SAM LABS

Into Cyberspace

Lesson 1

Learn

What is an algorithm?

An **algorithm** is a set of step-by-step instructions to write and follow, in order to solve a given problem.

The language in instructions needs to be precise to ensure a task is properly completed.

A **sequence** is a series of algorithmic instructions in a precise order.

Unplugged Activity

- Create a handshake with at least three elements.
- First describe it to a partner. How easily can they follow your description?
- Next write down step-by-step instructions. Is this easier for your partner to follow?

Quick Reflection:
What happens if instructions are not clear enough?

What are algorithms designed to do?

Algorithms are designed to complete a task.

In order to design an algorithm, two questions need to be answered:

- What is the problem you want to solve?
- What are the steps to solve it?

Computer programs are a series of processes to solve a need.

Compare and Contrast

Which algorithm would be best to follow to make pizza?

1

- Lay pizza base on work surface
- Add tomato sauce top of pizza base
- Add grated cheese on top
- Add 10 pepperoni slices on top
- Put in oven for 15 mins on high

2

- Add tomato sauce
- Add cheese
- Add topping
- Cook it

Quick Reflection:
Is there a problem in your school that a computer program could solve?

Checks for Understanding

Q1

Which of the following are algorithms that occur in everyday life?

a. Google Maps directions

b. My morning routine

c. Facebook newsfeed

Q2

Which of the following are characteristics of a well-designed algorithm?

a. Clear and precise instructions

b. Step-by-step instructions

c. Quick instructions

Checks for Understanding

A1

Which of the following are algorithms that occur in everyday life?

a. Google Maps directions

c. Facebook newsfeed

A2

Which of the following are characteristics of a well-designed algorithm?

a. Clear and precise instructions

b. Step-by-step instructions

Keywords

algorithm

Step-by-step instructions to write and follow, in order to solve a given problem.

steps

Each instruction within an algorithm.

sequence

A series of instructions that are followed one after the other in a specific order.

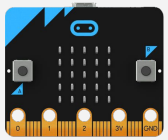
program

A series of processes to solve a need.

Do

1. 

Click ‘ADD DEVICE’
Select device(s) from list

2. 

Connect the micro:bit battery

3. 

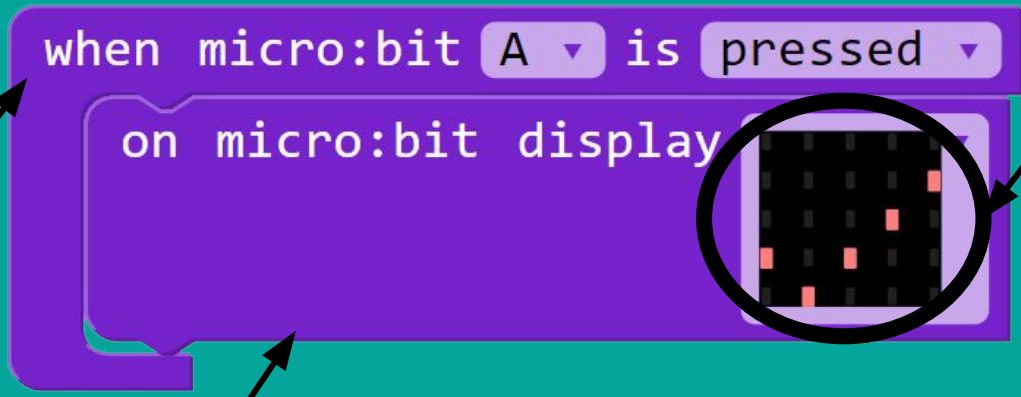
Click ‘CONNECT’

4. 

Select device from list
Click ‘Pair’

Code a sequence to display an output on the micro:bit

From 'micro:bit' 'Events'



'Yes' from drop-down

From 'micro:bit' 'Actions'

Click 'RUN' and test!

This program is the **micro:bit test** and will help me in the future!

