BEAM Week 1 Lesson Plan - Scratch Demo

Introduction

Have a quick demo of the full project for the kids!

Download Project Skeleton

Help the kids download this project skeleton as per steps linked here.

Basic Movement

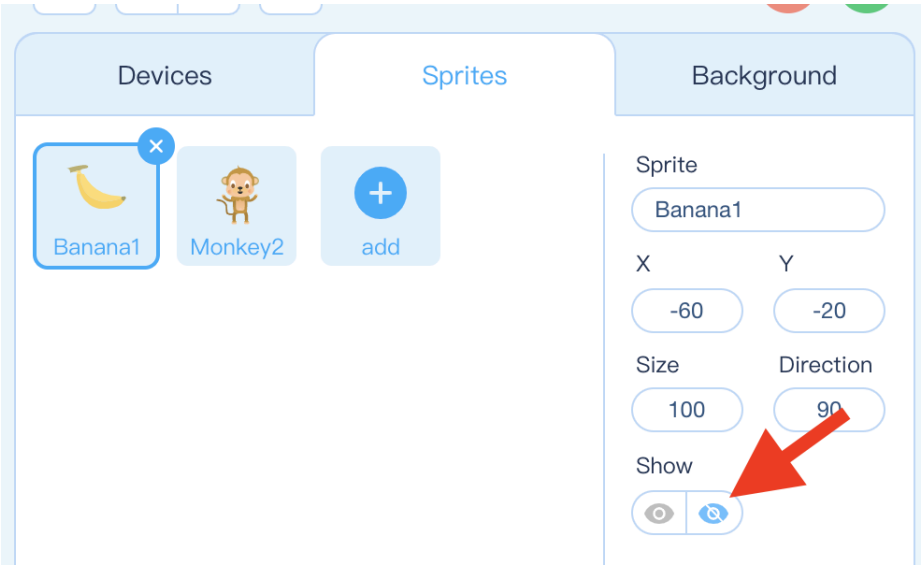
INTRODUCE MOVEMENT BLOCKS, EVENT BLOCKS

Step 1: Environment Setup

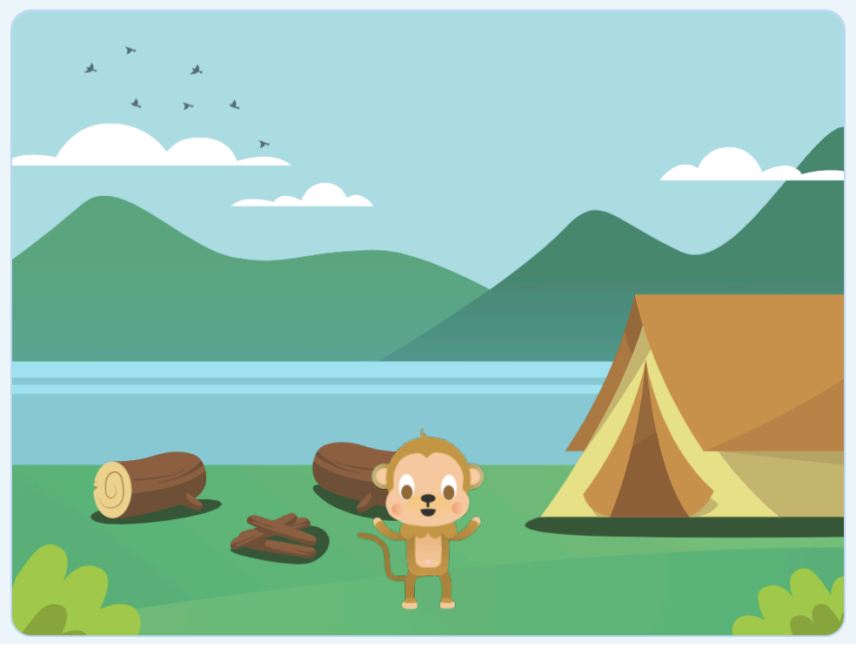
For now, let’s focus on getting the Monkey to move!

Select Banana Sprite.

Press the “don’t show” button under the sprite. The banana should now no longer be on the screen.



The environment should look like:

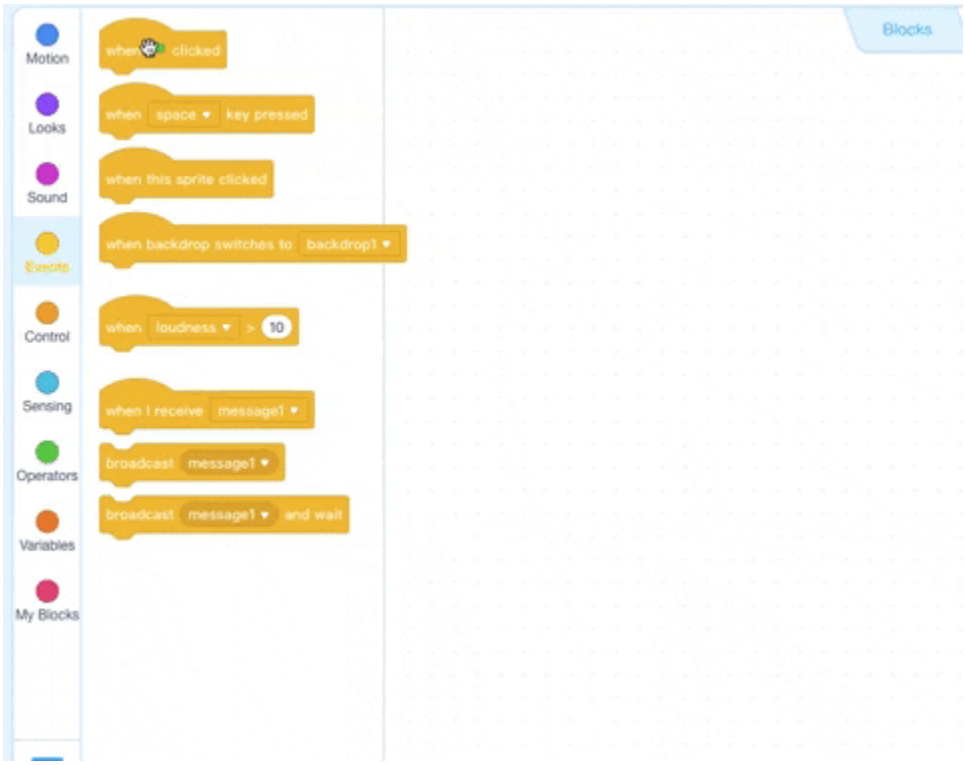


Step 2: Event Blocks

Let's make the monkey move! **Select the Monkey sprite in the sprites tab. (Note: if the kids accidentally start coding on the wrong sprite, you can transfer the blocks by dragging them onto the correct icon in the sprites tab)**

Select the EVENTS tab in the blocks editor and drag a "When Flag Clicked" block into the working area.

Make sure to have a quick demo to show how blocks can be **deleted** by dragging them back into the panel area:



Very briefly explain the general idea of event blocks - "This tells the monkey that when this event (when flag clicked) occurs, it should do something"

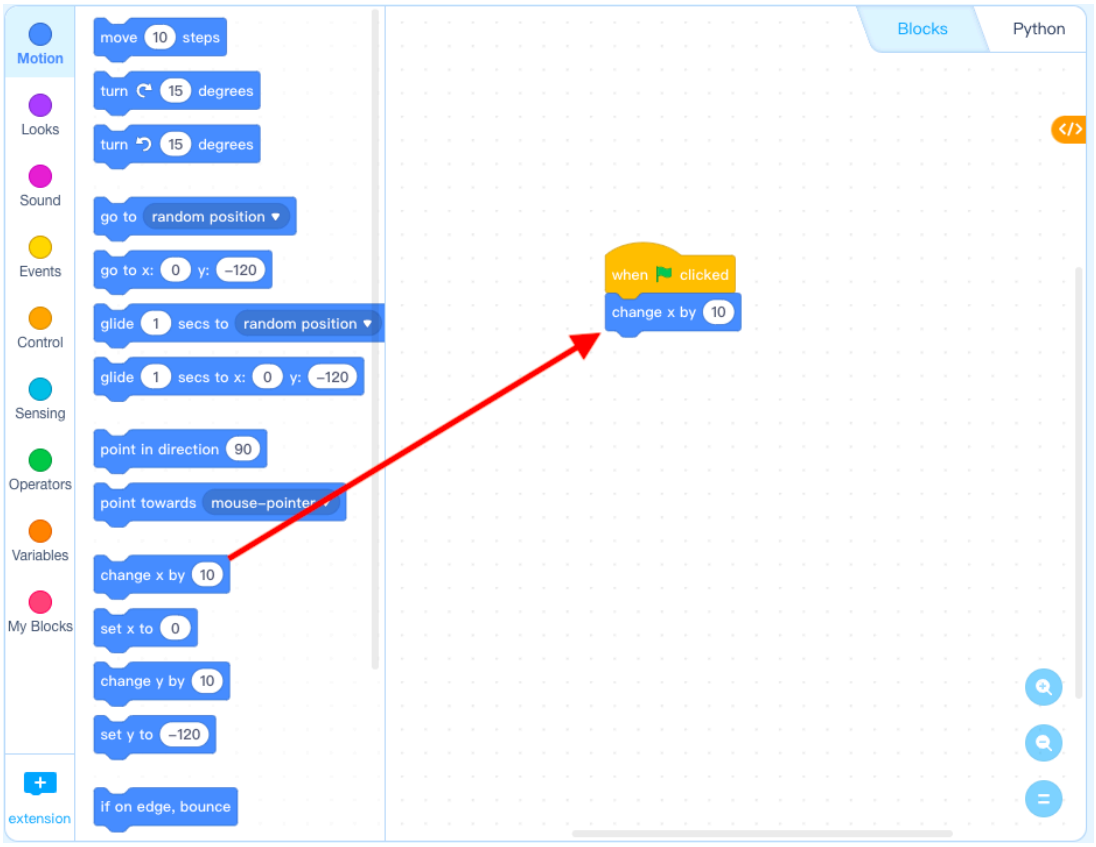
NOTE: Notice how there is a little tab on the bottom of the block? This means we can attach another block to the bottom of this one!

