

Logic, Conditionals, and IF/ELSE statements

Textbook

Logic, Conditionals, and IF/ELSE Statements



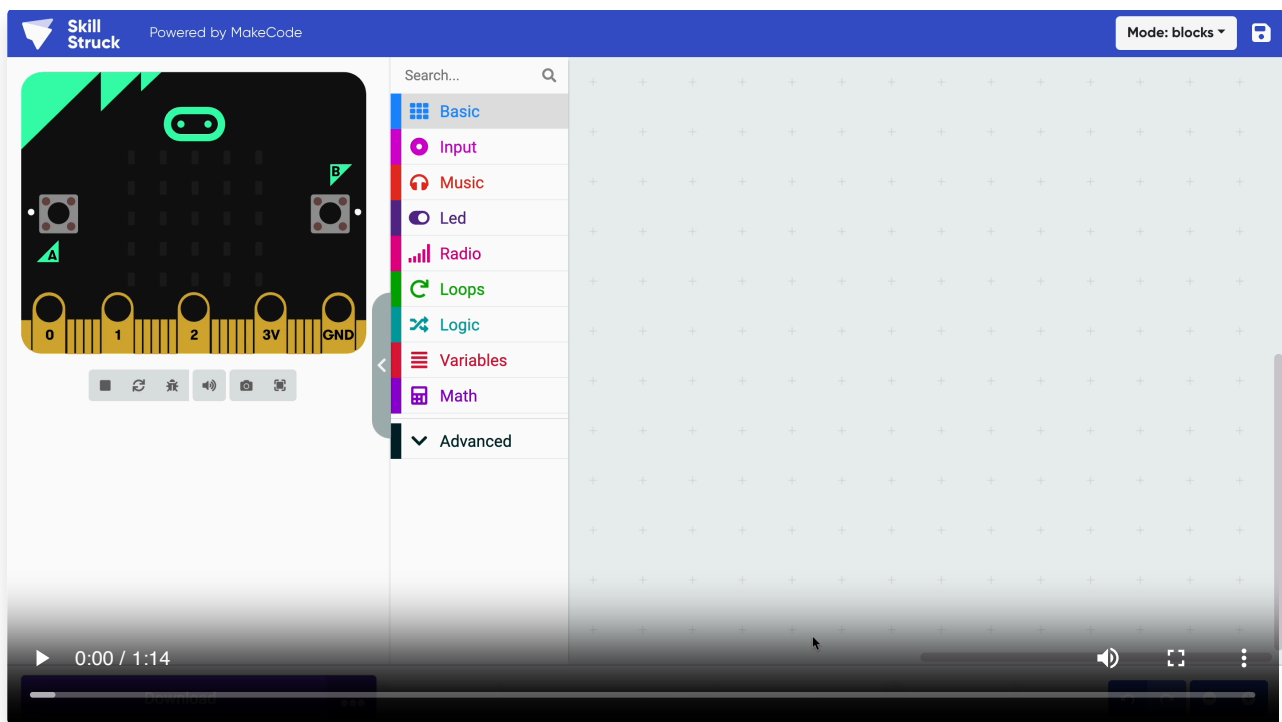
Have you ever thought, 'IF I finish my homework, THEN I get to play video games'? That's a great example of how conditionals work in programming. IF statements help computers decide what to do based on certain conditions. In this lesson, we'll learn how to use IF/ELSE statements to control what happens when certain conditions are met. Let's dive into how you can make your micro:bit respond based on your actions!

IF Statements

A [conditional](#) is something that will happen only IF something else happens first. For example, IF you press a button, THEN something will happen. That's how conditionals work, one action depends on another.

Conditionals are very useful in programming. Sometimes, you want something to happen only IF something else happens first. Conditionals help you time your code. We sometimes refer to these conditionals as IF statements.

IF statements are instructions that tell a computer to do something *if* a certain thing happens. An IF statement starts with the word "IF". For example, *if* Button A is pressed, then a heart will show.

