

# WHAT DO SCIENTISTS DO?

## TIE-IN: SHARK SCRATCH GAME

**60 minutes | Grades 3-9**



**SUPERNOVA**  
DALHOUSIE UNIVERSITY | HALIFAX, NOVA SCOTIA

### OVERVIEW

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#### Description

*Participants will explore block coding using Scratch to create a basic video game that demonstrates marine food webs and ocean conservation.*

#### Learning Outcomes

- Understand the basics of Scratch, including sprites, backdrops, loops, conditionals, and variables
- Develop computational thinking skills
- Explore the basics of game design
- Explore marine food web interactions and the impact of pollution on ocean animals

#### Outline

1. Set-Up Scratch
2. Add a Backdrop
3. Add a Shark Sprite
4. Add Fish Sprites
5. Add Ocean Pollution
6. Play!

#### Materials

##### Item

- Computer or laptop with internet access

##### Quantity

- 1

## SAFETY CONSIDERATIONS

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- Precautions for Instructor and Participants.
- Please use caution, and explain each safety measure to the participants. Ensure any incidents are reported appropriately.
- Indicate with an 'x' next to the items that apply to this activity.

Material/Chemical Safety	
<input type="checkbox"/>	SDS Required ( <i>attach in write up</i> )
<input type="checkbox"/>	Electrical Components
<input type="checkbox"/>	Food &/or Potential Allergens
<input type="checkbox"/>	Other:
Equipment Precautions	
<input type="checkbox"/>	Sharp Objects: Scissors/ Staplers/ Scalpel
<input type="checkbox"/>	Burn Risk: Glue Guns/ Hot Plate/ Flame
<input type="checkbox"/>	Tools
<input type="checkbox"/>	Other:

Digital Safety <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Special Clean-up Required? (indicate below)	
<input type="checkbox"/>	
Safety Equipment or Protection	
<input type="checkbox"/>	Goggles/ Gloves
<input type="checkbox"/>	Lab Coat
<input type="checkbox"/>	Fire Extinguisher
<input type="checkbox"/>	Other:
Other Safety Precautions? (indicate below)	
<input type="checkbox"/>	

## KEY INFORMATION

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### Topic 1: Scratch

Scratch is a free online and desktop application that allows users to create programs using block programming. Block programming (or block coding) differs from traditional coding in that users do not have to write out individual lines of code. Instead, they can drag, drop, and connect pre-made code “blocks” to create programs. This makes the basics of programming easier to understand for entry-level programmers.

Some common types of code include:

- Loops are a set of instructions that are repeated when a given condition is met either indefinitely or until another condition is met.
  - For example, a loop can be used to code a sprite moving 10 steps until it touches another sprite.
- Conditionals are the way that the program decides what to do next using the logic that you decide. A common condition is “if=then.”
  - An example of a conditional is if the sprite touches another sprite, then it makes a sound.
- Variables are information used within the program that can be changed by the programmer. Variables can contain text, numbers, or even conditions, and as such can have so many different uses.
  - An example of a variable is the number of steps a sprite moves, or the number of seconds a sprite moves for. Another example of a variable is the points scored during the game.

Each of these types of codes are used in this activity; try to identify each type as you create your Scratch game.

Scratch allows programmers to create scripts to be performed by a sprite/character, allowing students to create animations and games.

You can access Scratch from your web browser, or [download it to a computer](#).

### Topic 2: Sharks

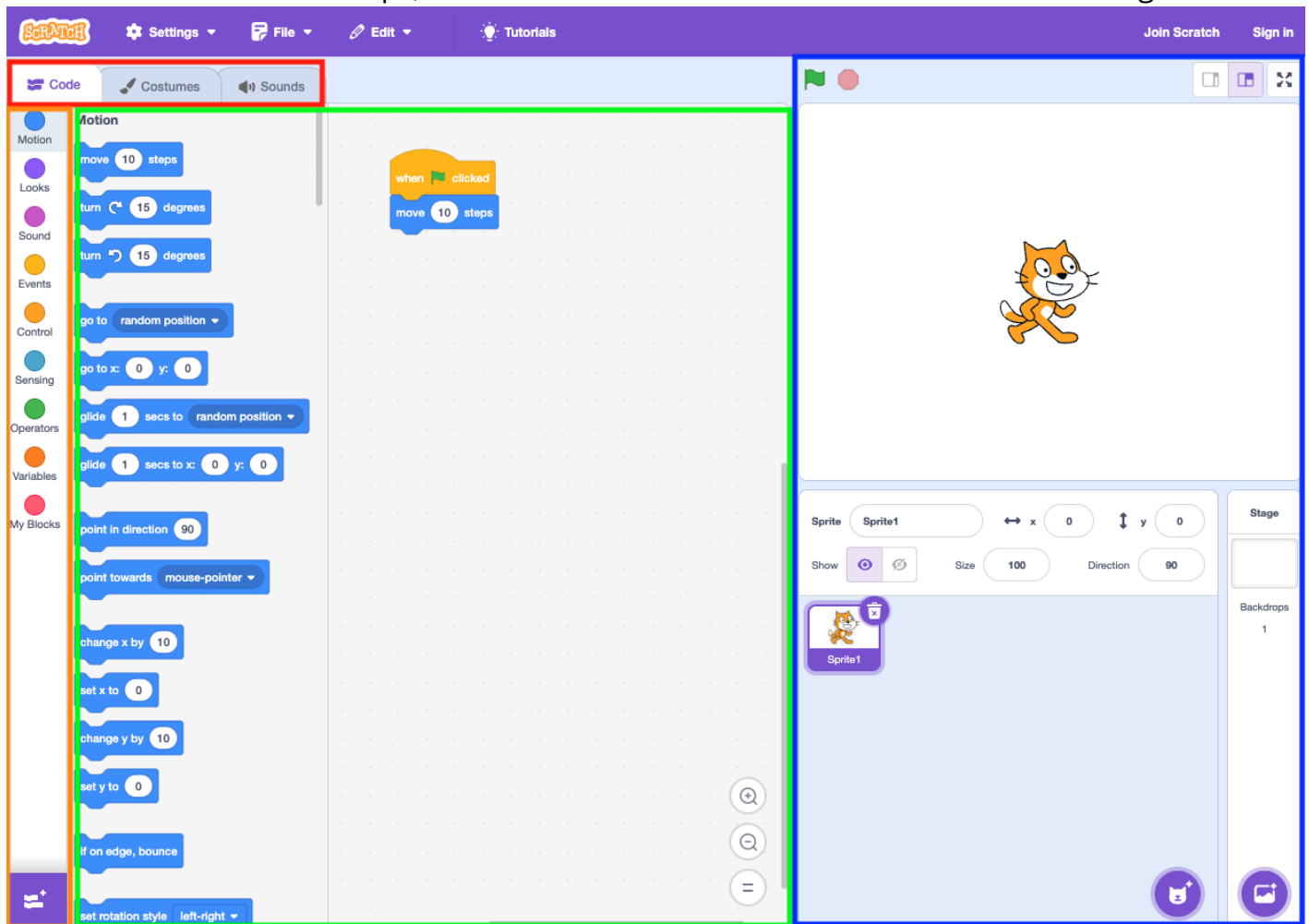
Sharks are ocean predators, meaning that they must eat other organisms to survive. Almost all sharks are carnivores and eat meat like fish, crab, or shrimp. The only known omnivorous shark is the bonnethead shark, which also eats seagrass! Omnivores eat both meat and plants.