A group of blocks will execute from top to bottom, so we should read them that way too to understand what they'll do.

Step 3: Motion Blocks

Now let's add something for the monkey to do:

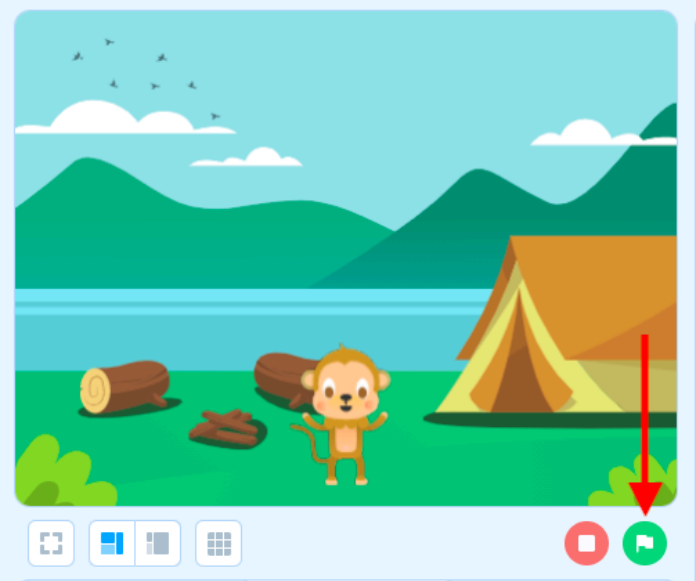
Go to the MOTION tab of the blocks editor. Drag a “Change x by __” block and attach it to our “When Flag Clicked” block:



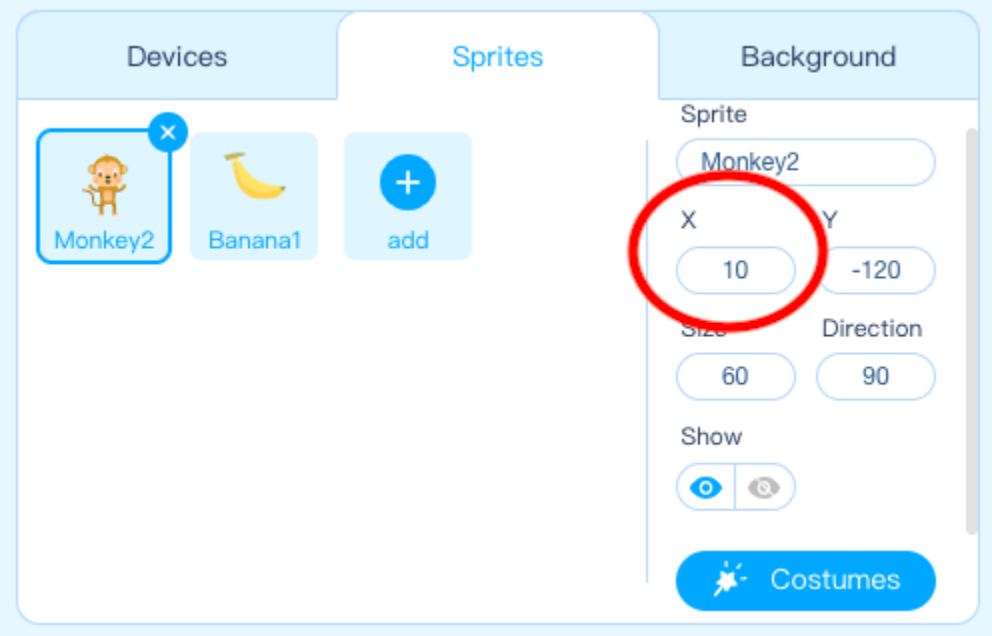
Anything attached under an event block like the “When Flag Clicked” block will happen if that event occurs.

> We can read this group of blocks as: “Whenever the flag is clicked, change the monkey’s x coordinate by 10”.

Let’s try it out!
Click on the Flag icon under our scene:

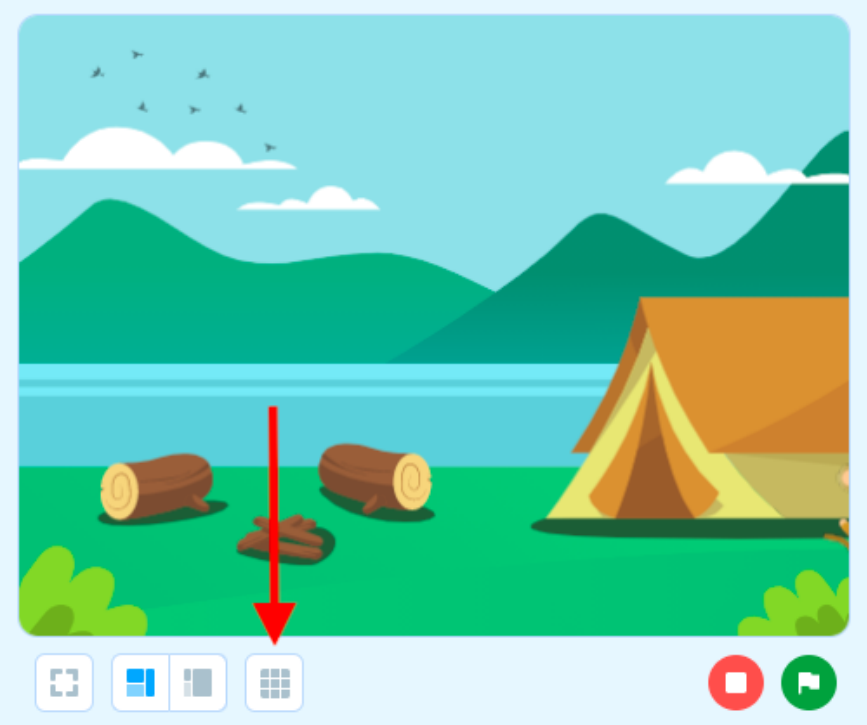


The Monkey moves right! What happened to the Monkey's x position?



What would happen if we change 10 to -10 in our "Change x by __" block?

NOTE: If your kids haven't learned about coordinate planes yet in school, toggling this button pulls up a grid over the scene that might be helpful when explaining x coordinates!

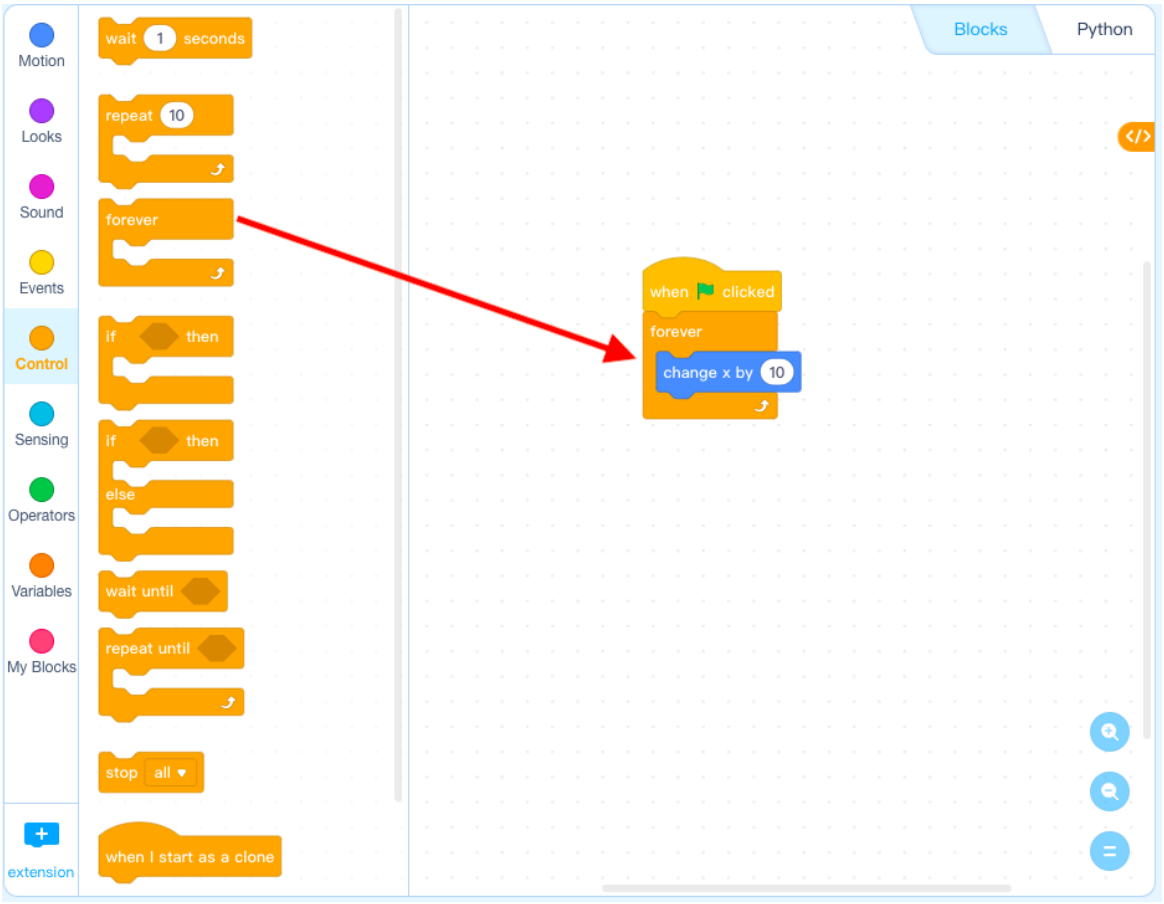


Moving

Step 1: Moving In a Line (Loops)

Let’s make the monkey walk all the way to the right edge of the screen.