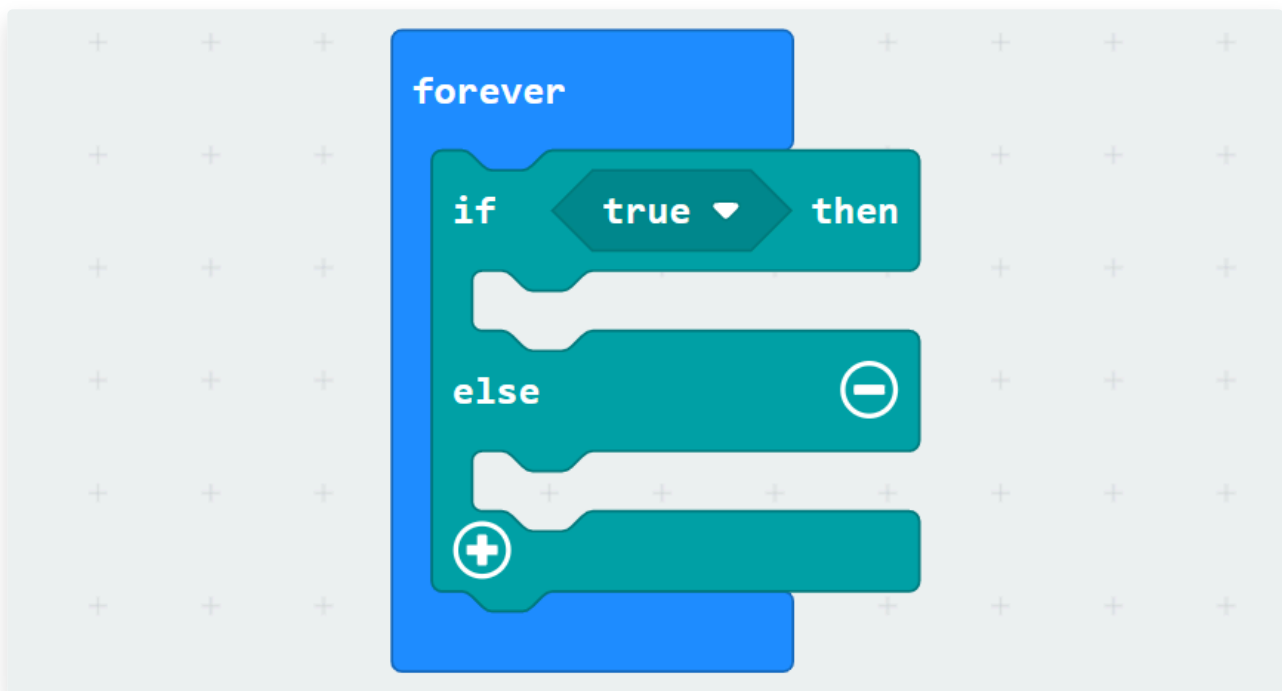


Code It! – IF Statements

Practice coding the example above.

1. Drag a **forever** block into the code editor.
2. Drag the **If true then** logic block and connect it in the **forever** block.
3. Drag the **if button A is pressed** input block and connect it in the space that says "true" on the **If true then** block. This will replace the word "true."
4. Drag the **show icon** block and connect it in the **If button A is pressed then** block.
5. Select the heart icon.

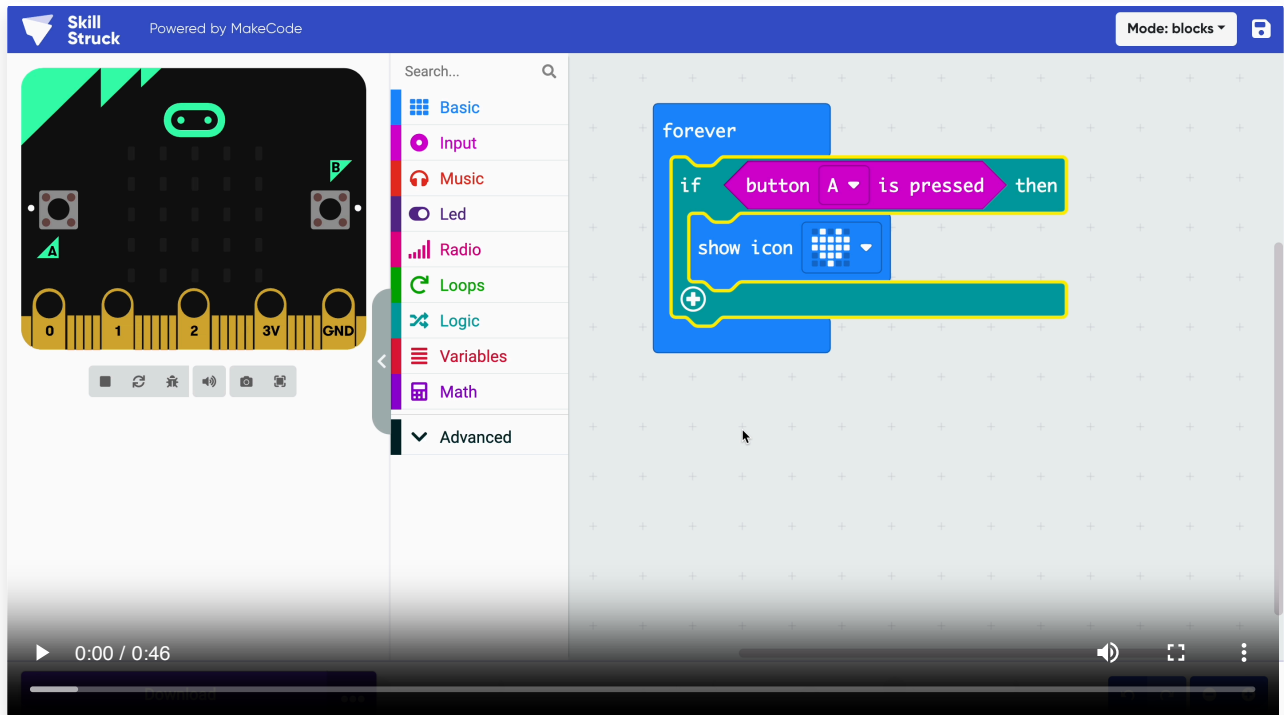
This will tell the micro:bit to show a heart icon only IF Button A is pressed.



