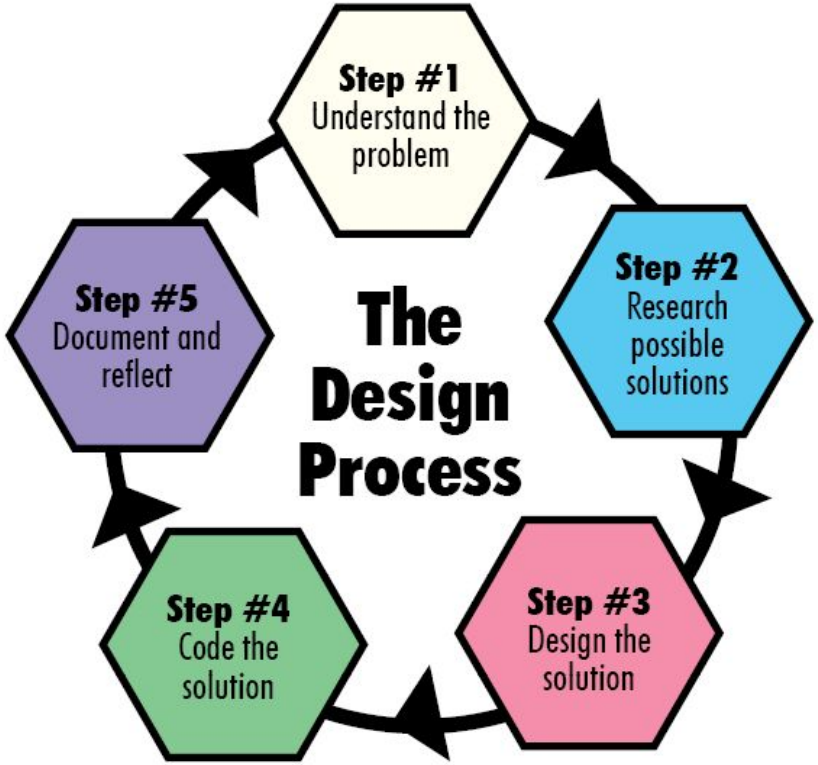
Flowcharts to Code

A supplemental lesson for Firia Labs CodeX -- AP CSP

Review: The Design Process



Many industries, including computer science, use a design process when working on a new project.

Definition: The design process is a tool that helps you break down large projects into smaller, easier-to handle stages

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Summary of each step:

Step #1

Come up with a new programming idea that solves a problem – make sure you understand what it should do

Step #2

Review what you already know how to do. What programming skills and concepts can you use?

Step #3

Plan the solution to your idea: what it will look like (buttons pressed) and coding (variables, conditions, etc.)

Step #4

Code the solution.

- A few lines at a time
- Documenting and fixing bugs as you go

Step #5

Document your code. Get feedback on the project, and reflect on how it works so far. Then improve it

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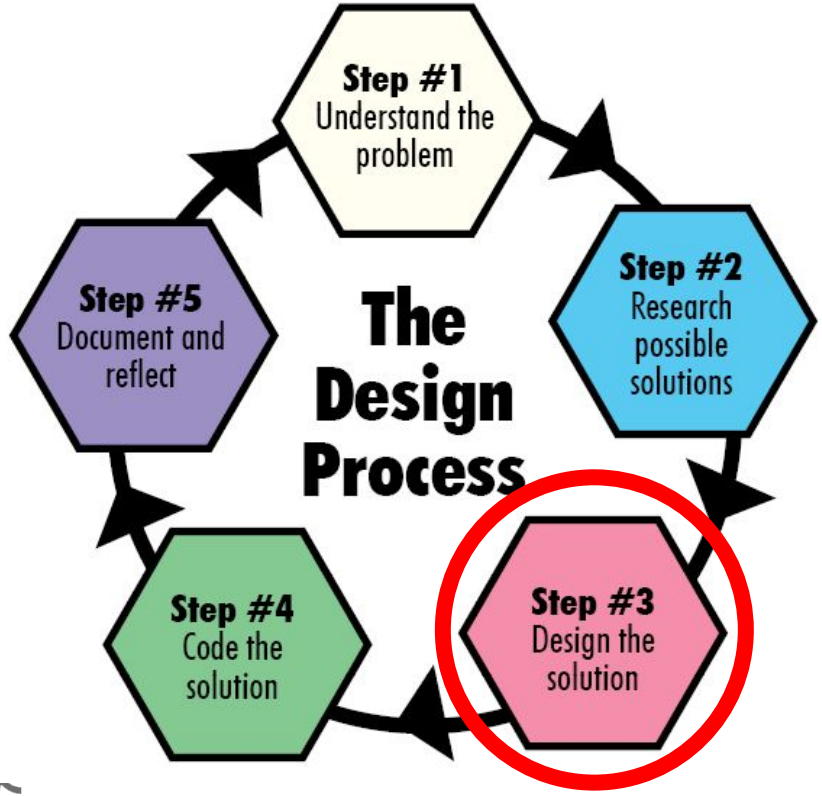
Step #3 - Design a solution



In the first flowchart lesson, you were given Python code and then created a flowchart from the code.