Go to the CONTROL tab of the blocks editor. Drag a “Forever” block on top of our “Change x by __” block. The “Change x by __” block should be sandwiched by the “Forever” block like this:

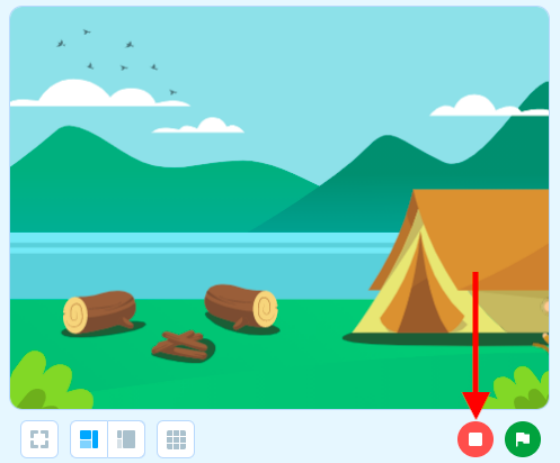


Forever in this case means that whatever is surrounded by the “Forever” block will be **repeated** over and over again. We can read this as “When the flag is clicked, **repeat** change x by 10 forever”.

Click on the flag and see what happens.

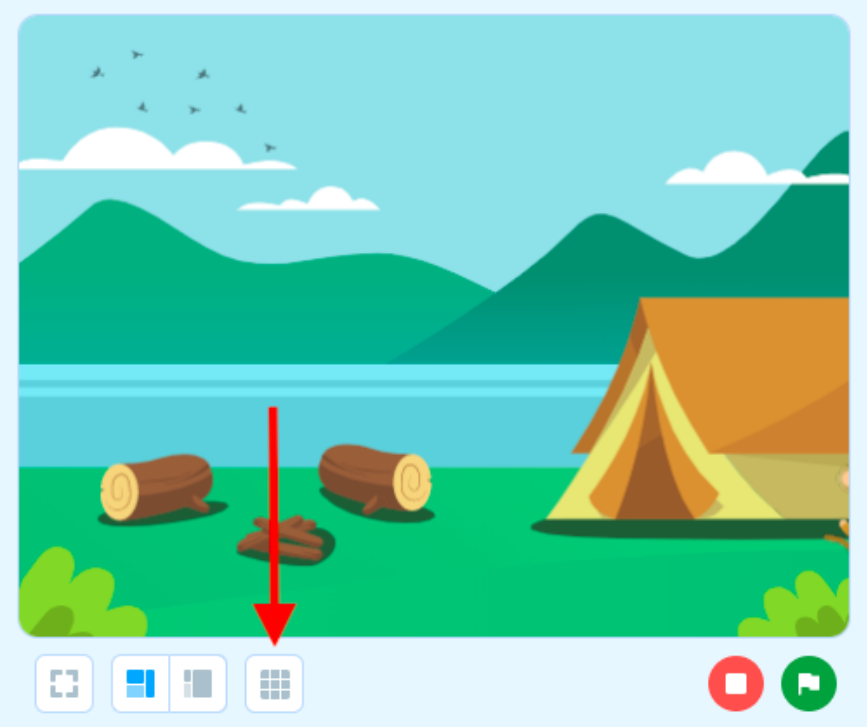
Oh no! Our monkey disappeared off the side of the scene. How can we tell them to stop walking once they’ve reached the edge?

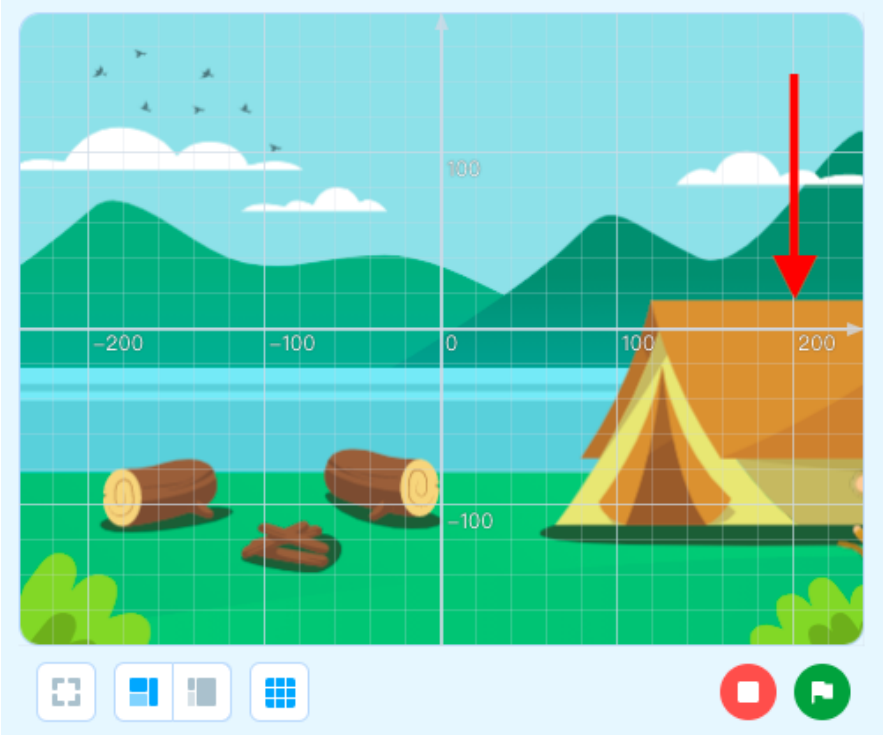
NOTE: Since the “Forever” block repeats forever, we have to manually stop our code! Click on red square icon below the scene to end the program when there is a forever loop:



Step 2: Stopping at Edge of Screen (Conditionals)

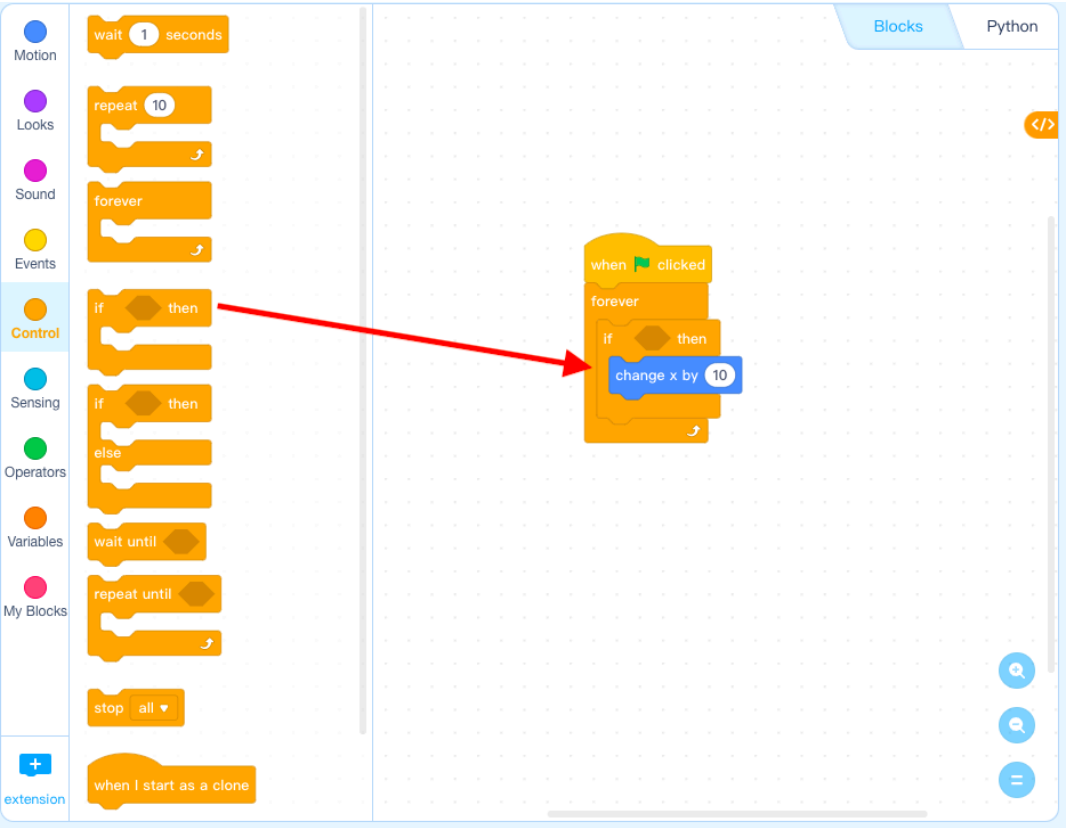
Let’s take a look at how the scene is set up. Turn ON the grid by clicking this button under the scene:





200 seems like a good stopping point on the grid! Let's tell the monkey to stop once it's at this point.