Many shark species are endangered, and some are at risk of going extinct in the near future. Threats to sharks include overfishing, destruction of marine habitats, climate change, and marine pollution. In this activity, we’re going to focus on the impacts of ocean pollution on marine ecosystems.

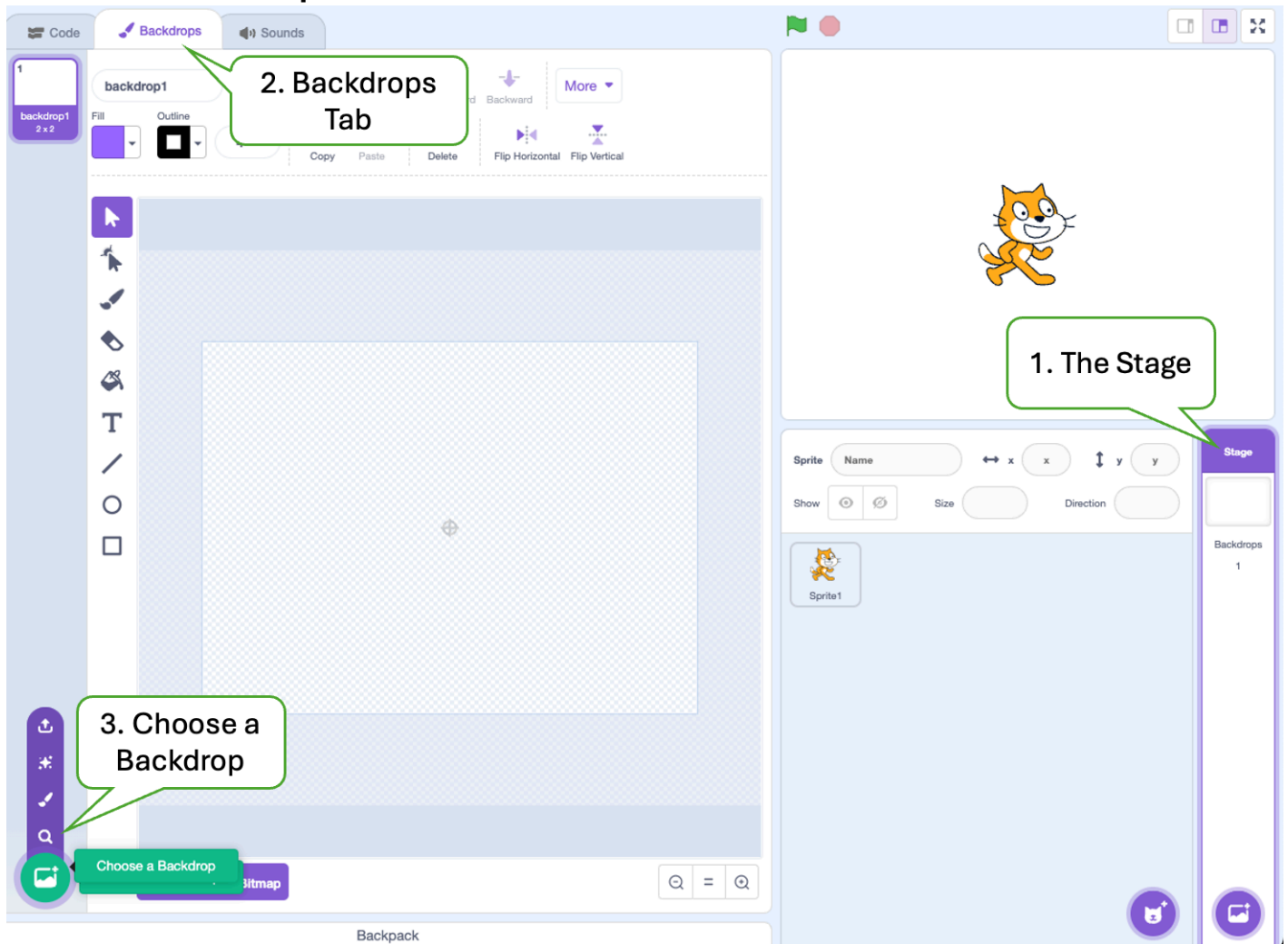
## LESSON PLAN AND PROCEDURE

### 1. Set-Up Scratch

- Navigate to the [Scratch website](#) or the Scratch desktop application.
- In the top left hand corner, select "create". This will take you to the coding environment.
- Sections of the Scratch interface:
  - Tabs:** Allows you to switch between coding, editing your sprite, and adding sounds.
  - Side bar:** Allows you to navigate through different types of blocks. The bottom left corner has extensions that allow you to do even more!
  - Coding interface:** This is where your code goes! Click and drag blocks into the central panel to program your sprite.
  - Preview panel:** Shows you what your program looks like. The green flag button starts your program. Underneath you can preview your sprites and backdrops, and add new ones with the buttons in the bottom right corner.