ELSE

You can also add an ELSE clause to an IF statement to tell the computer what to do if the IF statement is NOT true. For example, IF you practice playing soccer, then you will get better at soccer, or ELSE you will not get better if you do not practice. This might look like the following using our previous example:

IF button A is pressed, then a heart icon will appear, or ELSE a truck icon will show.



Code It! – Else Clauses

Add the following to the algorithm you just built:

1. Click the + sign on the bottom of the **If button A is pressed then** block. This will add a section that says "else."
2. Drag the **show icon** block and connect it in the **else** section of the **If button A is pressed then** block.
3. Select the truck icon.

This tells our computer to show a heart only if Button A is pressed, or ELSE a truck icon will show.

Multiple ELSE Clauses

You can check for as many ELSE statements as you want. Here is an example of a program with multiple ELSE statements that checks to see if someone is old enough to drive.

1. **IF age >= 16, you are old enough to drive.**
2. **ELSE if age = 15, you are old enough to have a driver's permit.**
3. **ELSE you are too young to drive.**

See how this program is designed to check multiple ELSE clauses? On the micro:bit this might look like:

1. Click the + sign on the bottom of the **else** section of the block. This will add another **else** section.
2. Drag the **if button A is pressed** input block and connect it in the now empty space of the first

`else` section of the logic block.

3. Click the dropdown arrow and select B.
4. Then, drag the `clear screen` block and connect it in the second `else` section.

This tells our computer to show a heart if Button A is pressed, or else a truck icon will show if Button B is pressed, or else the screen will be clear.

Decomposing a Problem: Breaking It Down

When we have a big problem to solve, it can seem really hard. But computer scientists know a secret: **decompose the problem!**

Decomposing a problem means breaking a big, complex problem into smaller, easier-to-manage parts. It's like preparing for school by getting your backpack ready. Instead of just thinking "pack my backpack," you break it down into smaller steps.

How to Decompose a Problem:

1. **Understand the Goal:** What exactly are you trying to achieve?
2. **Ask Questions:** What do you need to know? What pieces do you have?
3. **Break It Apart:** Find natural places to split the big problem into smaller, simpler tasks.
4. **Solve Each Small Part:** Focus on one small part at a time.
5. **Put It Back Together:** Once all the small parts are solved, combine them to solve the original big problem.

Example with Conditionals: Imagine your goal is to pack your backpack for school each morning:

Big Problem: Get my backpack ready for school.

Decomposing the problem:

- **Small Part 1:** Do I have my homework? (IF yes, put it in. ELSE, remember to do it tonight!)
- **Small Part 2:** Do I have my lunch? (IF yes, put it in. ELSE, pack it.)
- **Small Part 3:** Do I have my water bottle? (IF yes, put it in. ELSE, fill it up and put it in.)
- **Small Part 4:** Do I have all the right books? (IF yes, put them in. ELSE, check my schedule.)

By breaking down "packing my backpack" into these smaller, step-by-step decisions, the big task becomes much easier. This makes coding (and solving any problem!) much easier!