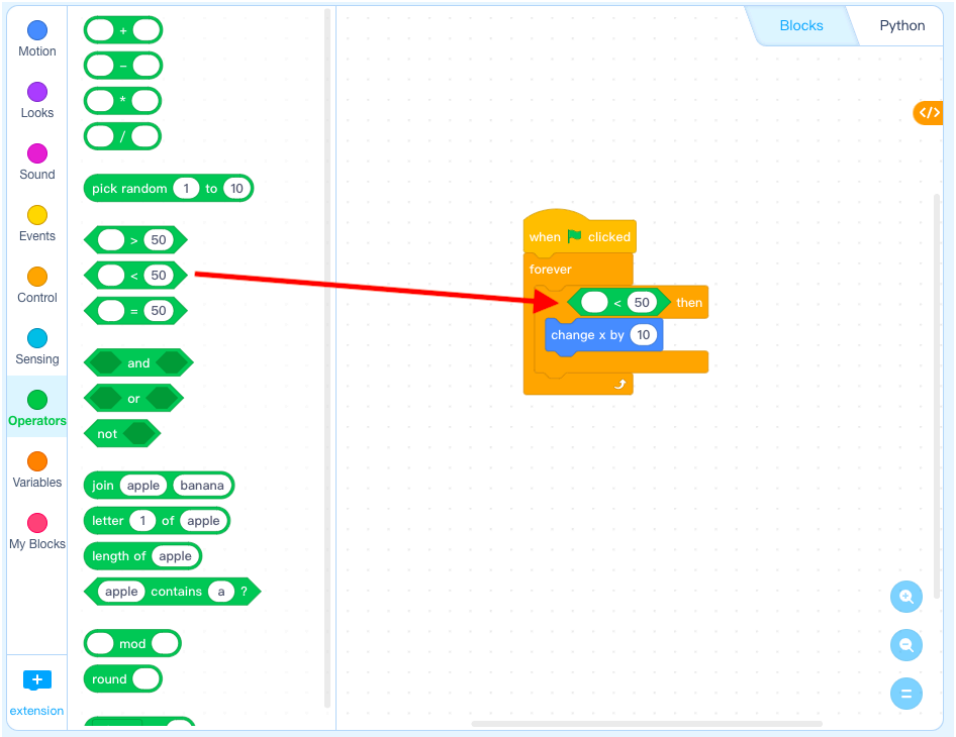
Change the monkey's x coordinates back to 0 under the sprites tab to reset its position. Go back to the CONTROL tab of the blocks editor. Drag an "If __ Then" block on top of our "Change x by __" block. Your group of blocks should look like this:



Briefly give a 1-2 sentence explanation of “If__Then” statements. (e.g. “The blocks **INSIDE** of the “If__Then” bracket will only happen **IF** some condition is met”)

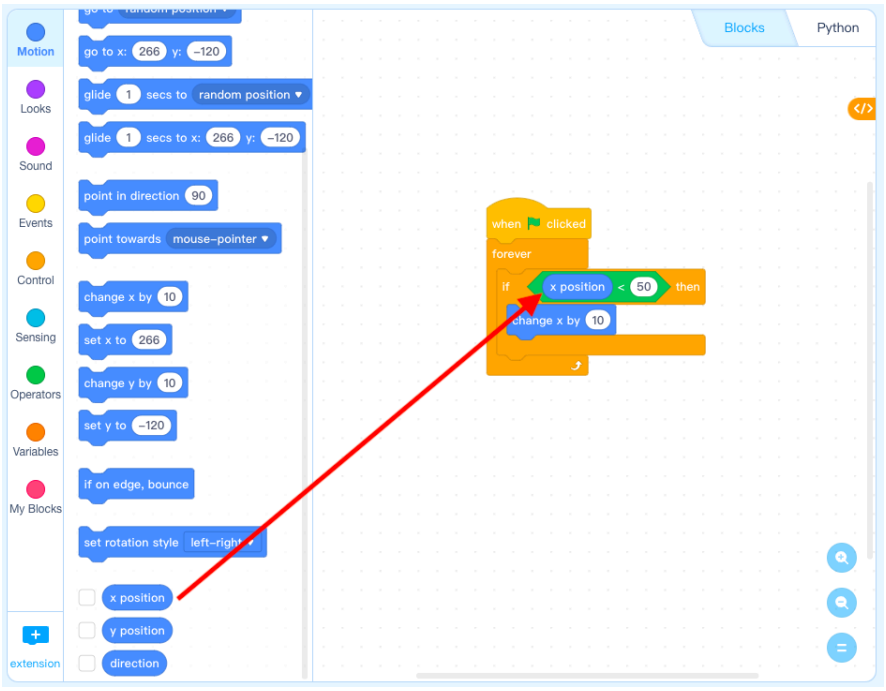
So when do we want to change x by 10?
Before the monkey has reached 200! In other words, when the monkey’s x coordinate is smaller than 200.

Let’s tell this to the monkey:
Go to the OPERATORS tab of the blocks editor. Drag an “ __ < 50 ” block into the blank spot in the “If __Then” block. Your group of blocks should look like this:

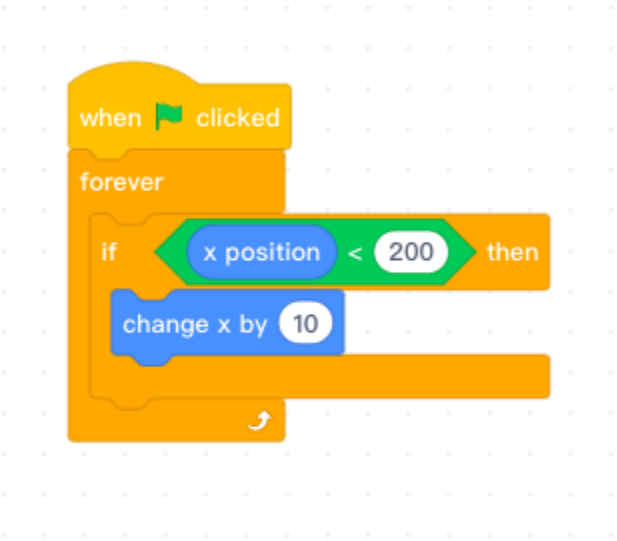


NOTE: Notice how the block has pointed sides → the empty slot in the “If__Then” is also pointed! You have to match the shape of the block to the shape of the slot.

Go to the MOTION tab of the blocks editor. Scroll to the bottom and drag a “ x position ” block into the empty space in the “__ < 50” block. Your group of blocks should look like this:



We want the monkey to stop when their x-coordinate reaches 200, so let's put that into the block:



Now what the block is saying is: "When the flag is clicked, repeatedly check if the monkey's x position is less than 200. If it is, change x by 10."

Press the flag to try it out!

What happens if we change the 10 in the "Change x by __" block to 20? What happens if we change it to 5? → (20: the monkey moves faster, 5: monkey moves slower)

Set the block back to "Change x by 10".