In the design process, you don't have the code. You design the solution first using a flowchart, and then write the code.

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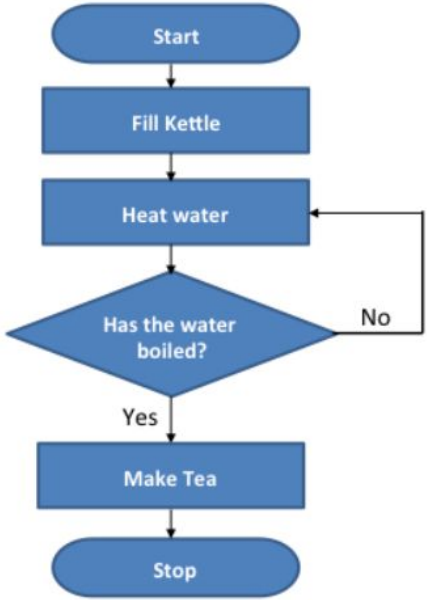
Flowcharts

Example (Making the Tea)



The flowchart visualizes the algorithm, or how to solve the problem.

There are four common shapes used when creating a flowchart:

Source: https://www.teachwithict.com/flowcharts.html#google_vignette

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Flowchart symbols

start or **stop**

Use an oval to mark the beginning and end of the program.

input or **output**

Use a parallelogram to show input or output. **Input** could be the button pressed. **Output** could be text on the screen, an image displayed, a pixel lit or a sound played.

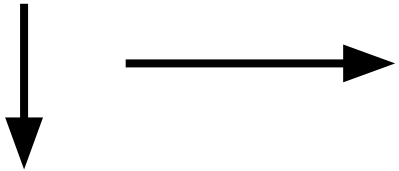
action or **process**

Use a rectangle to process an action. It could be used to assign a value to a variable, or increment a counter, or get a random number.

decision

Use a diamond to make decisions. This shape will have two or more lines that come from it – one for each outcome. This step might ask a question or provide options. The result could be true or false, yes or no, or choices (red, blue, or green).

flow lines



Use lines to connect the shapes. The arrows show the direction of the steps. Some lines should include labels, such as yes or no, to explain what is happening.

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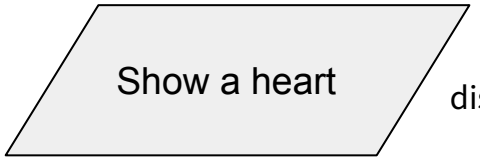
Practice with Kahoot!

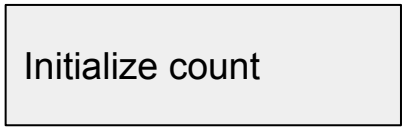
Use your phone or computer to go to https://kahoot.it/

Flowcharts

Now you will be given a flowchart, and you need to write the Python code that it visualizes.

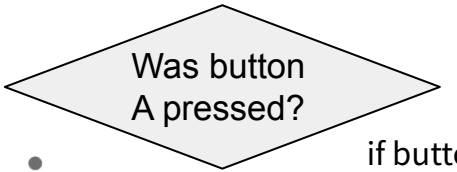


display.show(pic.HEART)

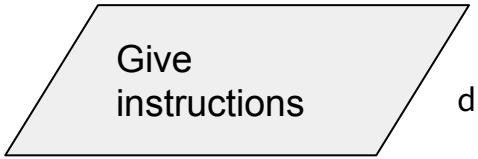


count = 0

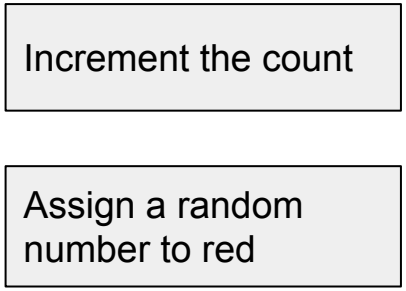
color = RED



if buttons.was_pressed(BTN_A):

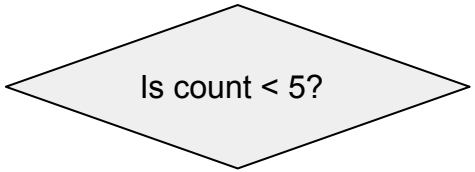


display.print(“Press a button)



count = count + 1

red = randrange(256)



if count < 5:

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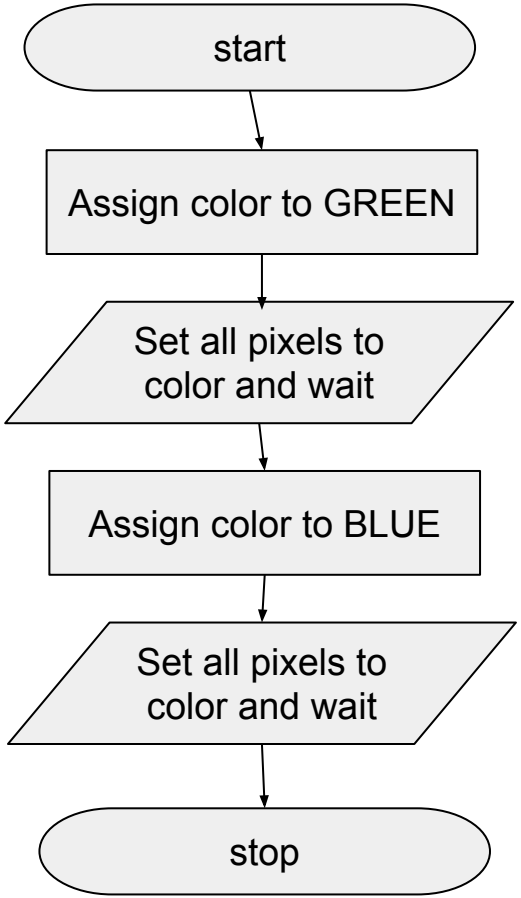
Sample A



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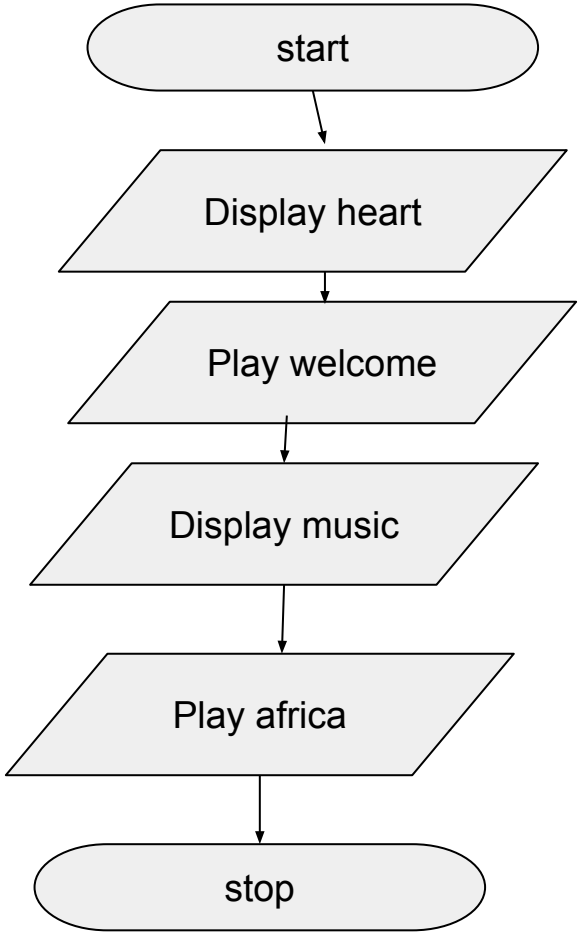
Sample B



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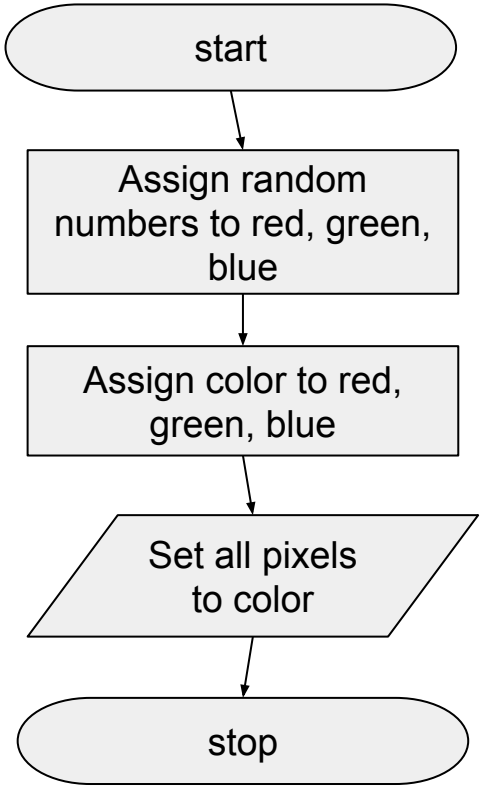
Sample C