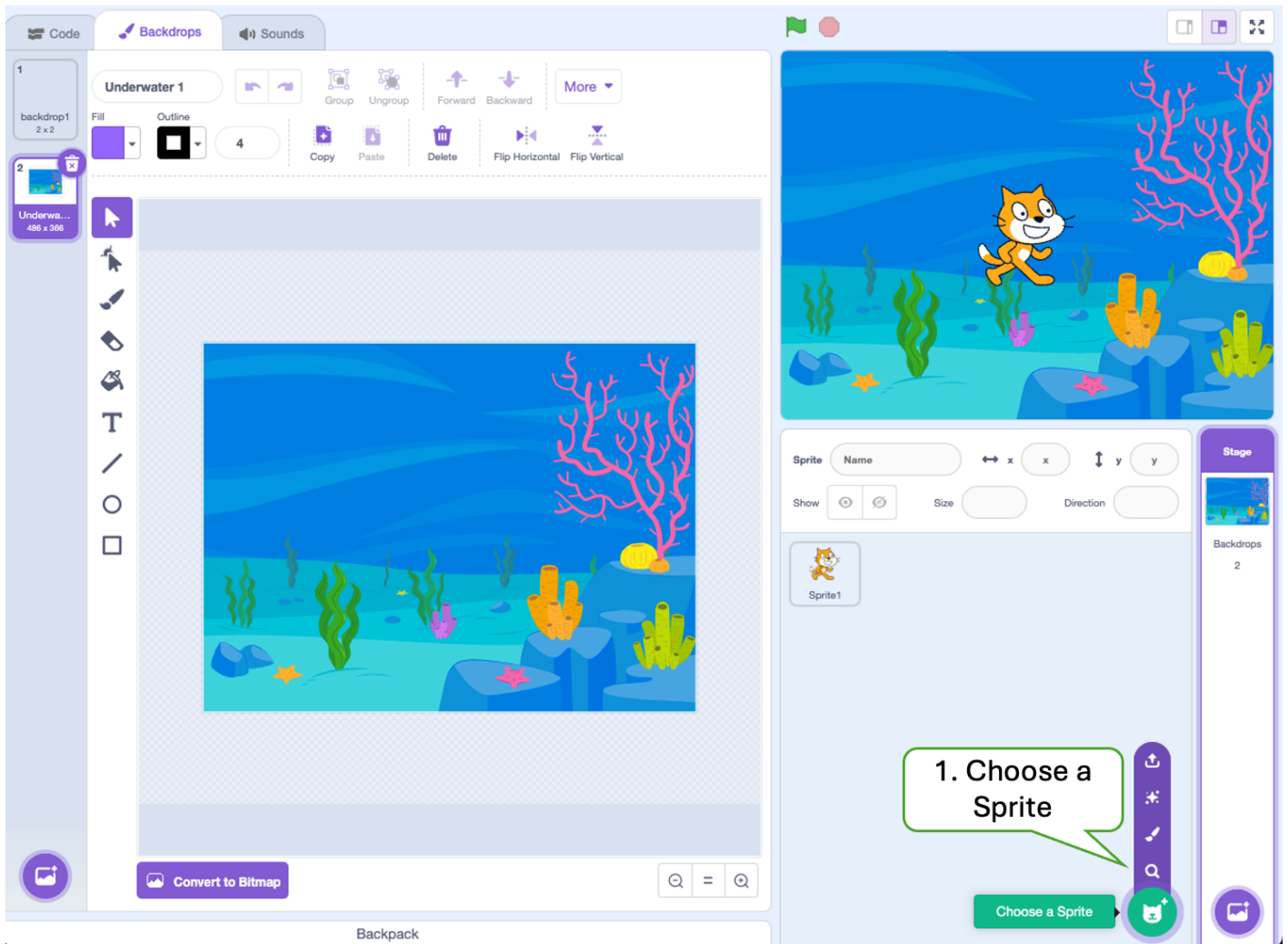


## 2. Add a Backdrop

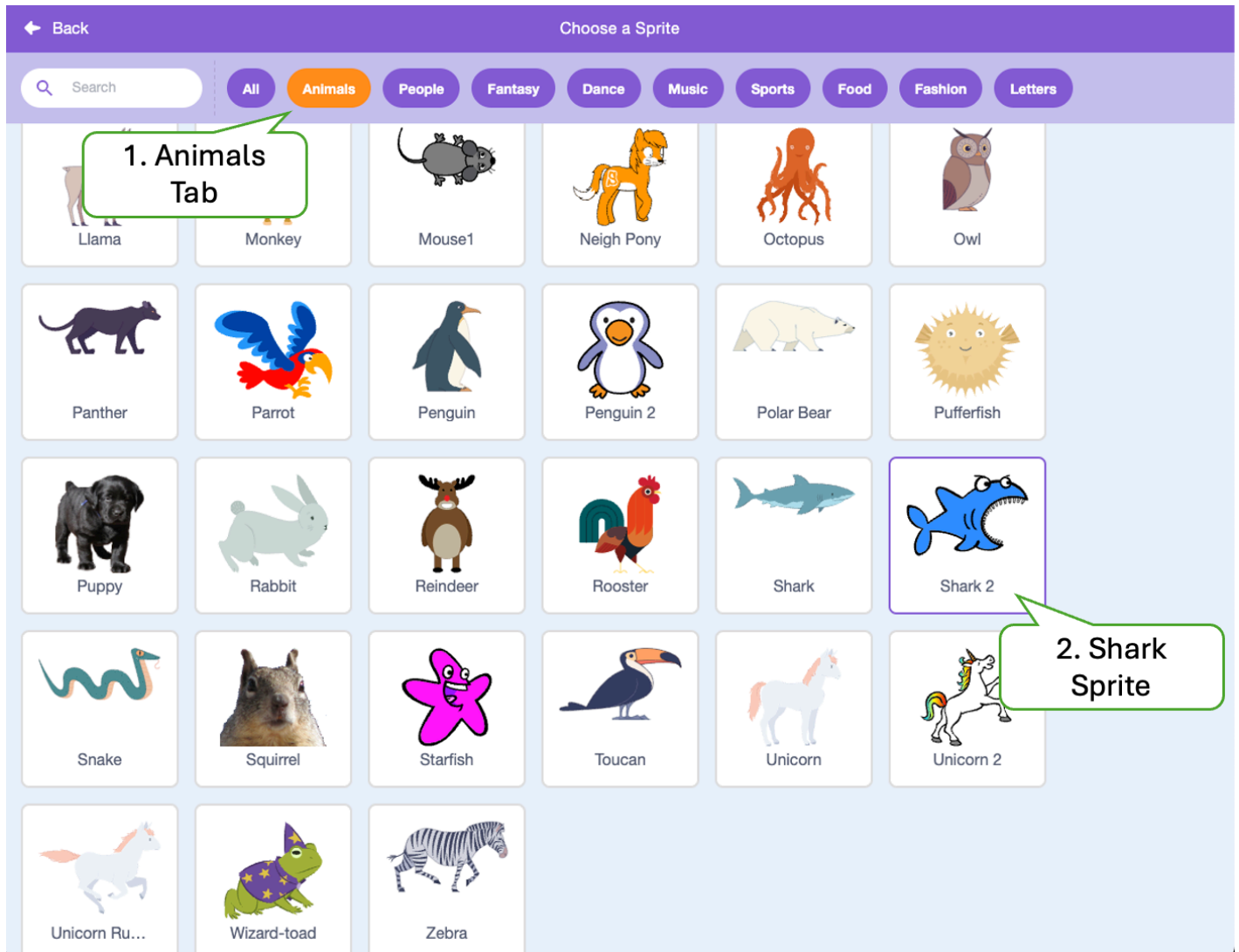


**Click on Stage.** Select the Backdrops tab and choose an underwater