

Programming with Micro:bit

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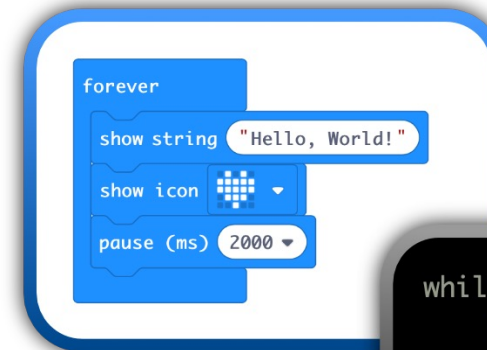
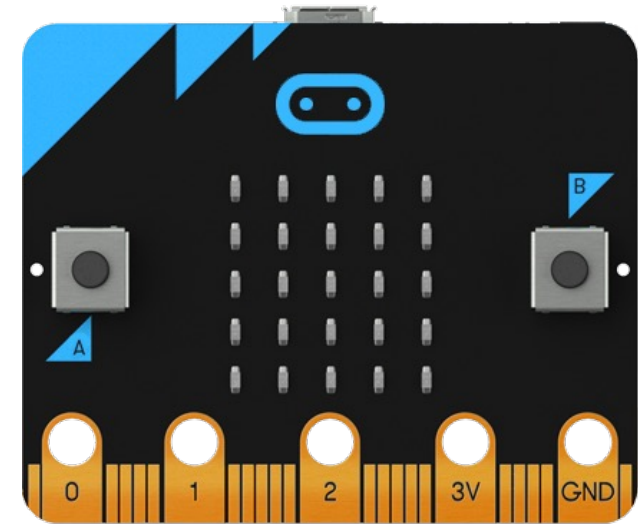
Presenting with iTEM group
members at TU-Liberec
Czech Republic



What is Micro:Bit

Micro:Bit is a tiny physical computing device for learning programming. It is designed by British Broadcasting Corporation (BBC). After its launch, the ownership of the micro:bit project is transferred to Micro:bit Education Foundation.

- The micro:Bit is a handheld, programmable micro-computer that can be used for all sorts of cool creations, from robots to musical instruments – the possibilities are endless.
- It can be coded from any web browser in Blocks, Javascript, Python, Scratch and more; no software required.



```
while True:  
    display.scroll('Hello, World!')  
    display.show(Image.HEART)  
    sleep(2000)
```

First steps: Set up your micro:bit

1. **Program:** You'll need either:

- a **computer** with a web browser and internet access, or
- a **phone or tablet** and [free micro:bit app](#) for MakeCode coding on Android or iOS (iPhone and iPad) mobile devices

2. **Connect:** Connect your micro:bit to your computer or mobile device.

- If you're using a **computer**, you need a **micro USB cable** to connect to your micro:bit to your computer's USB socket
- If you're using a **phone or tablet**, use **Bluetooth** to connect your micro:bit wirelessly

3. **Transfer from a computer:** There are two ways to transfer your program from a computer:

- **Drag and drop** is like copying a downloaded file from your computer to a USB memory stick. It works on any computer.
- **Direct flashing** sends your program from the code editor direct to your micro:bit. It works on any computer in two popular web browsers.

Micro:bit Designed as a Learning Tool for Students

MicroUSB

Connect to a computer and power source

LED matrix

25 LED grid for text and image displays

Buttons

Use buttons A and B as control inputs

Edge connector pins

Connect external components, sensors and motors

Bluetooth

Connect to external devices and other micro:bits

Compass

Determine the direction by detecting the earth's magnetic field

Battery Connector

Use external battery pack to make micro:bit portable

Accelerometer

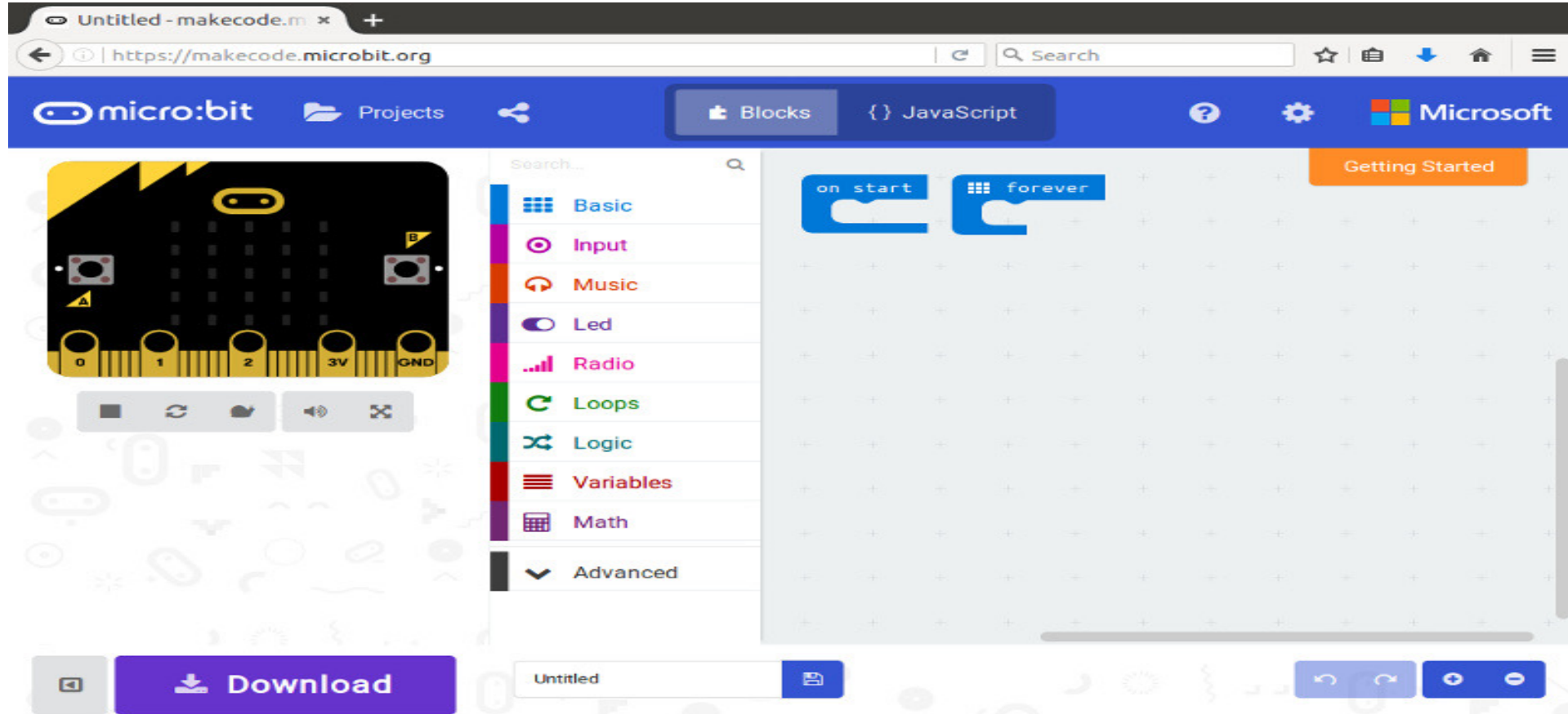
Shake, tilt and measure acceleration

Reset Button

Reset your program

Makecode Editor!!!

<https://makecode.microbit.org/>



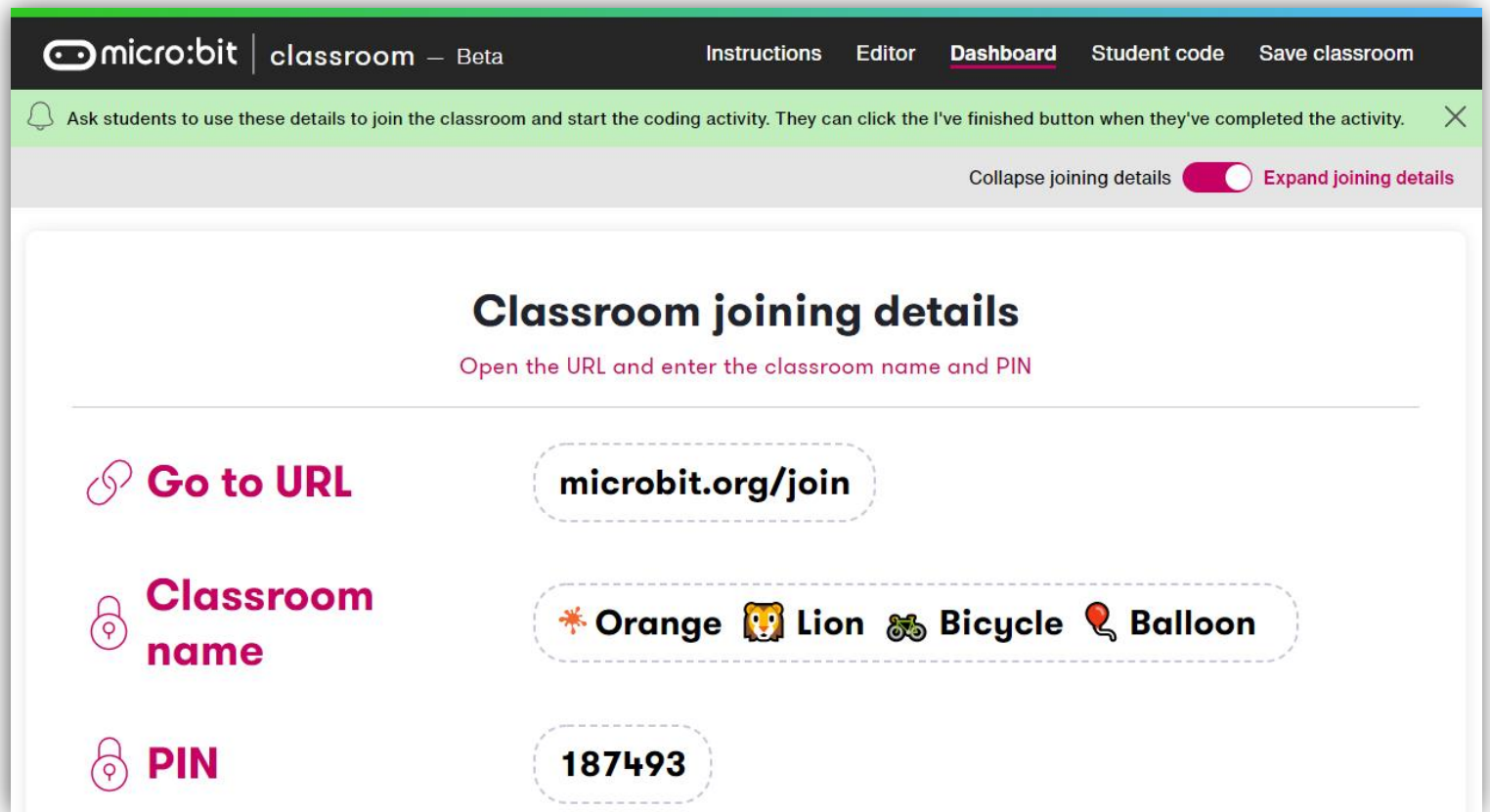
Micro:bit - Virtual Classroom

Go to: classroom.microbit.org

Micro:bit classroom (Virtual teaching)

Generate join details

1. Select “Dashboard” from the top navigation
2. Share join information with students, examples:
 - Project teacher’s screen to the students
 - Write the join details on the whiteboard
3. Have students to go to:
microbit.org/join



The screenshot shows the Micro:bit classroom dashboard. At the top, there's a navigation bar with 'micro:bit | classroom - Beta' and links for 'Instructions', 'Editor', 'Dashboard' (which is highlighted), 'Student code', and 'Save classroom'. Below the navigation bar, there's a green notification bar that says 'Ask students to use these details to join the classroom and start the coding activity. They can click the I've finished button when they've completed the activity.' with a close button (X). Below the notification bar, there's a toggle switch for 'Collapse joining details' (which is collapsed) and 'Expand joining details' (which is expanded). The main content area is titled 'Classroom joining details' and includes the instruction 'Open the URL and enter the classroom name and PIN'. There are three rows of join details: 1. 'Go to URL' with a link icon and the URL 'microbit.org/join'. 2. 'Classroom name' with a lock icon and a row of four options: 'Orange' (with a star icon), 'Lion' (with a lion emoji), 'Bicycle' (with a bicycle emoji), and 'Balloon' (with a balloon emoji). 3. 'PIN' with a lock icon and the PIN '187493'.

micro:bit | classroom – Beta








Instructions Editor **Dashboard** Student code Save classroom

Ask students to use these details to join the classroom and start the coding activity. They can click the I've finished button when they've completed the activity. X

Collapse joining details Expand joining details

Classroom joining details

Open the URL and enter the classroom name and PIN

 Go to URL	microbit.org/join
 Classroom name	 Orange  Lion  Bicycle  Balloon
 PIN	187493

Students join virtual classroom

Join classroom

To join the classroom please enter the classroom name and PIN below

Classroom name

Colour: Please select

Animal: Please select

Transport: Please select

Object: Please select

PIN

Number

Join classroom

To join the classroom please enter the classroom name and PIN below

Classroom name

Colour: Orange

Animal: Lion

Transport: Bicycle

Object: Balloon

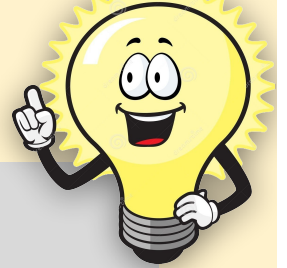
PIN

Number: 187493

Continue

- From microbit.org/join, each student enters:
 - Colour,
 - Animal,
 - Transport,
 - Object, and
 - PIN
- Then each student selects “Continue”
- Teacher must be in the session for students to join

Challenge:



**1st micro:bit
challenge**

on start

show string "Hello!"

**2nd micro:bit
challenge**

on button A pressed

show icon



**3rd micro:bit
challenge**

on shake

show number

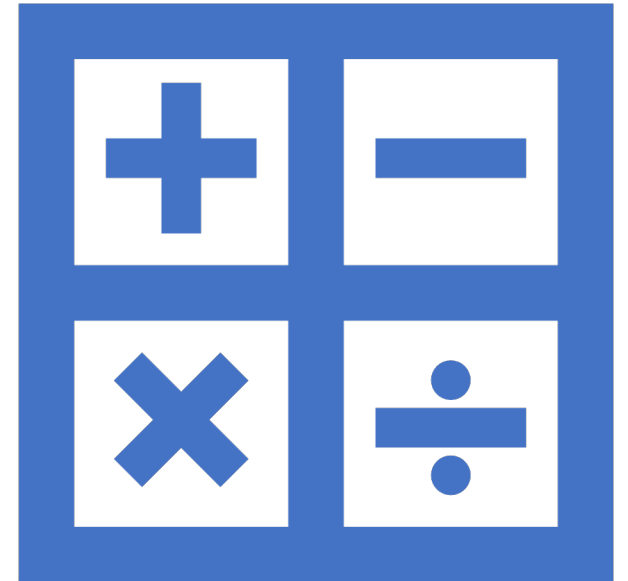
pick random 0 to 5

Activities with Micro:bit

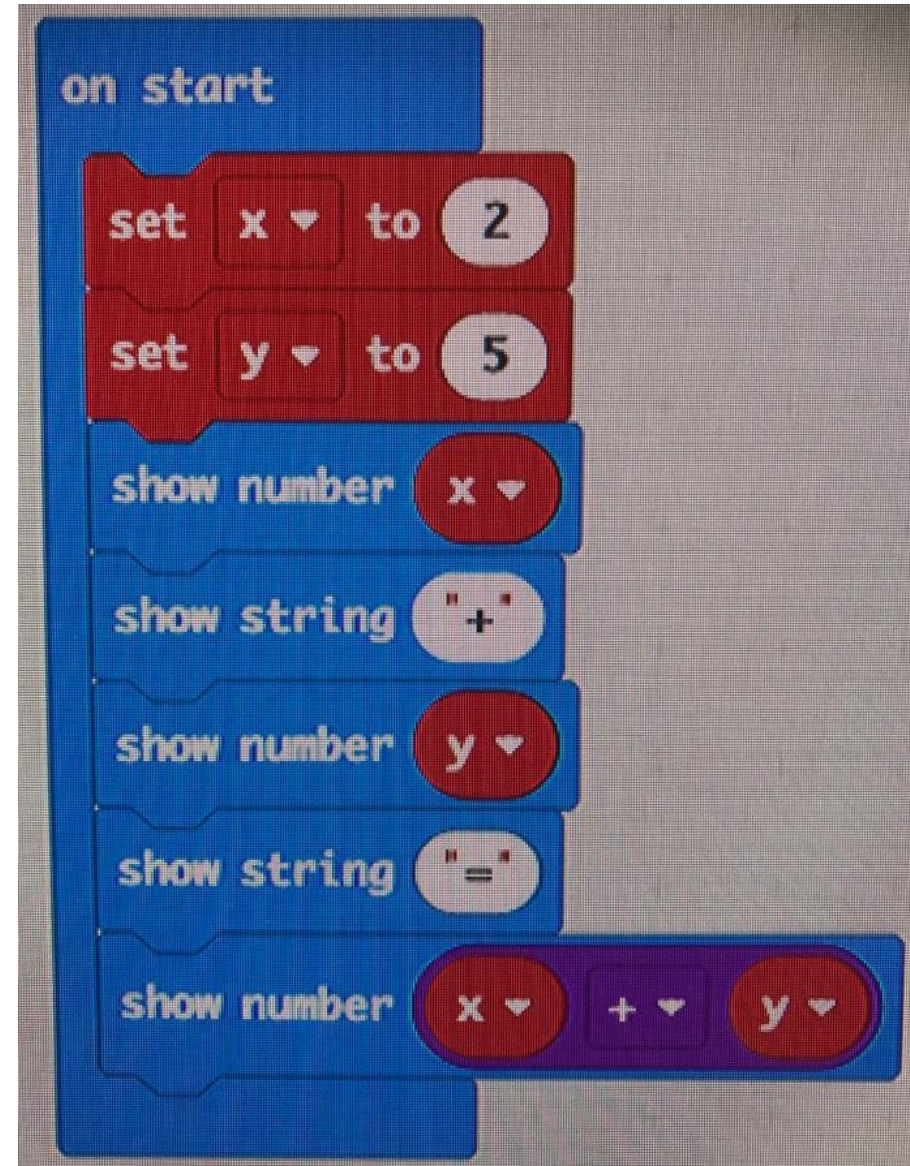
Using Mathematical Operations with Micro:bit

Activity-1:

Use basic mathematical operations such as **addition, subtraction, multiplication, and quotient division** with two numbers.



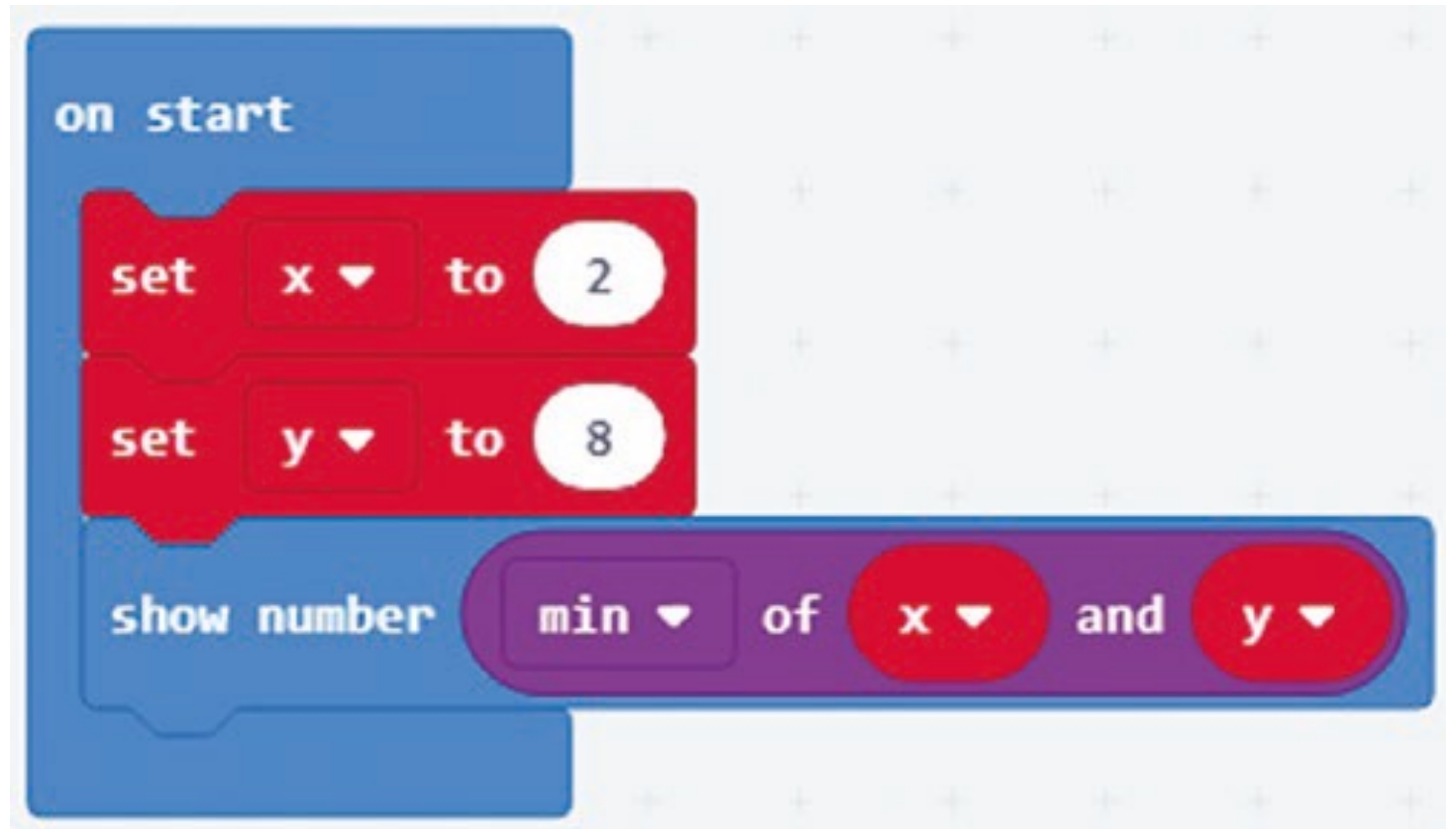
How to
add two
numbers?



Using Mathematical operations (functions) with Micro:bit

Activity-2:

- Finding Smaller and Larger Values of Two Numbers



Using Mathematical operations (function) with Micro:bit

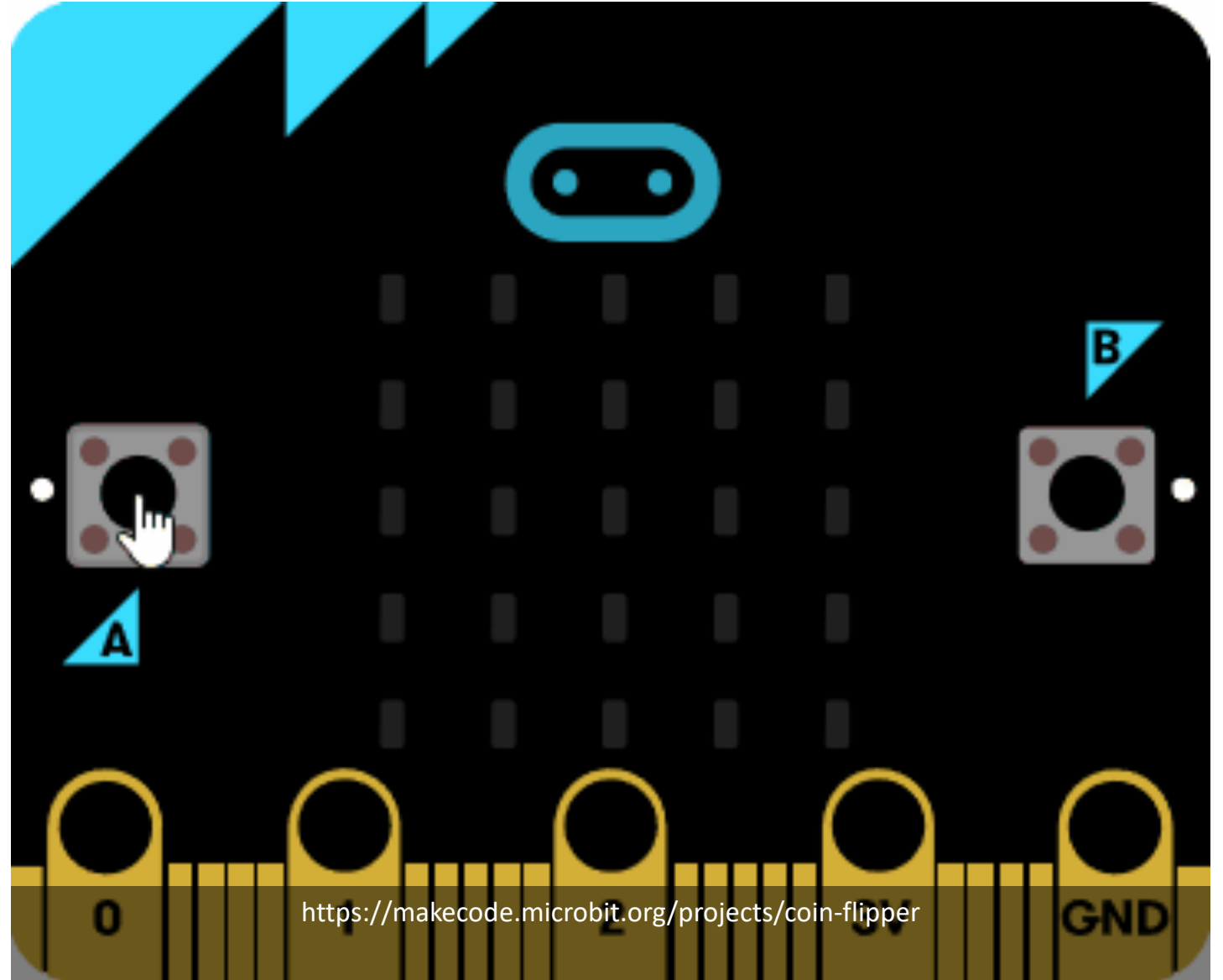
Activity-3:

- Finding Square Root of a Number Problem

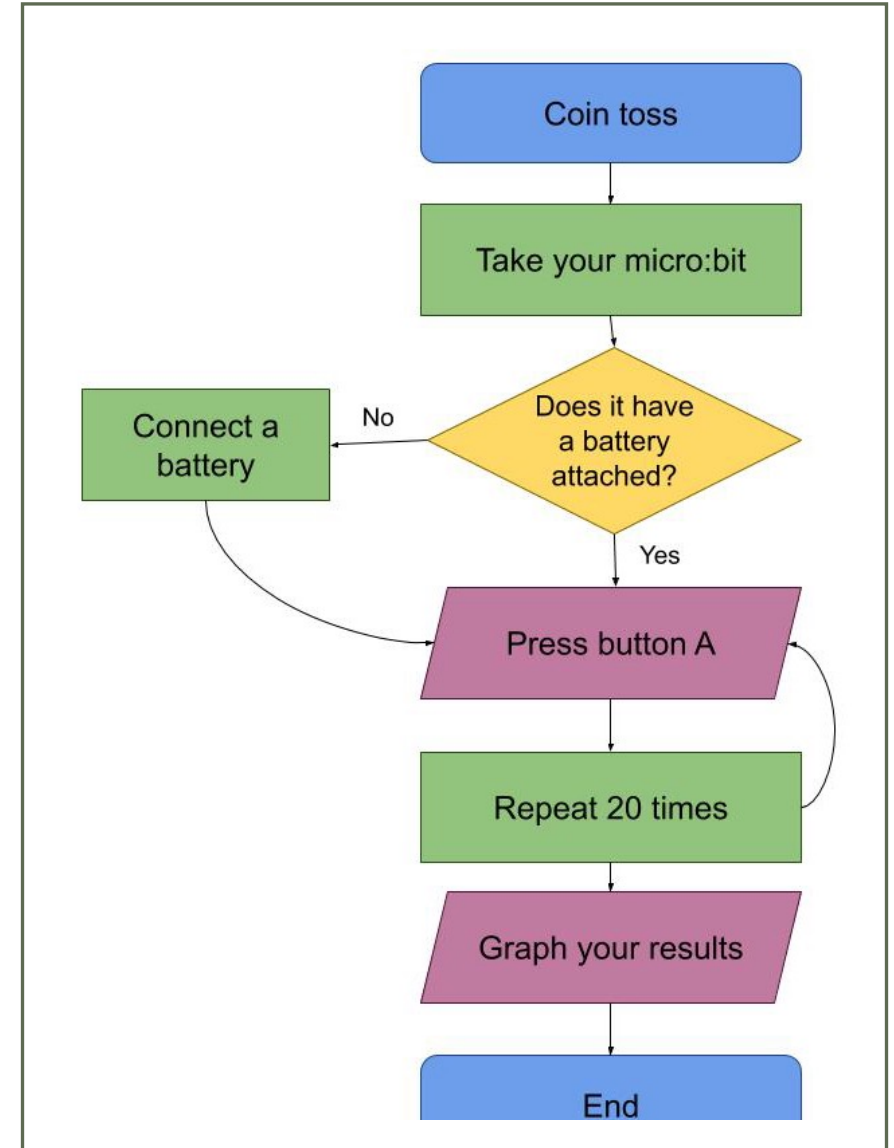
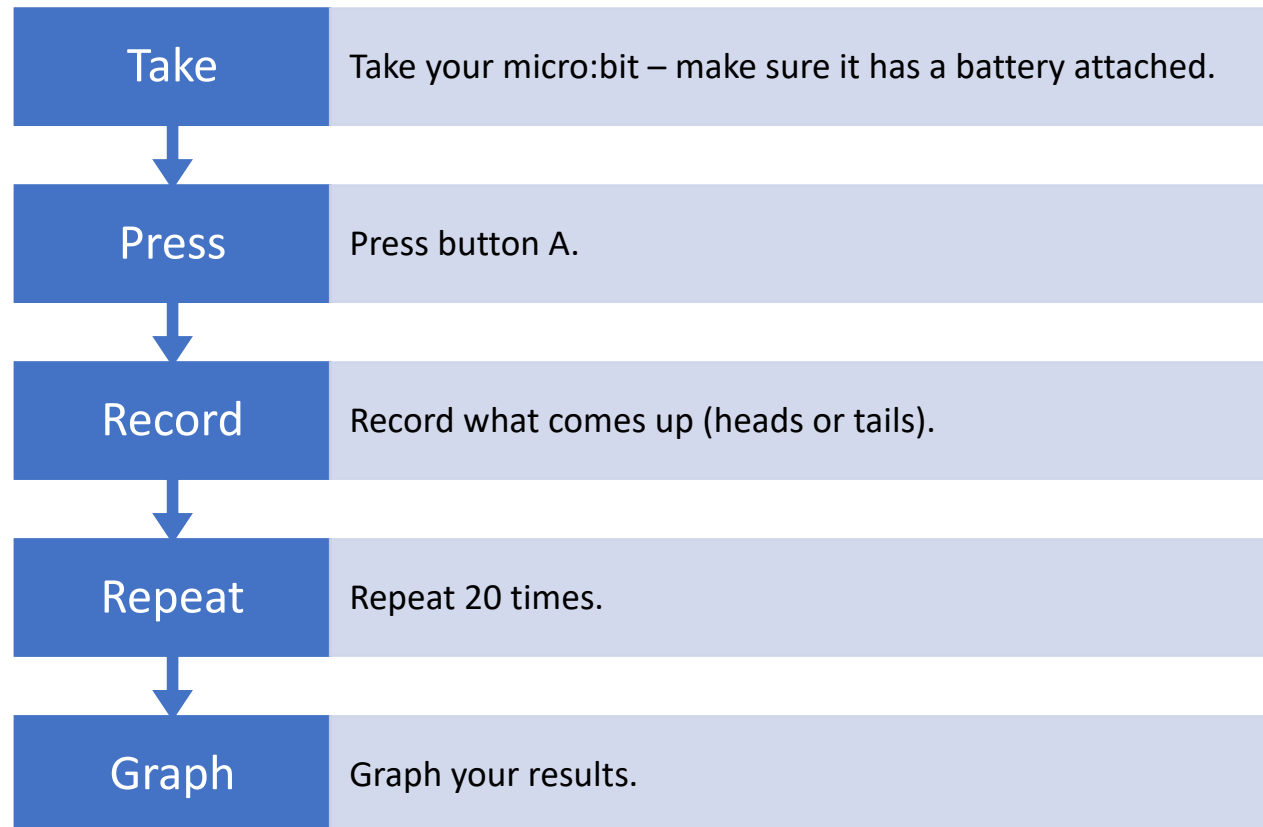


Coin toss

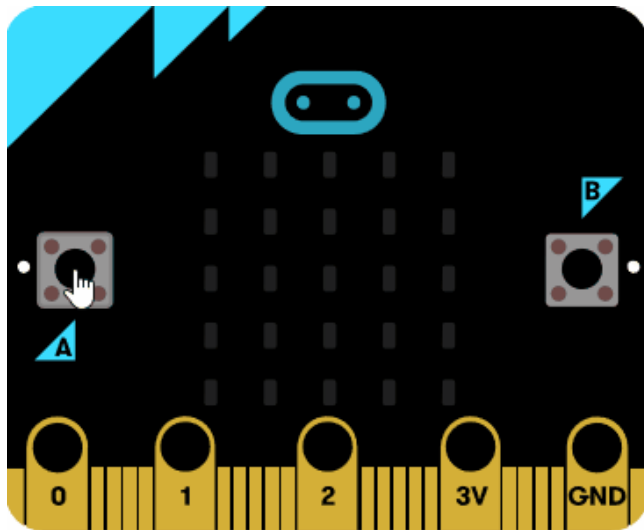
Let's create a coin flipping program to simulate a real coin toss. We'll use icon images to represent a heads or tails result.



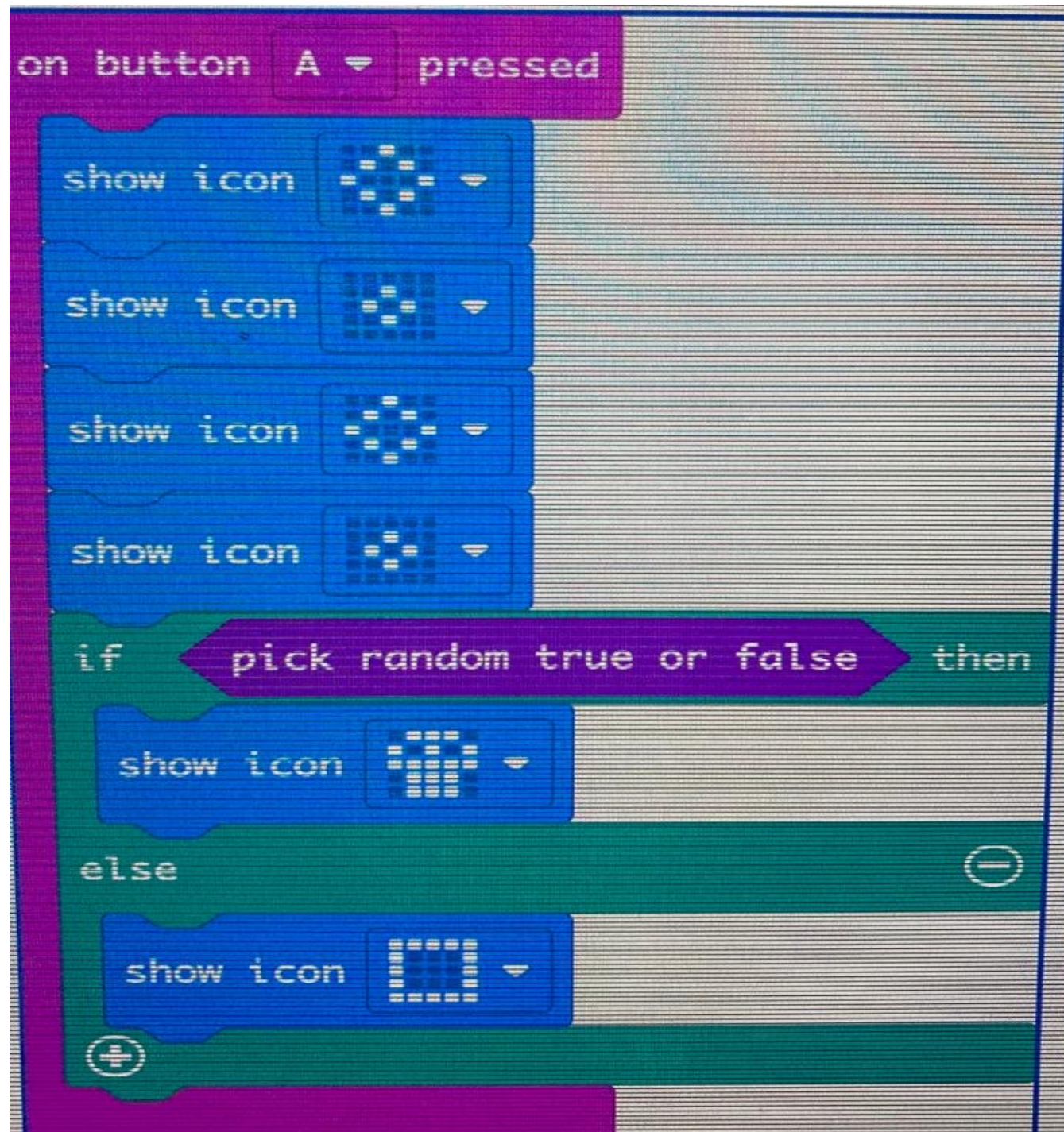
Coin toss



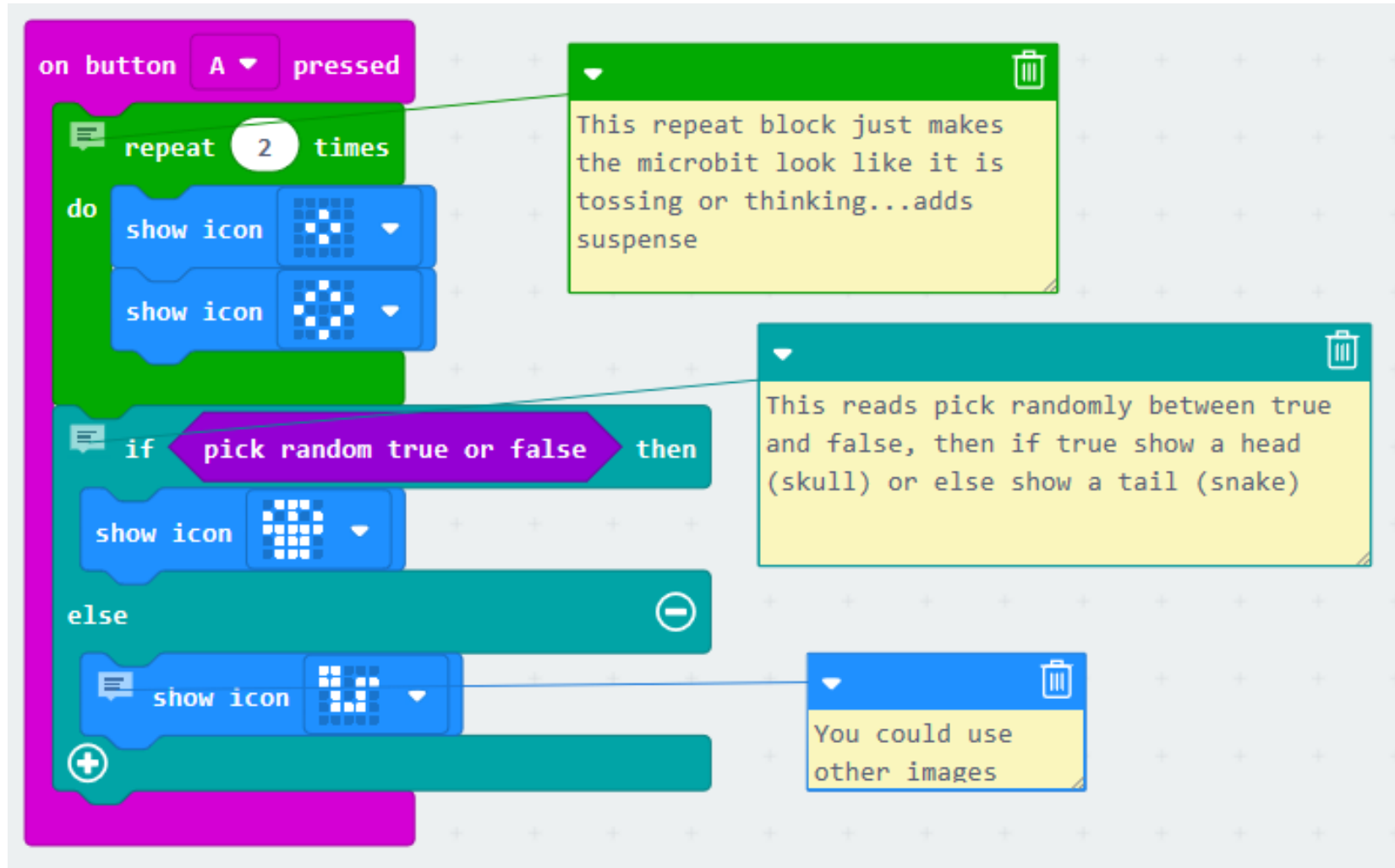
Coin toss



<https://makecode.microbit.org/projects/coin-flipper>



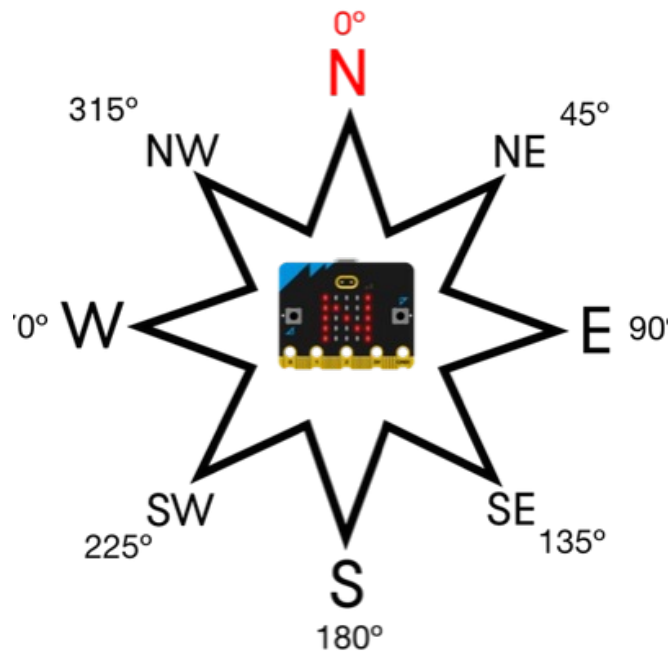
Another perspective





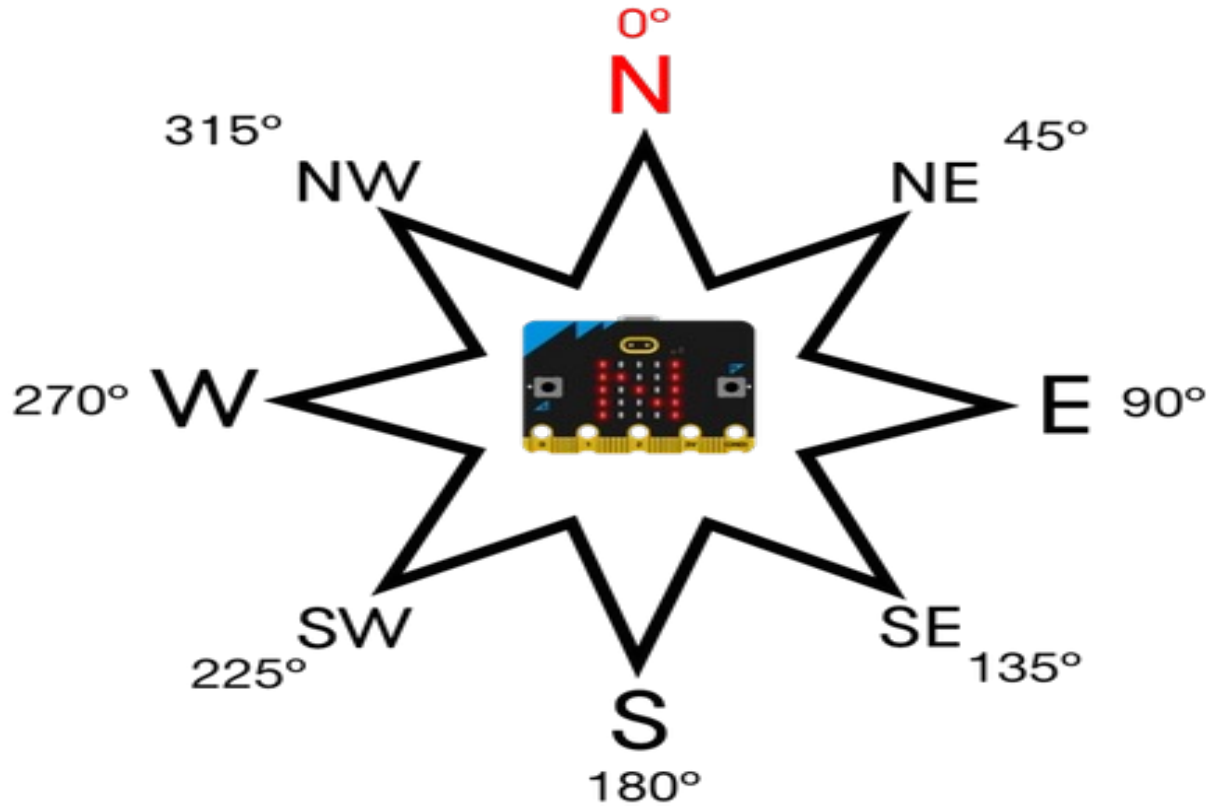
Making Compass:

Compass displays the direction the micro:bit is pointing with compass



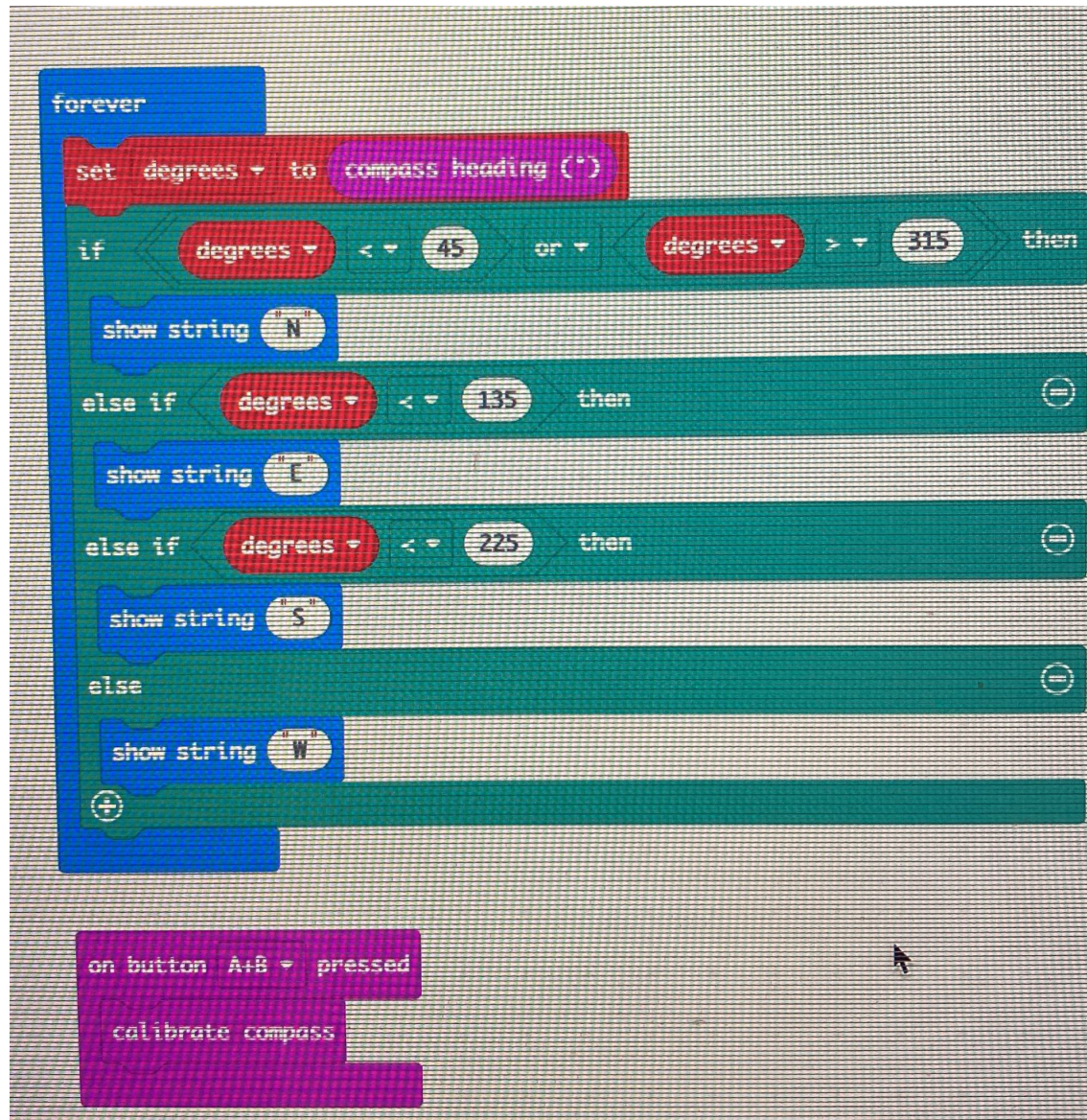
The project uses the micro:bit to make a compass. The micro:bit has a [compass](#) that identifies magnetic north. The code uses input from that and the accelerometer to determine the angle of the micro:bit compared to the direction of magnetic north. The goal is to keep track of the angle of the micro:bit and give the user their current direction based on that angle.

Making Compass:

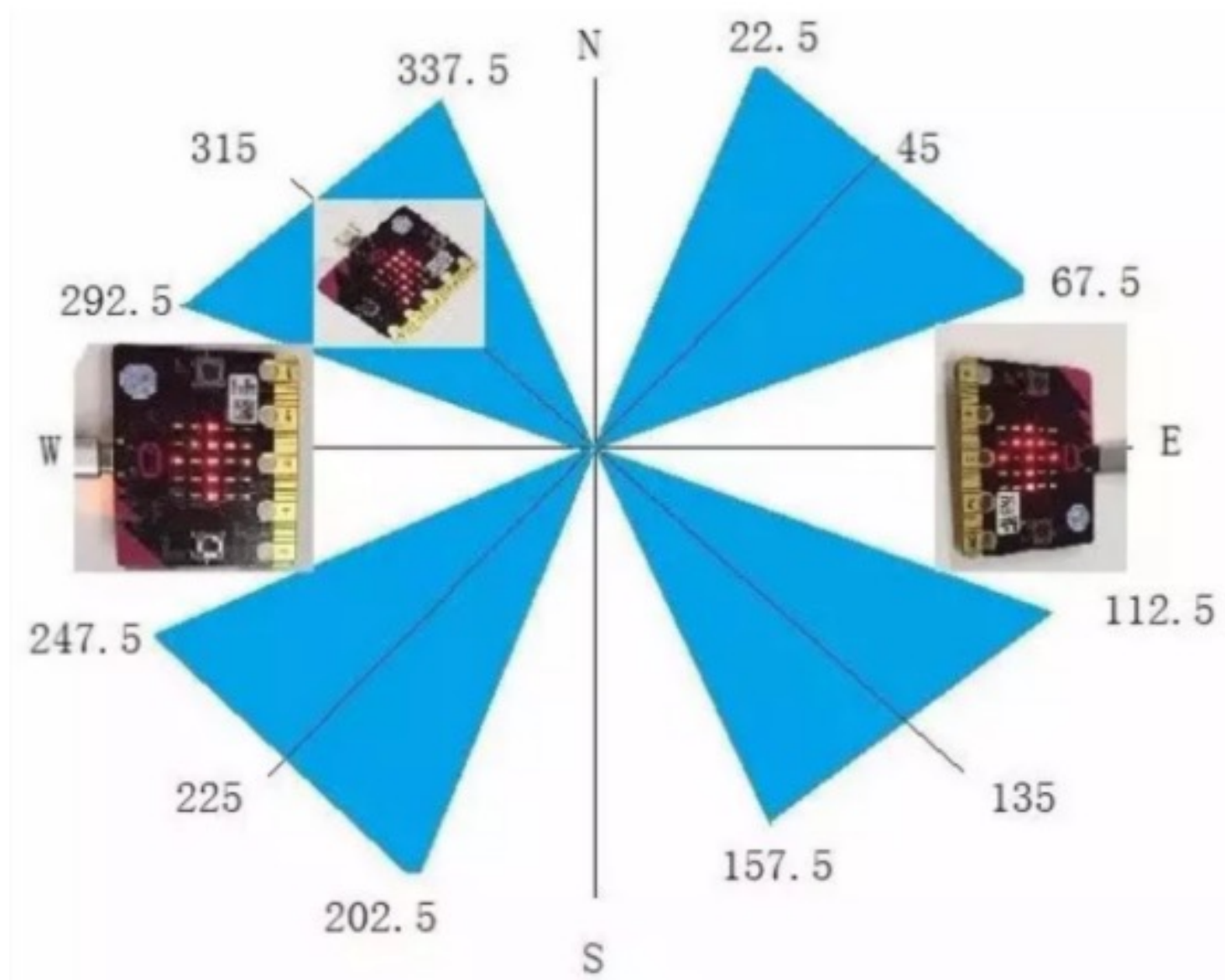


<https://makecode.microbit.org/projects/compass>

https://www.youtube.com/watch?v=Wu4gi5vYv94&t=2s&ab_channel=NordicSemiconductorStudentProjects



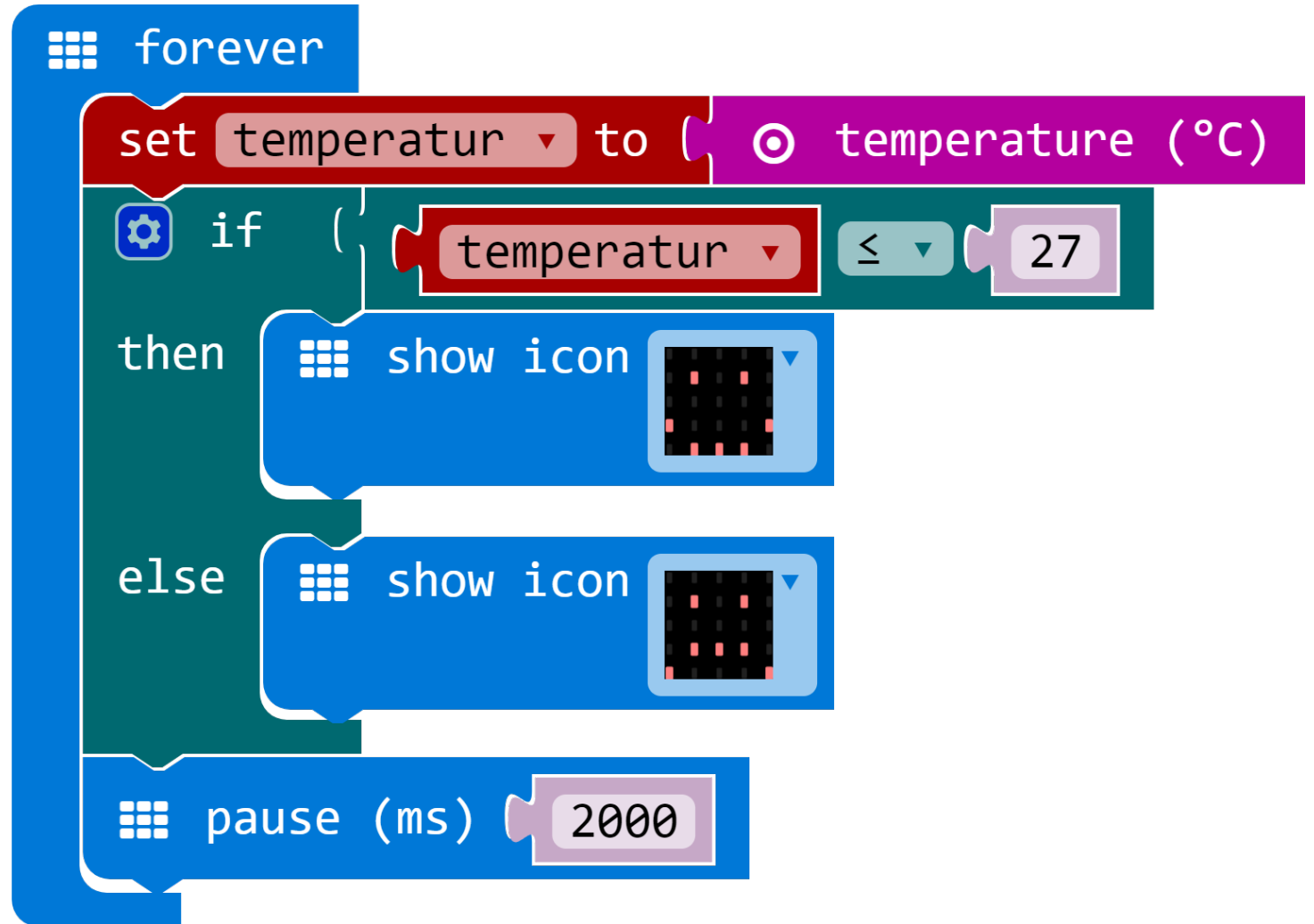
Next challenge:



Warm or cold

Variables and conditional actions

This example demonstrates how the micro:bit can "sound the alarm" if the temperature exceeds 27 degrees - it has become too hot. The "alarm" here consists of an angry smiley.



Making of turtle

- **Turtle Square**

<https://makecode.microbit.org/projects/turtle-square>

Work with students

Micro:bit activity in the class-room
Score-recorder

Micro:bit activity in the class-room: Activity-4: Score-recorder

This Micro:bit activity guides the students to create a program with three variables that will keep score for their Rock Paper Scissors game.

Tell the students that they will be creating a program that will act as a scorekeeper for their next Rock Paper Scissors game. They will need to create variables for the parts of scorekeeping that change over the course of a gaming session. What are those variables?

- The number of times the first player wins
- The number of times the second player wins
- the number of times the players tie

Creating and naming variables: Lead the students to create meaningful names for their variables.

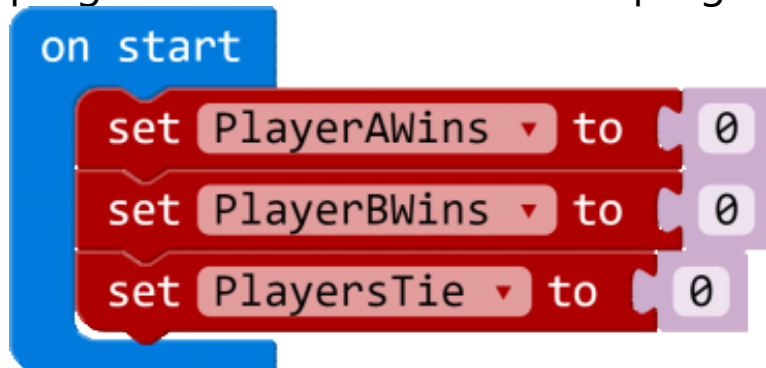
- What would be a unique and clear name for the variable that will keep track of the number of times Player A wins?
- Student suggestions may be: 'PAW', 'PlayerA', 'AButtonPress', 'AButtonCount', 'PlayerAWins'...
- Discuss why (or why not) different suggestions make clear what value the variable will hold. *In general, variable names should clearly describe what type of information they hold.*

In MakeCode, from the Variables menu, make and name these three variables: PlayerAWins, PlayerBWins, PlayersTie

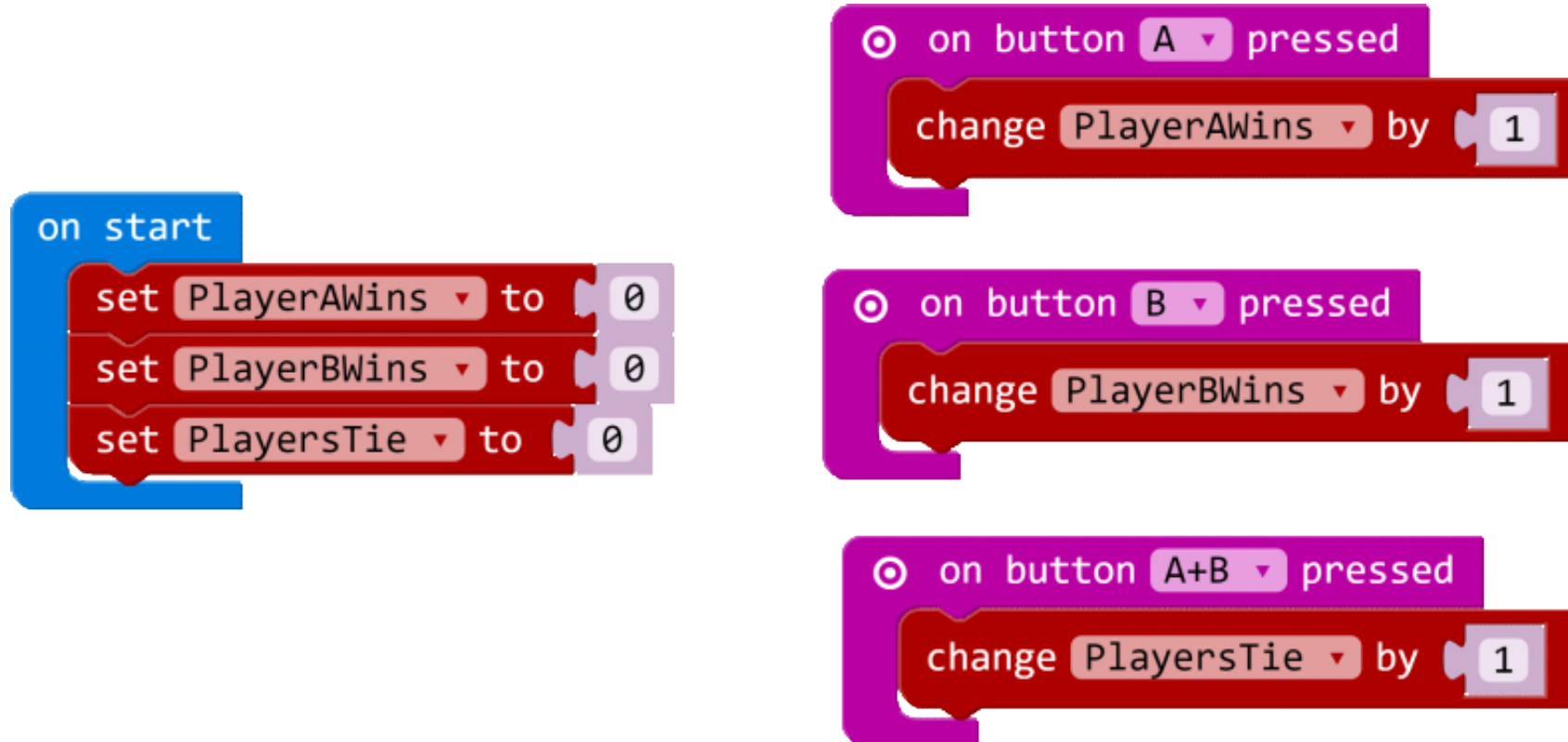
Micro:bit activity in the class-room: Score-recorder

Initializing the variable value

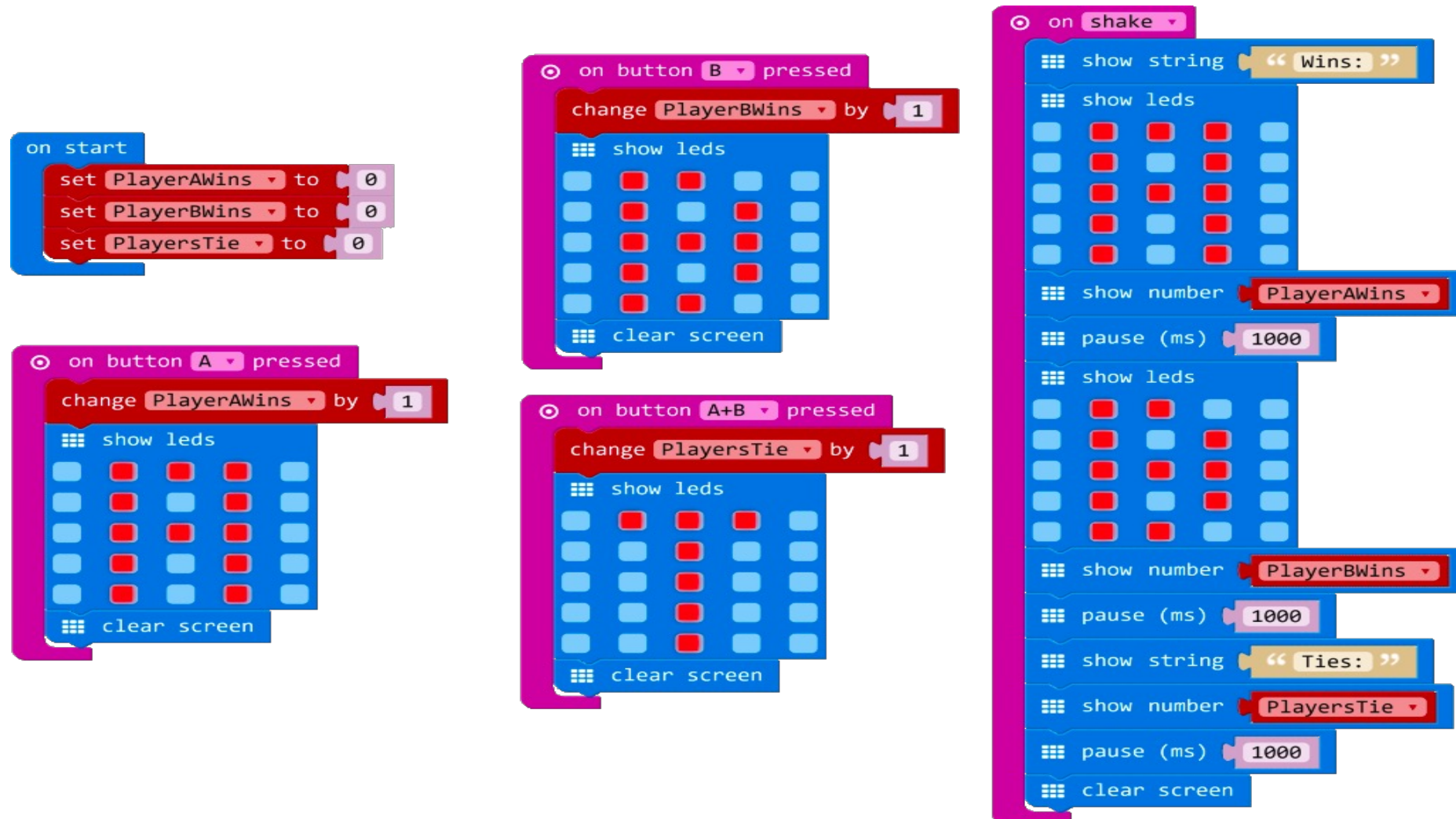
It is important to give your variables an initial value. The initial value is the value the variable will hold each time the program starts. For our counter program, we will give each variable the value 0 (zero) at the start of the program.



Micro:bit activity in the class-room: Scorekeeper



Micro:bit activity in the class-room: Score-recorder



Reference:

- <https://makecode.microbit.org/courses/csintro/variables/activity>