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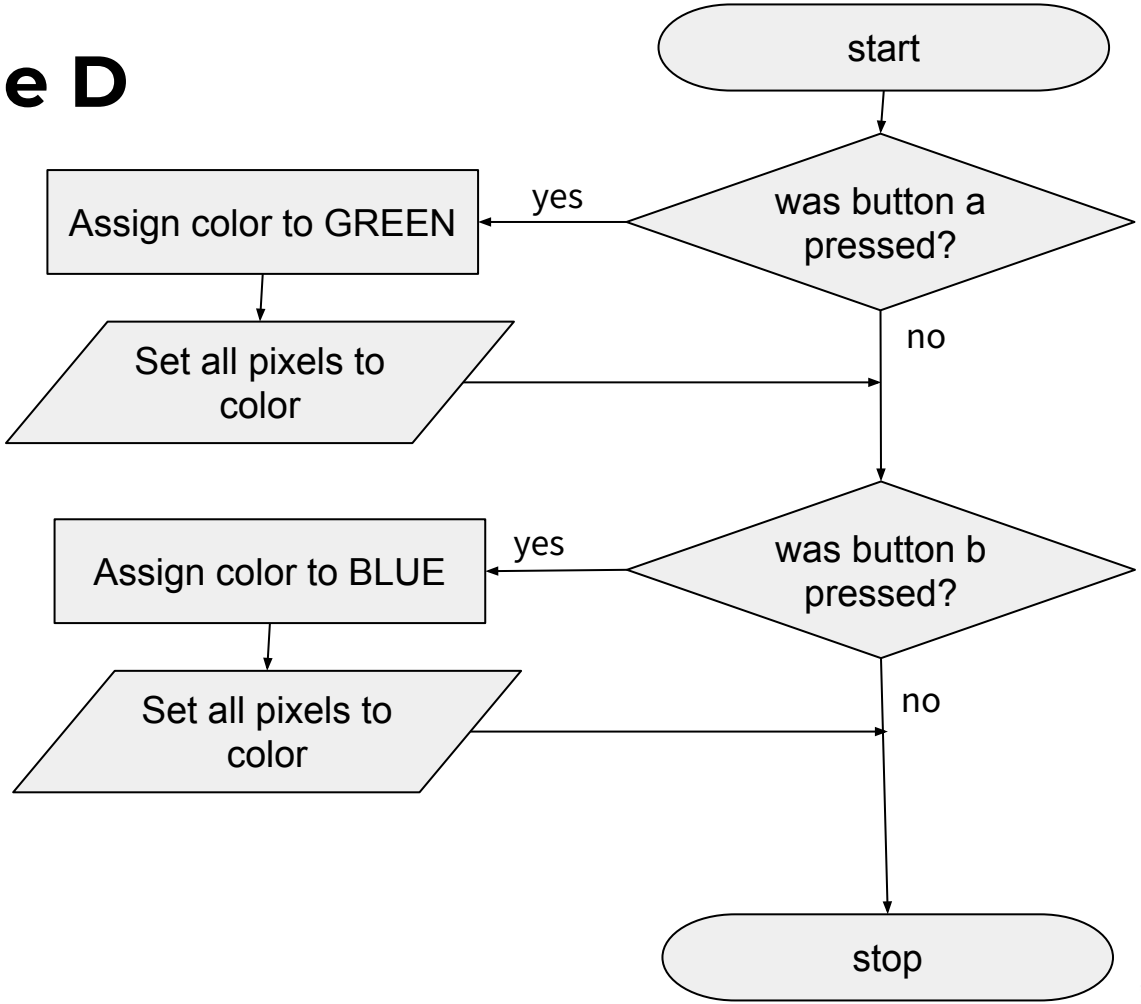
Sample D



