

Game Design with Scratch

...with Brittany & Elicia

*girls
learning
code

Ice Breaker

Everyone pair up!

1. Introduce yourself
2. Ask your partner the “Would You Rather” questions on the handouts
3. Switch roles

What is a Game?

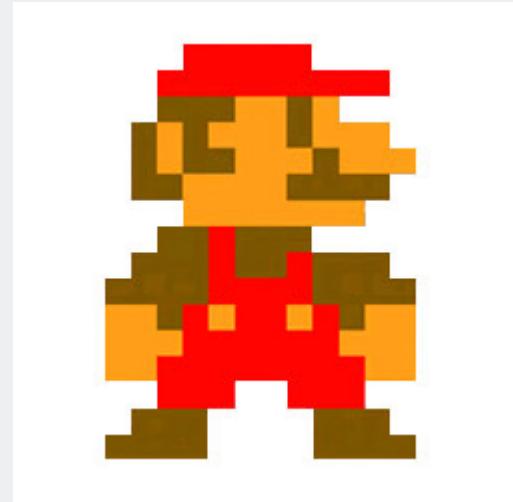
A game is playing

...but it's a special kind of playing

Q: What makes games different
than play?

Games vs Play

- Games have **players**
- Games have **goals**
- Games have **rules**



Example: Mario

Players

A player (you, your friend, etc) controls a character in the game.

Players

A player (you, your friend, etc) controls a ~~character~~ **sprite** in the game.



Q: Name the sprites



Q: Which sprite is our player controlling?



HIGHSCORE: 118800
SCORE: 0



Q: Name the sprites



HIGHSCORE: 118800
SCORE: 0

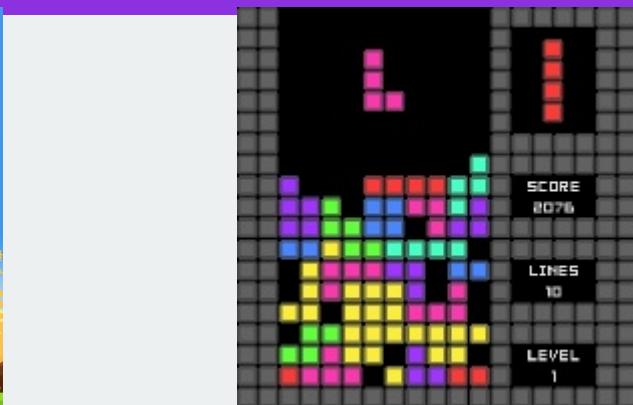
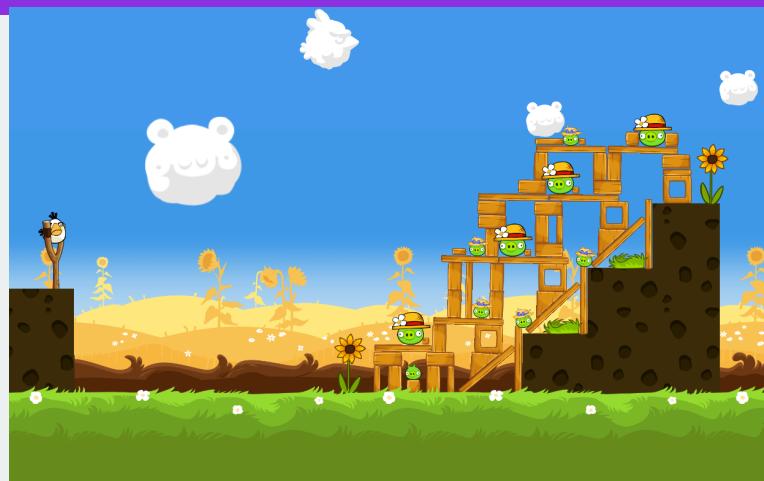


Q: Which sprite is our player controlling?

Players

A player can compete against:

- against the computer
- against another player



Example: you play against the computer



Example: you play against other players

Goals

What is the player is trying to do ?

How do they win?

Examples: reach the finish line first, save the princess, kill all the monsters

Rules / How to Play

Rules tell us what our player can do

Rules tell us what happens when we do things

Rules usually have an **if** and a **then**

Rules are what make a game **fun** or **exciting** or
easy or **hard**

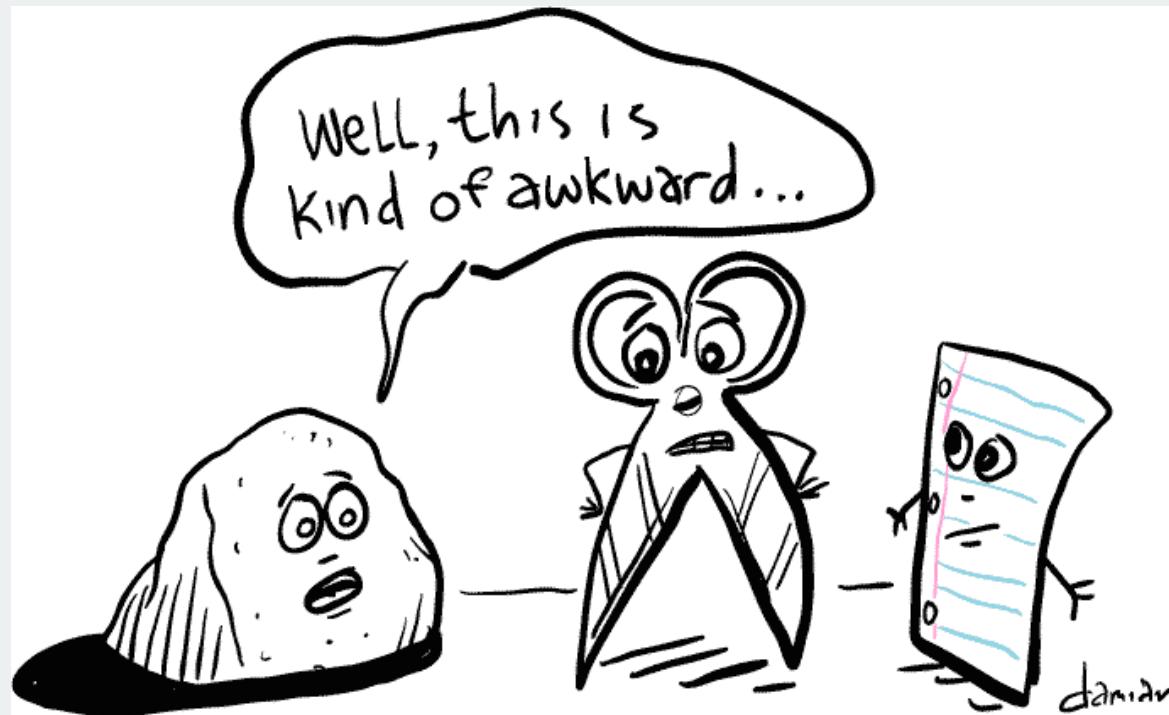


If Mario jump on an enemy, then the enemy dies

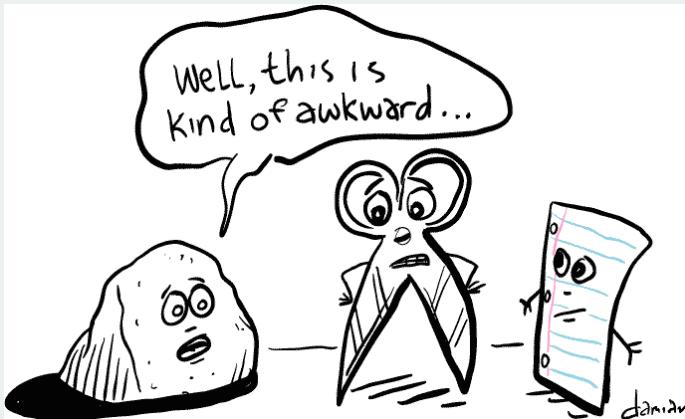
More examples

- **If** the player gets to the end of the level, **then** they win
- **If** the player picks up a coin, **then** they get a point
- **If** the player runs into a monster, **then** their health decreases
- **If** the player's health reaches 0, **then** they lose

Rock, Paper, Scissors

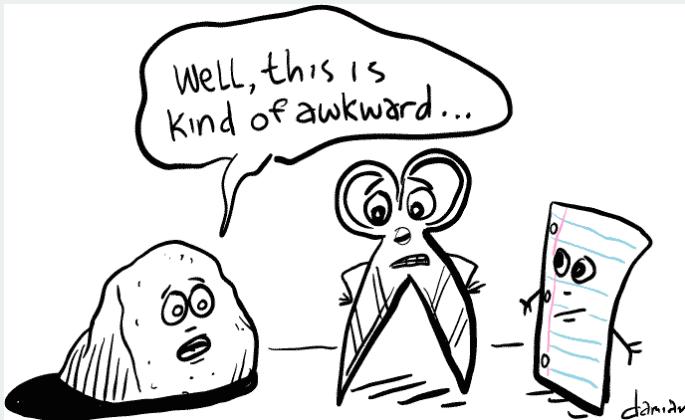


Who are the Players?



- Any two people with hands
- Two people compete against each other

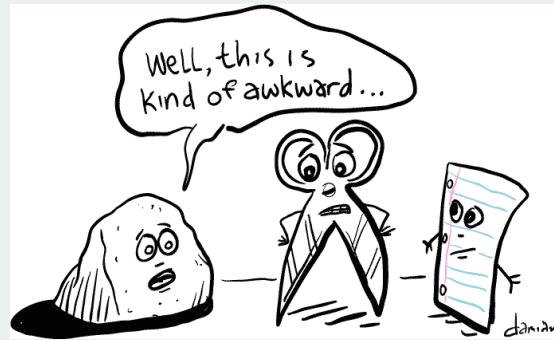
Who are the Players?



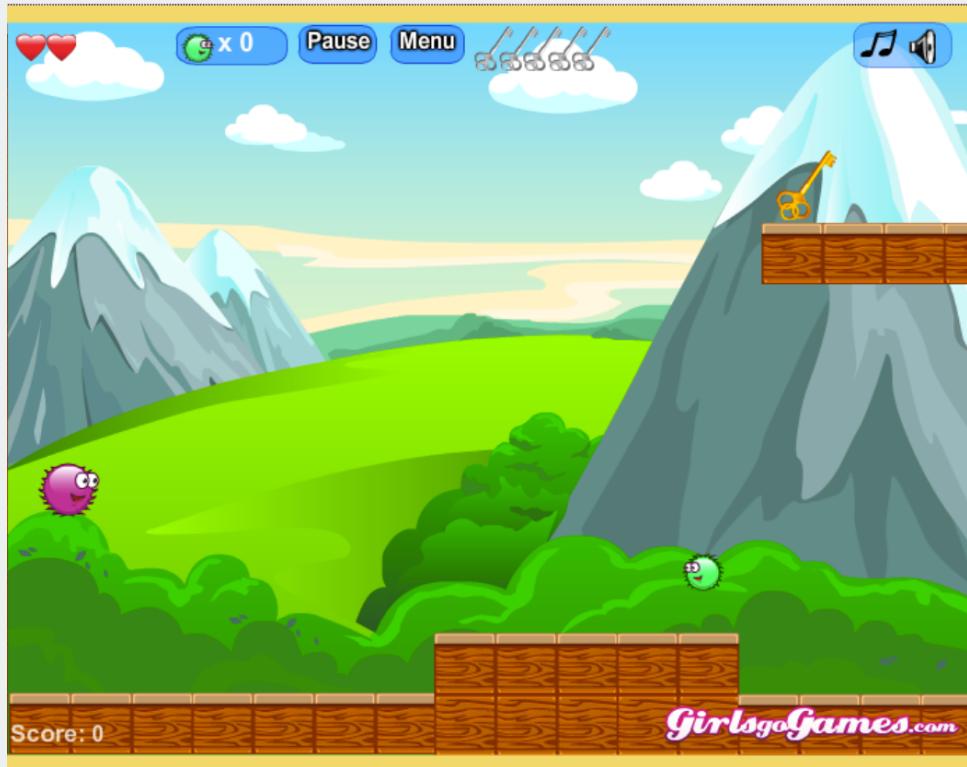
- Pick the sign that beats your opponent's sign
- 2 out of 3 times?

How do you play?

- Each player picks a hand sign
- The options are rock, paper, and scissors
- Both players make a sign at the same time
- If one is rock and one is scissors, **then** rock wins
- If one is scissors and one is paper, **then** scissors wins
- If one is paper and one is rock, **then** paper wins



Frizzle Fraz



www.girlsgogames.com

Who is the Player?



- Frizzle
- He/she competes against the computer

What are the Goals?



→ Bring the little Frizzles to a safe place

How do you play?



- Move with the arrow keys
- If you collect a little frizzle, then you get points
- If you collect all 4 keys, then you can open the door at the end of the level
- If you open the door, then you can go to the next level
- If you touch a bad guy, then you lose a heart

What are your favorite games?

- Who are the players?
- What are the goals?
- What are the rules?
- Why is it fun?

Making Games with Scratch



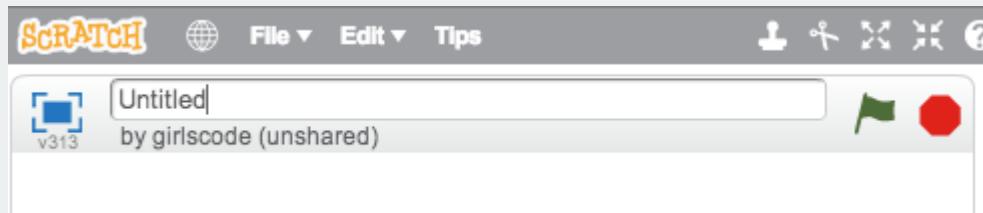
Enough talking, let's make a game!

Getting Started

- Go to **scratch.mit.edu**
- Click on **login**
- Username: **girlscode**
- Password: **helloworld**

Start a New Project

- Click on **Create** at the top of the page
- Change the name from ‘untitled’ to your name

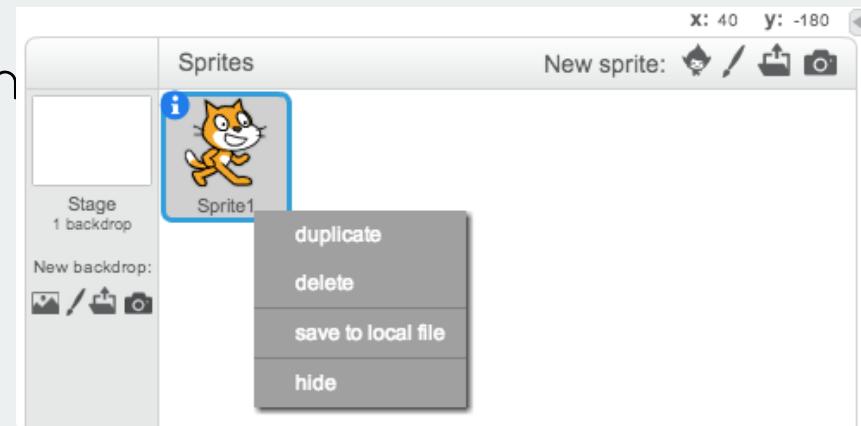


Making a Player

Remember: every **thing** in a game is a sprite.

Ex: *players, enemies, items, blocks, etc.*

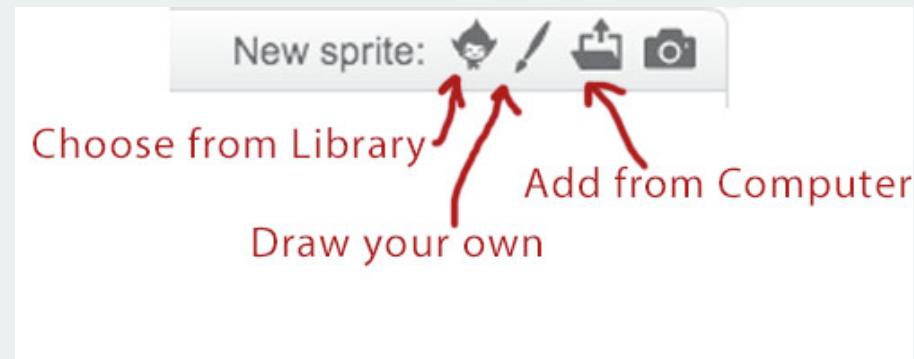
- Find **Sprite1** in the Sprites Pan
- Right-click on **Sprite1**
- Select **Delete**



Making a Player

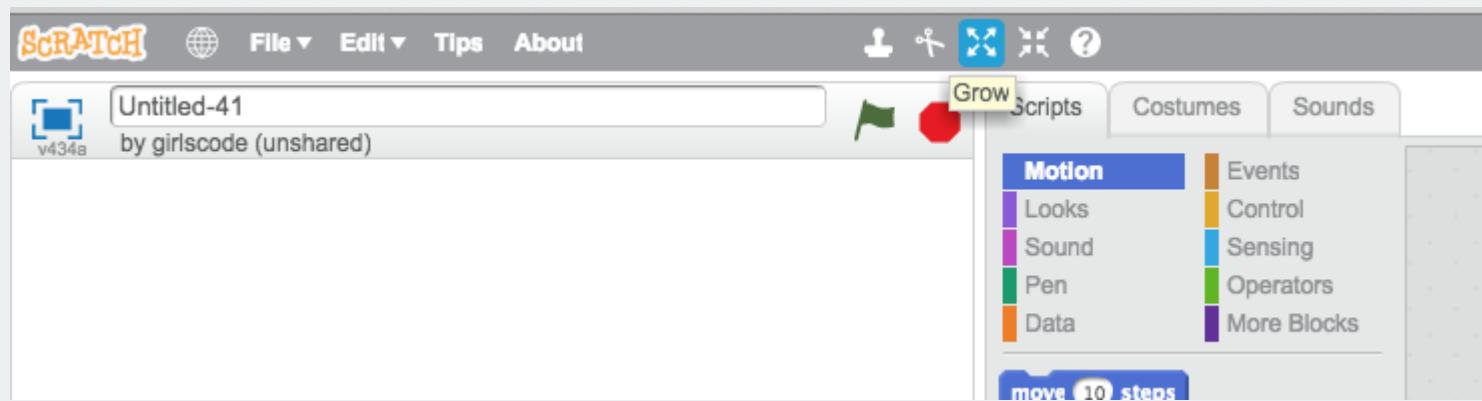
Now we'll make a new sprite. You have 3 choices:

1. Use a sprite from the Library
2. Draw a sprite
3. Upload a sprite from your computer



Edit your Player

- If your player is the wrong size, you can make it smaller by clicking on the **Grow/Shrink** icons



Edit your Player

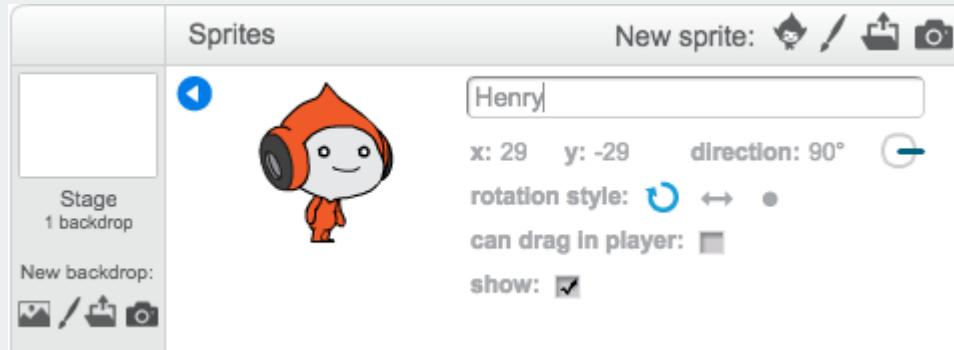
- You can also change the colour and add your own hand-drawn edits in the **Costume** tab



Edit your Player

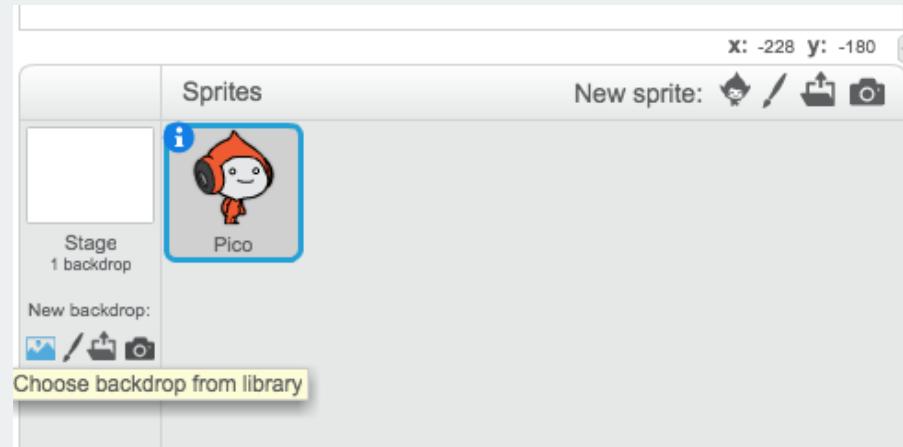
Don't forget to give your sprite a name!

- Click on the **i** icon to change your sprite's name.



Add a background

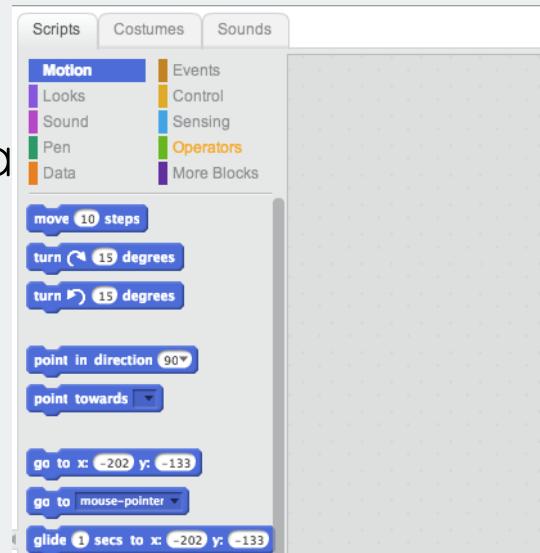
Under **New backdrop**, you can add a background from the library, draw your own, or upload one from your computer



Make your Player move

- We're going to make a **script** for our player
- A **script** controls the way the sprite acts and responds to events. It tells your sprite what to do!

- Click on your sprite in the Sprite palette
- Click on the Scripts tab



Add a Start Button

The green flag will be a start button



1. From the Events section, drag the **when flag clicked** block into the script panel
2. From the Control section, drag the forever block and attach it to our flag block.

Moving our Sprite

Question: How can we make our sprite move?

Moving our Sprite

Question: How can we make our sprite move?

Answer: By using the arrow keys!



move right



move left



move up



move down

Moving our Sprite

If you press a certain key, then do something

Example:

IF you press the key

THEN move to the right



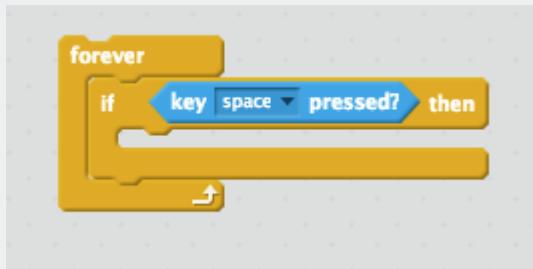
Moving our Sprite



From the **Control** section, drag the **if then** block inside the forever block.



From the **Sensing** section, drag the **key _____ pressed** block into the empty space in our **if then** block.



Moving our Sprite



Click the drop-down where it says 'space' and pick 'right arrow'

Our script now says:

if right arrow key is pressed then ...

Moving our Sprite

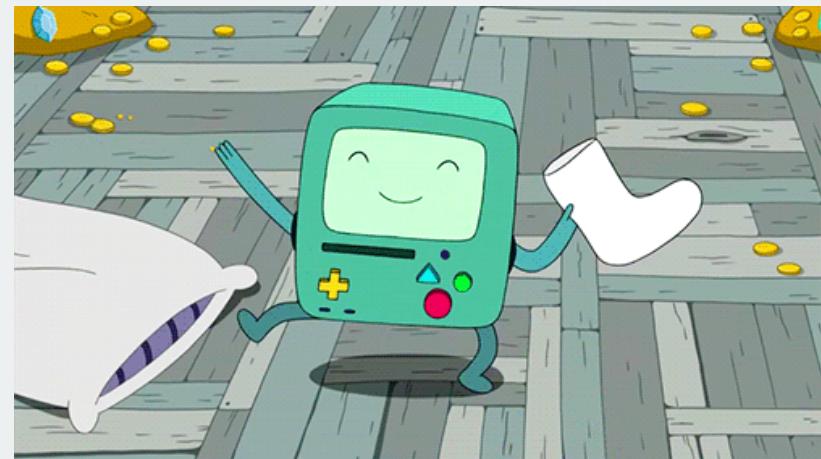
Then what? Then our sprite should move!



- Find the **move 10 steps** block in the **Motion** section
- Drag it inside the **if then** block

Try it out!

- Click the green flag on our preview panel
- Press the right arrow and... he moves!



But he only moves to the right...

Moving our Sprite

We need to do the same thing for the left arrow key

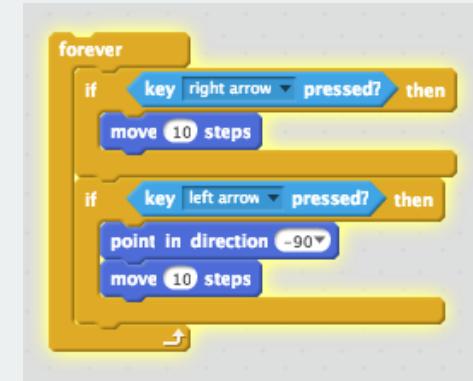
- Drag another **if then** block from the Control section.
Place it underneath our first **if then** block.
- From the **Sensing** section, drag the **key _____ pressed** block into the empty space in our **if then** block.
- Click the drop-down where it says ‘space’ and pick
‘left arrow’

Now try it out!

Moving our Sprite

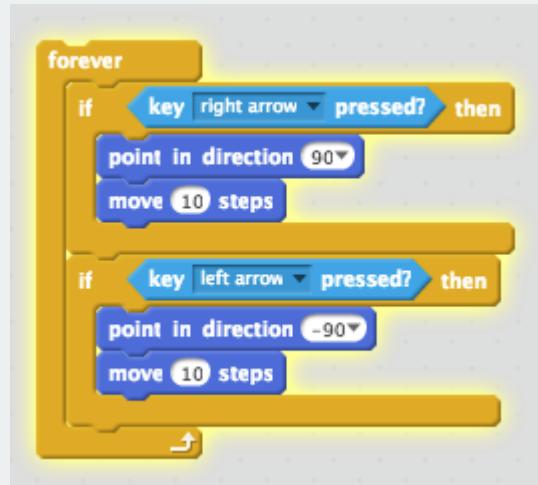
It doesn't just have to move, it needs to point in the direction we want it to go

- Drag the **point in direction** block above the **move 10 steps** block
- Click the drop-down and select **-90 (left)**



Moving our Sprite

- Add a **point in direction** block above the other **move 10 steps** block
- select **90 (right)** from the drop-down



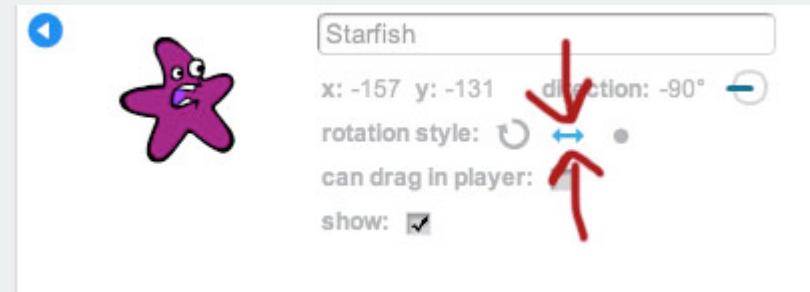
Moving our Sprite

Now try it out!

Our player moves left and right, but he turns upside down...

Moving our Sprite

- Click on the blue **i** icon beside your sprite in the sprite panel
- Change the **rotation style** to back and forth (the arrow with two points)



Moving our Sprite

Now let's add instructions for moving up and down! We can copy the script we already have:

- Right-click on the **if then** block
- Select **duplicate**
- Add it right beneath the other **if then** block
- Change the **key ____ pressed** and **point in direction** blocks so your sprite moves up.
- Repeat this process for moving down!

Add an Object

- We're going to add an object for your player to collect
- Create a **new sprite** the same way you made your first one

Add an Object

Click on your object sprite in the sprite panel. We'll start our script the same way we started the player script:

- Add a **When Flag Clicked** block and a **forever** block



Add an Object

We need a script to control what happens when the Player touches the new object

What would the if then statement say?

if _____, **then** _____

Add an Object

We need a script to control what happens when the Player touches the new object

What would the if then statement say?

if object is touching player, **then** hide object

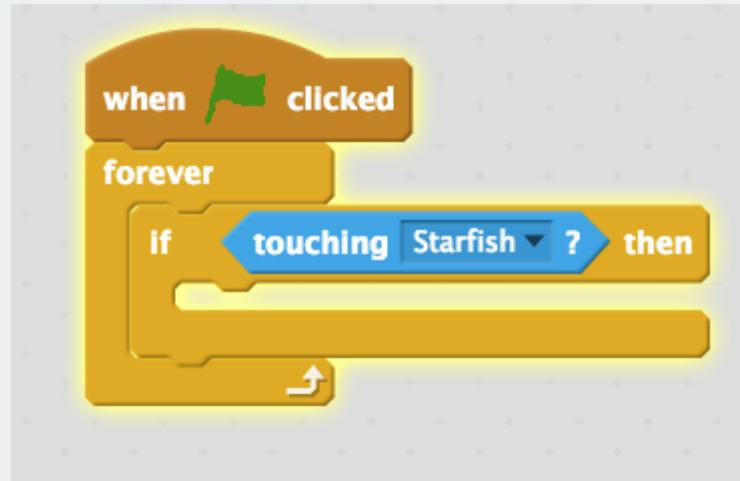
Add an Object

- Inside the forever block, we'll add our **if then** statement



Add an Object

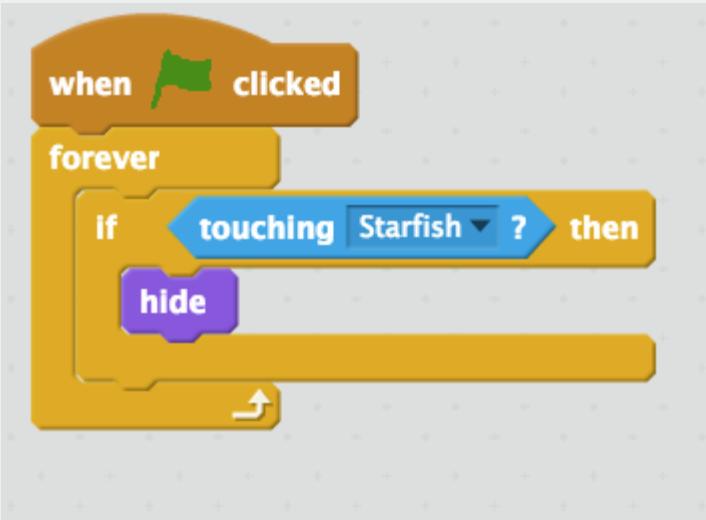
- Next drag the **touching ___?** block from the **Sensing** section to the blank spot in the **if then** block
- Pick the name of your player sprite from the drop-down



Add an Object

What's the **then** part? Disappear!

- Drag a hide block from the looks section inside the if then block



Add an Object

When a player restarts the game, we want all the objects to show up, even if they collected them the last time they played

- So lets add a **show** block under our **when flag clicked** block



Try it out!

Your object should disappear when your player runs into it!

Counting Objects

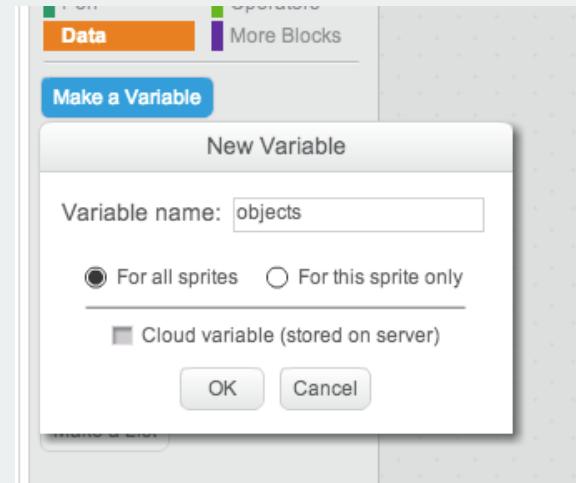
Collecting objects is more fun when you know how many you've got!

We can keep track of the number of objects with a variable

A variable is just a number that you can change

Add a Variable

- Click the **Make a Variable** button in the **Data** section
- Give your variable a name (like ‘coins’, or ‘apples’ or ‘objects’)



Show a variable

We want to display the variable to players of our game

- Select your Player sprite
- Find the **Show variable** block from the **Data** section
- (Include “for all sprites” if it prompts you)
- Add it beneath the **when flag clicked** block on our Player
- Select your variable in the drop-down



Show a variable

- We also want the counting to always start at 0, so we'll add a **Set variable to** block after our **show variable** block
- And set the variable to 0



Change the Variable

What should happen to the variable when a player collects an object?

- It goes up!
- Select your **object** sprite

Change the Variable

- Drag a Change variable by block inside the if then block
- Make sure it's selecting the right variable



Try it out!

Your variable should change to 1 when your player touches your object

But there's only one object to collect...



Making more Objects

To make another collectible object, right-click on your object sprite in the sprite panel

- Select **duplicate**
- Do this as many times as you like!

Winning the Game

Collect enough objects!

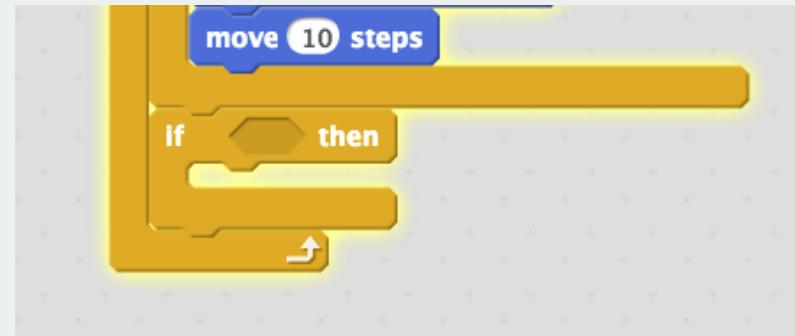
If you collect 5 apples, then you win the game!

Winning the Game

- Select your Player sprite from the sprite panel
- Add a new **if then** statement

Q: How do we know if they've collected 5 items?

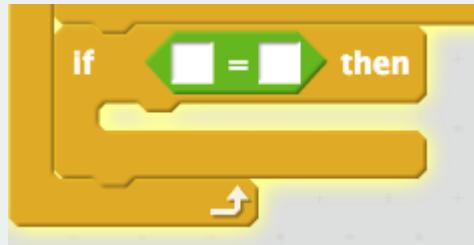
A: If our **variable** is 5!



Winning the Game

We need to check if our variable equals 5

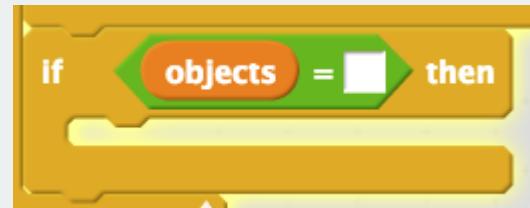
- Drag a = block from the **Operators** section to the blank space in the **if then** block



Winning the Game

What is the first blank going to be? The variable!

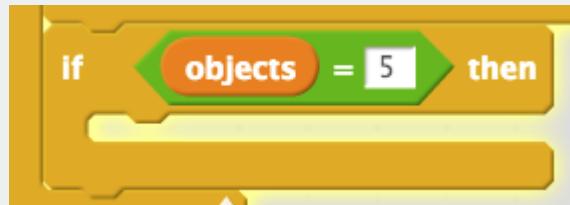
- Drag the block with your variable name from the **Data** section into the first blank



Winning the Game

- Type a number into the second blank.

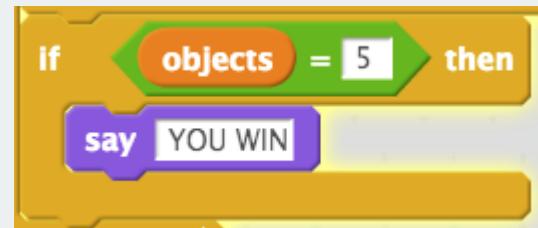
This number is how many items you must collect to win



Winning the Game

To show the player that they've won, we're going to have our sprite say "YOU WIN!"

- Drag the **Say Hello** block from the **Looks** section into the **if then** block
- Change the message to "You Win" or whatever you want.



Try it out!

That was a bit too easy though...

Making it Harder

This game is too easy because there aren't any obstacles or challenges

Let's add a timer so that the player has to beat the clock!

Adding a Time

- In the **Sensing** section, click the checkbox next to **timer**



This will put a timer on your screen



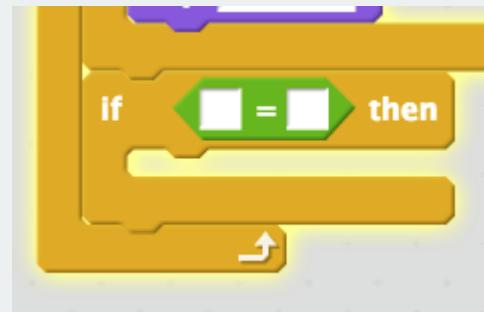
Adding a Timer

Lets make a rule for our timer:

if the timer reaches 15, then the player loses

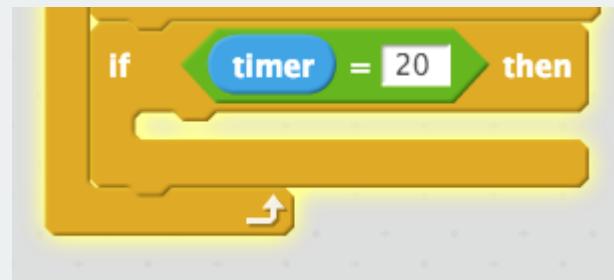
Adding a Timer

- Drag a new **if then** block into the **forever** block for your player
- Drag a = block into the blank space



Adding a Timer

- Drag the **timer** block from the **Sensing** section into the first blank
- Set the second blank to whatever you want your time limit to be



Adding a Timer

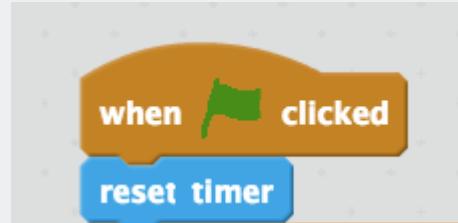
- Then lets drag in a **say hello** block inside the **if then** block
- And change the text to “You lose!” or whatever you want.



Adding a Timer

But our timer just keeps going up and up and up...
We need to reset it when you start a new game

- Drag the reset timer block from the **Sensing** section right after the **When flag clicked** block



Making Obstacles

So far the only hard part about our games is collecting the objects in time

But we can add obstacles to make the game more challenging

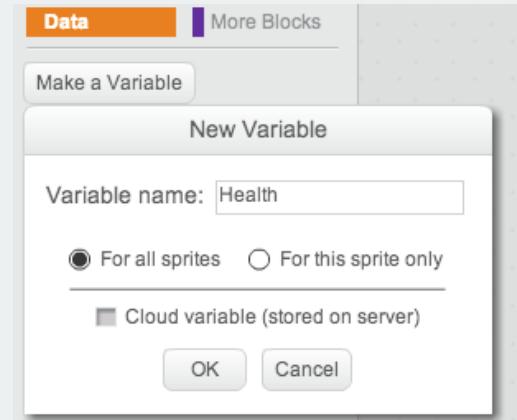
Obstacles will hurt the player

If they get too hurt, they lose

Adding Health

How should we keep track of how much health the player has? With a variable of course!

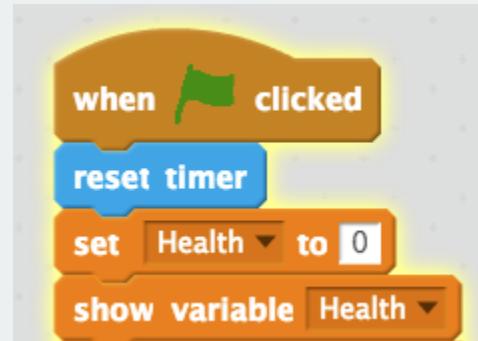
- Create a new variable called **health**



Adding Health

Lets make sure our health variable starts at a number greater than 0 and is shown to the player

- Add a **set variable** to block and a **show variable** block after the **when flag clicked** block



Adding Health

- Pick a number for how much health your player has and write it in the blank spot after **Set Health to...**

How does the player lose health? By touching an obstacle!

Making Obstacles

Exercise: What could an obstacle be?

Making Obstacles

What could an obstacle be?

Obstacles can be anything. From monsters to environmental dangers like spikes.

Making Obstacles

To create an obstacle, start by creating a **new sprite**.

Once you've created your new sprite, select it so you can add a script

Making Obstacles

What do we want to happen when the player touches the obstacle?

What's the **if then** statement?

if _____, **then** _____

Making Obstacles

What do we want to happen when the player touches the obstacle?

What's the **if then** statement?

if the player touches an obstacle, then the player loses health

Making Obstacles

The script for this one starts similar to the other scripts:

- Add a **When flag clicked** block followed by a **show** block.
- Add a **forever** block right after the **show** block

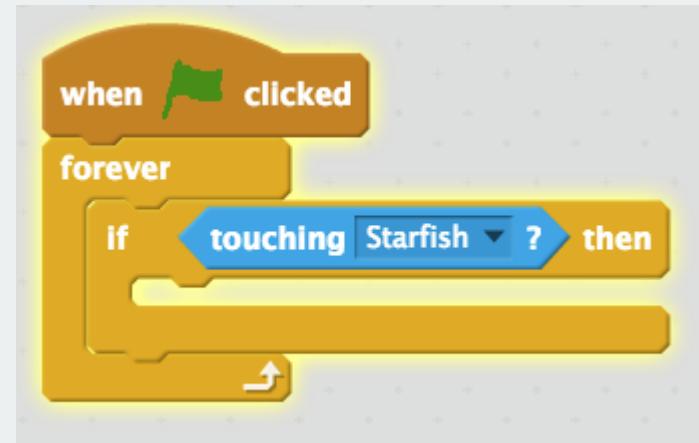


Making Obstacles

- Inside the **forever** block, add in an **if then** block

Q: If what?

A: If the obstacle is touching
the player!



Making Obstacles

Then what happens? Our player loses health!

Q: How do we keep track of health?

A: With our health variable!

Making Obstacles

- Drag the **Change variable by** block into the **if then** block
- Change the number from 1 to -1

We also want to hide the obstacle

- Drag a hide block



Try it out!

Making Obstacles

Now our player's health goes down if it touches an obstacle. But what happens when it loses all its health?

Right now: Nothing :(

So now we need to add a rule for when our player's health gets to 0

Making Obstacles

What's the **if then** statement?

if the health variable is 0, **then** show the 'You lose'
message

That sounds familiar...

Making Obstacles

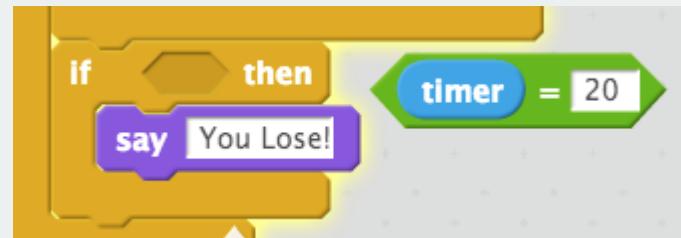
Now there are two ways to lose:

1. **If** the timer is 15
OR
2. health is 0 **then** you lose

We can change our ‘You lose’ script to check if **either** of these are true

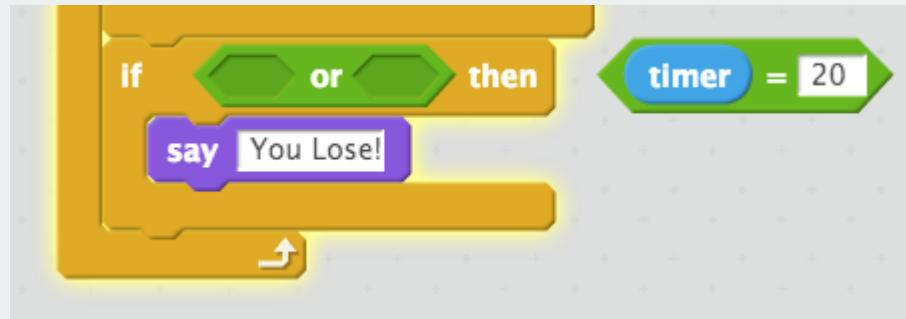
Making Obstacles

- Drag the **timer = 15** block out of the **if then** blank and put it to the side



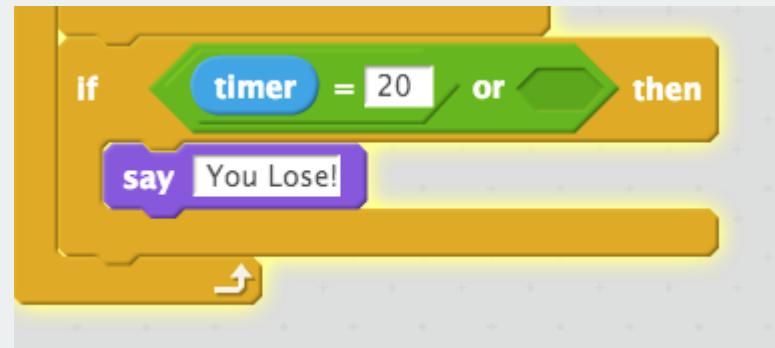
Making Obstacles

- Drag in the OR block from the **Operators** section



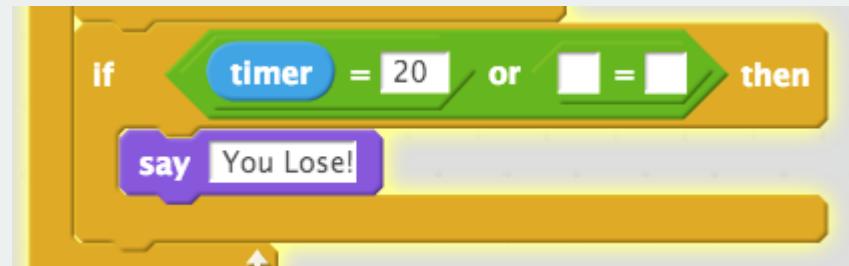
Making Obstacles

- Drag the **timer = 15** block into the first blank of the OR block



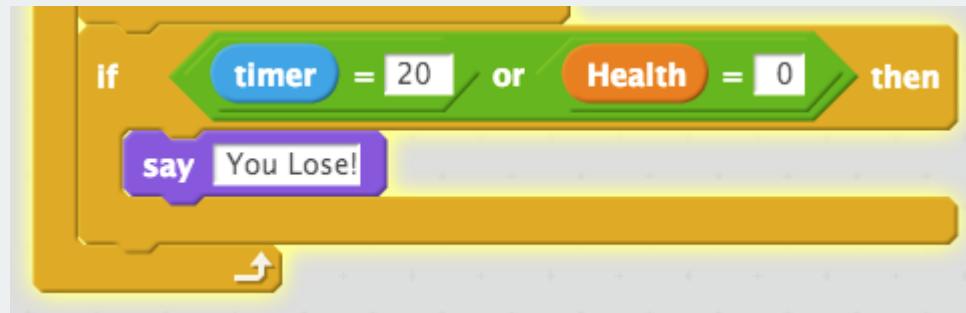
Making Obstacles

- Drag a = block into the second blank of the OR block



Making Obstacles

- Drag the **health** variable from the **Data** section into the first blank of the **__ = __** block
- Type **0** into the second blank



Add more Obstacles

Add more obstacles by duplicating your original obstacle. Remember, your game can't be too easy!

Make sure your obstacles are small enough so your player can dodge around them. Remember, your game can't be impossible!

Finito!

Congratulations! You just create your own game using Scratch.

Extra Tasks

- Add new types of obstacles that remove more/less damage
- Add obstacles that take away your collected objects
- Change the players color when you touch an obstacle or collect an item.
- Change color when the player wins or loses.
- Make the player talk when he gets an item or touches an obstacle
- Edit your sprites (colors, drawing, etc)