Arrow keys

Step 1: User Input

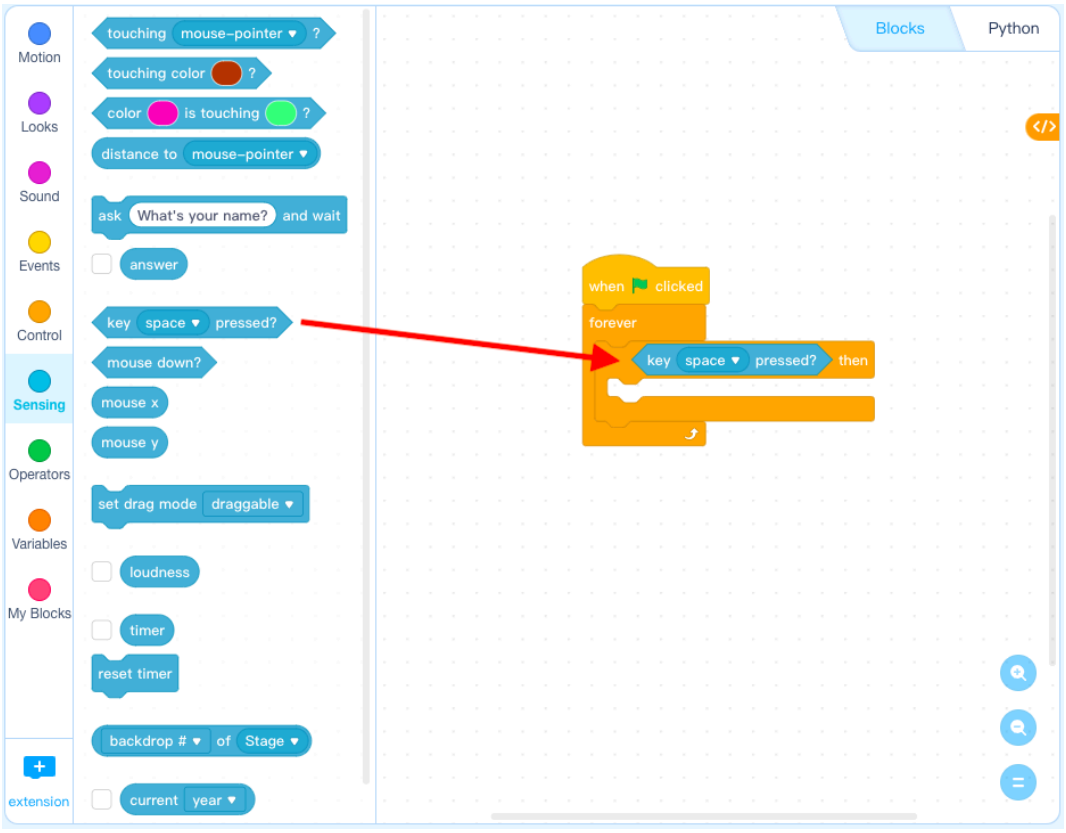
What if we want to use the keyboard to tell the monkey what to do?
Delete the blocks inside of the "Forever" block by clicking on the **top-most** block and dragging the group into the block selection panel.

Now instead of just moving right forever, let's instead check for keyboard input!

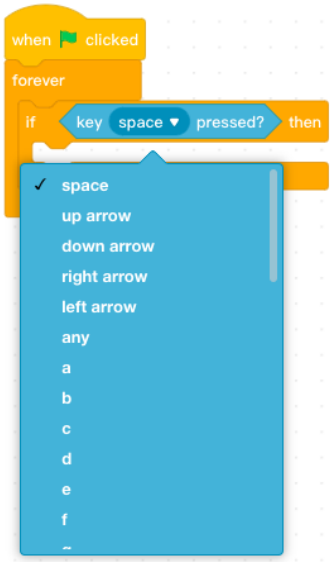
- If the left arrow key is being pressed what should the monkey do? → (Move left)
- How should we tell the monkey to do that (which block to use)? → (change x by -10)
- When should the monkey decide to do that? → (**IF** the left arrow key is pressed)

So **IF** the left arrow is pressed, **THEN** we should change x by -10!

Go back to the CONTROL tab of the blocks editor. Drag an “If __ Then” block into our “Forever” block.
Now let’s introduce a new category of blocks: Sensing blocks!
Go back to the SENSING tab of the blocks editor. Drag a “Key__Pressed?” block into the slot of our “If__Then” block:



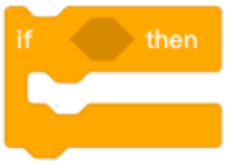
Click on the little arrow next to space to choose a key. Select “left arrow”.



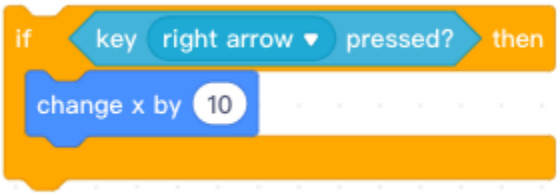
When the left arrow is pressed, we want to move left! So go to the MOTION tab of the blocks editor and drag a “Change x by __” block into the bracket of the “If_Then” block. Change the 10 to -10 (since we’re moving left):

Click the flag to try it out!

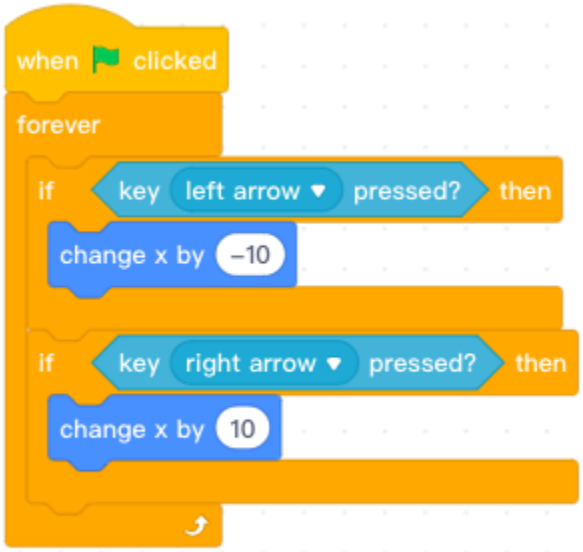
Now let’s get the right arrow key to work as well:
Go to the CONTROL tab of the blocks editor. Drag an “If __ Then” block into the block editing area:



What blocks do we need to add?
When the right arrow key is pressed what do we want the monkey to do?



Now let's put the pieces together. Where do you think we should put this chunk of code? Drag the block group we just created so that it's right under the other "If_Then" bracket in the "Forever" bracket:



What this group of blocks does: "When the flag is clicked, repeat two things: first check if the left arrow key is pressed. If it is, then change x by -10. After that, check if the right arrow key is pressed. If it is, then change x by 10."

The computer loops this block very, very fast -- so there's no lag at all! It'll basically be checking both keys simultaneously, all the time.

Click the flag and try it out!

Overview of Initial Banana Code

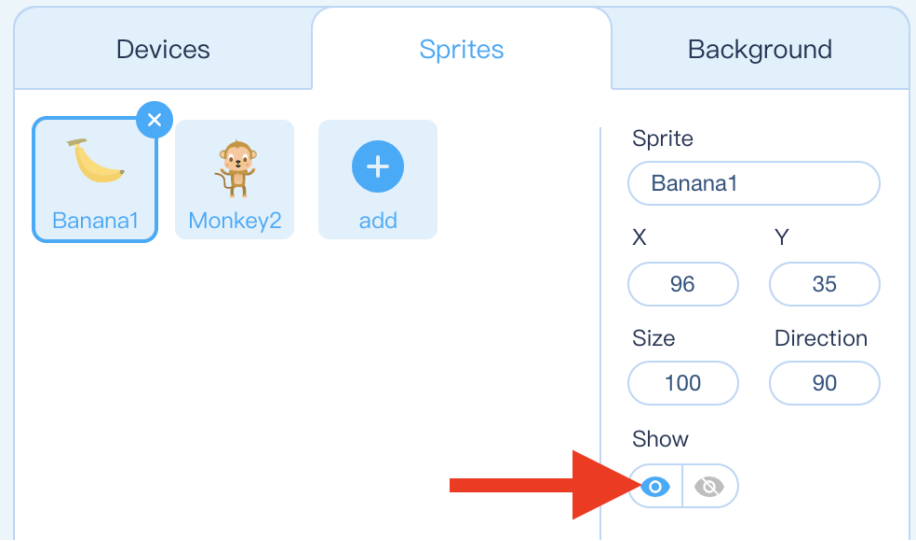
Let's take a look at what code is already given in our banana sprite!

Step 1: Setup Banana

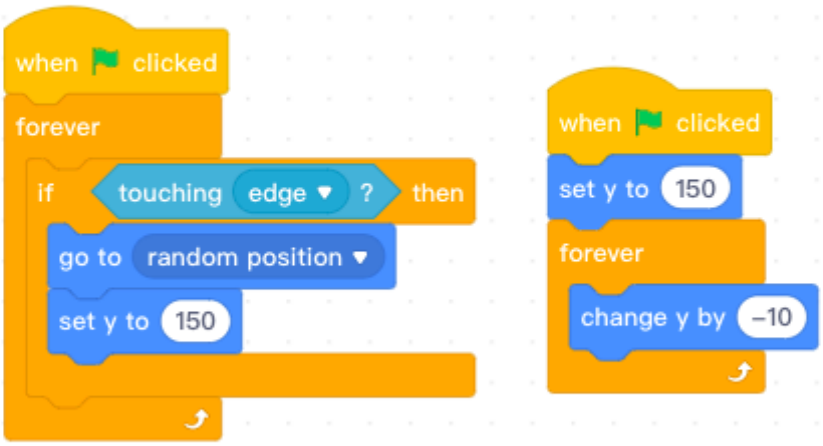
First, let's bring back the banana.

Select Banana Sprite.

Press the show button.



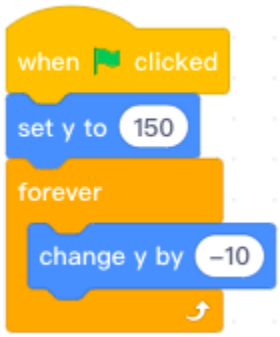
The banana code looks like this right now:



Press on the green flag to see what the banana does so far!
(Should fall to bottom then teleport back to the top at a random location)

Let's take a closer look at these blocks.