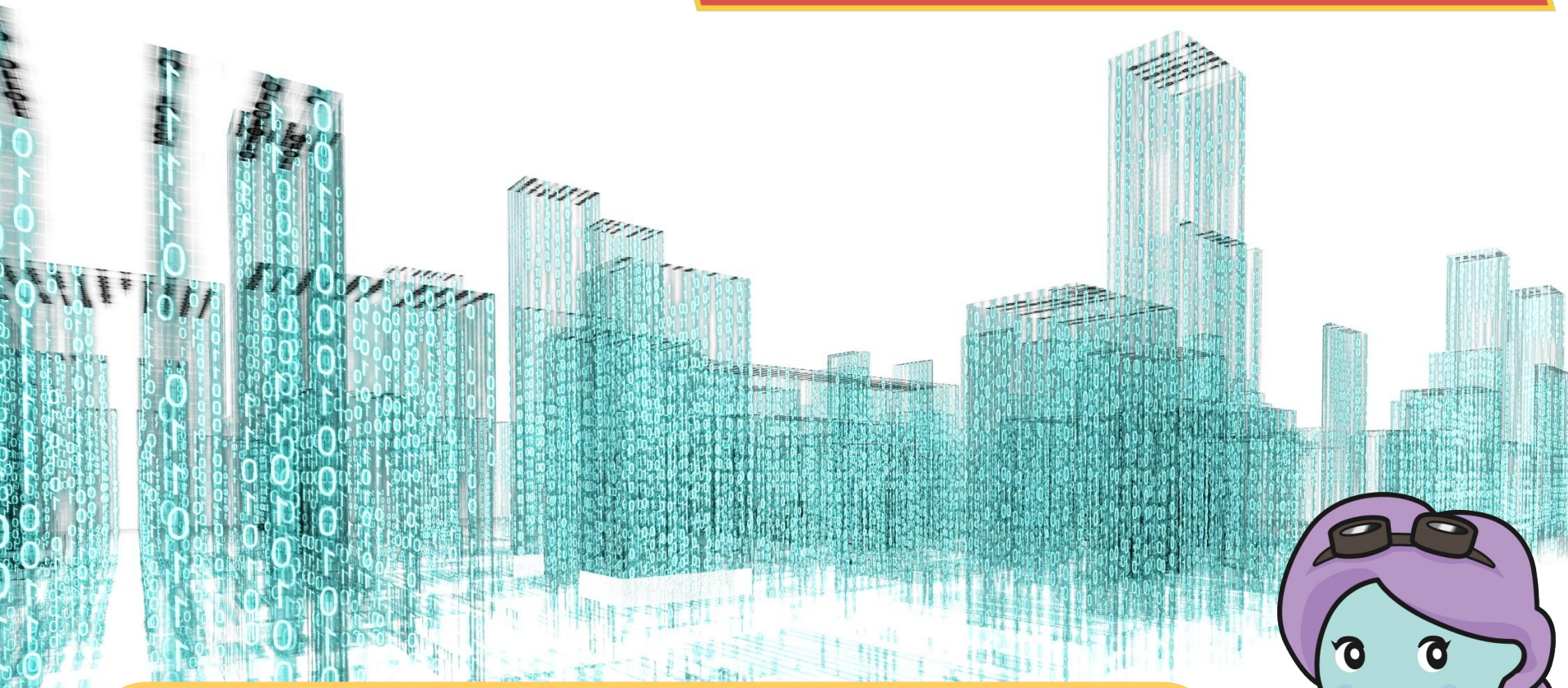
Quick Reflection:
What happens if another option is selected from the drop-down?

My story so far!

One day, during a routine check of the network at Mission Control, Sam detected suspicious activity coming from the middle of cyberspace.

Sam traveled to investigate and found it was a trap! What's worse, the Cyber Scanner, her tool for detecting malware and spyware, was damaged.

MISSION JOURNAL



I need to code a start-up sequence for my Cyber Scanner.

Can you help me use images and sound?

How can I write the steps for my program to work?

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1

2

3

4

5

Blocks

1. 

Click ‘ADD DEVICE’
Select device(s) from list

2. 

Turn on the Buzzer

3. 

Click ‘CONNECT’

4. 

Select device from list
Click ‘Pair’

Challenge

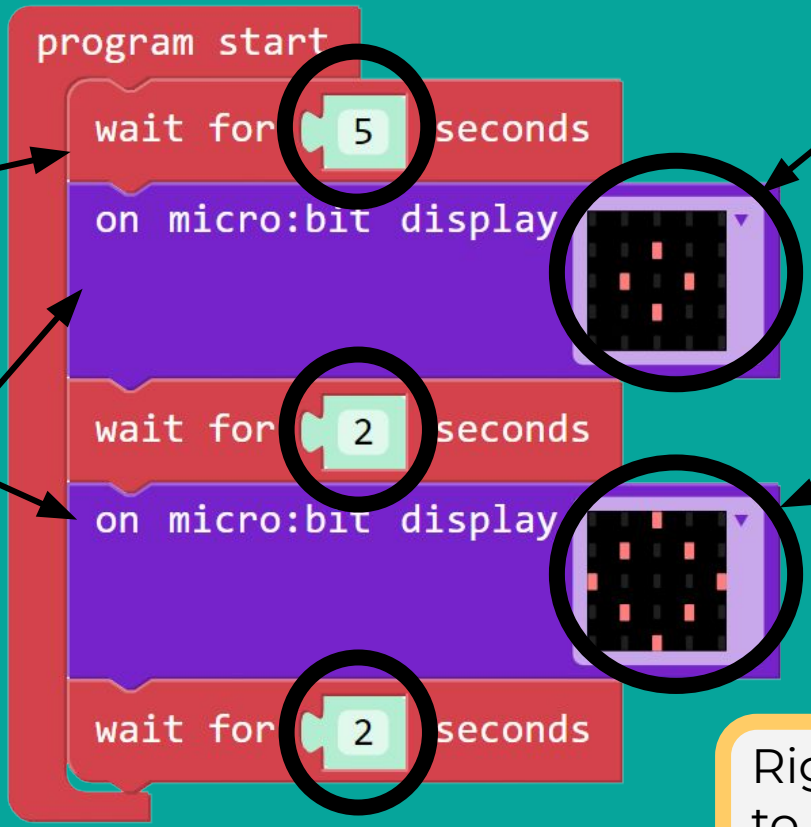
Code a start-up sequence on Sam's Cyber Scanner

Keep the Let's Build program on the workspace.

1

From 'General'

From 'micro:bit' 'Actions'



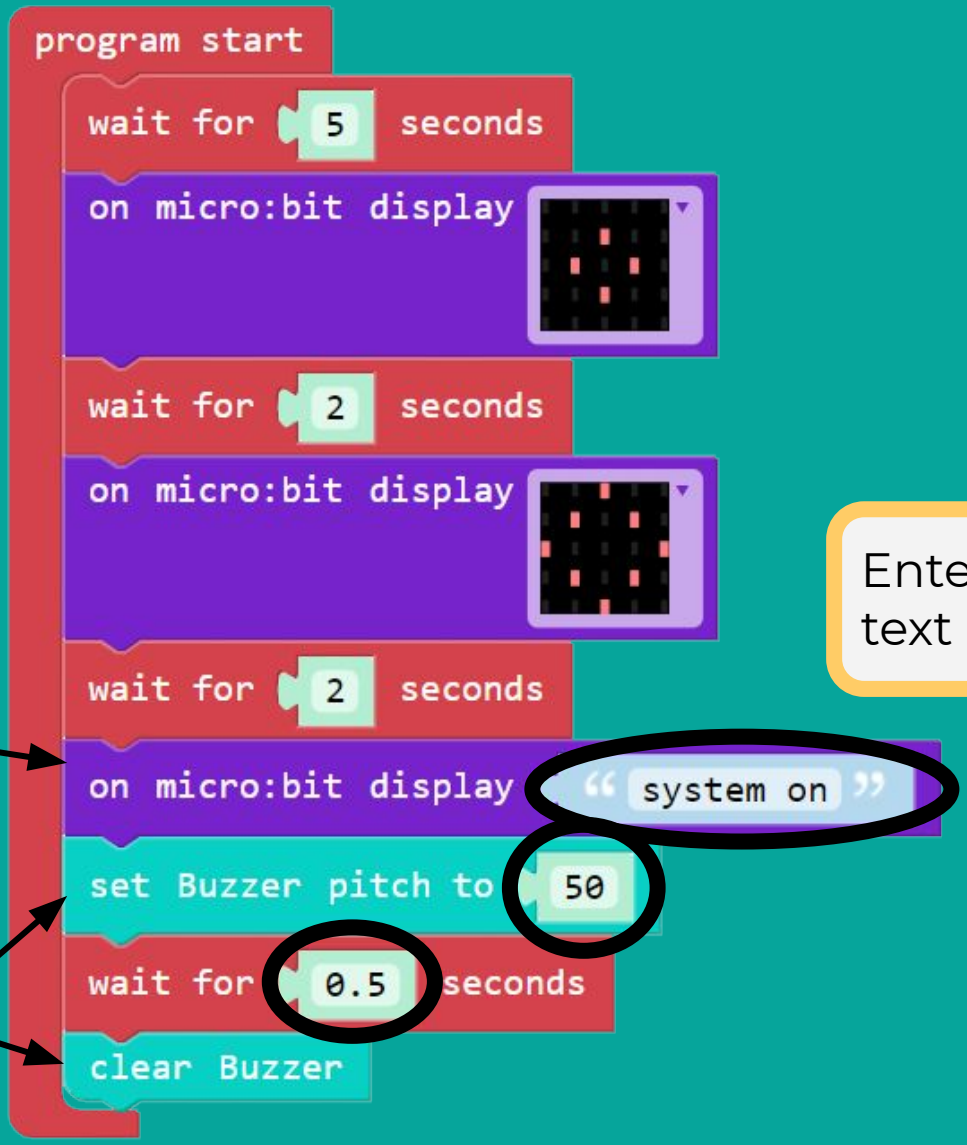
'Small diamond'

'diamond'

Right click to duplicate blocks!

Challenge

2



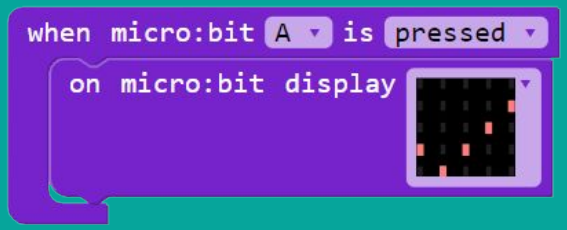
From ‘micro:bit’ ‘Actions’

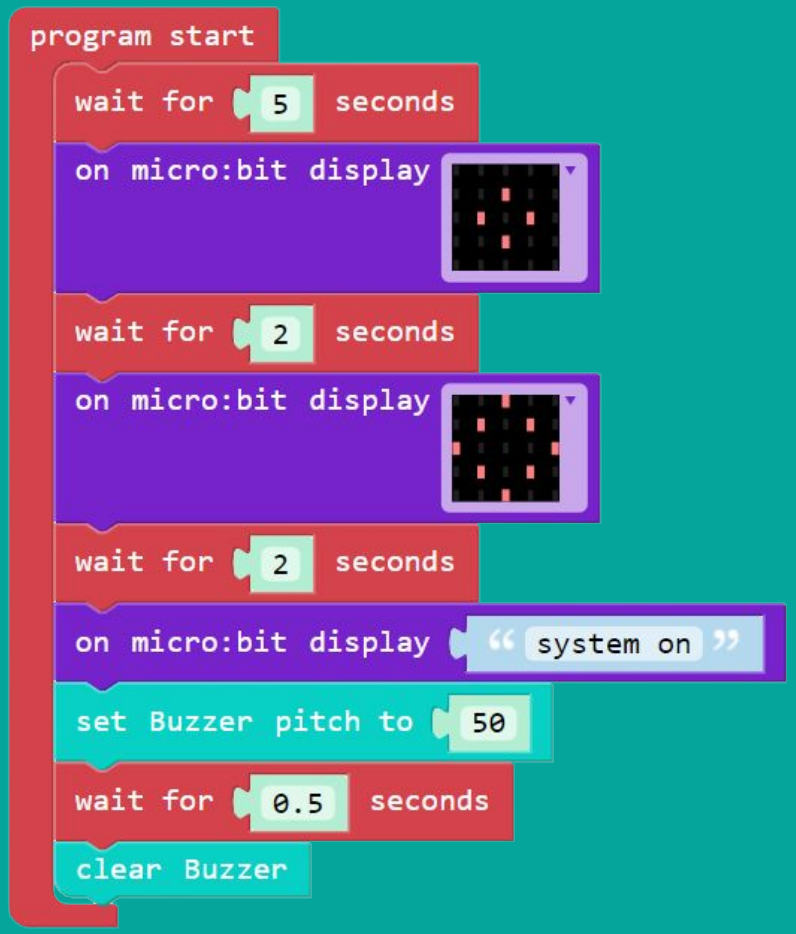
From ‘Buzzer’ ‘Actions’

Enter this text

Challenge: Test your program

Click ‘RUN’ to test!





Quick Reflection: Does your algorithm look the same as mine? Follow the flowchart on the next slide!

Follow the flowchart!

Completed Challenge

Did your algorithm look like mine?

YES

Great! Could it have been done another way?

NO

Did it work?

YES

Great! What did you do differently?

NO

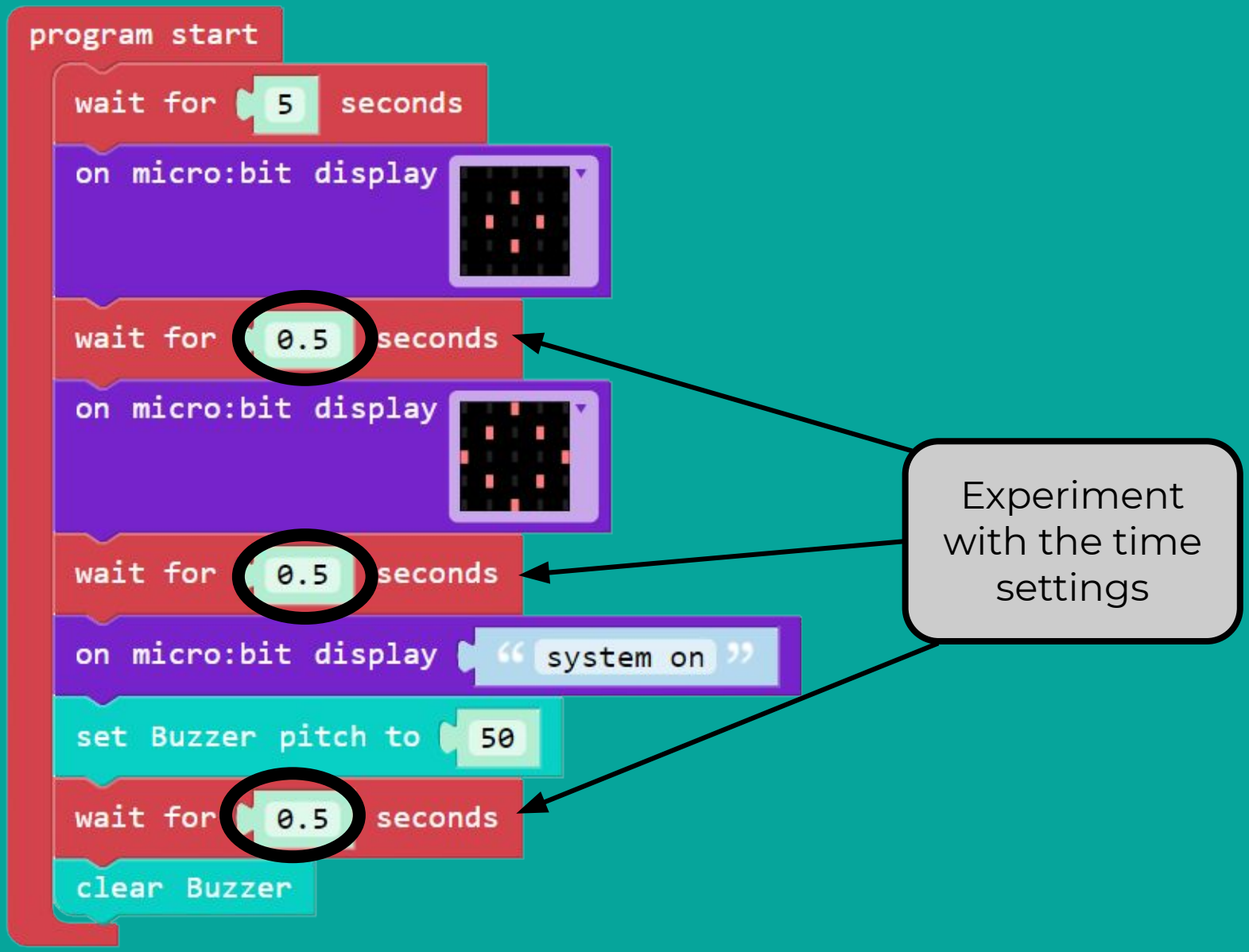
Look through and check what needs to be **debugged**.

Debug

The program is running too slow.

How can I debug it?

Debug


program start
wait for 5 seconds
on micro:bit display
wait for 0.5 seconds
on micro:bit display
wait for 0.5 seconds
on micro:bit display "system on"
set Buzzer pitch to 50
wait for 0.5 seconds
clear Buzzer
Experiment with the time settings

Quick Reflection:
What did you find out from experimenting with the time settings? What was the impact on the program?

Checks for Understanding

Q1

Which of the below describes the start-up sequence you coded?

a. Small diamond, large diamond, text, Buzzer.
b. Large diamond, small diamond, text, Buzzer.
c. Text, small diamond, large diamond, Buzzer.

Q2

Which is an example of an everyday start-up sequence?

a. Reading the introduction of a book.
b. Watching a movie trailer.
c. Turning on a car.

Checks for Understanding

A1

Which of the below describes the start-up sequence you coded?

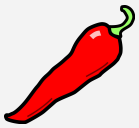
a. Small diamond, large diamond, text, Buzzer

A2

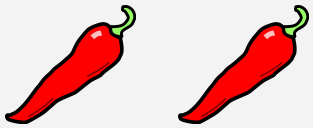
Which is an example of an everyday start-up sequence?

c. Turning on a car.

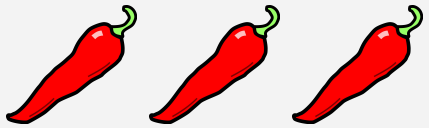
Extend: Chili Challenges



Experiment further with the ‘wait’ blocks and the ‘on micro:bit display (“word”)’ block.
Can you perfect the Cyber Scanner start-up sequence?



Experiment with other inputs, such as button ‘B’ on the micro:bit. Can you code a start-up sequence that is activated ‘when micro:bit (B) is pressed’?



Experiment with ‘Loops’.
Can you code a program that runs continuously?

Great work explorers!

Reflect

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Amazing work! Now I can turn on my Cyber Scanner and it displays a start-up sequence. This will help me start investigating the suspicious activity I noticed coming from the middle of Cyberspace.

But first, can you help me complete my Mission Journal and report back to Mission Control?

MISSION JOURNAL

I can describe what an algorithm is.

I can describe what an algorithm is designed to do.

I can code a start-up sequence on Sam's Cyber Scanner.

Cyber Mission complete!