Adopted from microbit.org platform

Critical Thinking Questions

1. Can you think of an example in a game or a school project where one thing only happens if something else happens first?
2. How could IF/ELSE statements be useful in a game or an app you like to use?
3. What would happen if a program only used IF statements and didn't have any ELSE clauses? How would that affect the outcome?

Questions (5)

1. What does an IF statement do in coding?

MULTIPLE CHOICE

Choose the correct answer:

- A. It plays music automatically
- B. It repeats a task over and over
- C. It makes a decision based on something happening
- D. It stops the program

2. Which of these is an example of a conditional in real life?

MULTIPLE CHOICE

Choose the correct answer:

- A. You eat lunch at the same time every day
- B. If it rains, you bring an umbrella
- C. You go to school every weekday
- D. You always wear red shoes

3. What does the ELSE part of a statement do?

MULTIPLE CHOICE

Choose the correct answer:

- A. It ends the code
- B. It repeats the first part
- C. It tells the computer what to do if the IF is not true
- D. It starts a new program

4. If a micro:bit is told to show a heart when Button A is pressed, but Button A is NOT pressed, what happens?

MULTIPLE CHOICE

Choose the correct answer:

- A. The micro:bit will still show the heart
- B. Nothing will happen unless there is an ELSE
- C. The micro:bit breaks
- D. It will show two icons

5. If a micro:bit is told to show a heart when Button A is pressed, but Button A is NOT pressed, what happens?

MULTIPLE CHOICE


Choose the correct answer:

- A. The micro:bit will still show the heart
- B. Nothing will happen unless there is an ELSE
- C. The micro:bit breaks
- D. It will show two icons

Games (2)

1. Logic, Conditionals, and IF/ELSE statements Typing

Full Screen Audio Instructions Restart Pause



A conditional is somethin

2. Logic, Conditionals, and IF/ELSE statements

Put the following commands in order to tell the micro:bit to show a heart icon only IF Button A is pressed.

Full Screen

Audio

Instructions


Answer Key

Pause


Clear All

Check Matches


Attempts: 0




Drag the if button A is pressed input block and connect it in the space that says "true" on the If true then block.




Drag the If true then logic block and connect it in the forever block.





Drag a forever block into the code editor.

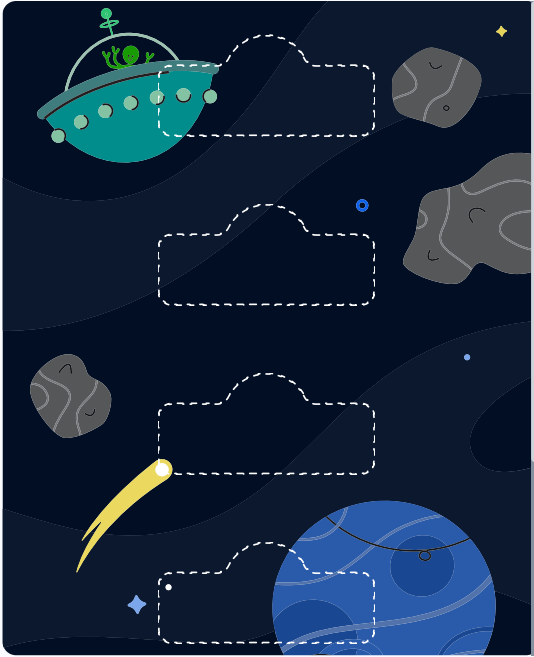


Select the heart icon.



Drag the show icon block and connect it in the If button A is pressed then block.





Robotics Challenges (8)

1. Low or High

Challenge

Textbook

Low or High

Code the micro:bit to play a low note when Button A is pressed, or else the micro:bit will play a high note.

Requirements

- Code a forever loop
- Code a low tone to play IF button A is pressed
- If button A is not pressed, code a high tone to play

Answer Key

Submit

Step 1

Begin with the **forever** block.

Low or High Step 1 of 6

1

Next

Toolbox

Search...

Basic

Input

Music

Led

Radio

Loops

Logic

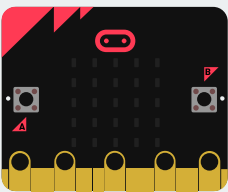
Variables

Math

Extensions

Advanced

forever



2. Press to Play

Challenge

Textbook

Press to Play

Code the micro:bit to do the following:

If Button B is pressed then the robot will show a music note icon and play a fun melody, or else nothing happens.

Requirements

- Code a forever loop
- Create a logic statement that begins with 'IF button B is pressed'
- Show a music note icon
- Play a melody
- Clear the screen if Button B is not pressed

Step 1

Begin with the **forever** block.