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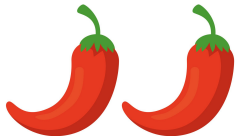
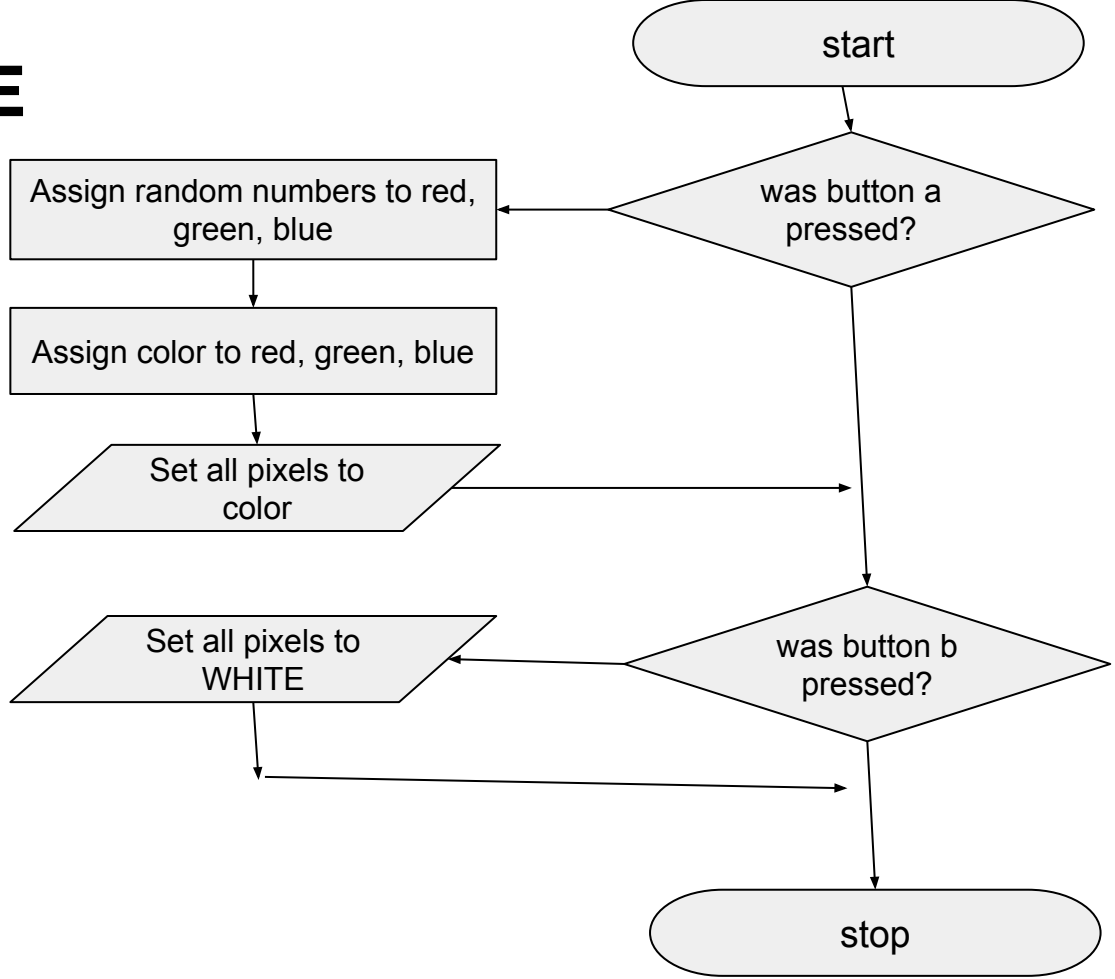
Sample E





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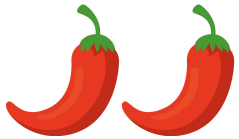
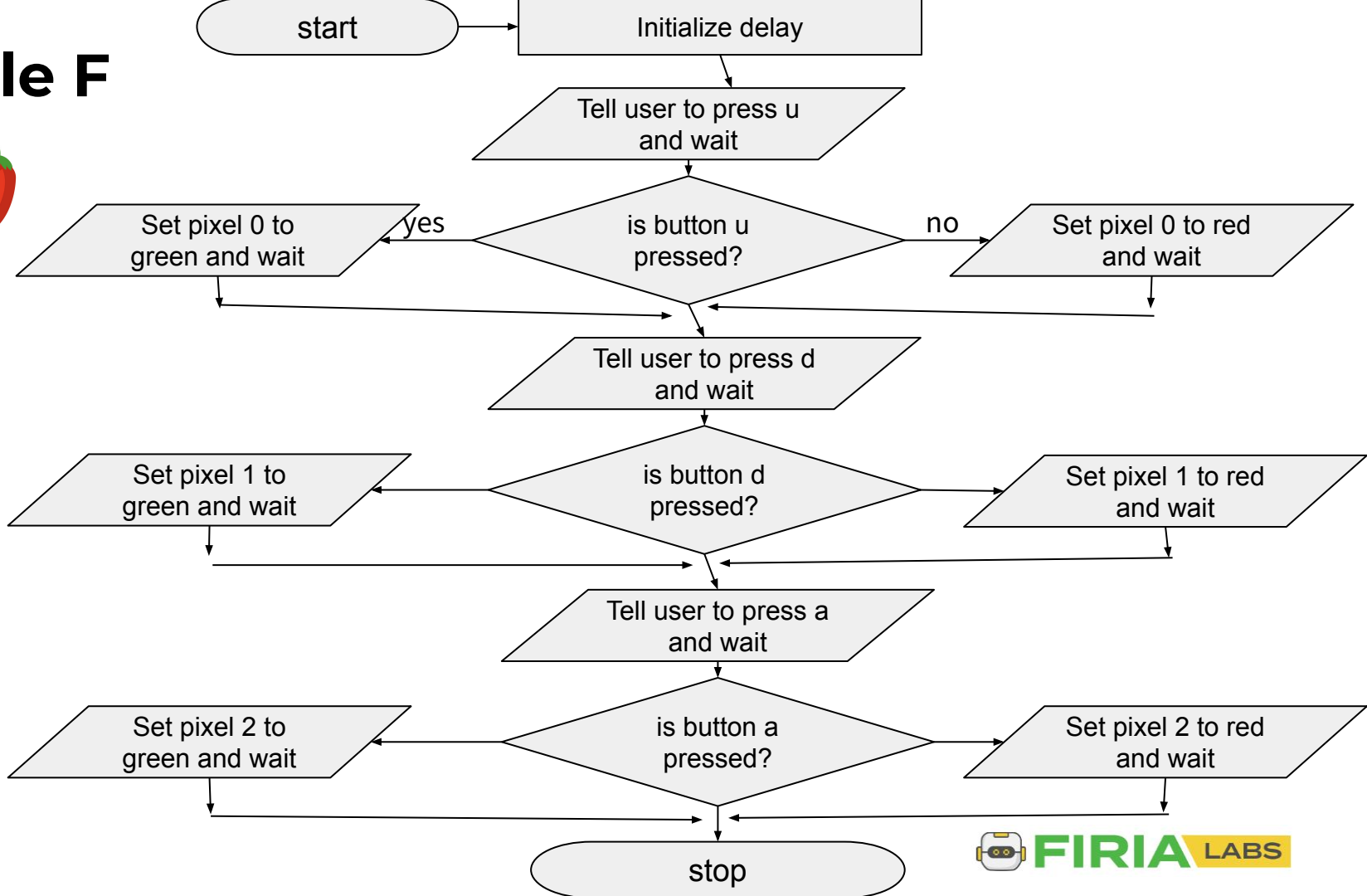
Sample F