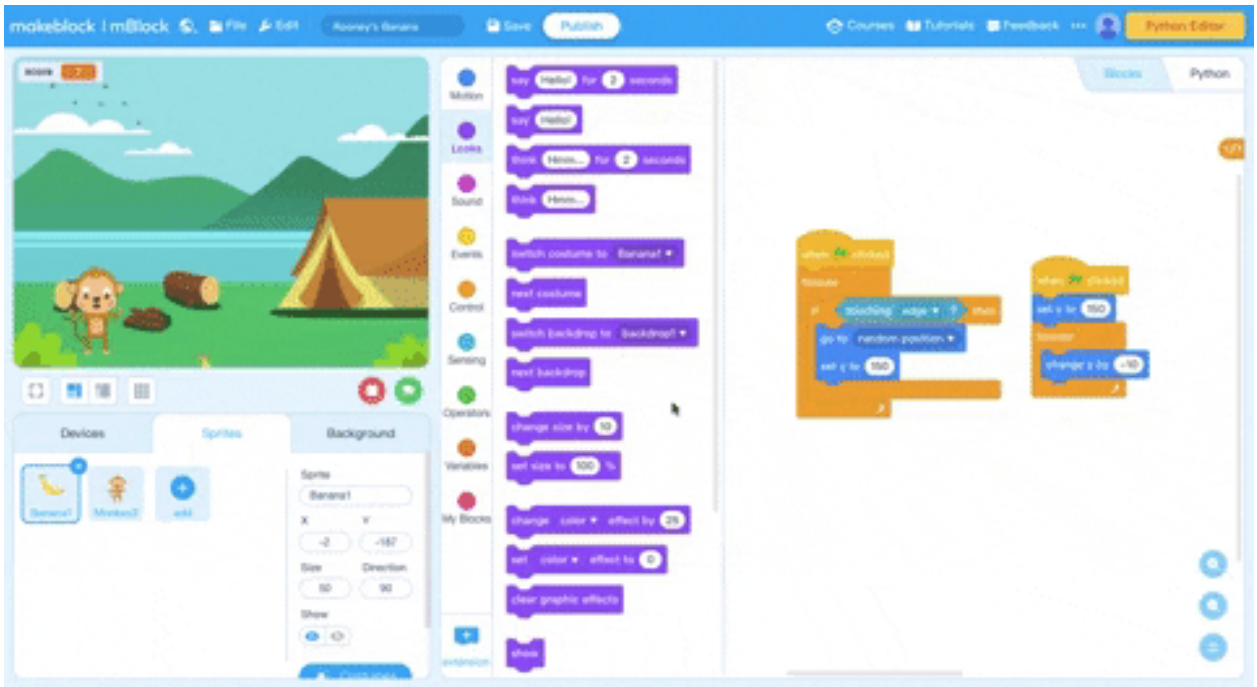
Step 2: How Banana Falling Works



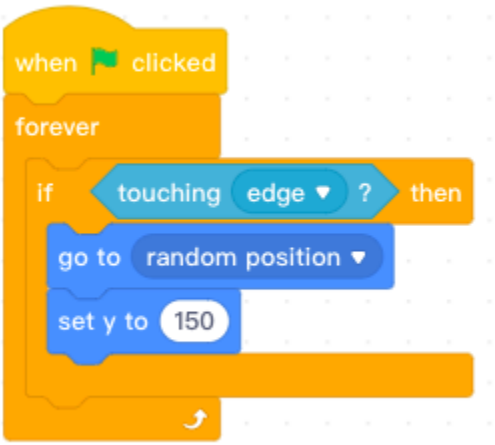
Breaking down this group of blocks:

1. "When flag clicked" is followed by "set y to 150" - so when we first start our game, the banana should jump to the top automatically
2. Next we have a FOREVER loop surrounding a "change y by -10" - so the banana should fall down forever!

Click on the block group to test it out by itself!



Step 3: How the Respawn to Top Works



Breaking down this group of blocks:

1. Again we have a "**When flag clicked**" and a "**Forever**" block because we want the banana to follow these instructions at all times during the game! These blocks will be repeated over and over again while the game is being played.

2. Next we have an **IF** bracket: we're telling the banana, check IF you **touch an edge** (so an edge of our game screen) - and if you do, we want you to do whatever is inside this bracket!

3. Inside the bracket we have two blocks:
    a. First: "**go to random position**" means exactly what it sounds like - we're telling the banana to go to ANY random spot on the game screen
    b. After that, we immediately have a "**set y to 150**" block - so the banana was just sent to a random spot on the screen, and now we're going to push it all the way up to the top of the screen (without moving it left or right at all).
    c. These two blocks happen pretty much instantaneously! So to us, the banana looks like it just jumps to a random spot on the top of the screen.

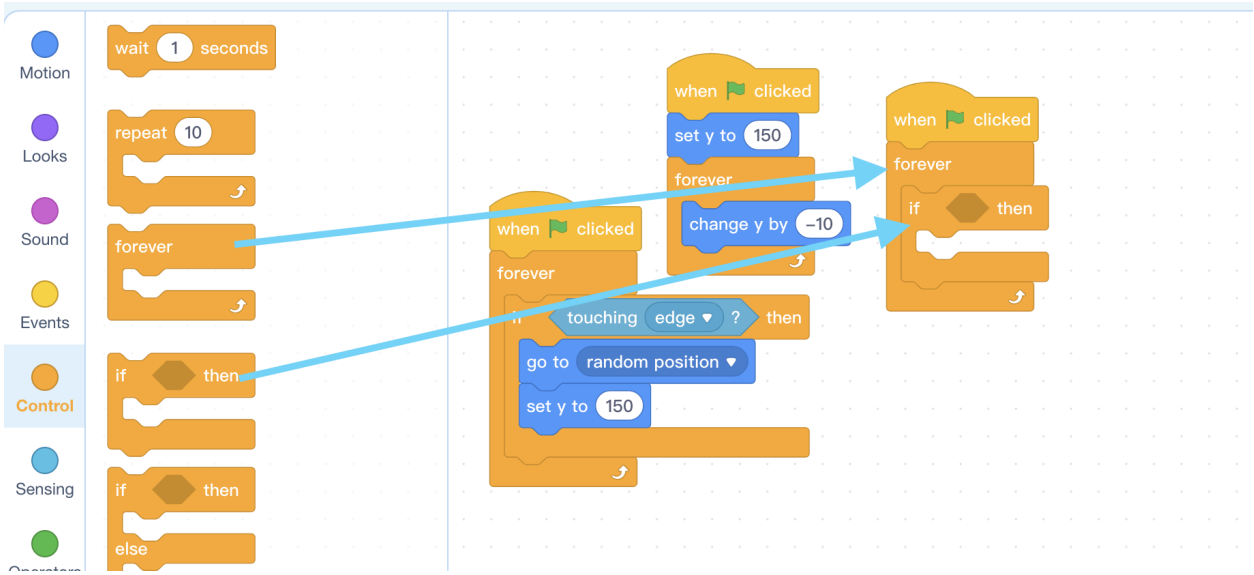
Monkey Banana - Full Game

INTRODUCE VARIABLES
Make sure to be working in the blocks of the sprite Banana.

Step 1: Banana Respawn when Sense Monkey

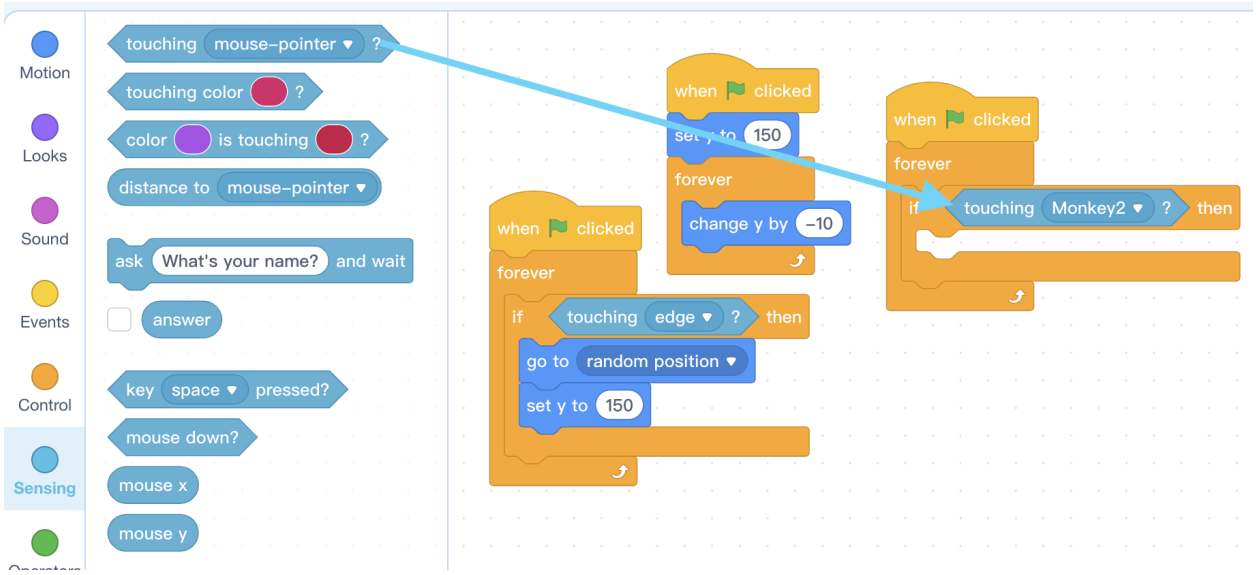
From EVENTS, bring a third “When Flag Clicked” block into the sandbox.