Backdrop from the selection of premade backdrops.

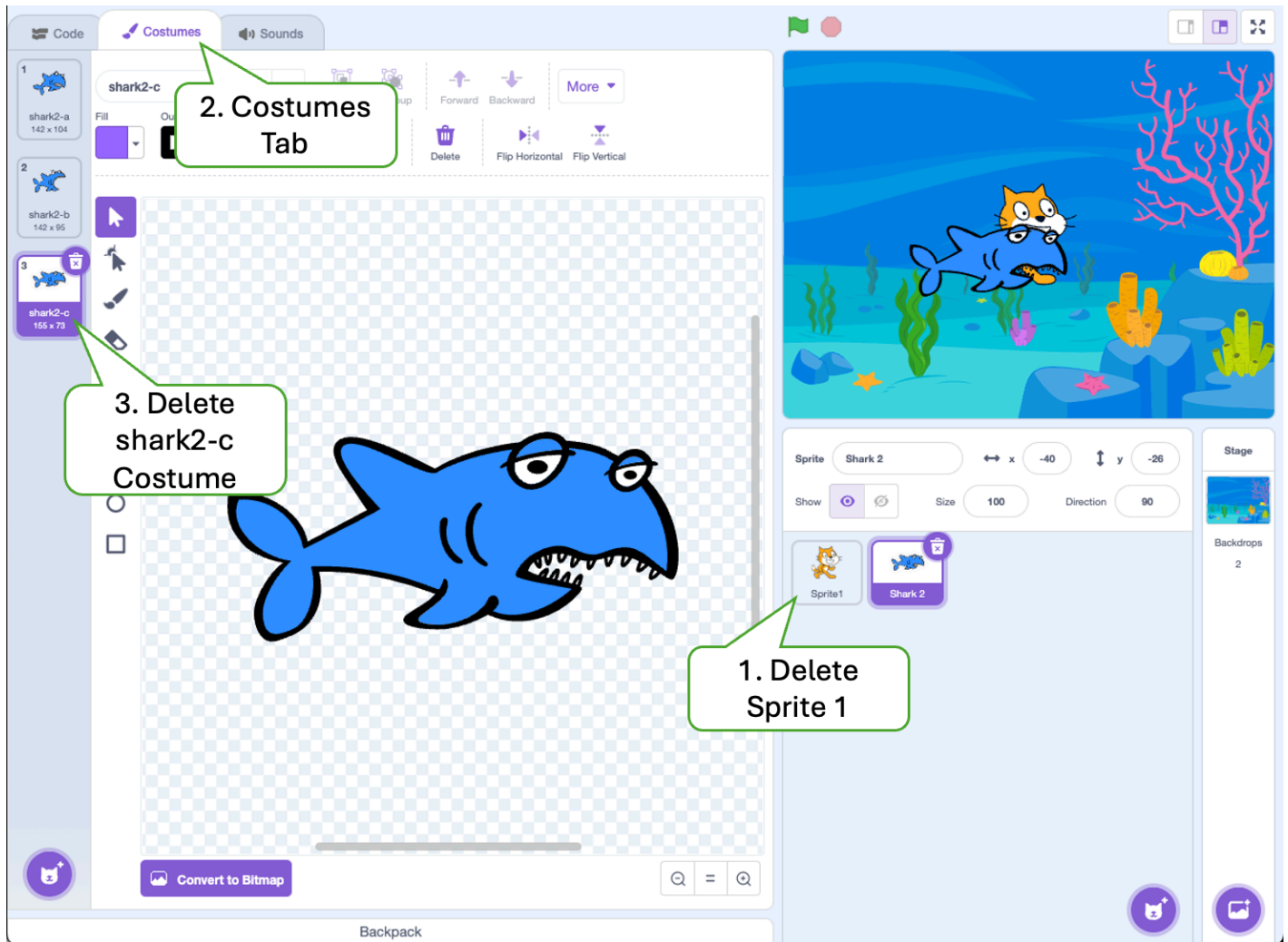
3. Add a Shark Sprite



Once the Stage is created, start on creating your shark. This is the sprite you will control in the game. Click **Choose a Sprite**.

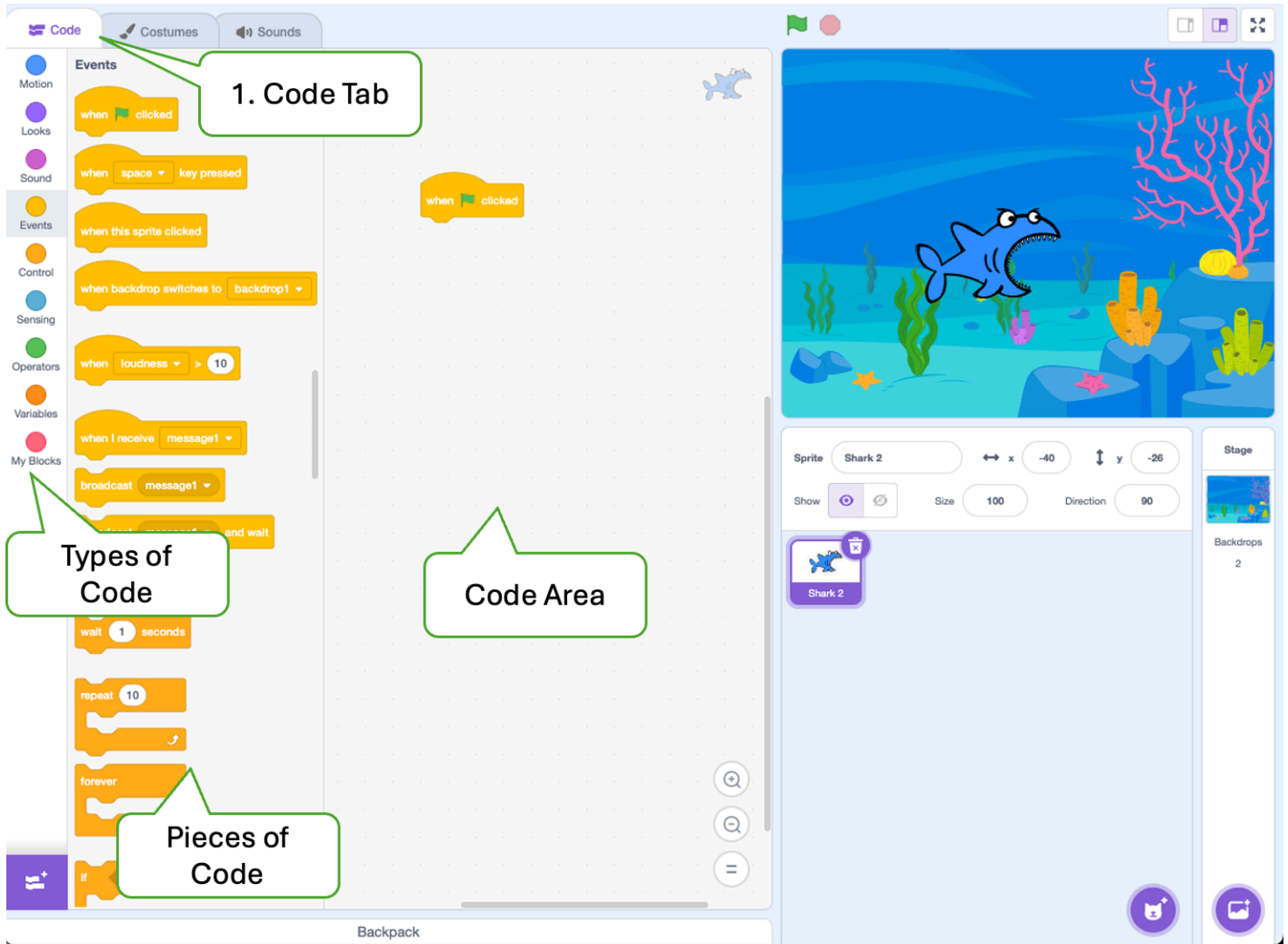


Under the **Animals** tab, select the **Shark 2** sprite.