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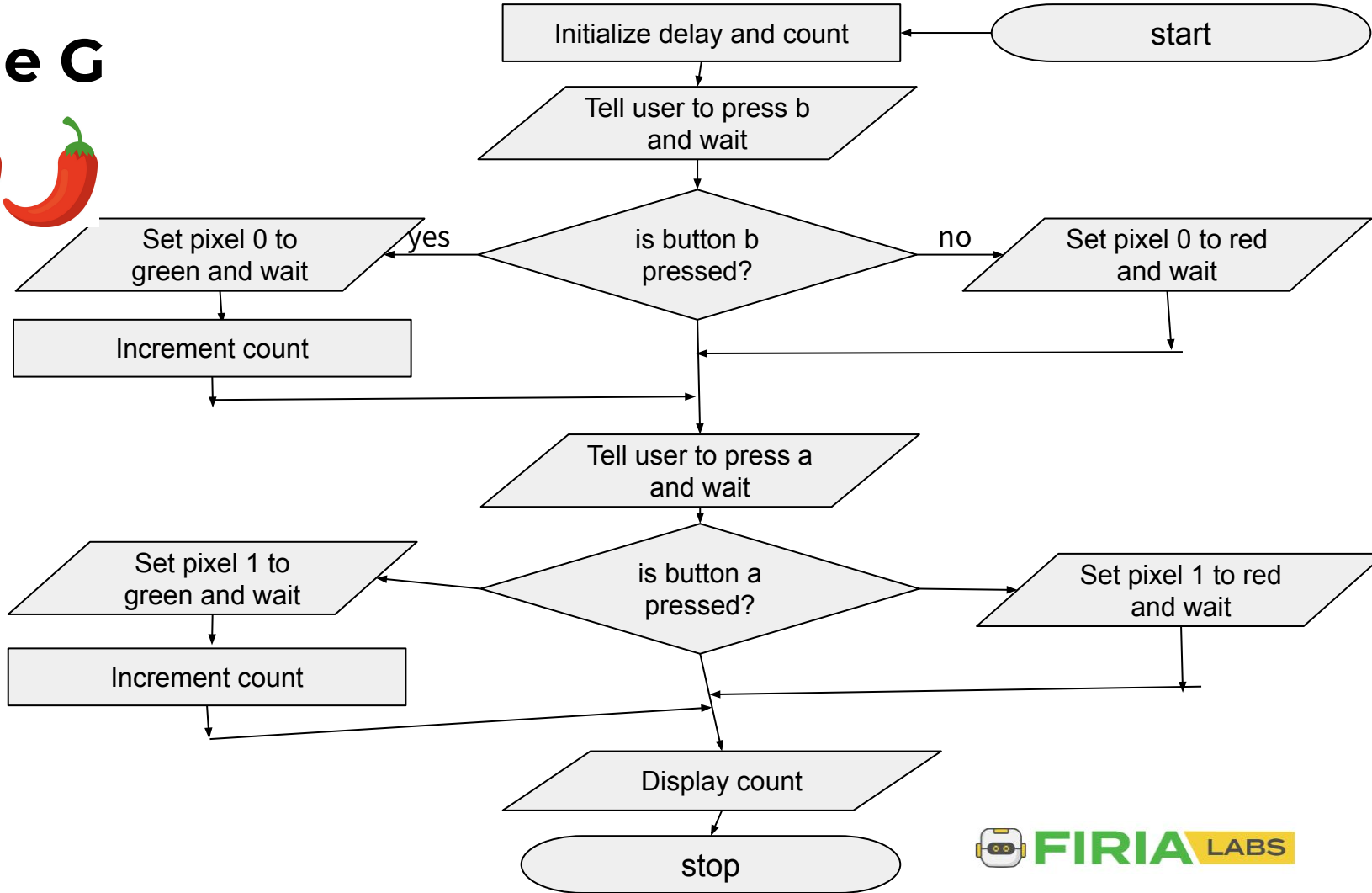
Sample G