From CONTROL, bring a “Forever” block to under the “When Flag Clicked” block and drag a “If __ then” block into the body of the “Forever” block.



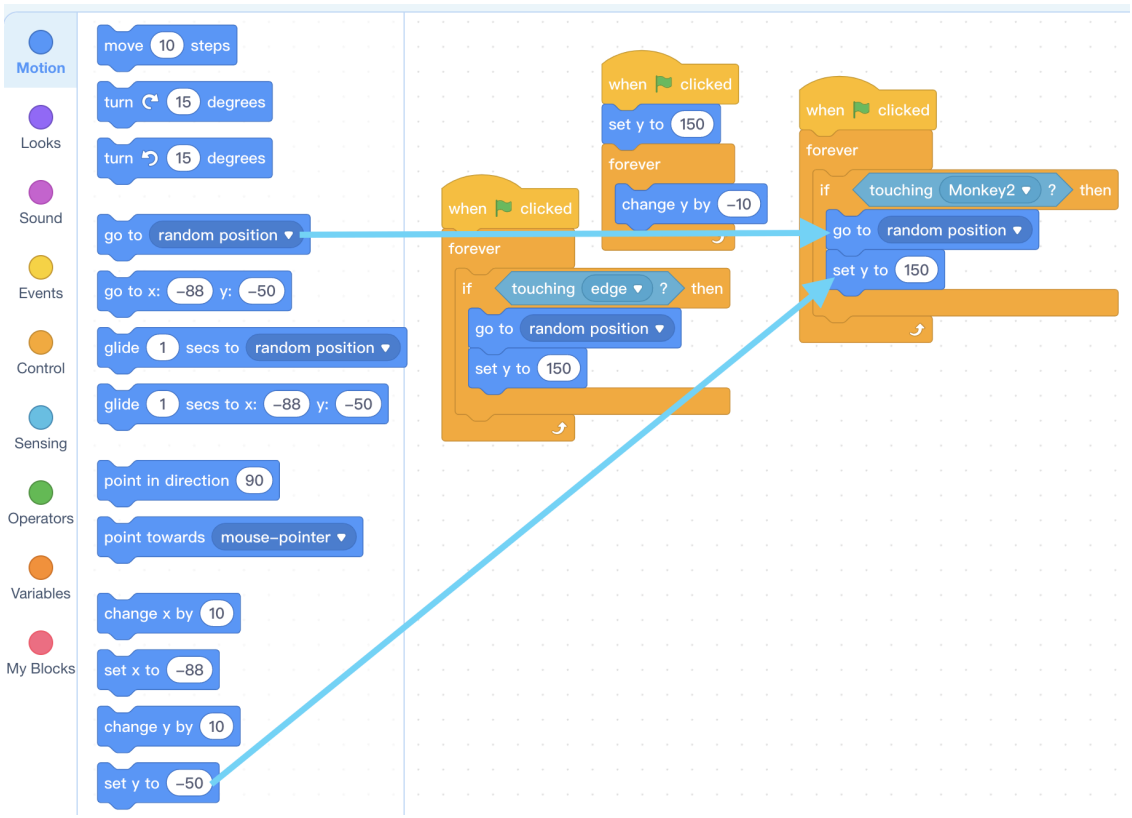
Under SENSING, drag “Touching __” block and place into “If __ then” block.

Change “Touching __” to “Touching Monkey2”.



From MOTION, bring “Set y to 150” block into body of “If touching Monkey2 then” block.

From MOTION, bring “Go to Random Position” block into body of “If touching Monkey2 then” block and above “Set y to 150” block.



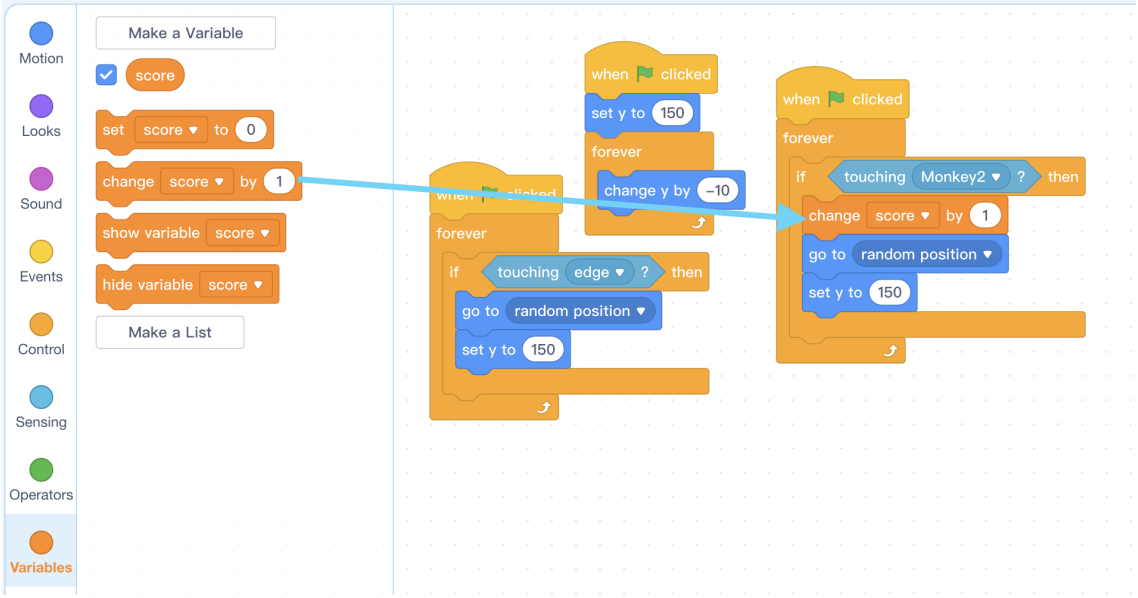
Step 2: Game Score

Explain what a variable is. A variable is a name of something that represents a value. A variable is something like “Dollars in bank” which represents the number of dollars you have in your bank. We will have a variable “score” that represents the game score.

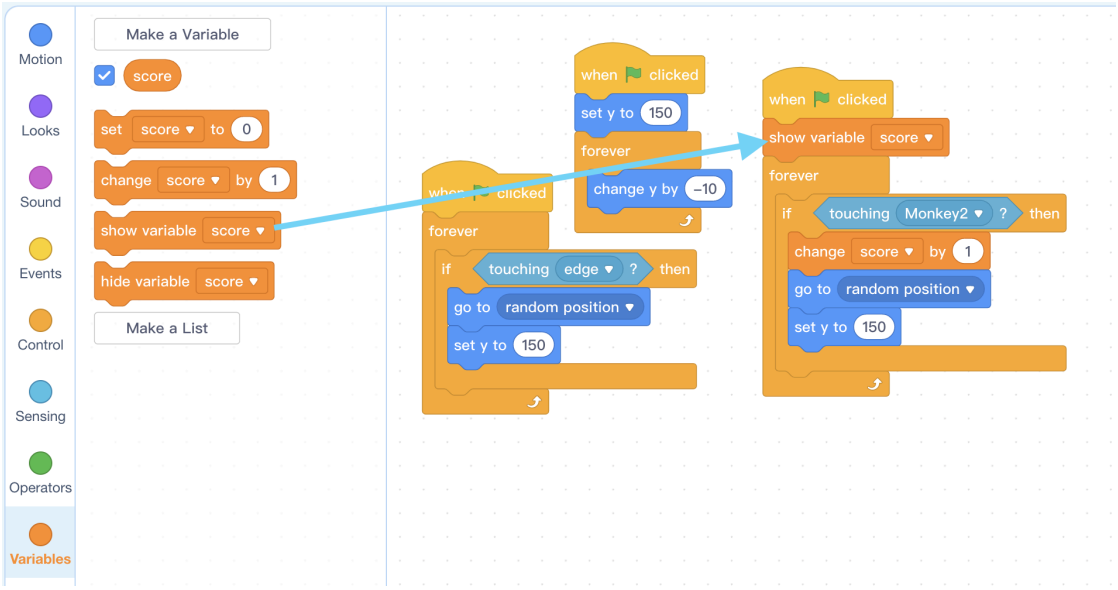
Ask the kids when the score should increase.

The score should increase when the banana touches the monkey.

From VARIABLES, drag “Change Score by 1” into body of “If touching Monkey2 then”.