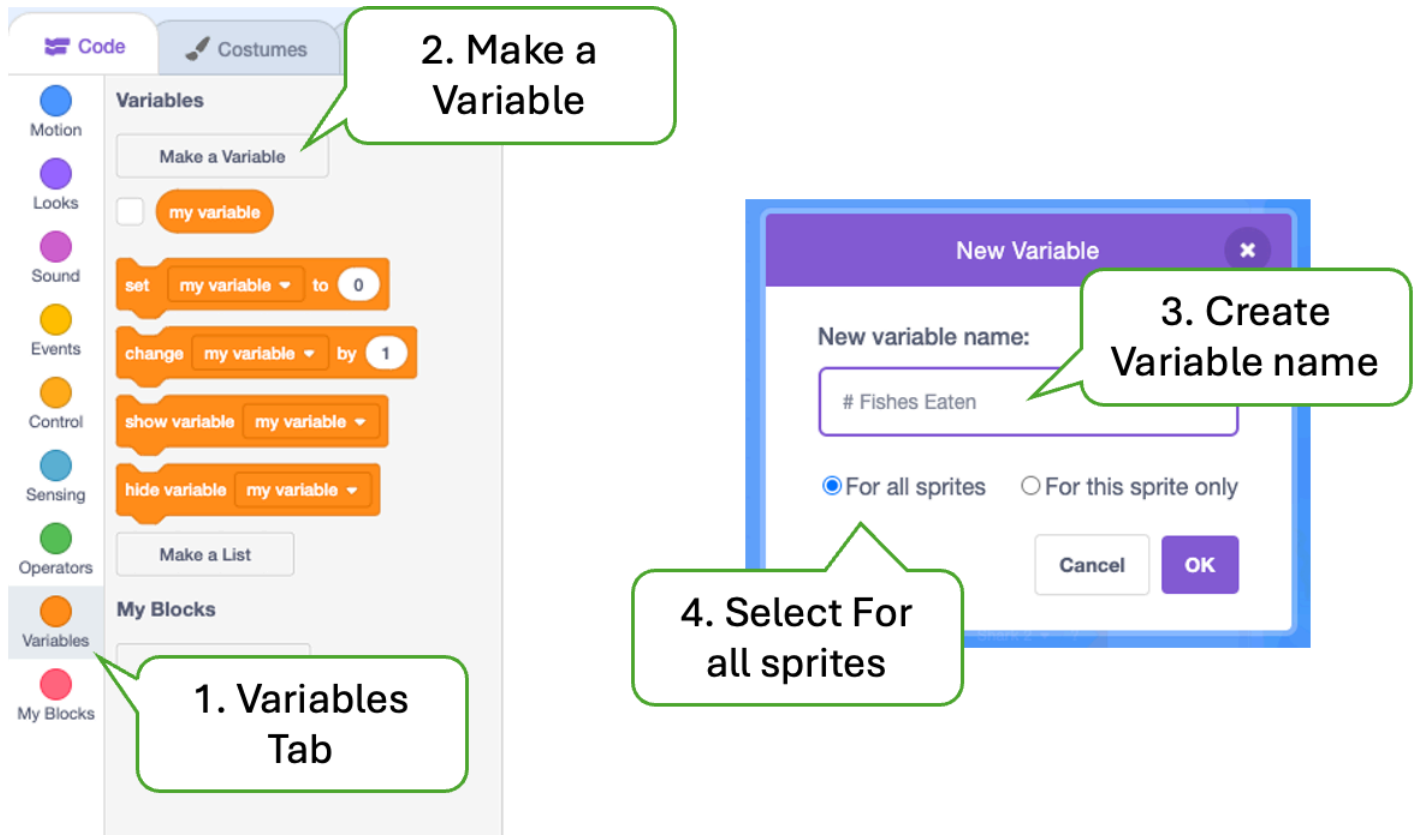


Delete **Sprite 1**. Select your shark sprite and click on the **Costumes** tab. Delete the third Costume down, **shark2-c** because we won't be using this Costume in our game and do not want to cycle through it later on.

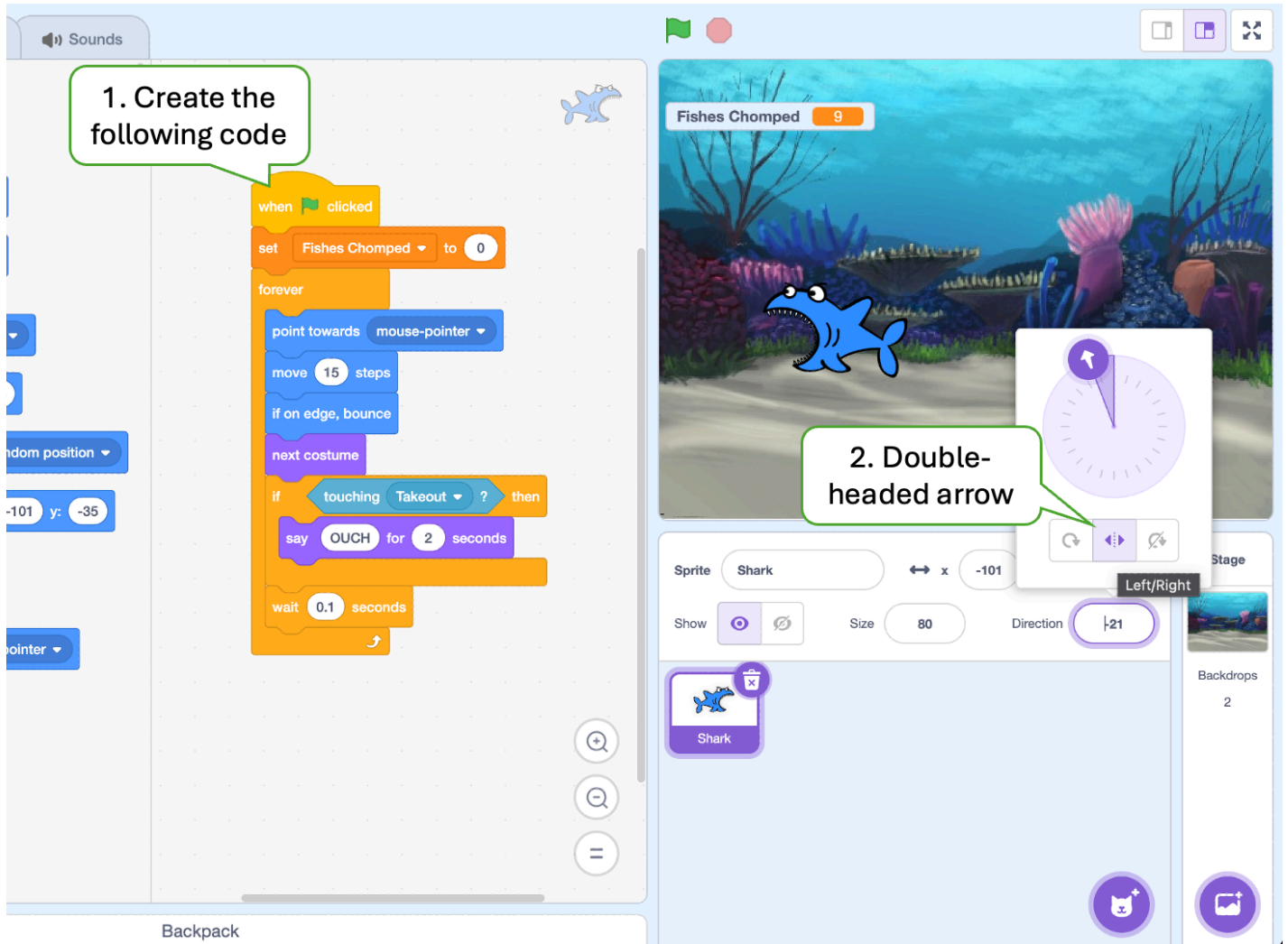




Now it's time to code our shark! You should have one sprite with two costumes. Navigate to the Code tab. You can drag Pieces of code, called Blocks, into the code area. The blocks are organized by the different types of code.



Before we code the shark we need to make a **variable**. Navigate to the **Variables** tab and **Make a Variable**. This variable will measure the number of fish caught, or the points you win during the game. You can use any name for the variable, like Eaten or Caught.

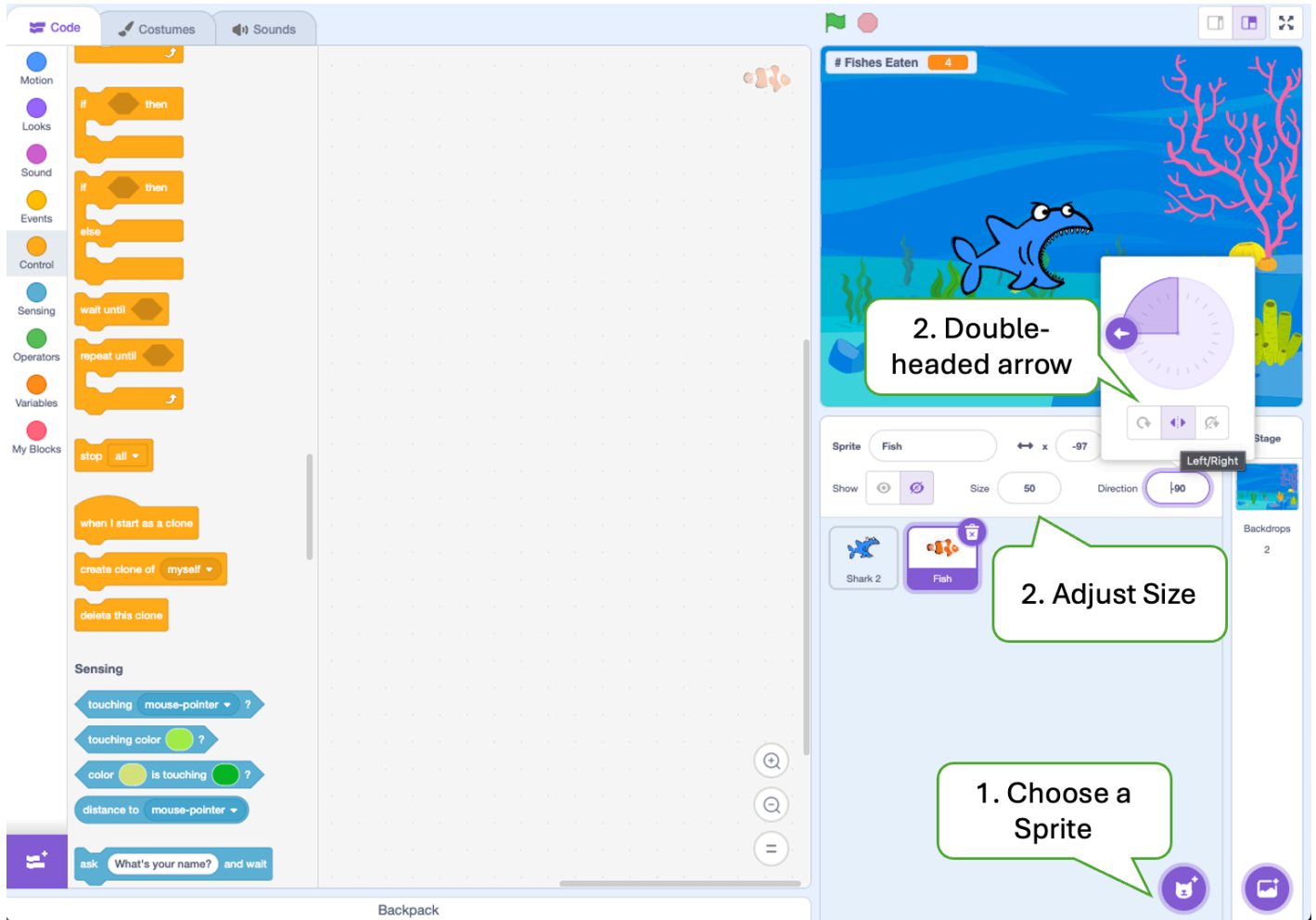


Create the above code. If you're having trouble finding the code blocks, try looking for the same colour. What do you think each piece of code tells the shark to do?

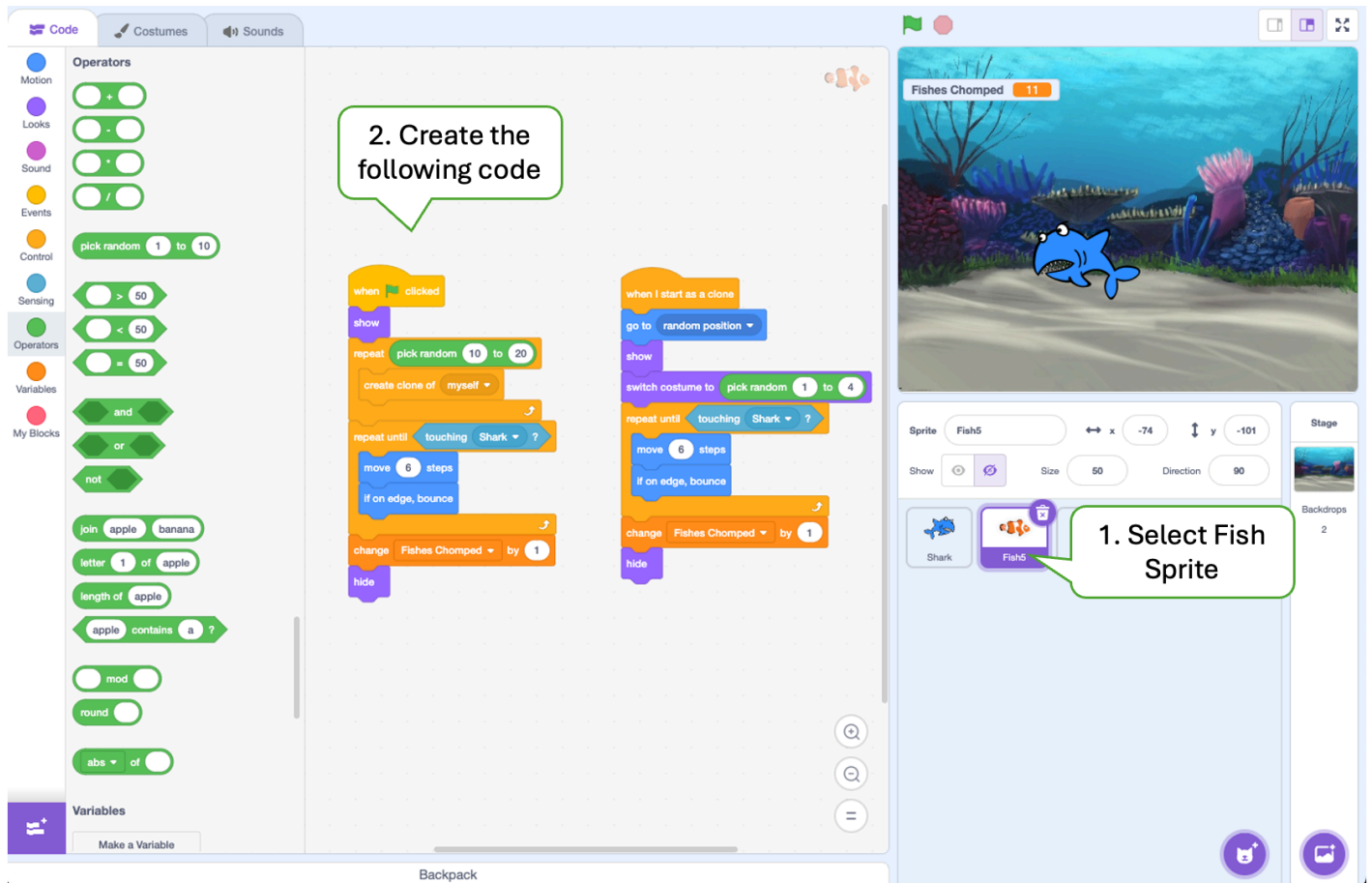
Click on **Direction** and select the **double-headed arrow** as this will keep our shark from swimming upside down!

Try clicking on the **green flag**—is the shark following your mouse pointer? If yes, proceed to the next steps! If it's not working, try going through the previous steps to make sure your code and sprite are correct.

#### 4. Add Fish Sprites



Now that your shark is in the ocean it must be getting pretty hungry. Let's create some fish for our shark to eat. Create a fish sprite by selecting **Choose a Sprite**, and follow the previous steps for creating a new sprite. Once you've created the fish sprite, adjust the size so it's smaller than the shark, and select the **double-headed arrow**.



With the **Fish** sprite selected, create the above two sequences of code. This will generate a random number of fish clones and randomly select their costume. What other variables can you change?

**5. Add Ocean Pollution**

Create a new **Sprite** using the same method you used to create the shark and fish. Select a sprite to represent garbage pollution in the ocean—we use a takeout container in this example but you can choose anything you think you’d see in the ocean!

2. Create the following code

```

when clicked
  show
  switch costume to pick random 1 to 5
  point in direction 45
  repeat until touching Shark ?
    move 5 steps
    if on edge, bounce
  set Fishes Chomped to 0
  hide

```

3. This will set your score to 0 if you eat pollution

1. Choose a Sprite to represent ocean pollution

Create the above code. If your shark eats the ocean pollution, your points will be reset, so be careful!

## 6. Play!

Your game is now ready to play!

If you're finding it too easy, what variables can you change? Can you make your shark move slower or the pollution move faster?

## Debrief

- *What other features could you add to the game? Can you simulate some of your own favourite video games in Scratch?*
- *How could you represent other threats to sharks in your video game?*
- *What other kinds of video games or animations can you create?*
- *How do you think pollution impacts ocean creatures?*