Press to Play Step 1 of 7

1

Next

Toolbox

Search...

Basic

Input

Music

Led

Radio

Loops

Logic

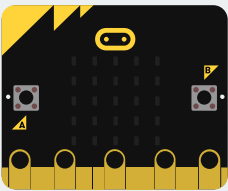
Variables

Math

Extensions

Advanced

forever



3. Funky Music

Challenge

Textbook

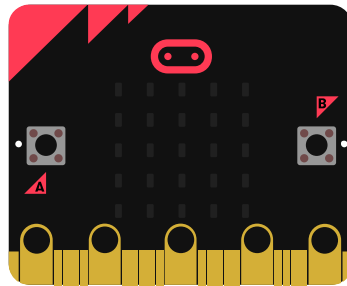
Funky Music

Code the micro:bit to do the following:

If Button B is pressed then the micro:bit will show an icon of your creation and play your own funky melody, or else nothing happens.

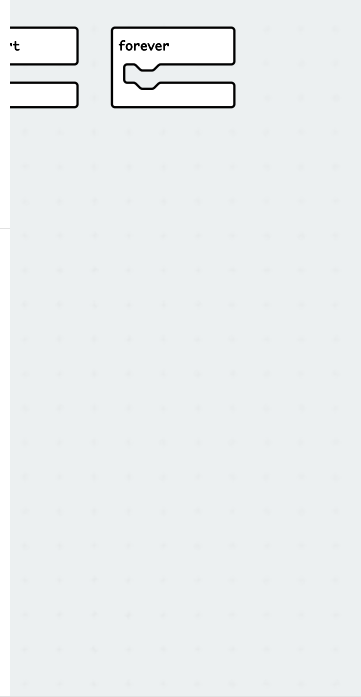
Requirements

- ☐ Code a forever loop
- ☐ Create your own icon
- ☐ Use a logic block to indicate something happening if Button B is pressed
- ☐ Clear the screen if nothing is pressed
- ☐ Play a funky melody



Search...

- Basic
- Input
- Music
- Led
- Radio
- Loops
- Logic
- Variables
- Math
- Extensions
- Advanced



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4. Hello Goodbye

Challenge

Textbook

Hello Goodbye

Code the micro:bit to do the following:

If you press the logo, then show the word, "Hello!" or else show the word, "Bye".

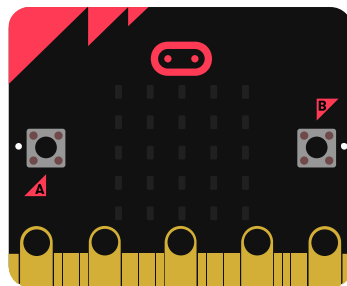
Note: Remember the logo needs to be held, not just touched.

Requirements

- ☐ Code a forever loop
- ☐ Show the word "Hello!" if the logo is pressed, or else show the word "Bye"

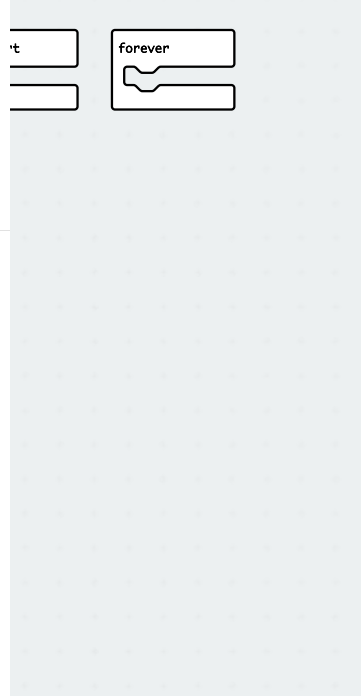
Answer Key

Submit



Search...

- Basic
- Input
- Music
- Led
- Radio
- Loops
- Logic
- Variables
- Math
- Extensions
- Advanced



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5. Shaken or Calm

Challenge

Textbook

Shaken or Calm

Code the micro:bit to do the following:

If the micro:bit is shaken, then show the word, "SHAKE," or else show the word, "CALM."

Requirements

☐ Code a forever loop

☐ Code the micro:bit to show the word "SHAKE" if the micro:bit shakes

☐ Code the micro:bit to show the word "CALM" if nothing happens

Answer Key

Submit

Step 1

Begin with the **forever** block.

Shaken or Calm

Step 1 of 2

1

Next

Toolbox

Search...

Basic

Input

Music

Led

Radio

Loops

Logic

Variables

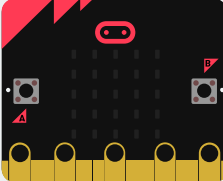
Math

Extensions

Advanced

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forever



6. Shapes

Challenge

Textbook

Shapes

Code the micro:bit to do the following:

If Button A is pressed, show a heart icon.

Else, if Button B is pressed, show a different shape icon.

Or else program your LED display to be clear.

Put this on a forever block.

Requirements

☐ Add the forever block

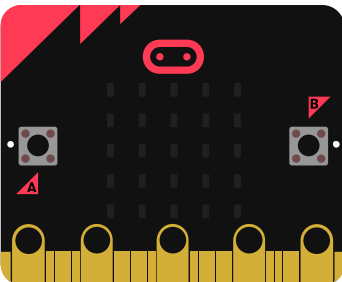
☐ Add the logic:if true then else block

☐ Add the input:button A is pressed block.

☐ Program the micro:bit to show a heart icon if button A is pressed.

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forever



7. Nickname

Challenge

Textbook

Nickname

Code the micro:bit to do the following:

If the logo is pressed, show your name.

Or else if buttons A+B are pressed together, show one of your nicknames.

Or else program your LED screen to clear.

Requirements

- Add the forever block
- Add the logic:if true then else block
- Add the input:logo is pressed block.
- If the logo is pressed, show your name. Use the string block.
- Else if input:button

Search...

Basic
Input
Music
Led
Radio
Loops
Logic
Variables
Math
Extensions
Advanced

Download

...

8. What Word Describes the Tune?

Challenge
Textbook

What Word Describes the Tune?

Code the micro:bit to play a different melody when you do the following:

Press Button A

Press Button B

Press Buttons A+B together

If none of these inputs are done, your LED screen should be clear.

Requirements

- Add the forever block
- Add the logic:if true then else block
- Add the input:button A is pressed block.

If button A is pressed play a melody. Then, show a word to describe the melody.

Download
...

...

Answer Keys & Solutions

Questions

1. What does an IF statement do in coding?

MULTIPLE CHOICE

Correct Answer:

- A. It plays music automatically ✗ Incorrect
- B. It repeats a task over and over ✗ Incorrect
- C. It makes a decision based on something happening ✓ Correct
- D. It stops the program ✗ Incorrect

2. Which of these is an example of a conditional in real life?

MULTIPLE CHOICE

Correct Answer:

- A. You eat lunch at the same time every day ✗ Incorrect
- B. If it rains, you bring an umbrella ✓ Correct
- C. You go to school every weekday ✗ Incorrect
- D. You always wear red shoes ✗ Incorrect

Explanation:

The choice depends on a condition (rain).

3. What does the ELSE part of a statement do?

MULTIPLE CHOICE

Correct Answer:

- A. It ends the code ✗ Incorrect
- B. It repeats the first part ✗ Incorrect
- C. It tells the computer what to do if the IF is not true ✓ Correct
- D. It starts a new program ✗ Incorrect

Explanation:

ELSE is the "what happens otherwise" part.

4. If a micro:bit is told to show a heart when Button A is pressed, but Button A is NOT pressed, what happens?

MULTIPLE CHOICE

Correct Answer:

- A. The micro:bit will still show the heart ✗ Incorrect
- B. Nothing will happen unless there is an ELSE ✓ Correct
- C. The micro:bit breaks ✗ Incorrect
- D. It will show two icons ✗ Incorrect

Explanation:

Without an ELSE, there's no backup instruction.

5. If a micro:bit is told to show a heart when Button A is pressed, but Button A is NOT pressed, what happens?

MULTIPLE CHOICE

Correct Answer:

- A. The micro:bit will still show the heart ✗ Incorrect
- B. Nothing will happen unless there is an ELSE ✓ Correct
- C. The micro:bit breaks ✗ Incorrect
- D. It will show two icons ✗ Incorrect

Explanation:

Without an ELSE, there's no backup instruction.

Games

1. Logic, Conditionals, and IF/ELSE statements Typing

2. Logic, Conditionals, and IF/ELSE statements

Correct Order:

1. Drag a forever block into the code editor.
2. Drag the If true then logic block and connect it in the forever block.
3. Drag the if button A is pressed input block and connect it in the space that says "true" on the If true then block.
4. Drag the show icon block and connect it in the If button A is pressed then block.
5. Select the heart icon.

Students must arrange items in the correct sequence.