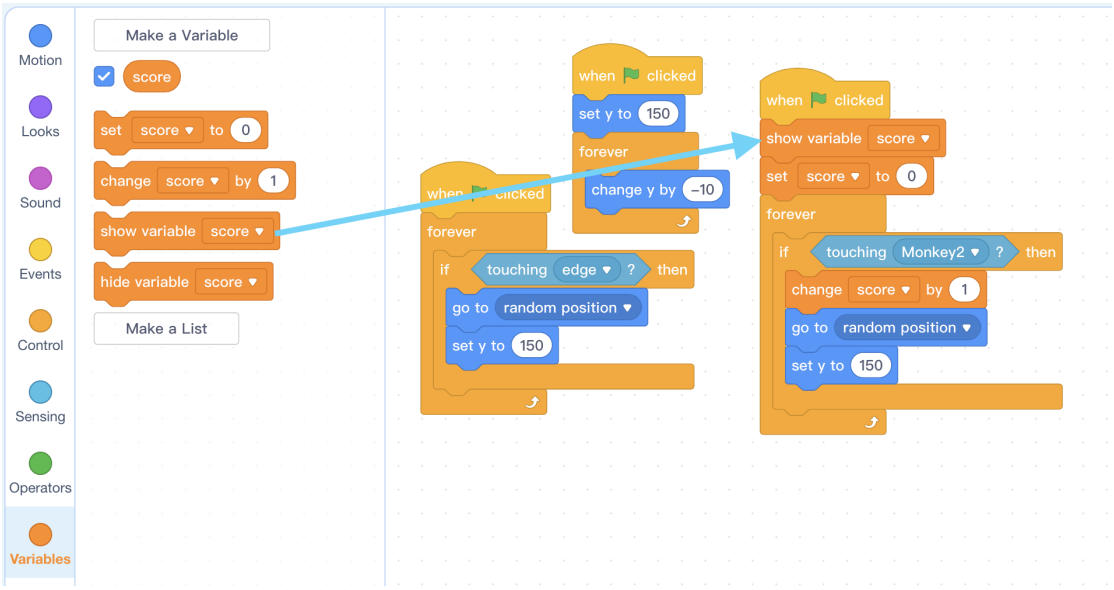
Next, we need to show the score on the screen. From VARIABLES, drag “Show variable score” block to right under any “When Flag Clicked”.



Press play and ask the kids if they notice anything wrong.

The score isn't set to 0 at the start of the game!

From VARIABLES, bring “Set score to 0” to right under the “Show variable score” block.



Press play and play the game. Yay! You are done!

Extra Activities

Some ideas if your breakout room finishes early:

1. Review Beetle Project from Previous Class

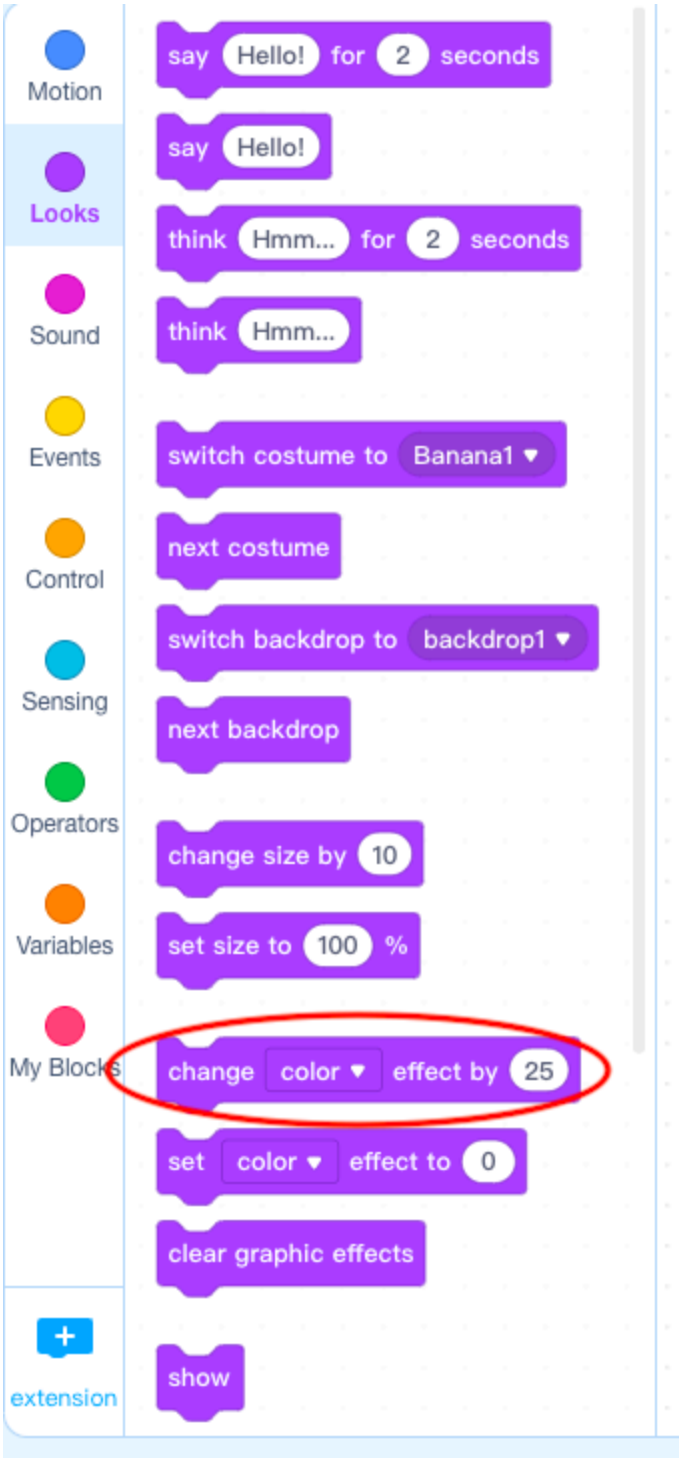
   FULL PROJECT: https://planet.mblock.cc/project/445974

   The coding concepts from this project are more analogous to what is used during the robot programming lessons - might be good in preparation for later weeks!

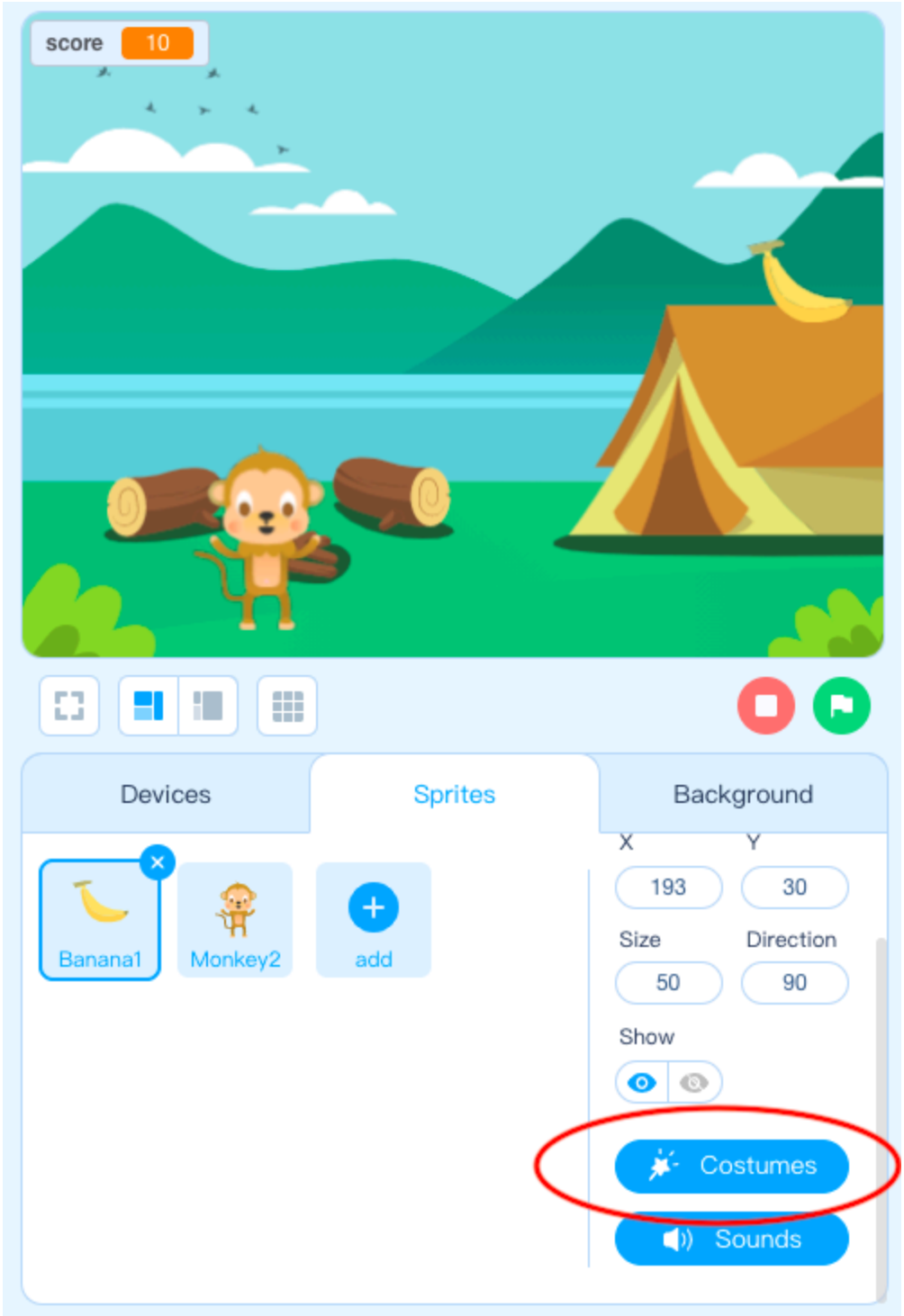
2. Coding Challenge:

   Try to get the banana to change colors each time it touches the monkey!

   Try using this block: (please give to the kids)



Or, try drawing your own costumes for the banana and use the “switch costume to ___” block to swap between them!


score
10
Devices
Sprites
Background
Banana1
Monkey2
add
X
Y
193
30
Size
Direction
50
90
Show
Costumes
Sounds

ONE POSSIBLE “ANSWER”: