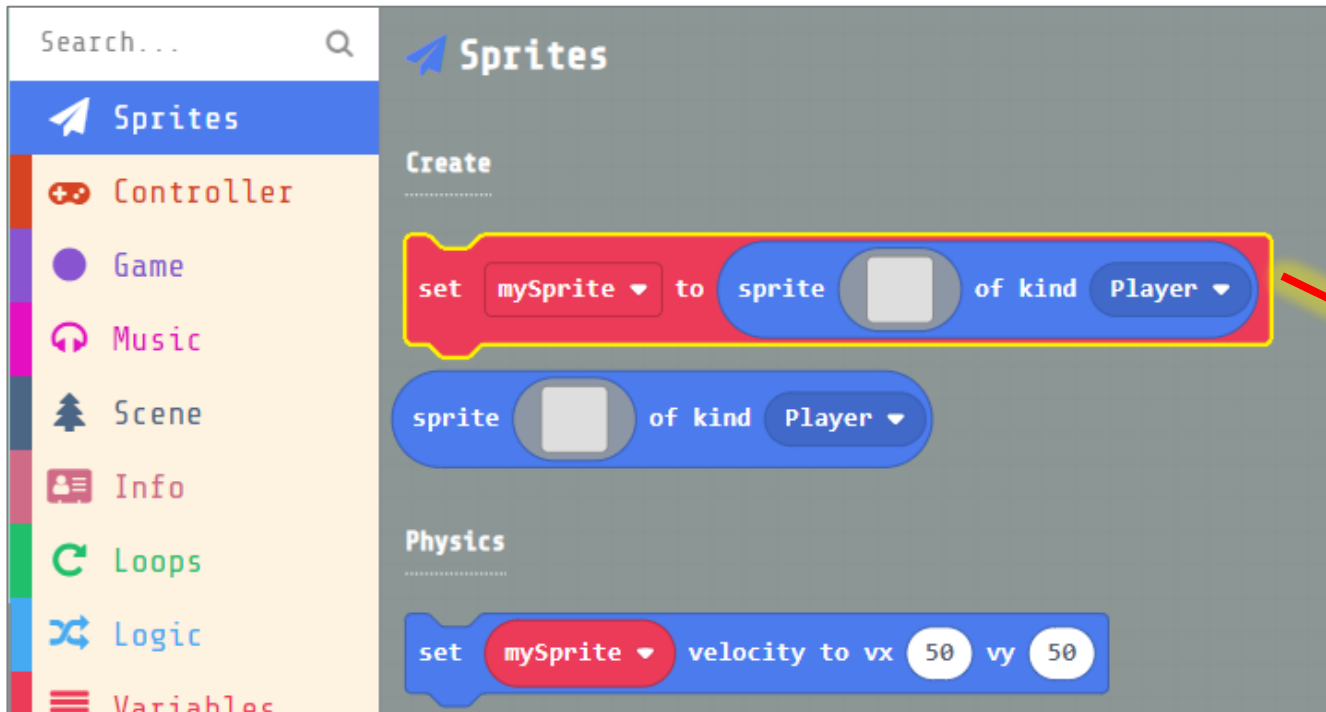
Add some Stars

- From the **Scene** Toolbox drawer, drag a **Start Screen Effect** block into the **On Start** block on the Workspace
- Click on the **confetti** drop-down menu to select **star field** effect



Create your Spaceship

- From the **Sprites** Toolbox drawer, drag a **Set mySprite** block into the **On Start** block



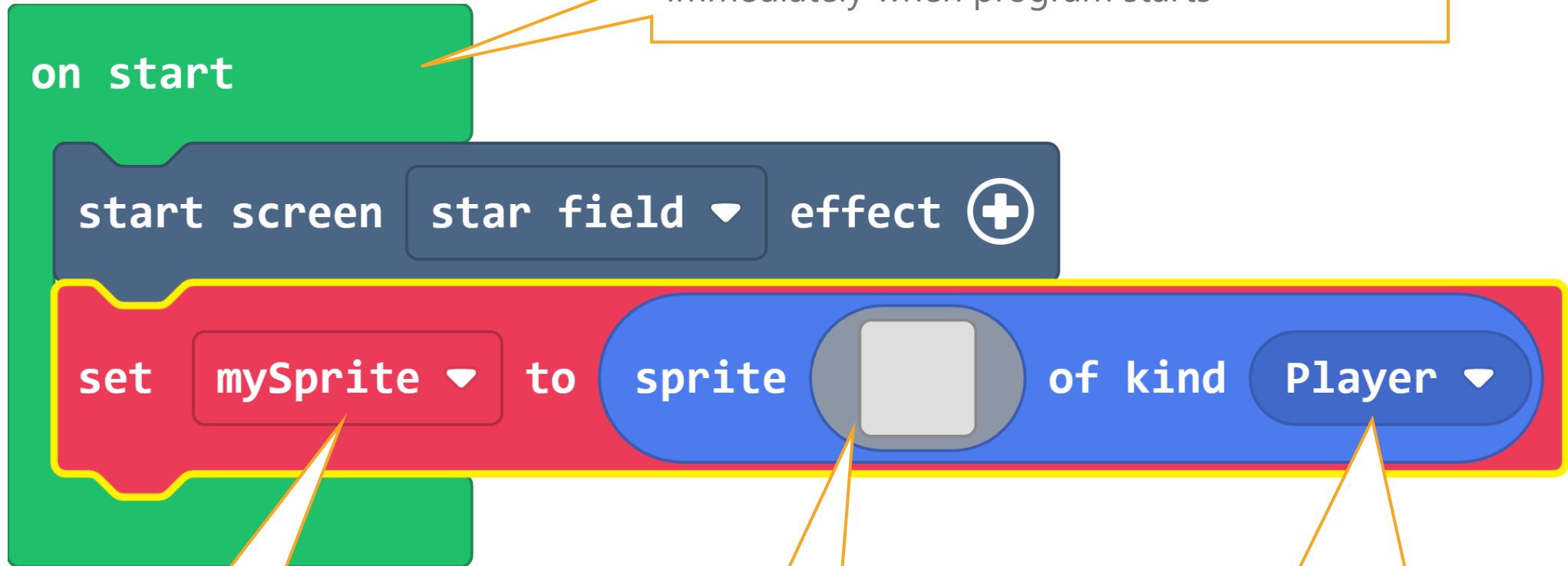
Sprites



any object in a game that has properties and behaviors

Set Sprite block

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



The diagram shows a Scratch 'Set Sprite' block nested within an 'on start' block. The 'on start' block is green and contains two sub-blocks: a 'start screen' block and a 'set sprite' block. The 'start screen' block is dark blue and has 'star field' selected in a dropdown menu, followed by the word 'effect' and a plus sign icon. The 'set sprite' block is red and blue. It has 'mySprite' in a dropdown menu, followed by the word 'to', a 'sprite' button with a grey square image, the word 'of kind', and a 'Player' dropdown menu. Callout boxes point to the 'on start' block, the 'mySprite' dropdown, the 'sprite' button, and the 'Player' dropdown.

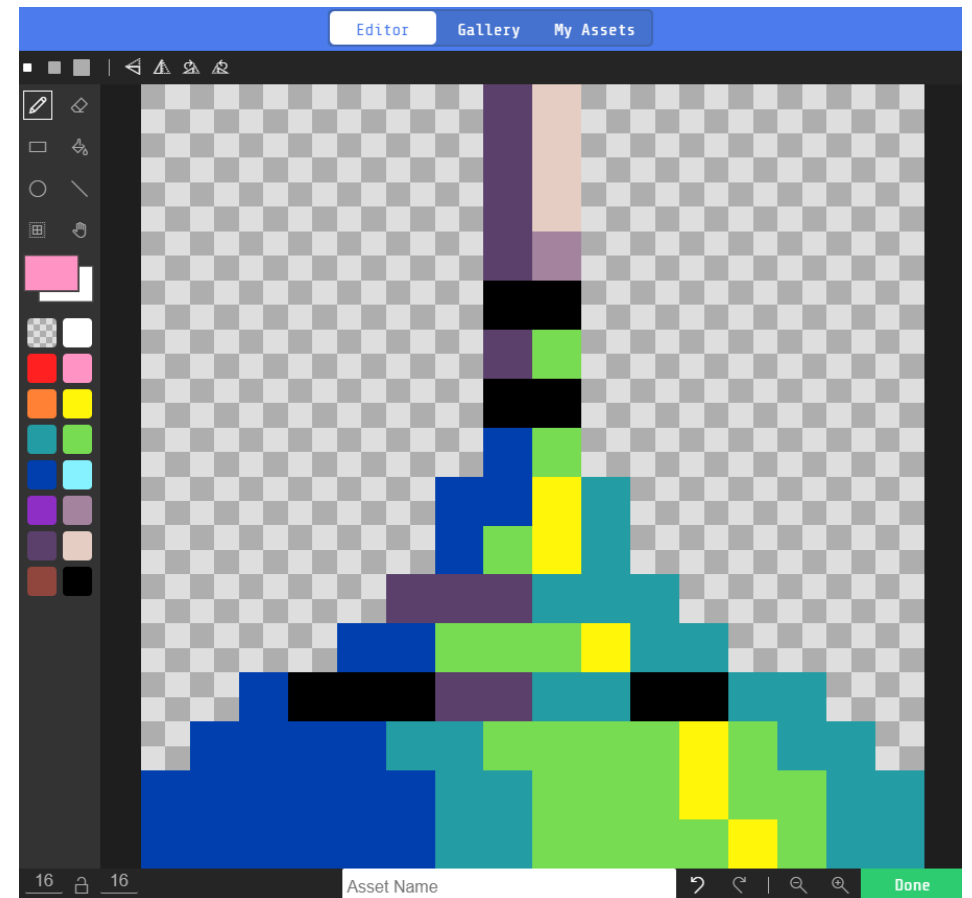
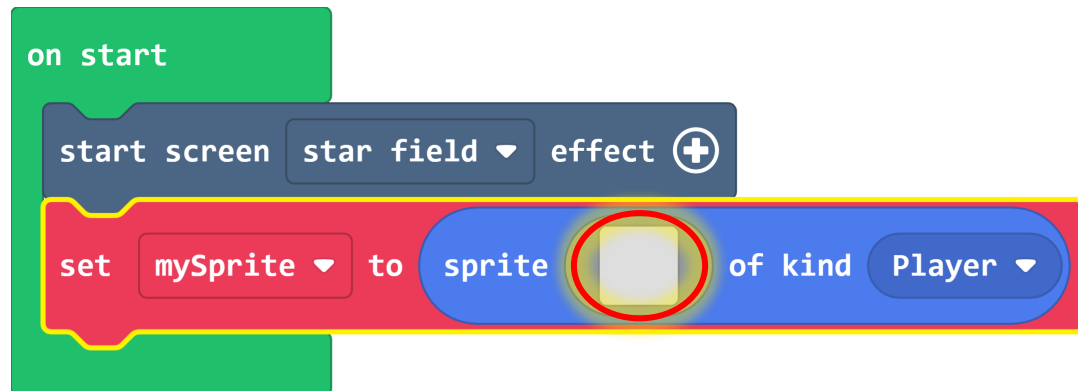
Sprite name

Sprite image

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

Create your Spaceship Image

- In the **Set mySprite** block, click on the grey square to open the Image Editor
- Draw your Spaceship
- Or pick an existing image from the Gallery



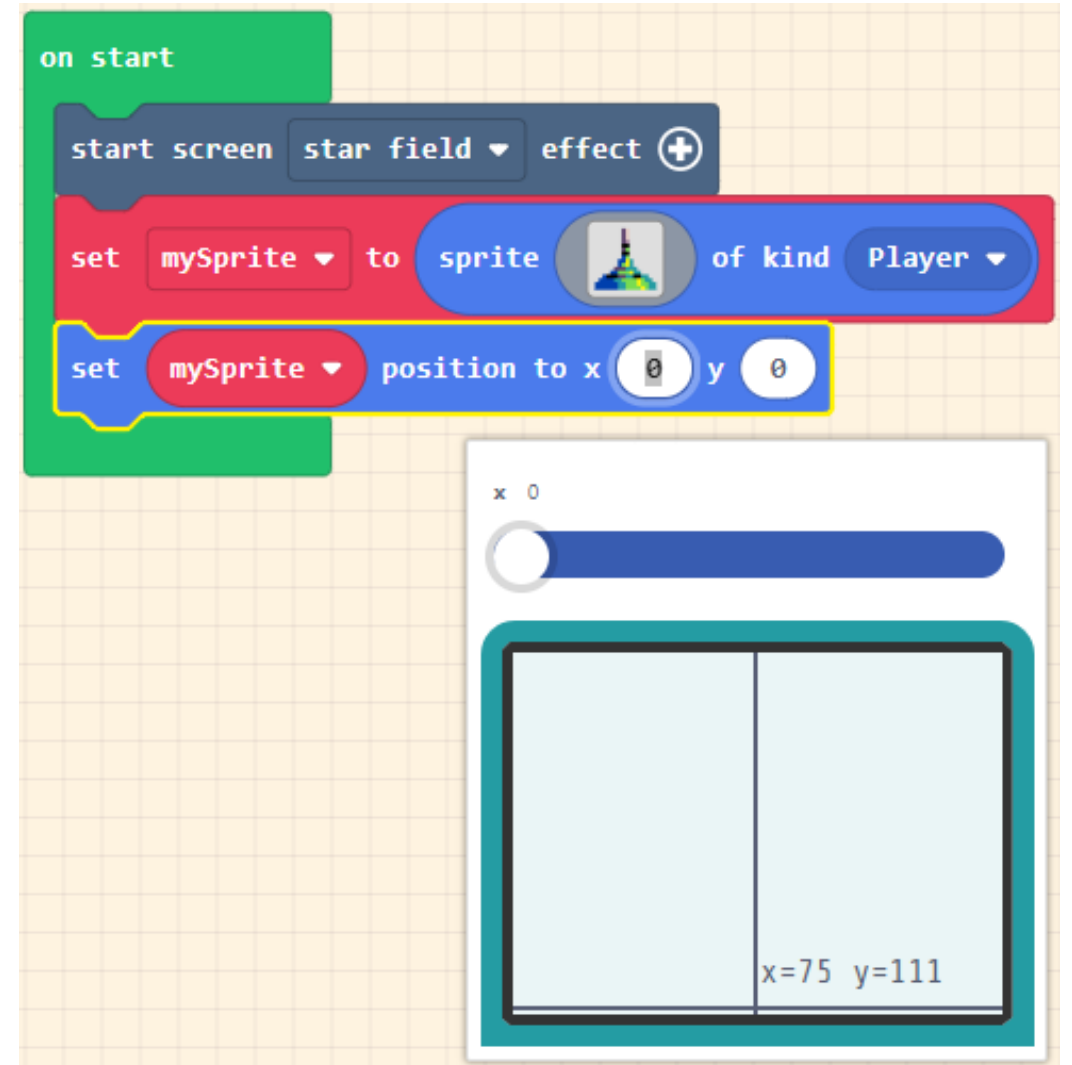
Place your Spaceship at the bottom of the screen

- From the **Sprites** Toolbox drawer, drag a **Set mySprite Position** block into the **On Start** block

The image shows a software interface with a 'Sprites' toolbox on the left and a script 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 Advanced. Under the 'Sprites' category, there are several blocks. One block is highlighted with a yellow border: 'set mySprite position to x 0 y 0'. A red arrow points from this block to the 'on start' script block on the right. The 'on start' script block is a green container with three blocks inside: 'start screen star field effect', 'set mySprite to sprite of kind Player', and 'set mySprite position to x 0 y 0'. The 'set mySprite position to x 0 y 0' block in the script is also highlighted with a yellow border.

Place your Spaceship at the bottom of the screen

- In the **Set mySprite Position** block, click on the **x 0** value
- Move your cursor to the bottom of the screen and click to select the Position of your spaceship



The image shows a Scratch script on a grid background. The script starts with a green 'on start' block. Below it is a blue 'start screen' block with 'star field' selected in a dropdown and a plus sign icon. The next block is a red 'set mySprite to' block with a 'sprite' dropdown, a spaceship icon, and a 'Player' dropdown. The final block is a blue 'set mySprite position to x y' block, where the 'x' and 'y' input fields both contain the number '0'. A yellow box highlights the 'x 0' input field. To the right of the code is a coordinate grid with a teal border. The grid is divided into two columns. The left column is labeled 'x 0' and has a blue slider bar. The right column is labeled 'x=75 y=111' at the bottom right corner.

Coordinates

The Arcade game screen dimensions are:

160 pixels wide x **120** pixels high

x is horizontal

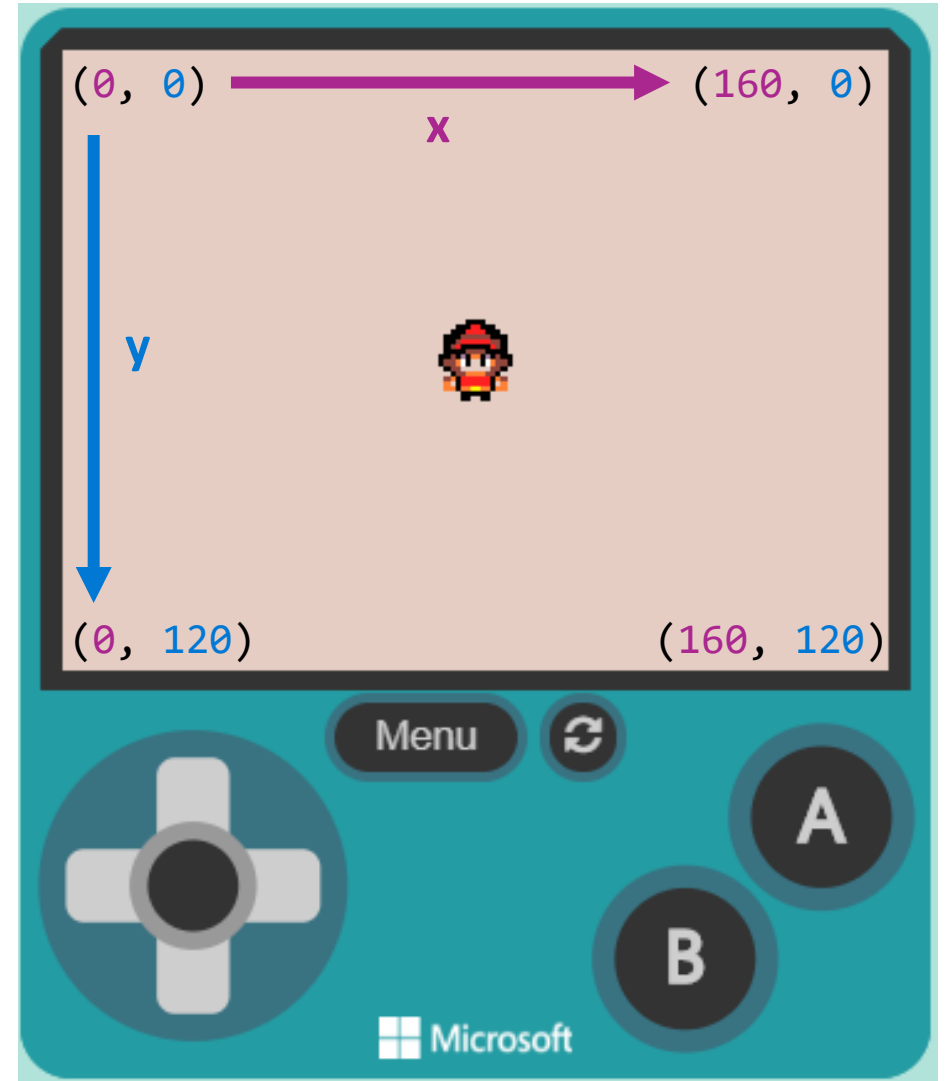
y is vertical

position to x

0

y

0



Control the movement of your Spaceship

- From the **Controller** Toolbox drawer, drag a **Move mySprite** block into the **On Start** block

The image shows the Scratch interface. On the left is the 'Controller' toolbox drawer, which is currently open. It contains several categories: Sprites, Controller (highlighted), Game, Music, Scene, Info, Loops, Logic, and Variables. Under the 'Controller' category, there are several blocks: 'move mySprite with buttons', 'on A button pressed', 'is A button pressed', 'dx (left-right buttons)', and 'dy (up-down buttons)'. A red arrow points from the 'move mySprite with buttons' block in the toolbox to the script area on the right. The script area shows an 'on start' block containing four other blocks: 'start screen star field effect', 'set mySprite to sprite of kind Player', 'set mySprite position to x 75 y 111', and 'move mySprite with buttons'. The 'move mySprite with buttons' block in the script area is highlighted with a yellow border, indicating it has been successfully added to the script.

Move only left and right

- In the **Move mySprite** block, click the plus (+) icon to expand
- Set the Velocity **vy** value to **0**

The image shows a Scratch script starting with an 'on start' block. It contains four blocks: 'start screen' set to 'star field' with an expanded 'effect' block; 'set mySprite to sprite of kind Player' with a player sprite icon; 'set mySprite position to x 75 y 111'; and 'move mySprite with buttons vx 100 vy 0'. The 'move' block is highlighted with a yellow border. Two callout boxes point to the 'vx' and 'vy' input fields: 'Speed along the horizontal X axis' points to '100', and 'Speed along the vertical Y axis' points to '0'. A minus sign icon is visible to the right of the 'vy' field.

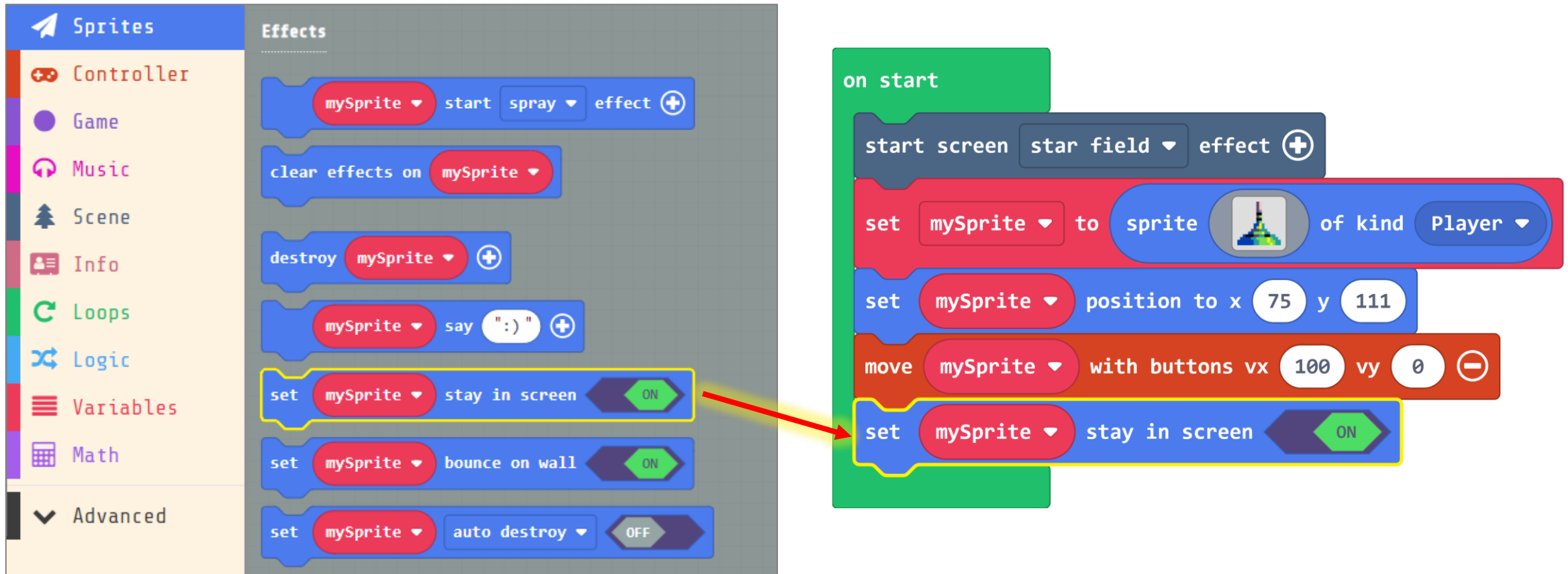
```
on start
  start screen star field effect
  set mySprite to sprite of kind Player
  set mySprite position to x 75 y 111
  move mySprite with buttons vx 100 vy 0
```

Speed along the horizontal X axis

Speed along the vertical Y axis

Keep your Spaceship on the screen

- From the **Sprites** Toolbox drawer, drag a **Set mySprite Stay In Screen** block into the **On Start** block



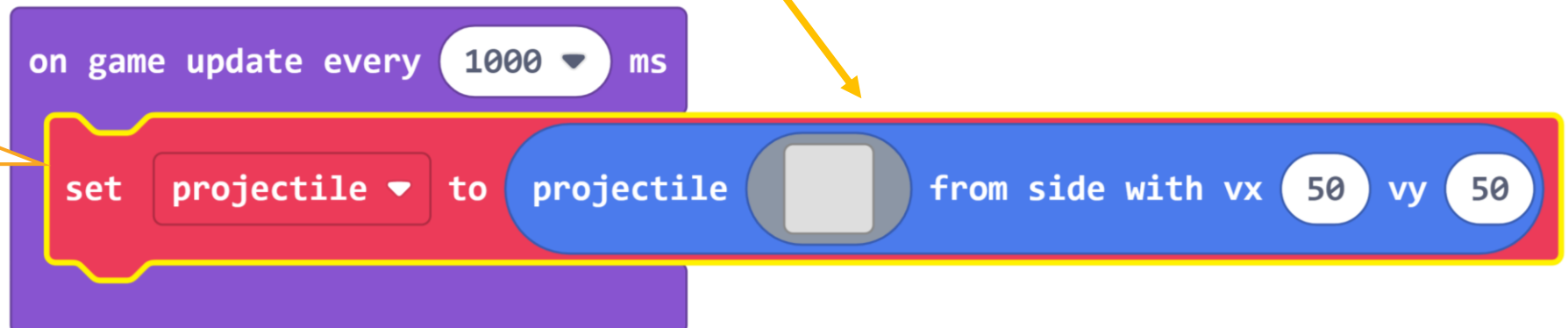
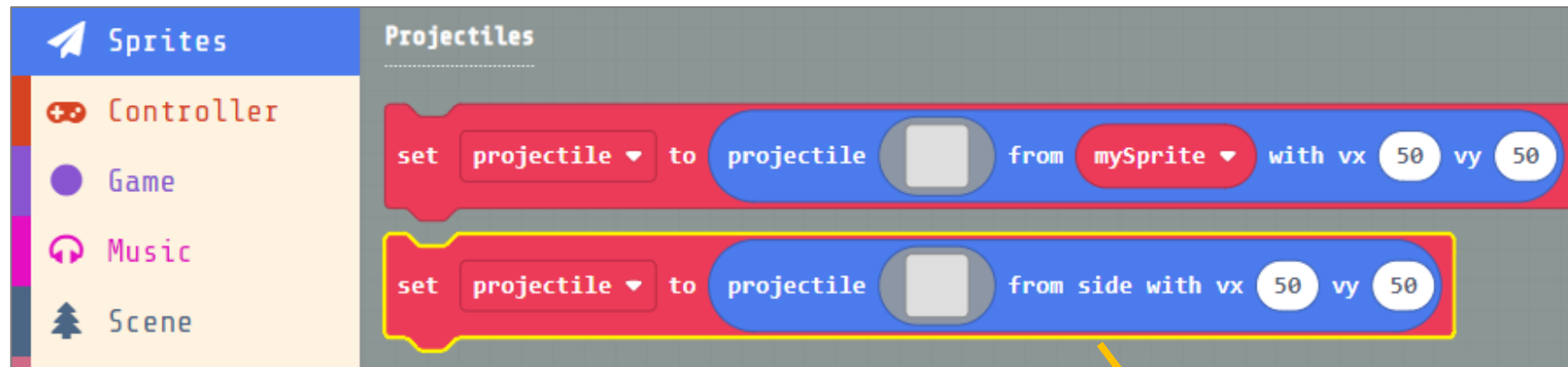
Make an Asteroid fall every 1 second

- From the **Game** Toolbox drawer, drag a **On Game Update Every** block onto the Workspace
- Click on the **500** ms drop-down and select **1 second** (1000 milliseconds)

The screenshot shows the Scratch Game Toolbox on the left and the Workspace on the right. The 'Game' category is selected in the toolbox. In the 'Gameplay' section, the 'on game update every' block is highlighted with a yellow border. A red arrow points from this block to a dropdown menu that is open, showing options: 100 ms, 200 ms, 500 ms, 1 second (checked), 2 seconds, and 5 seconds. A callout box on the right contains the text: 'Code in this block will execute on a given time interval'.

Create Asteroid

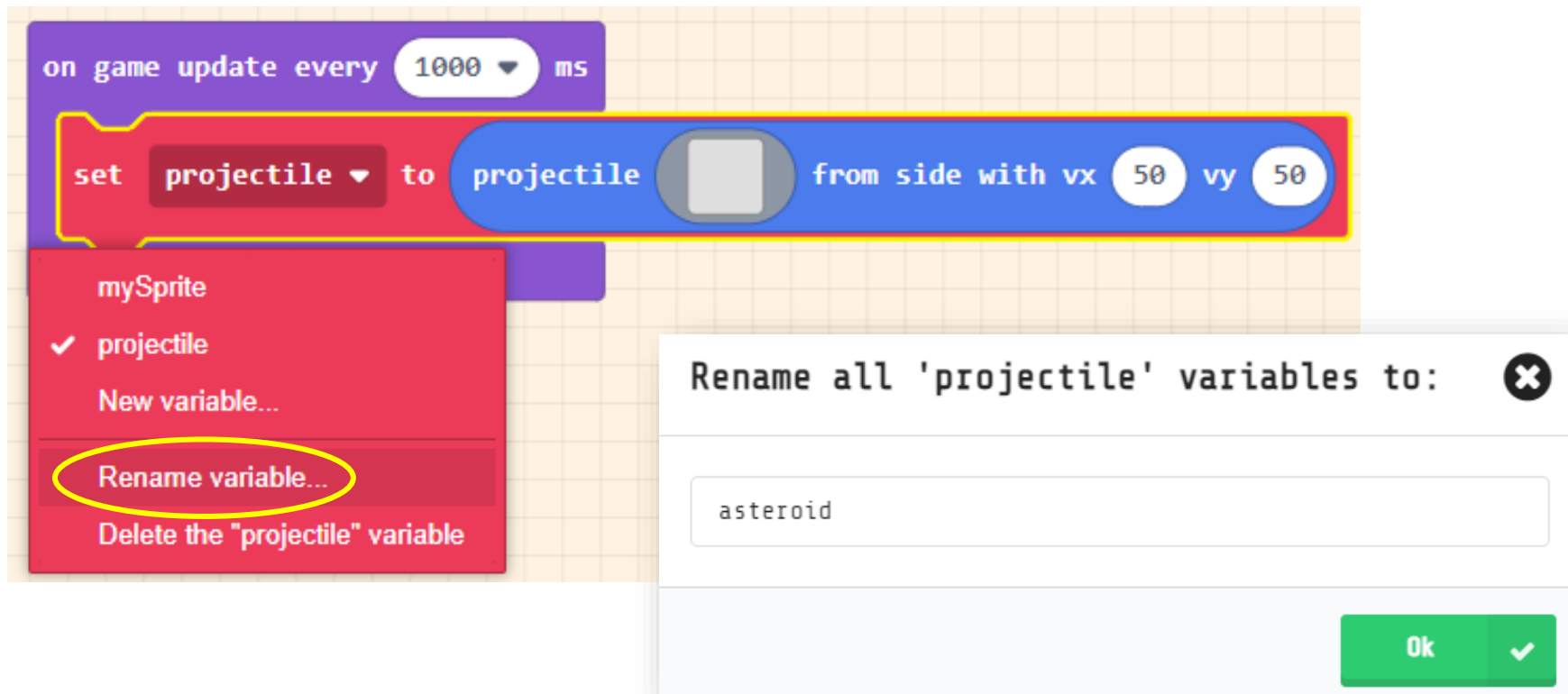
- From the **Sprites** Toolbox drawer, drag a **Set Projectile to Projectile from Side** block into the **On Game Update Every** block



A Projectile is a type of Sprite that moves by itself

Rename projectile

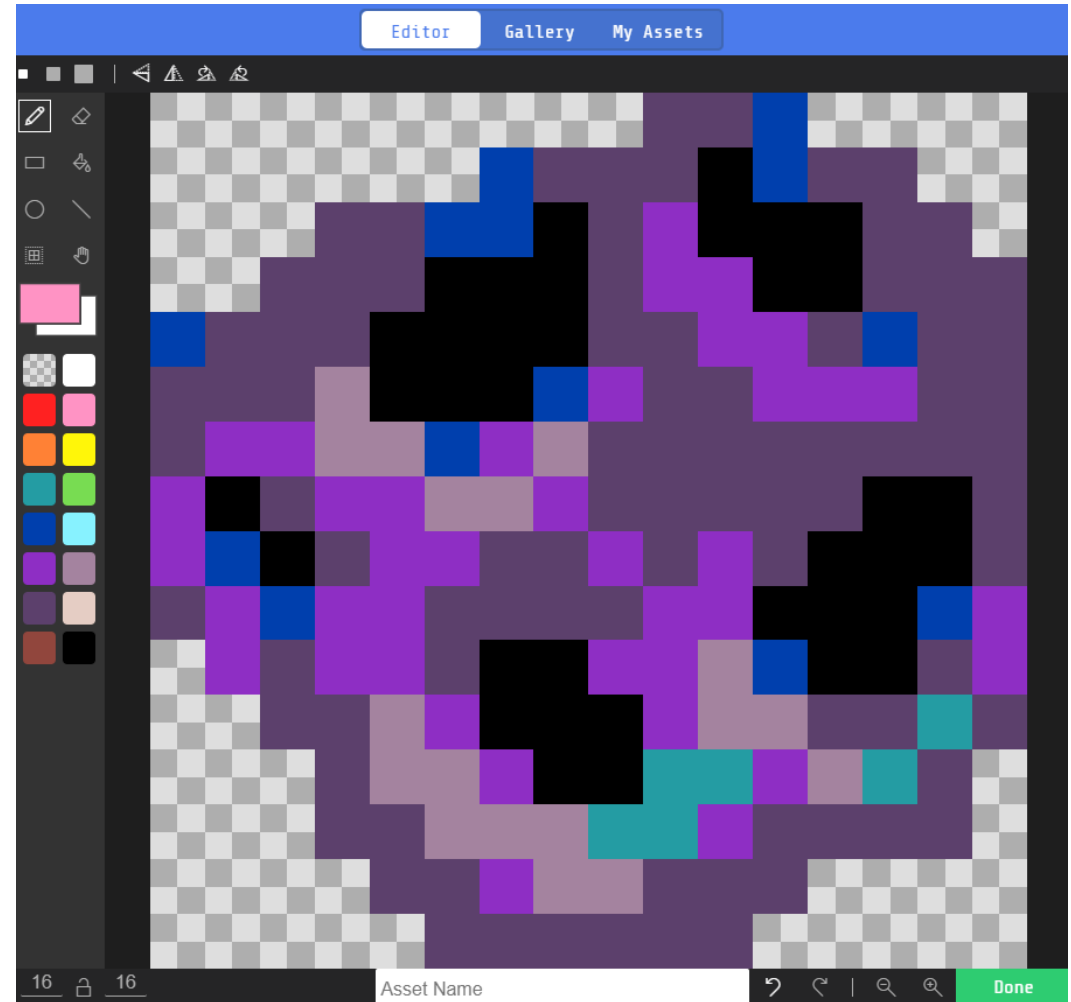
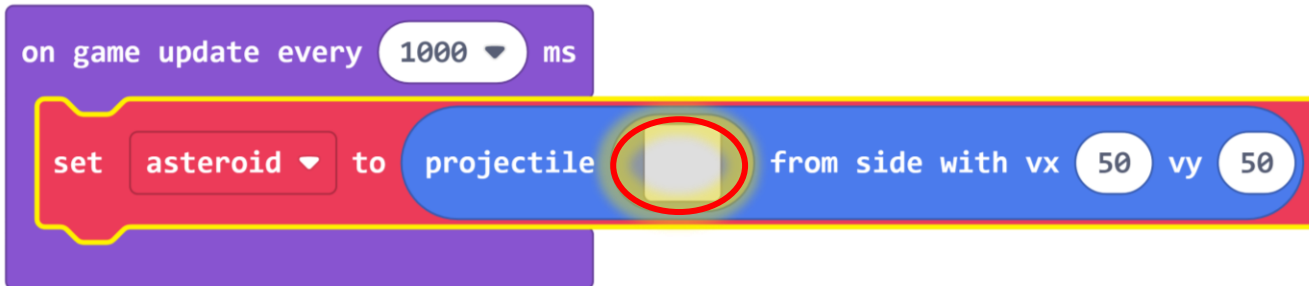
- In the **Set Projectile to Projectile from Side** block, click on the **projectile** drop-down menu and select **Rename Variable**
- Type in a name like **asteroid**



The image shows a Scratch script on a grid background. The script starts with a purple 'on game update every 1000 ms' block. Below it is a red 'set projectile to projectile from side with vx 50 vy 50' block. A red dropdown menu is open under the 'projectile' variable in the 'set' block, with 'Rename variable...' selected and circled in yellow. To the right, a white dialog box titled 'Rename all 'projectile' variables to:' is open, with 'asteroid' entered in the text field and an 'Ok' button at the bottom right.

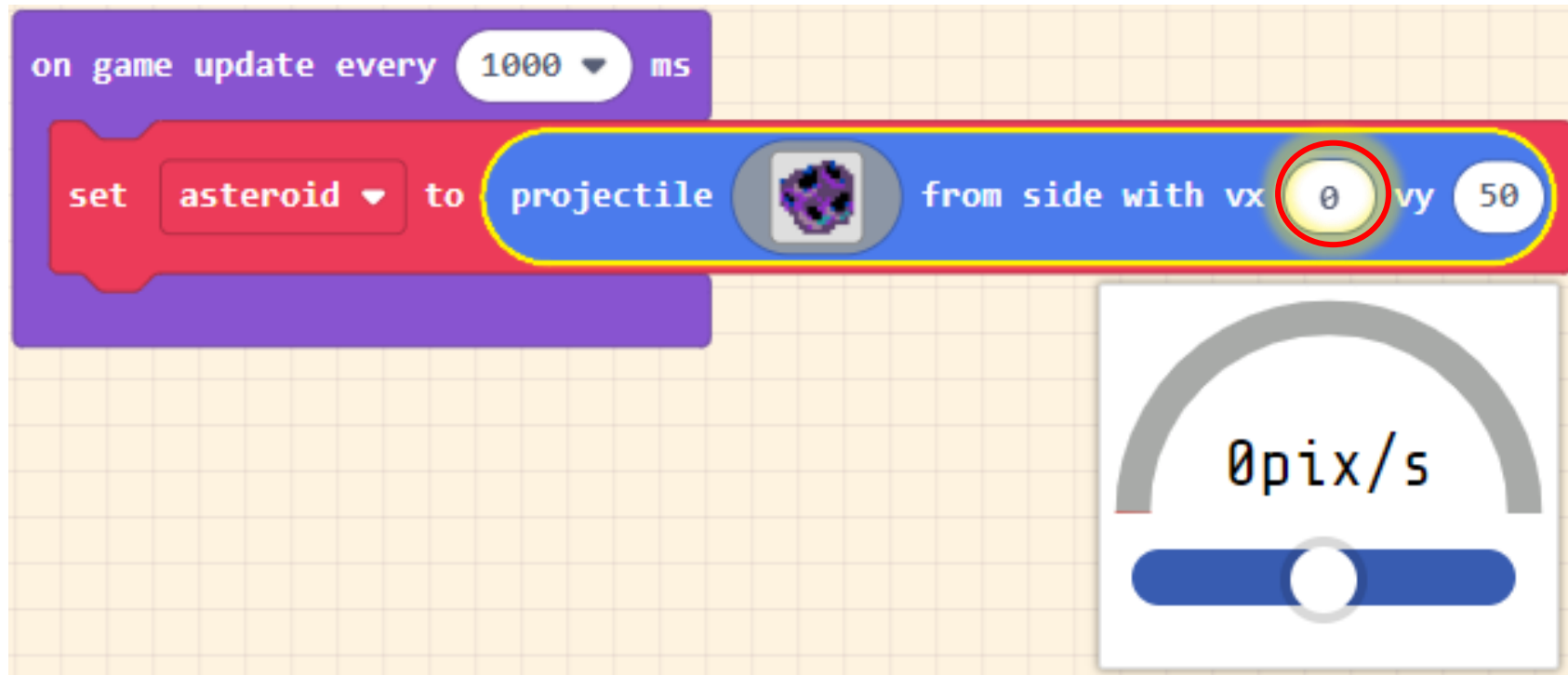
Create your Asteroid Image

- In the **Set Projectile to Projectile from Side** block, click on the grey square to open the Image Editor
- Draw your Asteroid
- Or pick an existing image from the Gallery



Set the Asteroid to fall down the screen

- In the **Set Projectile to Projectile from Side** block, set the Velocity **vx** value to **0**



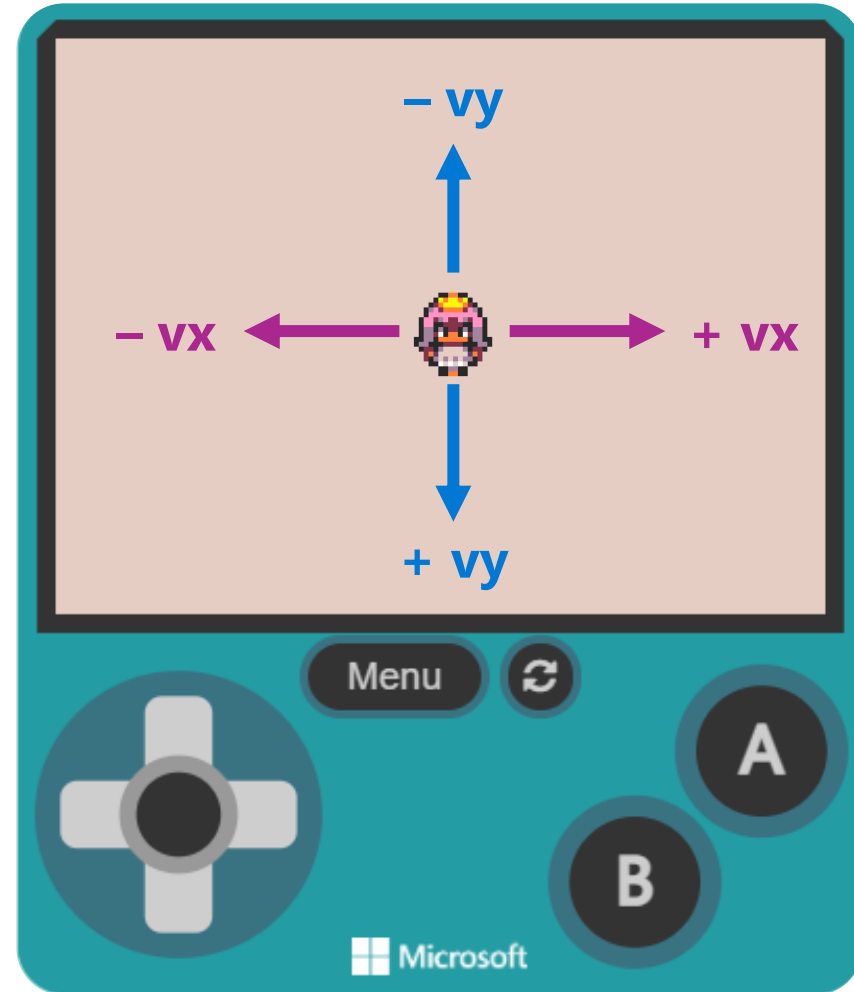
Velocity = speed and direction

vx = horizontal movement

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

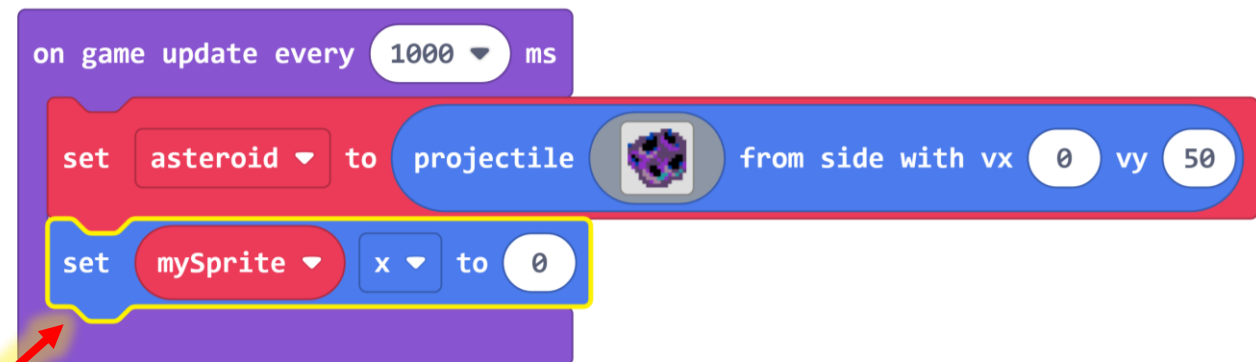
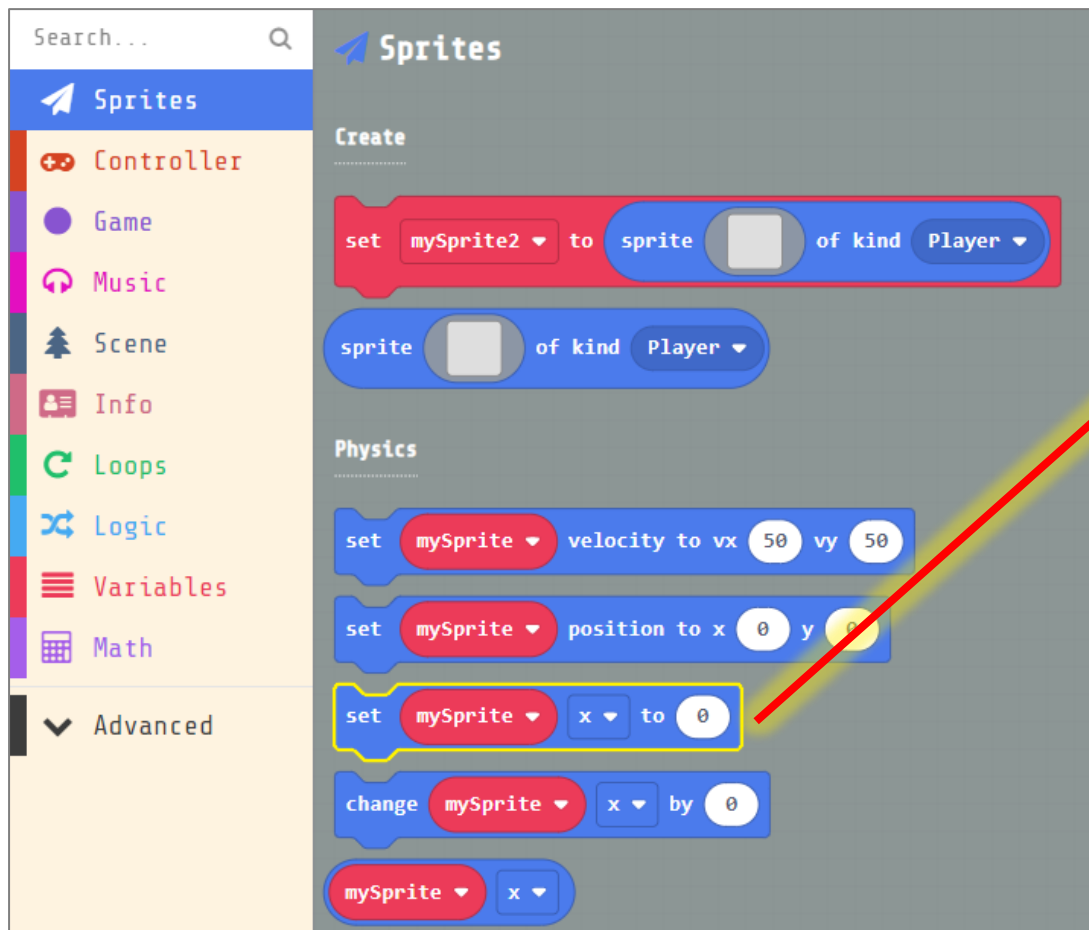
vy = vertical movement

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

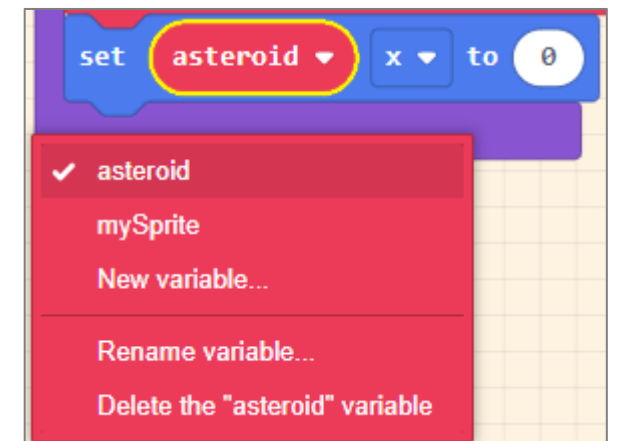


Set the Asteroid to fall from random locations

- From the **Sprites** Toolbox drawer, drag a **Set mySprite x** block into the **On Game Update Every** block

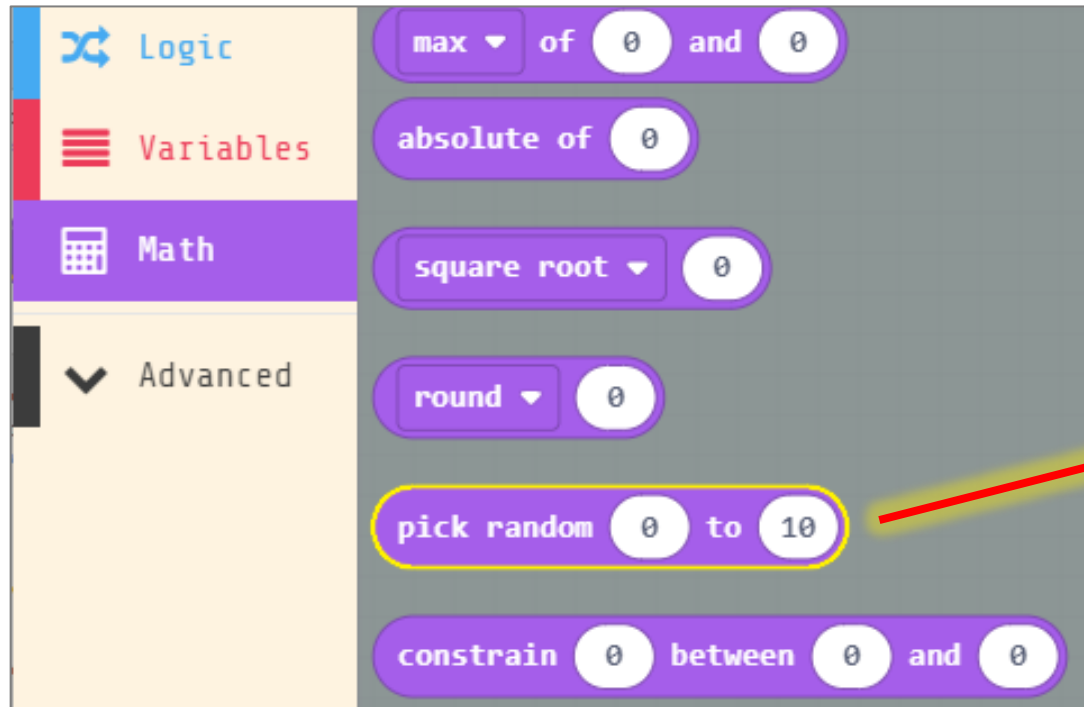


- Click on **mySprite** drop-down menu to select **asteroid**



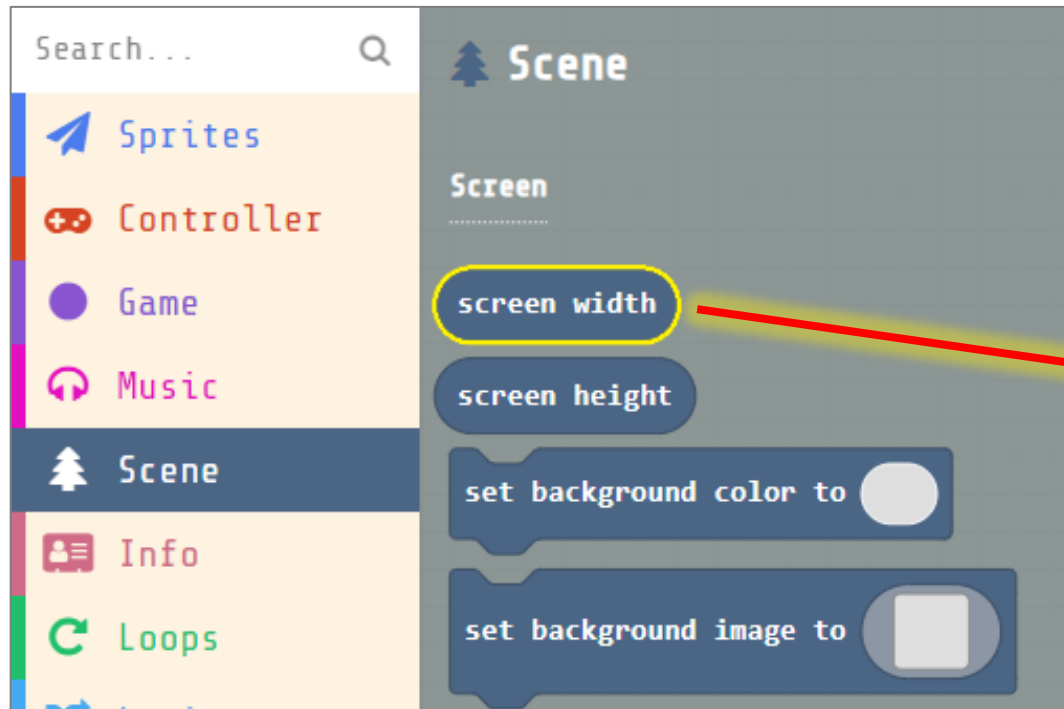
Set the Asteroid to fall from random locations

- From the **Math** Toolbox drawer, drag a **Pick Random** block and drop into the **Set asteroid x** block, replacing the **0**



Set the Asteroid to fall from random locations

- From the **Scene** Toolbox drawer, drag a **Screen Width** block and drop into the second slot of the **Pick Random** block, replacing the **10**



Asteroid's horizontal (x coordinate) position will be a random number between 0 and the screen width

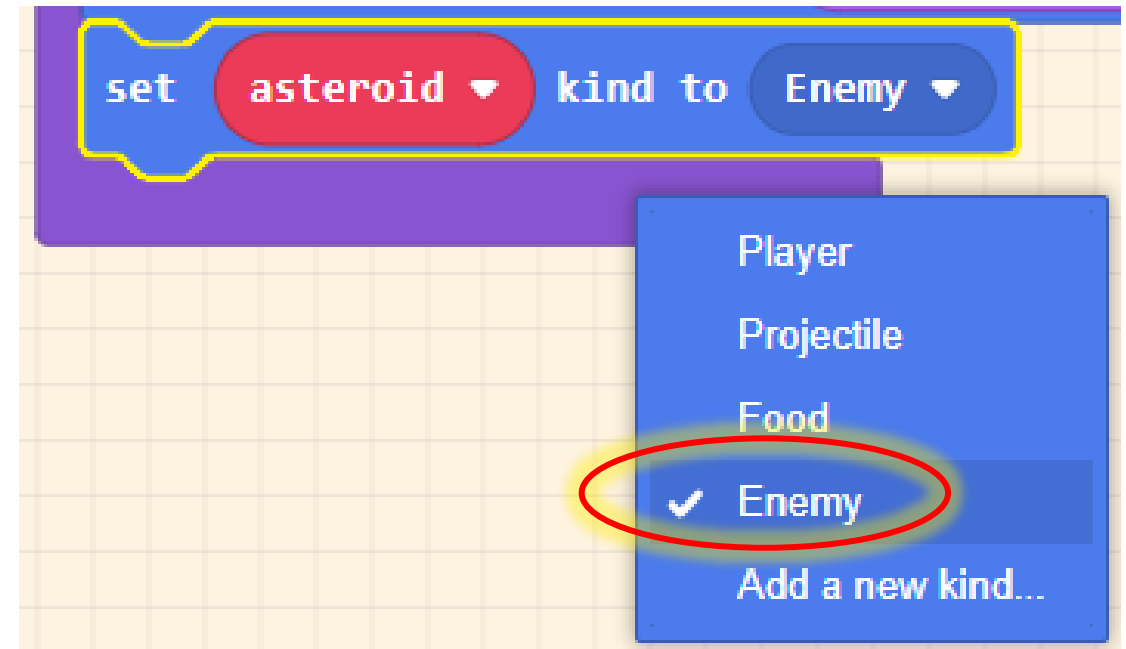
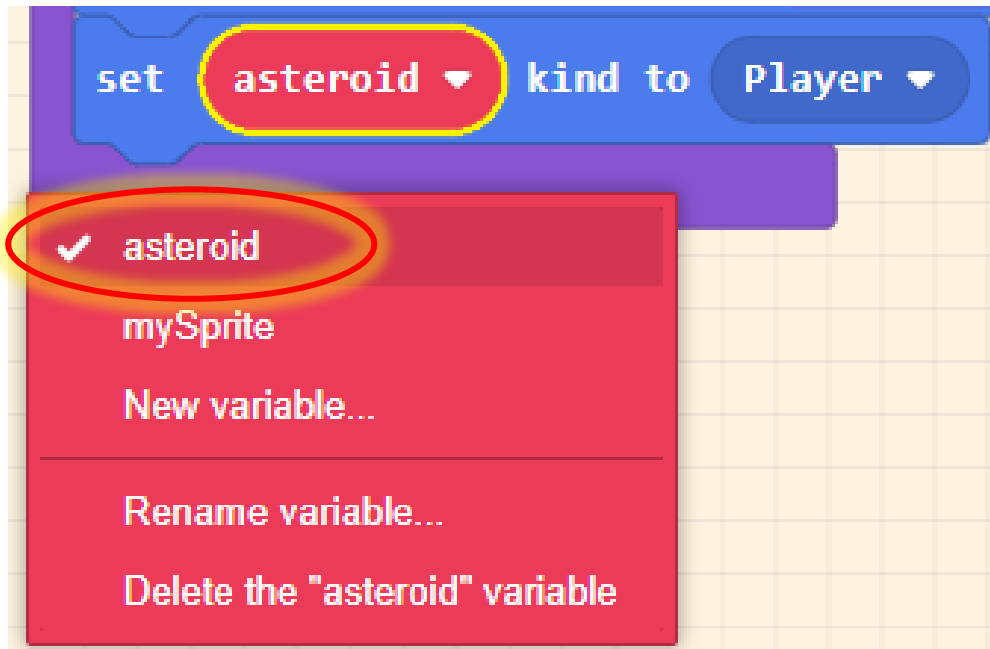
Set the Asteroid to be an Enemy Sprite

- From the **Sprites** Toolbox drawer, in the Overlaps section, drag a **Set mySprite Kind** block and drop into the **On Game Update Every** block

The image shows a software interface for creating a game. On the left is a 'Sprites' toolbox with categories: Controller, Game, Music, Scene, Info, and Loops. The 'Overlaps' section is expanded, showing three blocks: 'on sprite of kind Player overlaps otherSprite of kind Player', 'mySprite overlaps with otherSprite', and 'set mySprite kind to Player'. The 'set mySprite kind to Player' block is highlighted with a yellow border. A red arrow points from this block to a script editor on the right. The script editor contains an 'on game update every 1000 ms' block with three sub-blocks: 'set asteroid to projectile from side with vx 0 vy 50', 'set asteroid x to pick random 0 to screen width', and 'set mySprite kind to Player'. The 'set mySprite kind to Player' block in the script editor is also highlighted with a yellow border.

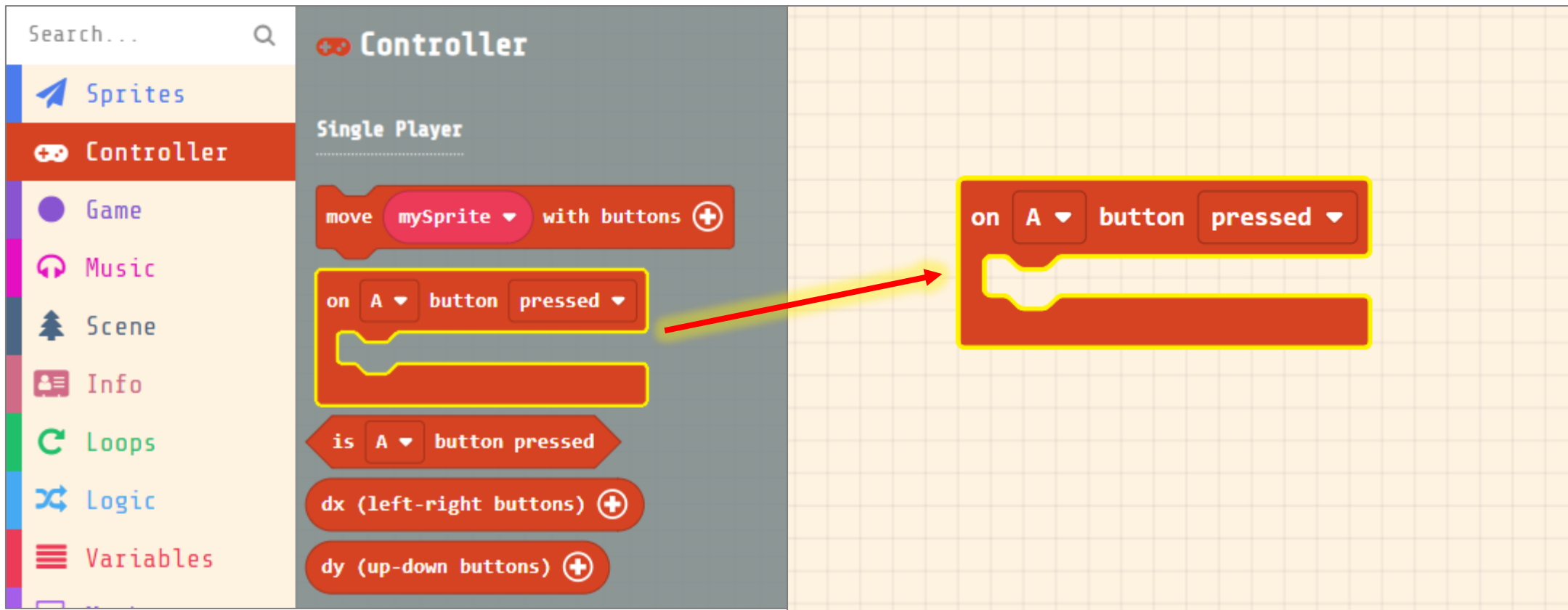
Set the Asteroid to be an Enemy

- In the **Set Kind** block, click on the **mySprite** drop-down menu and select **asteroid**
- In the **Set Kind** block, click on the **Player** drop-down menu and select **Enemy**



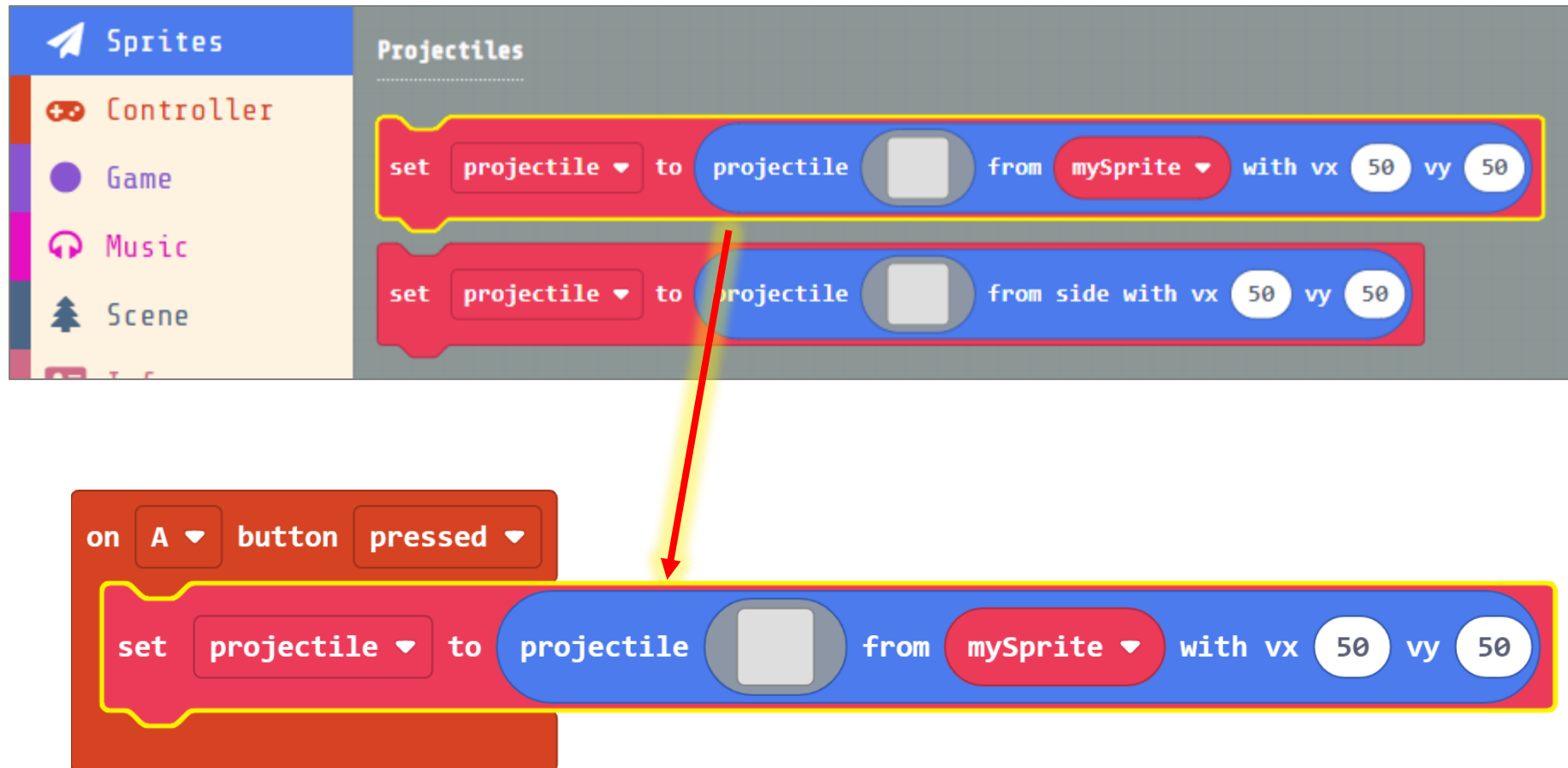
Shoot Lasers when you press a button

- From the **Controller** Toolbox drawer, drag an **On Button A Pressed** block onto the Workspace



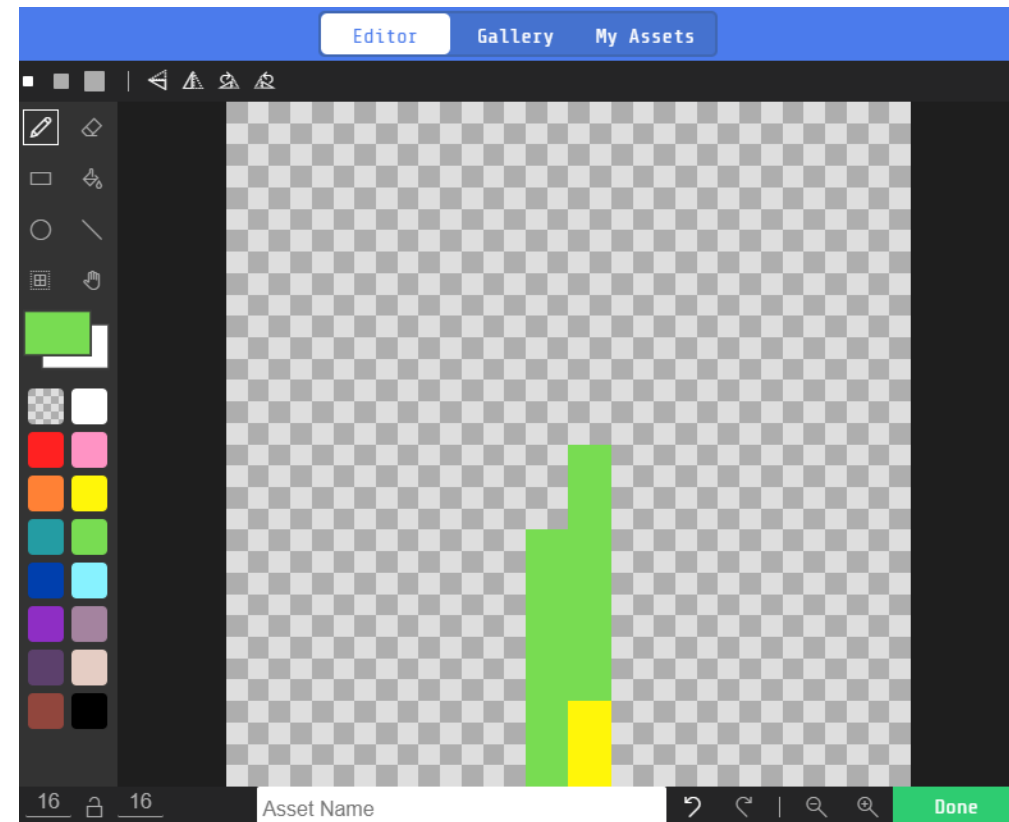
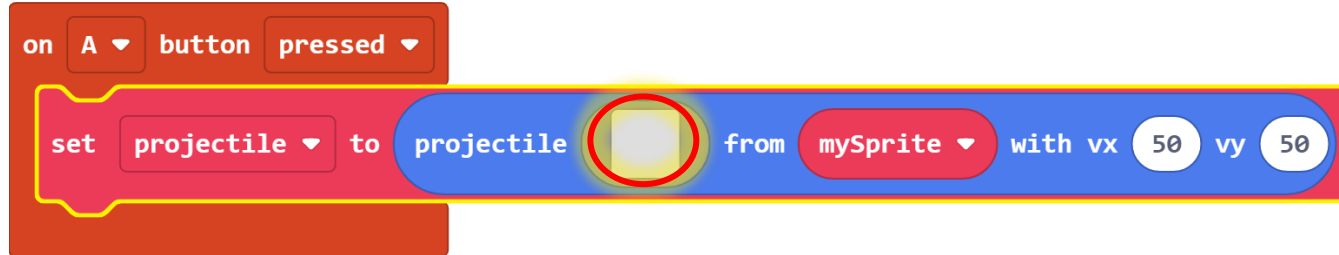
Shoot Lasers when you press a button

- From the **Sprites** Toolbox drawer, drag a **Set Projectile to Projectile from mySprite** block into the **On Button A Pressed** block



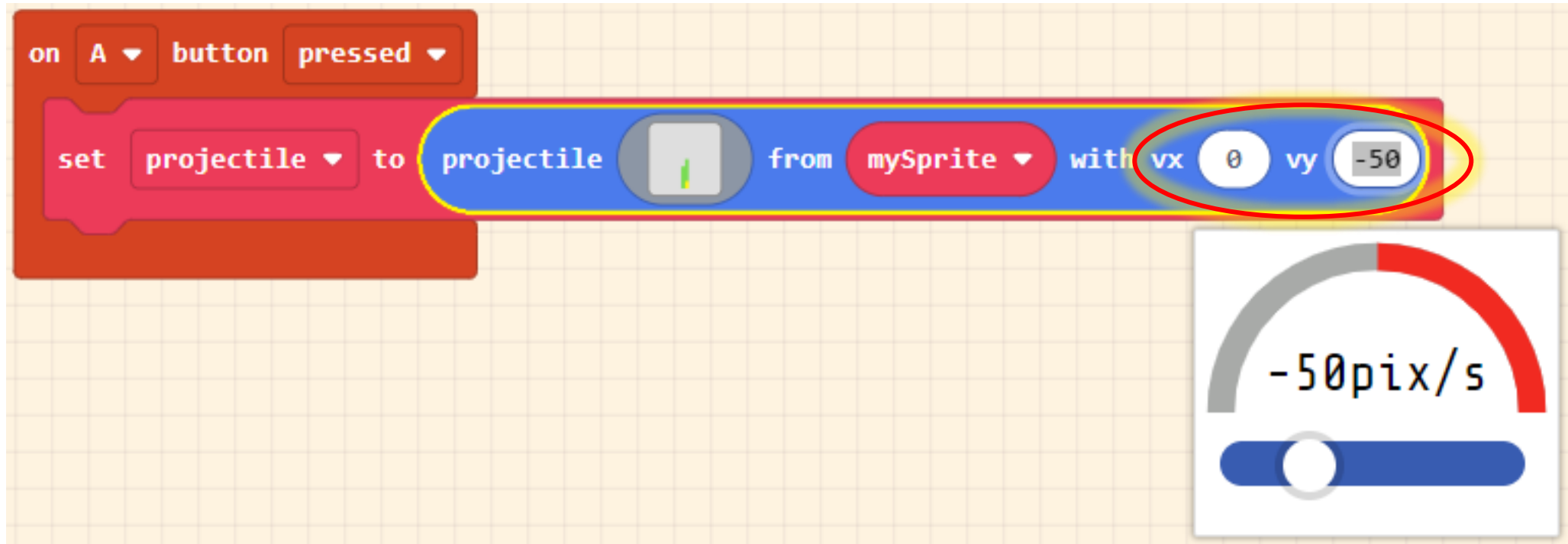
Draw your Laser

- In the **Set Projectile to Projectile from mySprite** block, click on the grey square to open the Image Editor
- Draw your Laser



Set the Velocity of your Lasers

- In the **Set Projectile to Projectile from mySprite** block, set the Velocity **vx** value to **0**, and the **vy** value to **-50**



This will make your lasers shoot vertically from the bottom to the top of the screen

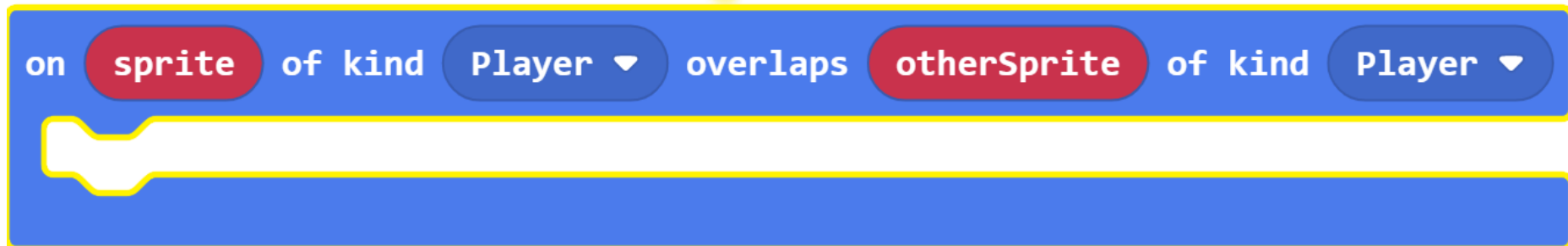
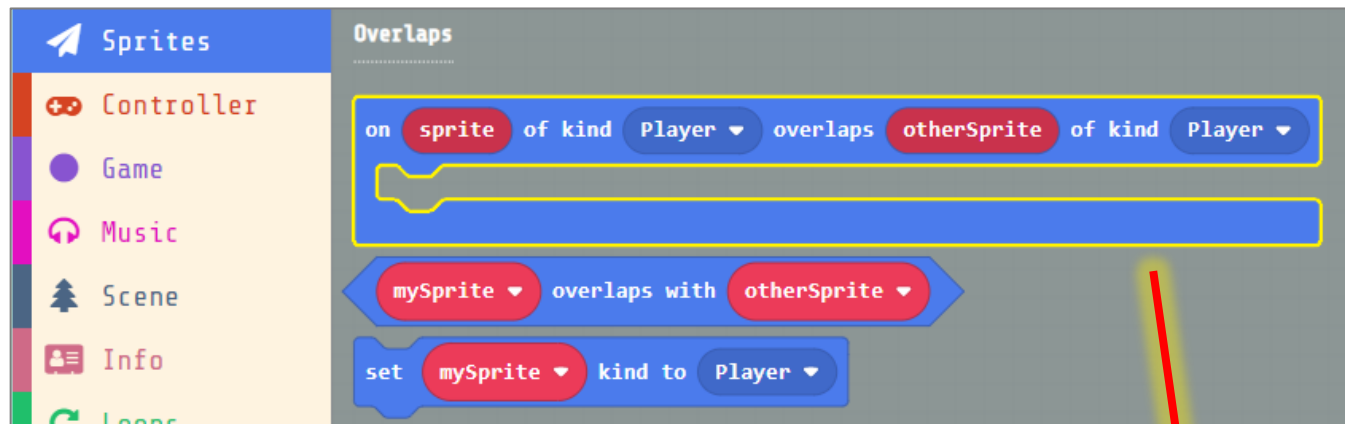
Add Sound effect

- From the **Music** Toolbox drawer, drag a **Play Sound** block into the **On Button A Pressed** block
- Click on the **ba ding** drop-down menu to select a sound

The image shows the Scratch Music toolbox on the left and a script block on the right. The toolbox has a search bar and a list of categories: Sprites, Controller, Game, Music, Scene, Info, Loops, Logic, Variables, and Math. The Music category is selected, showing a list of songs and sounds. A 'Play Sound' block is highlighted in the Sounds section, with a red arrow pointing to it. The script block on the right is an 'On Button A Pressed' block. It contains a 'set projectile to projectile from mySprite with v' block and a 'play sound pew pew until done' block. A dropdown menu is open below the 'pew pew' sound, showing a list of sounds: siren, pew pew (checked), knock, footstep, thump, small crash, and big crash.

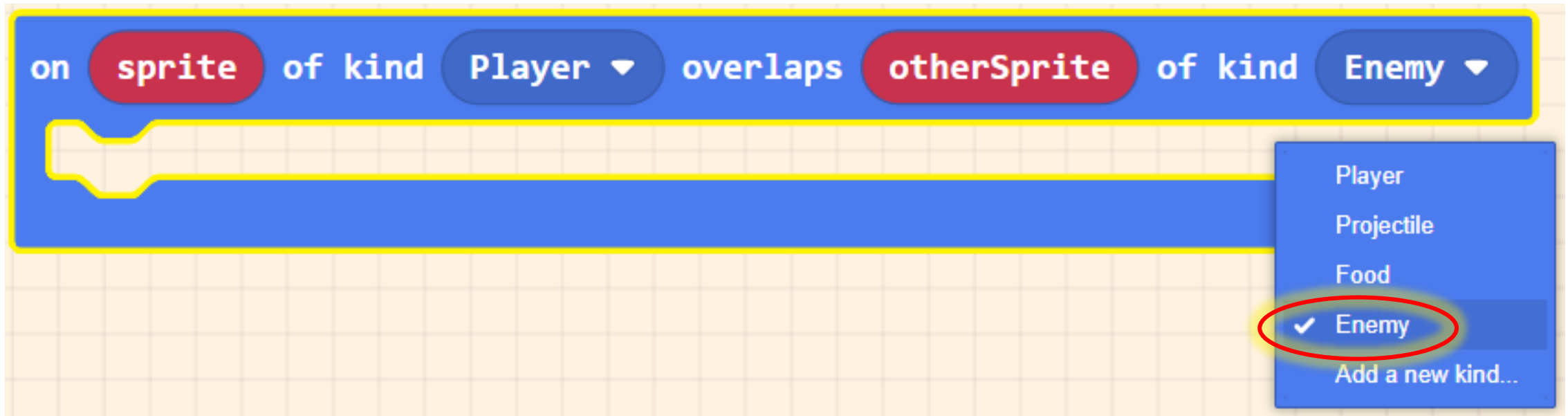
When an Asteroid crashes into your Spaceship

- From the **Sprites** Toolbox drawer, in the Overlaps section, drag a **On Sprite Overlaps OtherSprite** block onto the Workspace



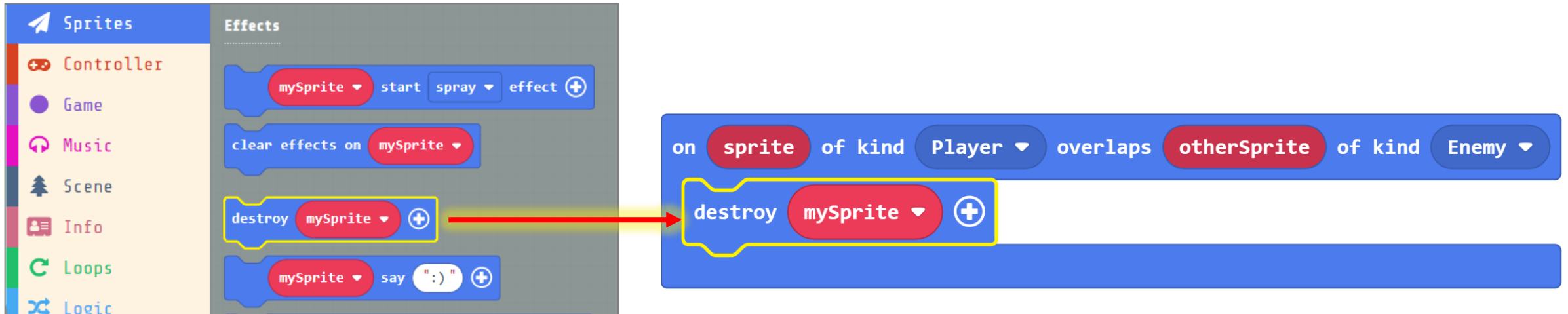
When an Asteroid crashes into your Spaceship

- In the **On Sprite Overlaps OtherSprite** block, click on the 2nd **Player** drop-down menu and select **Enemy**



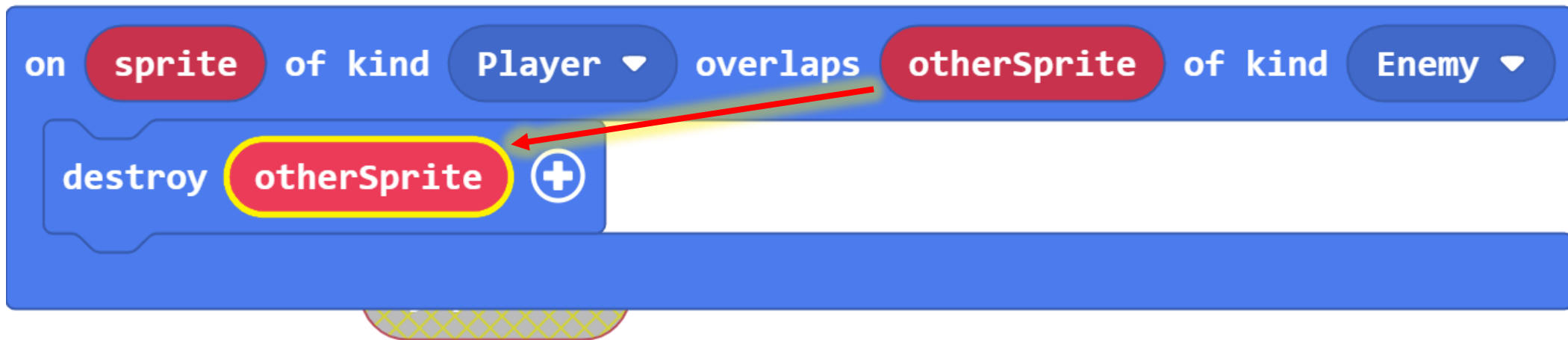
Destroy Asteroid

- From the **Sprites** Toolbox drawer, in the Effects section, drag a **Destroy mySprite** block into the **On Sprite Overlaps OtherSprite** block



Destroy Asteroid

- From the **On Sprite Overlaps OtherSprite** block, drag the **otherSprite** variable into the **Destroy** block replacing **mySprite**



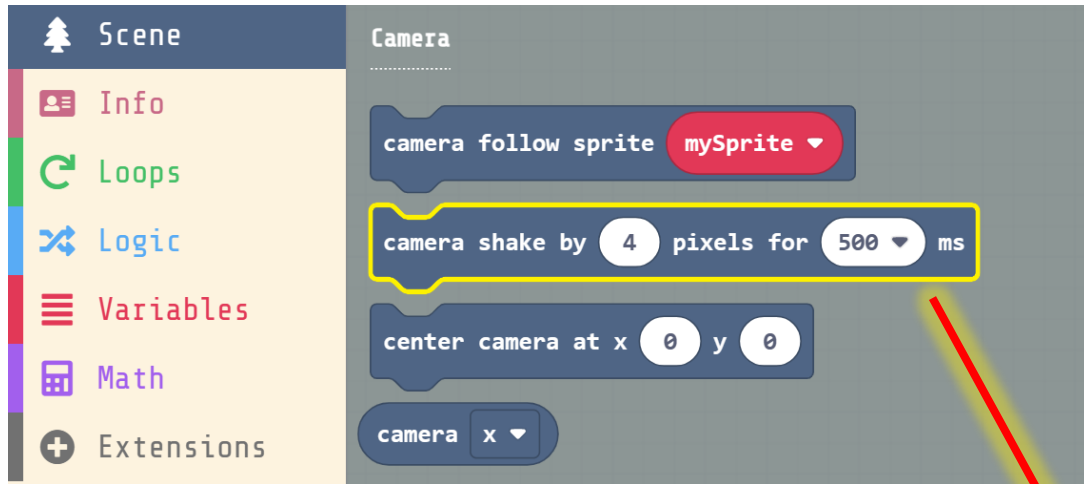
Add an Effect

- In the **Destroy** block, click the plus (+) icon to expand
- Click on the **spray** drop-down menu to select an effect



Add a Camera Shake

- From the **Scene** Toolbox drawer, drag a **Camera Shake** block and drop into the **On Sprite Overlaps OtherSprite** block



Decrease Life

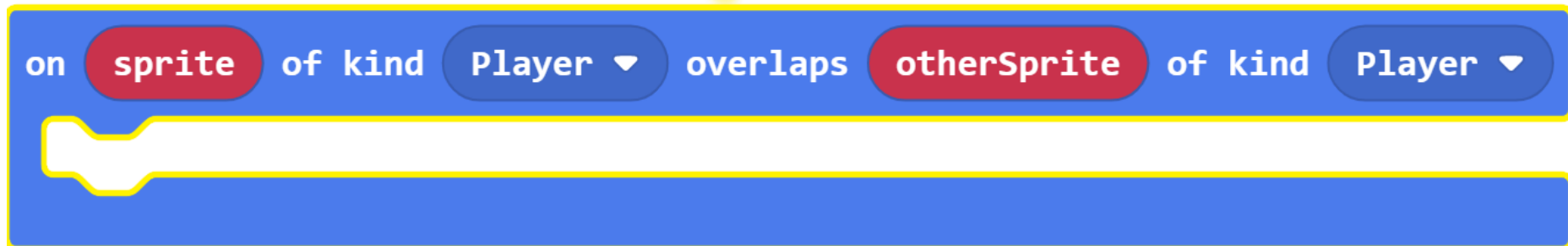
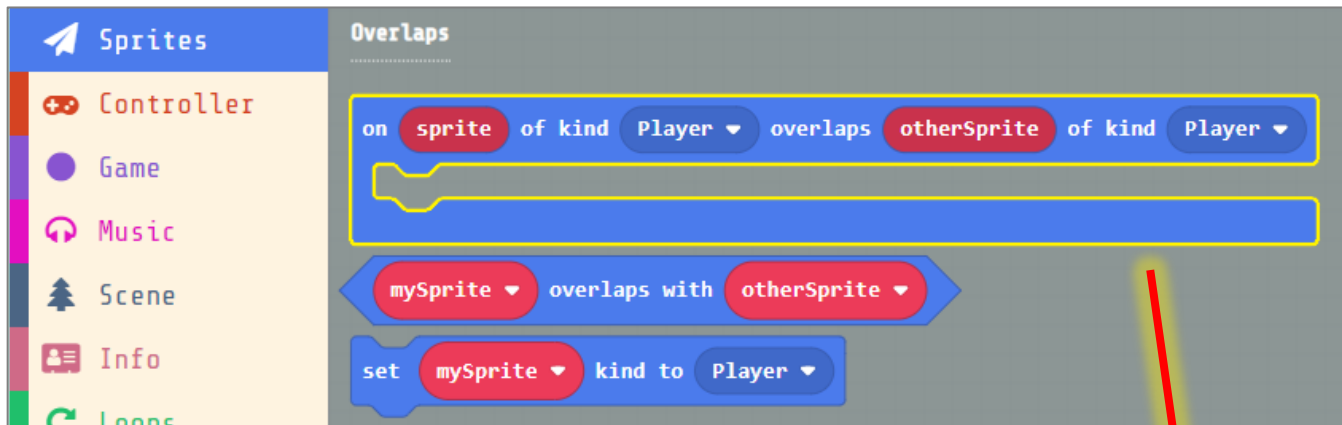
- From the **Info** Toolbox drawer, drag a **Change Life** block and drop into the **On Sprite Overlaps OtherSprite** block

The image shows the Scratch 'Info' toolbox on the left and a script block on the right. The toolbox has a 'Life' category selected, showing a 'change life by -1' block highlighted with a yellow border. A red arrow points from this block to the 'change life by -1' block in the script. The script block is an 'on sprite of kind Player overlaps otherSprite of kind Enemy' event. It contains three actions: 'destroy otherSprite with fire effect for 500 ms', 'camera shake by 4 pixels for 500 ms', and 'change life by -1'.

```
on sprite of kind Player overlaps otherSprite of kind Enemy
  destroy otherSprite with fire effect for 500 ms
  camera shake by 4 pixels for 500 ms
  change life by -1
```

When your Laser hits an Asteroid

- From the **Sprites** Toolbox drawer, in the Overlaps section, drag another **On Sprite Overlaps OtherSprite** block onto the Workspace



When your Laser hits an Asteroid

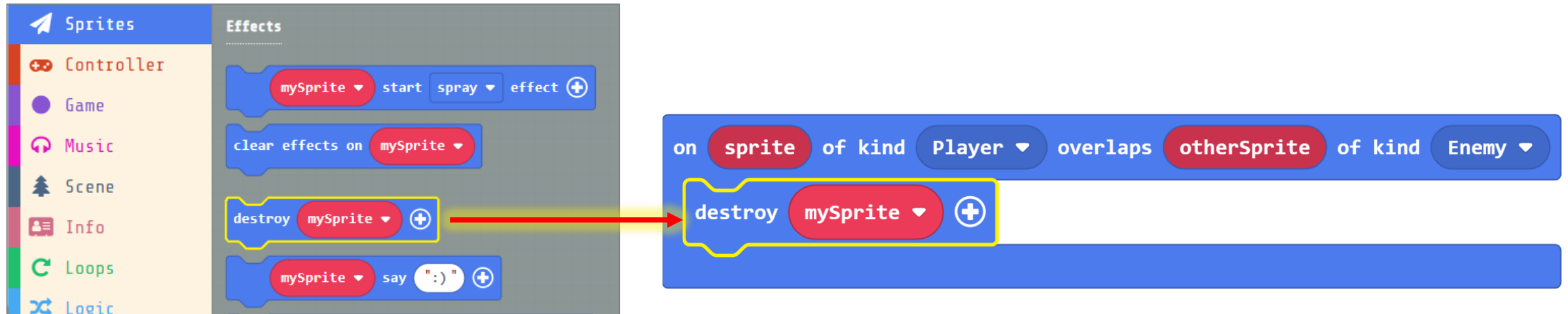
In the **On Sprite Overlaps OtherSprite** block,

- Click on the 1st **Player** drop-down menu and select **Enemy**
- Click on the 2nd **Player** drop-down menu and select **Projectile**



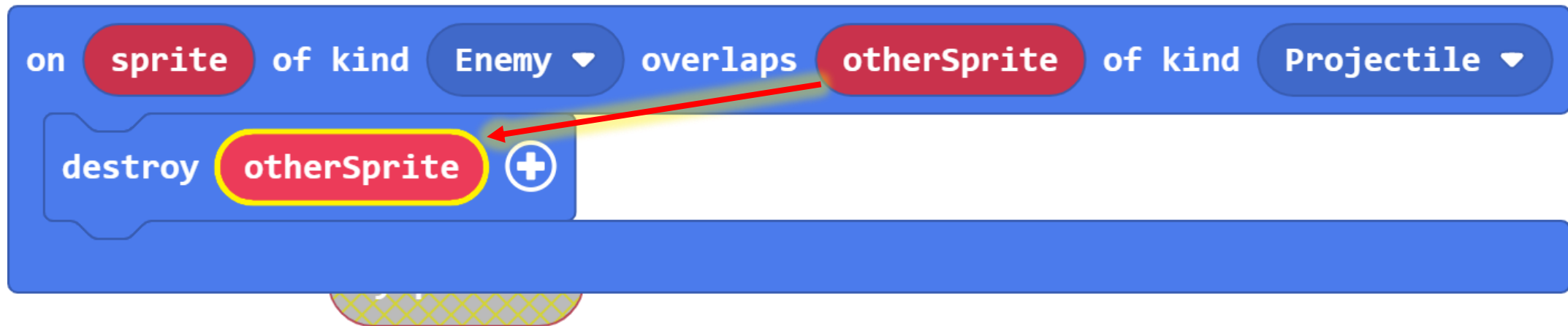
Destroy Laser

- From the **Sprites** Toolbox drawer, in the Effects section, drag a **Destroy mySprite** block into the **On Sprite Overlaps OtherSprite** block



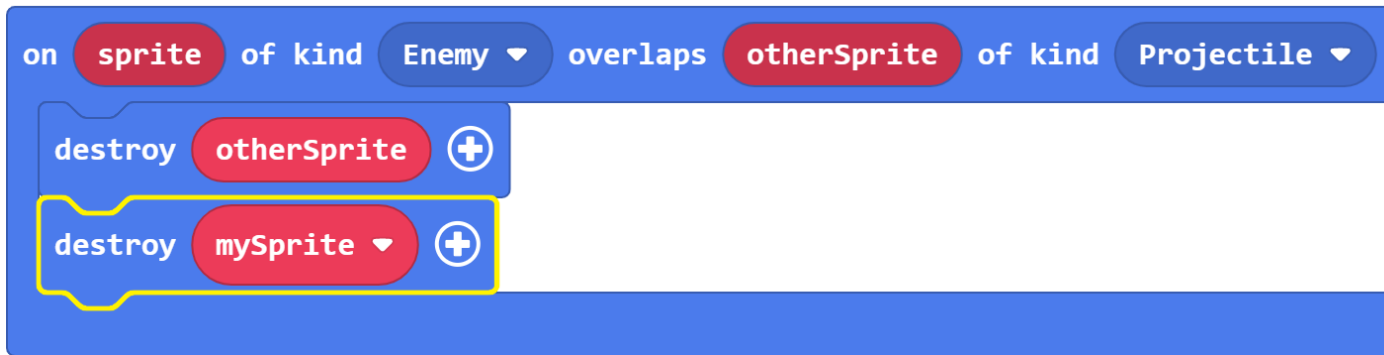
Destroy Laser

- From the **On Sprite Overlaps OtherSprite** block, drag the **otherSprite** variable into the **Destroy** block replacing **mySprite**

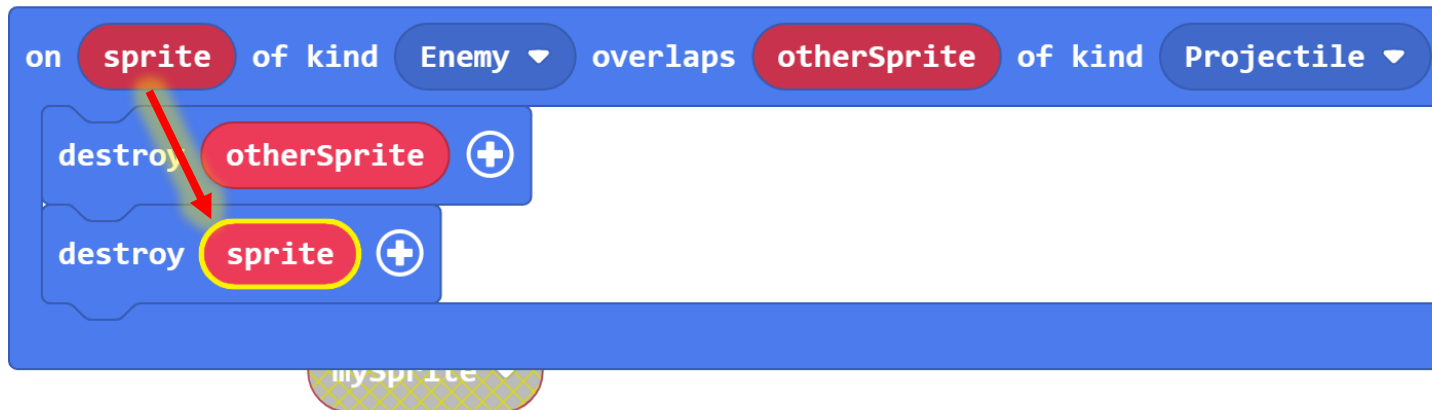


Destroy Asteroid

- From the **Sprites** Toolbox drawer, drag another **Destroy mySprite** block into the **On Sprite Overlaps OtherSprite** block

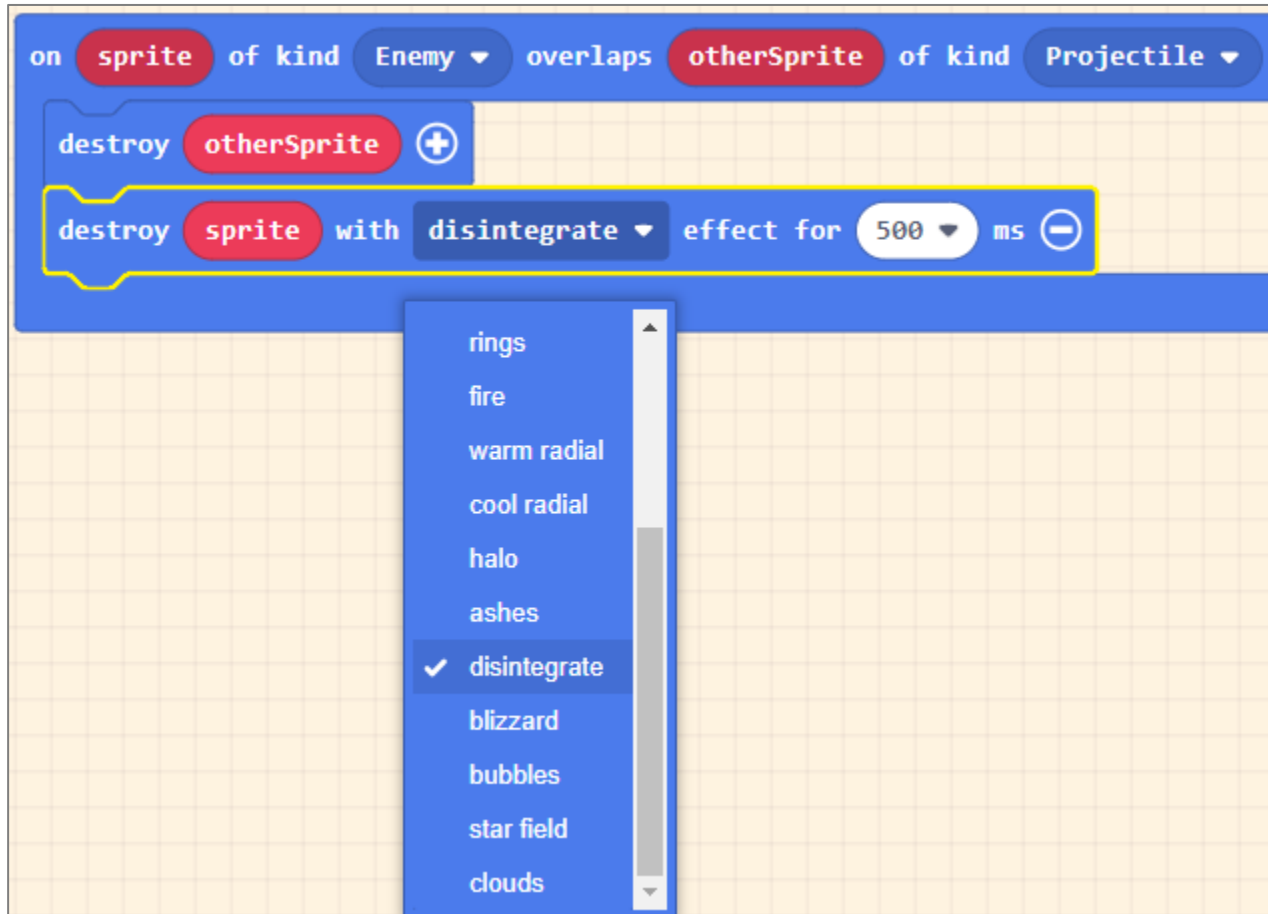


- Drag the **Sprite** variable into the second **Destroy** block replacing **mySprite**



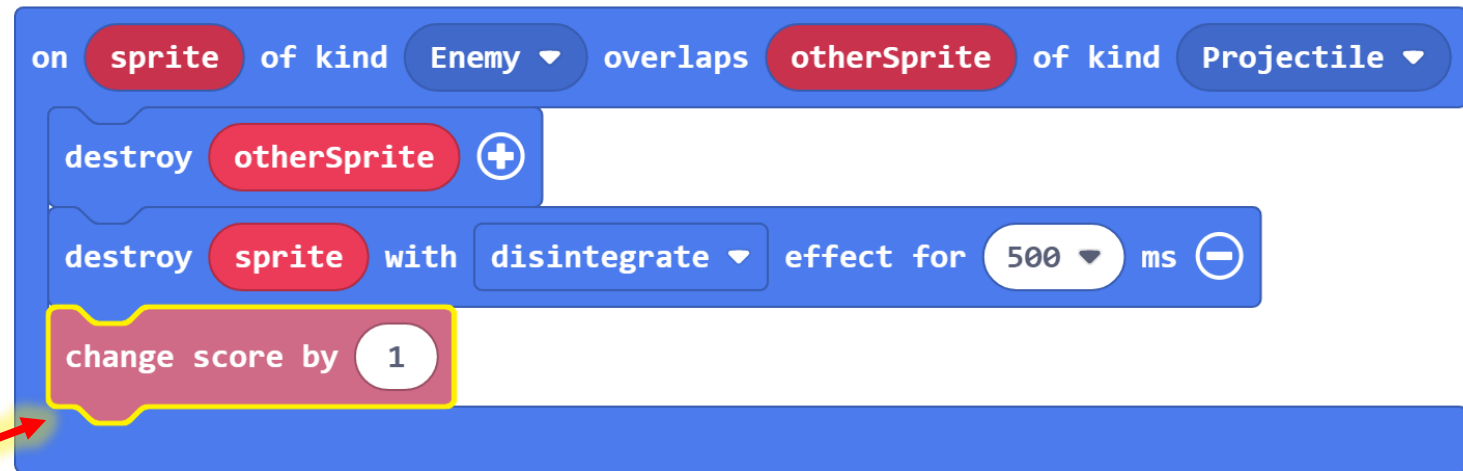
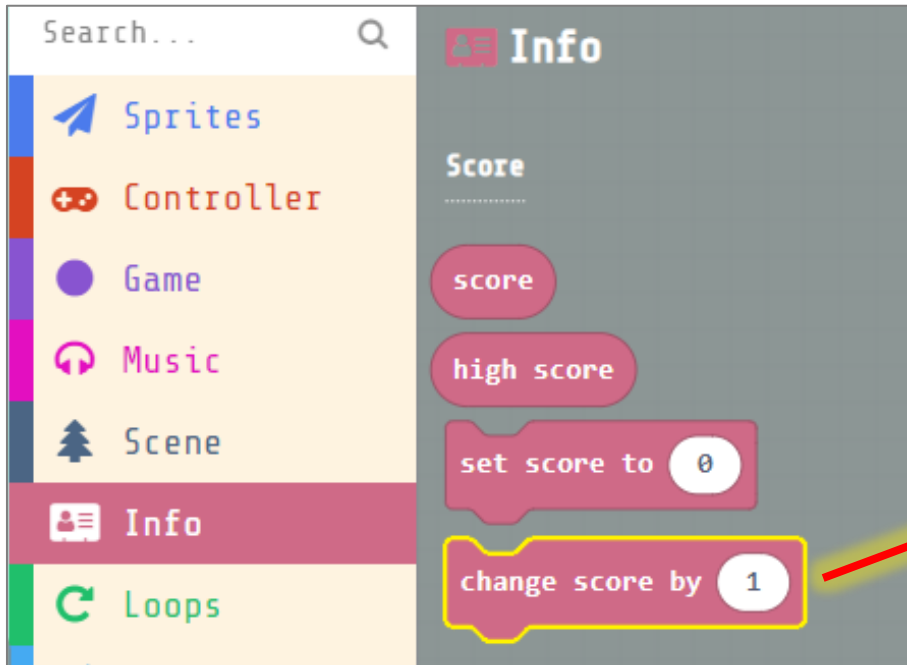
Add an Effect

- In the second **Destroy** block, click the plus (+) icon to expand
- Click on the **spray** drop-down menu to select an effect



Add to your Score

- From the **Info** Toolbox drawer, drag a **Change Score** block and drop into the **On Sprite Overlaps OtherSprite** block



Complete Code

```
on start
  start screen star field effect +
  set mySprite to sprite of kind Player
  set mySprite position to x 75 y 111
  move mySprite with buttons vx 100 vy 0
  set mySprite stay in screen ON

on game update every 1000 ms
  set asteroid to projectile from side with vx 0 vy 50
  set asteroid x to pick random 0 to screen width
  set asteroid kind to Enemy
```

```
on A button pressed
  set projectile to projectile from mySprite with vx 0 vy -50
  play sound pew pew
```

```
on sprite of kind Player overlaps otherSprite of kind Enemy
  destroy otherSprite with fire effect for 500 ms
  camera shake by 4 pixels for 500 ms
  change life by -1
```

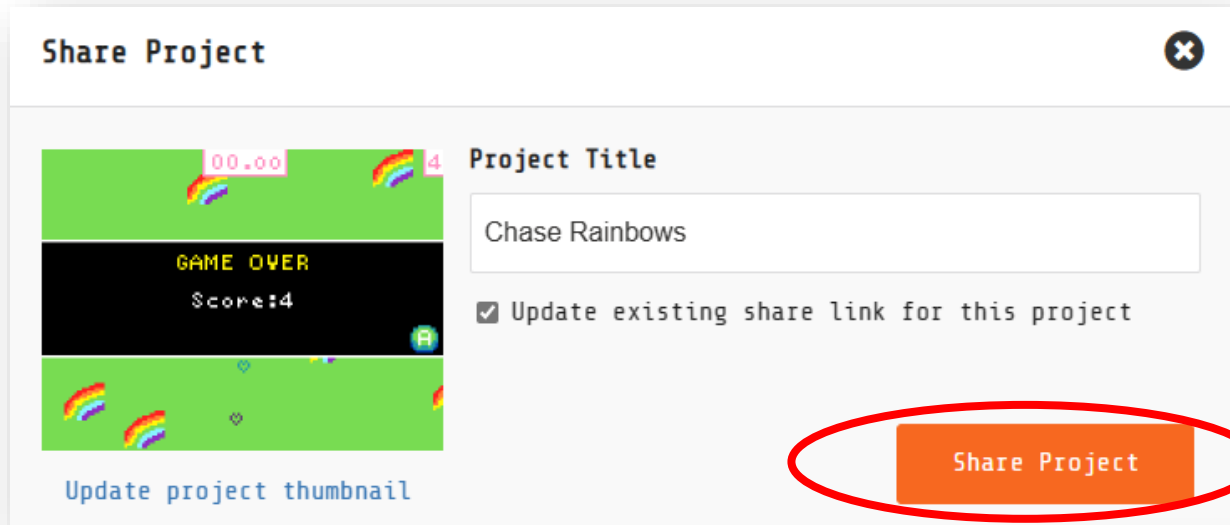
```
on sprite of kind Enemy overlaps otherSprite of kind Projectile
  destroy otherSprite +
  destroy sprite with disintegrate effect for 500 ms
  change score by 1
```

Try modding your game

- Add more sounds and effects
- Change how often asteroids appear
- Change the speed of your spaceship, asteroids or lasers
- Add a background image
- Add a beginning Splash screen with instructions
- Add Power-ups
- Add Animations

Share your game!

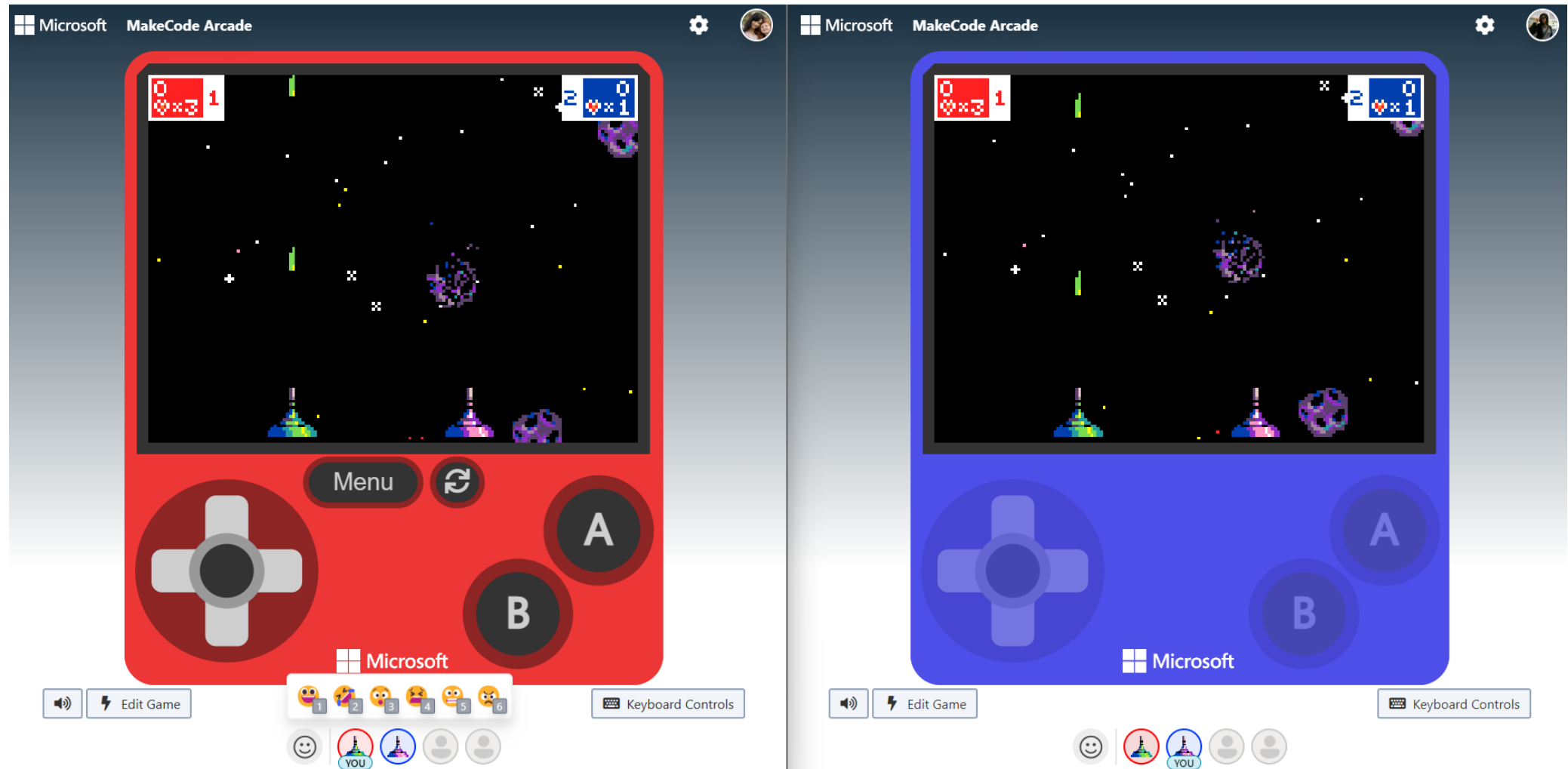
Click the Share button in the top left of the screen



Copy and Paste link
into Chat window

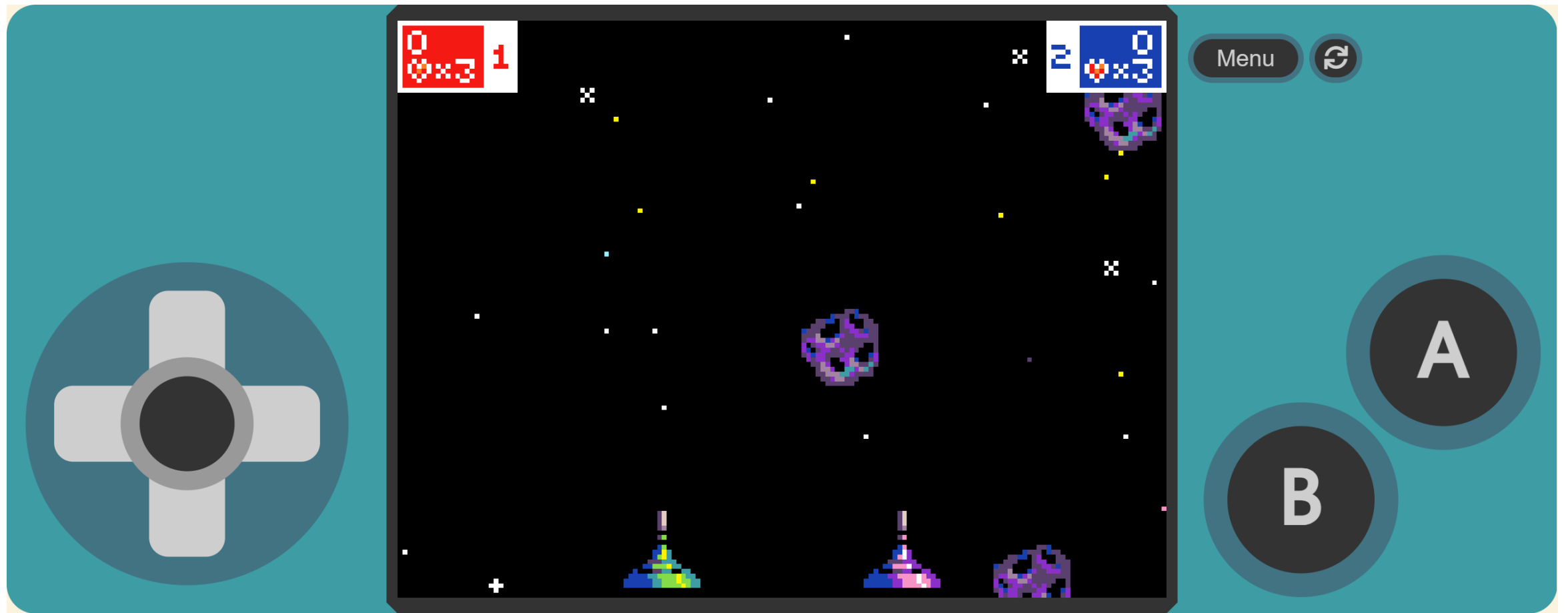


Playing games together



arcade.makecode.com/--multiplayer

Multiplayer Space Game!



<https://makecode.com/f4EgCyUR86eH>

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.

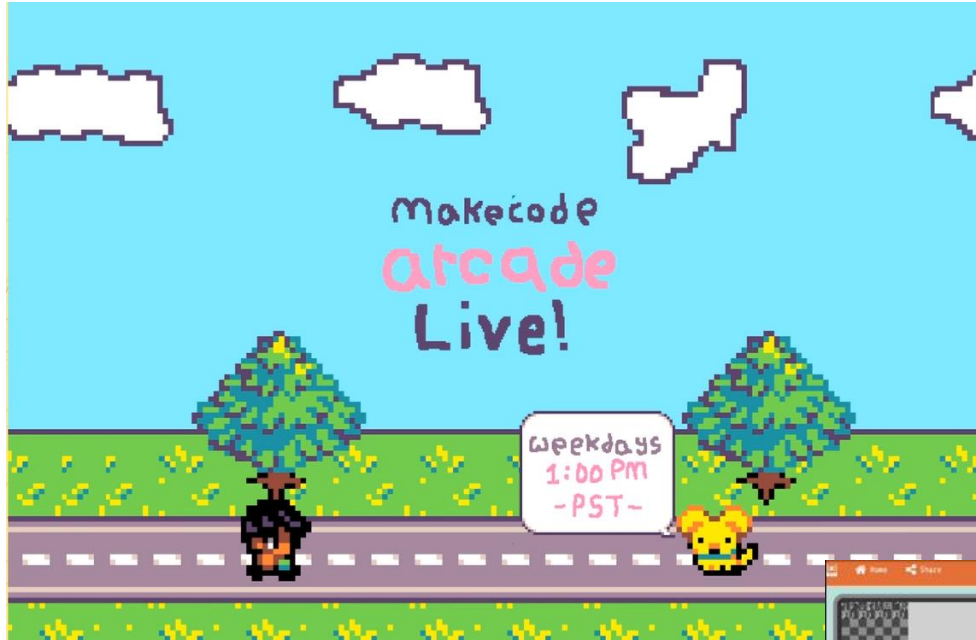


Arcade Kiosk Mode



arcade.makecode.com/hardware/kiosk

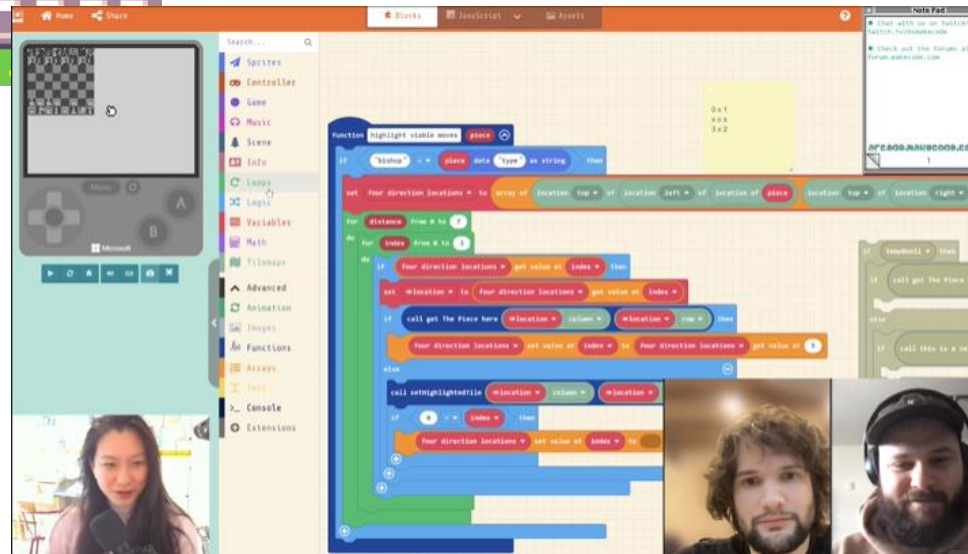
MakeCode Arcade Live Stream & Forum



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))
```