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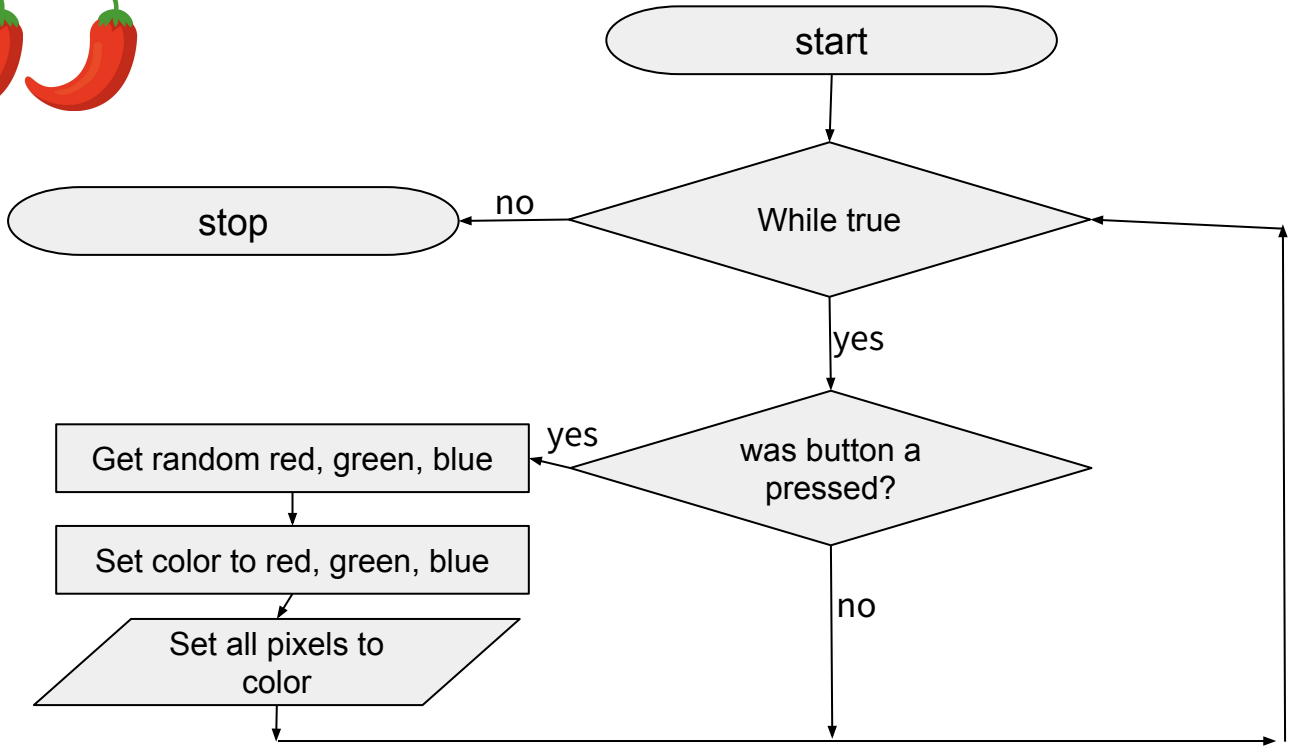
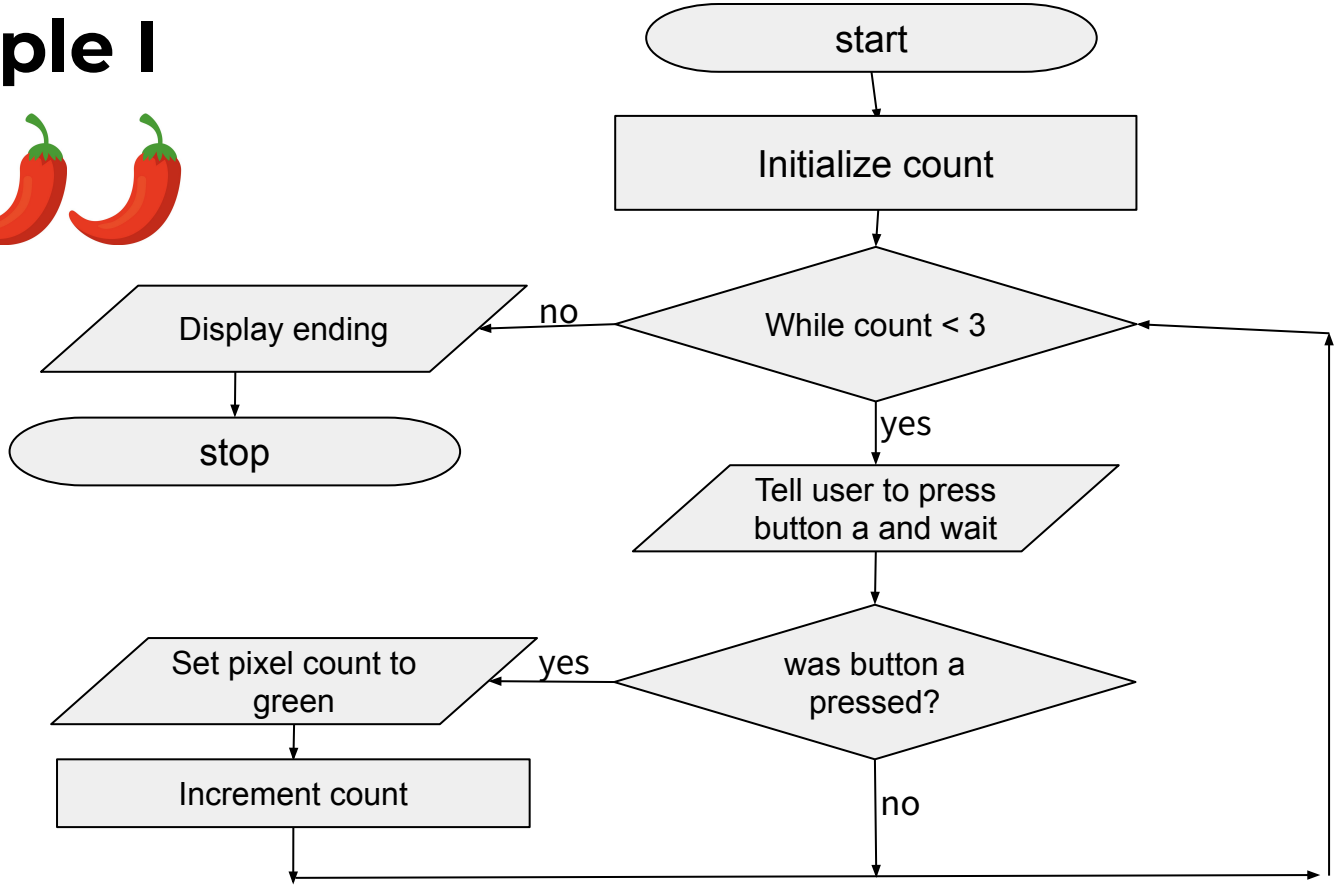
Sample H


start
While true
no
stop
yes
was button a pressed?
yes
Get random red, green, blue
Set color to red, green, blue
Set all pixels to color
no

Sample I



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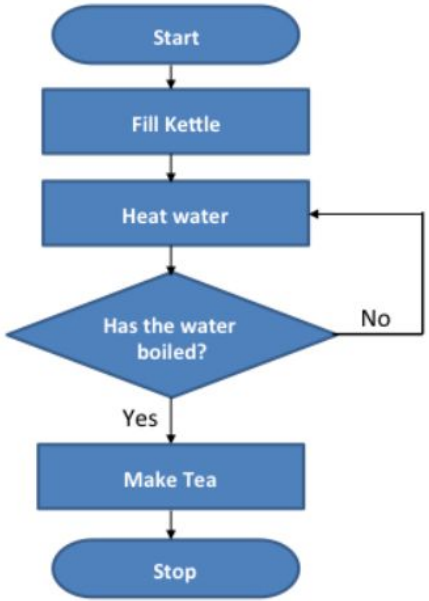
Flowcharts Summary

Example (Making the Tea)



Definition: An **algorithm** is a sequence of steps for completing a task.

Definition: A **flowchart** is a diagram that uses shapes, lines, and arrows to sequence steps.

Definition: A **flowchart** is a visual representation of the input, output, decisions, and actions that take place within a program.

Source: https://www.teachwithict.com/flowcharts.html#google_vignette

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