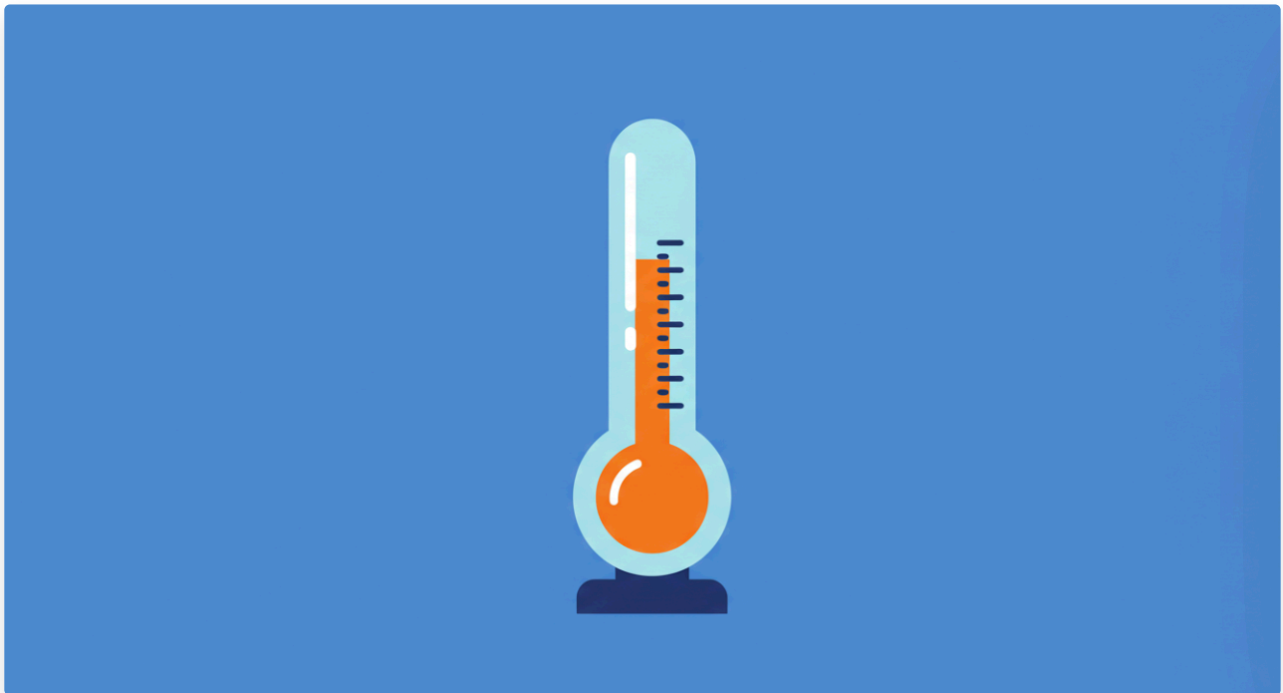


Temperature

Textbook

Temperature



Temperature Sensor: Reacting to the World

The weather outside can change so quickly, sometimes it is hard to keep track of. The last thing you want is to be caught outside and be too hot or cold because you weren't prepared. Using the micro:bit's temperature sensor, we can make the micro:bit react to temperature changes just like we do! In this lesson, you'll learn how to use the micro:bit's built-in temperature sensor to create a program that changes depending on the temperature around you. It's a perfect way to see how sensors help us understand the world in different ways!

Conditions

Let's review conditions. A condition might look like an IF ELSE statement. This statement says IF something happens first, then X will happen, or ELSE Y will happen. For example, IF it is cold outside, then I will wear a jacket; or else I will not wear a jacket. These outcomes are conditional upon it being cold outside.

Temperature Variables

A variable in programming stores information. Temperature is a variable on the micro:bit. The micro:bit has a temperature sensor that can read the temperature in the room. Find out more about the temperature sensor by watching this video: [The BBC micro:bit temperature video](#)

The temperature information collected by the micro:bit is an example of a variable, because that information can be remembered, used, and changed with the micro:bit. We see temperature sensors used everyday. For example, the thermostat in your home has a temperature sensor to keep your home warm or

cool depending on what you set it to. We can program the micro:bit to do certain things depending on what the temperature is. Note: The micro:bit measures temperature in Celsius, not Fahrenheit. We can use temperature variables in IF ELSE statements which will be practiced in today's lesson. Find out more about the temperature sensor by watching this video:



Solving Real Problems with Computational Thinking

Thinking like a computer scientist can help us solve real-life problems, even in science and engineering! This way of thinking is called **computational thinking**. It means:

1. **Breaking down problems:** Taking a big problem and making it into smaller, easier steps.
2. **Finding patterns:** Looking for things that happen again and again.
3. **Making a plan (algorithm):** Creating a step-by-step list of instructions.
4. **Testing and improving:** Trying out your plan and making it better if needed.

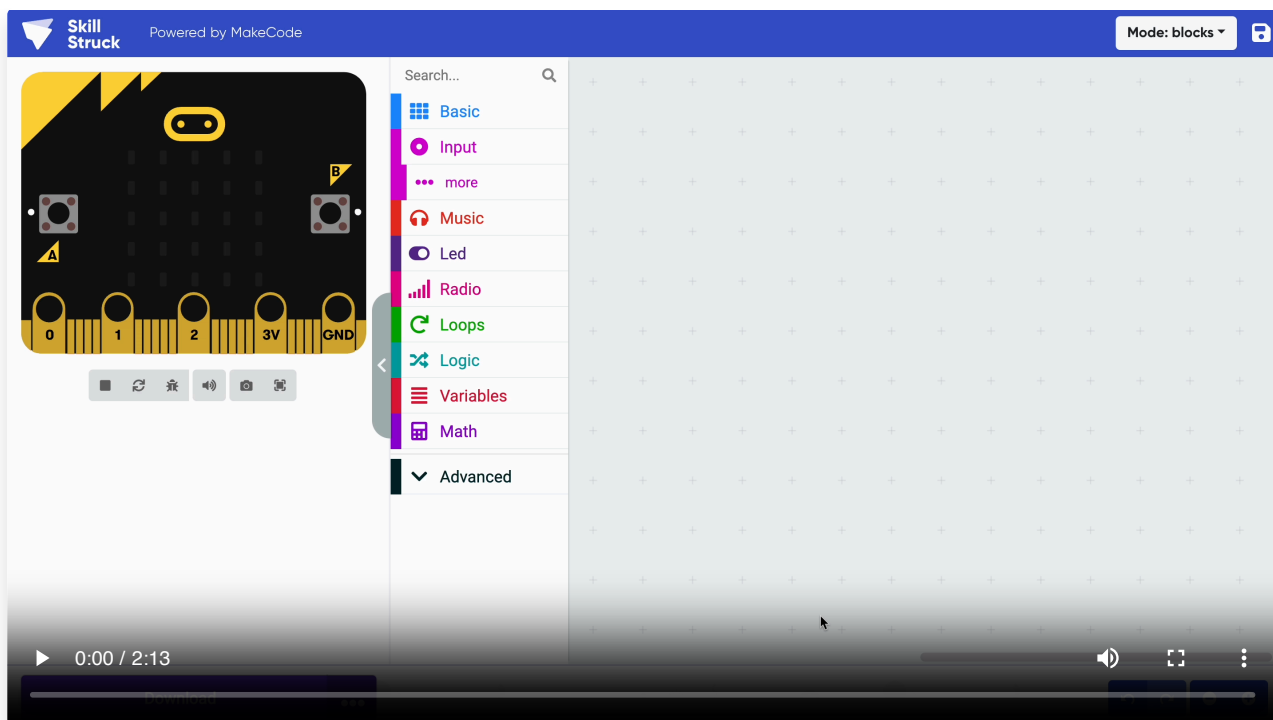
How Our Program Helps Solve Problems

The micro:bit temperature program is a great example of using computational thinking in science and engineering!

- **Science:** The temperature sensor helps us *collect data* about the environment, just like a scientist would. We can use our program to **understand** how temperature changes around us.
- **Engineering:** We are *building* a solution (our micro:bit program) that reacts to temperature. This is like an engineer designing a smart thermostat for a house or a warning system for a cold greenhouse.

You can **adapt** this program for different situations. What if you want the micro:bit to show a sun if it's *hot* and a snowflake if it's *cold*? You can change your program's steps to solve that new problem. Always ask: "Does my solution make sense?" and "Does it work correctly?" This helps you make your programs even better!

Note: The micro:bit measures temperature in Celsius, not Fahrenheit. We can use temperature variables in IF ELSE statements which will be practiced in today's lesson.



Code It! – Temperature

Here's how to program the micro:bit's temperature sensor using the temperature variable. Let's create a program that says IF the temperature is < 20 degrees Celsius, then show a check mark, ELSE show an X. This means if the temperature is less than 20 degrees Celsius it will show a check. If it is greater than 20 degrees Celsius, it will show an X.

1. First, drag an input block into your code editor.
2. Connect an **IF ELSE** block within the input block.
3. Look inside your logic category to determine which block will let us set a less than IF statement. It should say **0 < 0**.
4. Find the **temperature** variable by typing "temperature" in the variable category. Make sure it is spelled correctly!
5. Drag this block into the first value of the **< IF** statement.
6. Decide what you want that number to be. Let's type 20.
7. Drag the **show icon** block to the correct space and select a check mark.
8. Then drag another **show icon** block into the else portion of your **IF ELSE** block and select an X.

Adopted from microbit.org platform

Critical Thinking Questions

1. How do you think using a temperature sensor can help people in their daily lives? Can you think of a situation where knowing the temperature could be really useful?
2. What other types of sensors might be helpful to have in your micro:bit? How could those sensors work together to help you in everyday activities?

Questions (5)

1. Which block do you use to test if one number is smaller than another in the IF statement?

MULTIPLE CHOICE

Choose the correct answer:

- A. "=" block
- B. " $0 < 0$ " block
- C. "+" block
- D. "Repeat" block

2. You want to show a sun icon if it's hot. Where do you drag the sun icon?

MULTIPLE CHOICE

Choose the correct answer:

- A. Into the start block
- B. Into the IF part
- C. Into the forever block
- D. Next to the number 20

3. What is the purpose of using the temperature variable in a program?

MULTIPLE CHOICE

Choose the correct answer:

- A. To play a sound
- B. To change the color
- C. To store and check the room's temperature
- D. To show the time

4. How does the micro:bit know the temperature in the room?

MULTIPLE CHOICE

Choose the correct answer:

- A. It guesses
- B. It uses a temperature sensor
- C. It reads the weather app
- D. It looks outside

5. You want to use a variable for sound instead of temperature. What must you do first?

MULTIPLE CHOICE

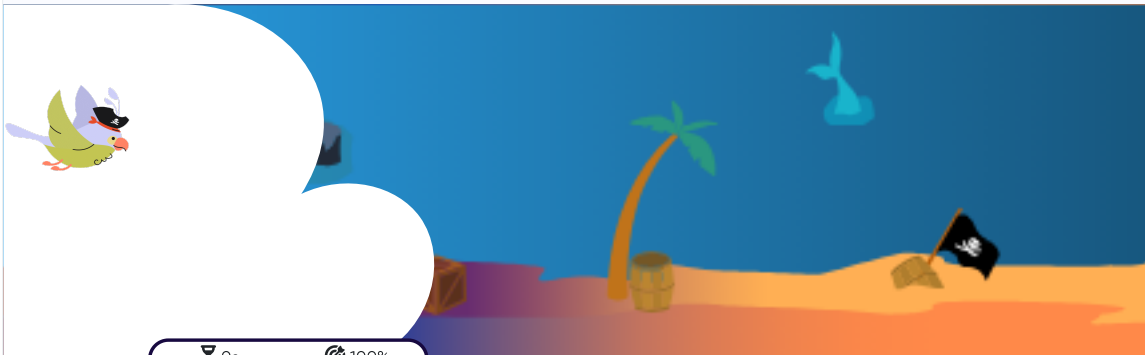
Choose the correct answer:

- A. Drag a loop
- B. Make a new variable
- C. Add an icon
- D. Use "="

Games (2)

1. Temperature Typing

Full Screen Audio Instructions Restart Pause



0s 100%

Using the micro:bit's temp

2. Temperature Matching

Full Screen

Audio

Instructions

Answer Key

Pause

Clear All

Check Matches

Attempts: 0

Variable

Condition

Temperature

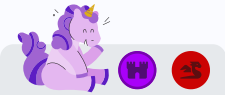
Thermostat

A place to store information

A device to measure temperature

Might look like an IF ELSE statement.

A variable to measure hot or cold



Robotics Challenges (3)

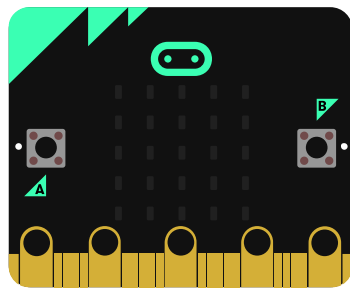
1. 72 and Sunny

72 and Sunny

The micro:bit measures temperature in Celsius. 22 degrees Celsius is the same as 72 degrees Fahrenheit. Code the micro:bit to show a sun if the temperature is greater than 72 degrees Fahrenheit, or else it should show an X.

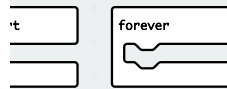
Requirements

- Begin with the basic:forever block.
- Drag the logic:if true then else block and connect it in the basic:forever block.
- Add the input:temperature input in the first 0 section. Then, change the second number to 22. It should now read temperature > 22.
- Add a basic:show LEDs block and create



Search...

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



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2. Cold Light

Cold Light

Code the micro:bit so if the temperature is below a 50 degrees it will show a light. Otherwise, the micro:bit will have a clear screen.

Requirements

- Begin with the **forever** block.
- Drag the **if true then else** block and connect it in the **forever** block.
- Add the temperature input in the first 0 section. Then, change the second number to 50. It should now read temperature < 50.
- Add a **show LEDs** block and create a light.
- Else, clear the screen.

Step 1

Begin with the **forever** block.

Cold Light Step 1 of 3



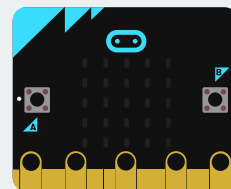
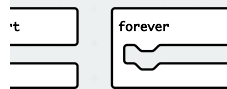
1

Next

Toolbox

Search...

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



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3. 10 Degrees Celsius

Challenge

Textbook

10 Degrees Celsius

The micro:bit measures temperature in degrees Celsius. 10 degrees Celsius is equal to 50 degrees Fahrenheit.

Code the micro:bit to do the following:

If the temperature is less than (<) 10, it will show the SAD icon.

Else if the temperature is equal to (=) 10 it will show the ASLEEP icon.

or else if the temperature is anything else, it will show the HAPPY icon.

Requirements

- Begin with the basic: forever block.
- If the temperature is less than (<) 10, it will show a sad face.
- Else if the temperature is equal to (=) 10 it will show the ASLEEP icon.

Step 1

Begin with the **forever** block. Code the micro:bit to do the following:

10 Degrees Celsius Step 1 of 4



1

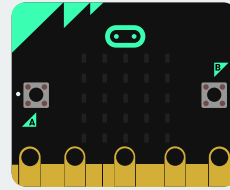


Toolbox

Search...

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

forever



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Answer Keys & Solutions

Questions

1. Which block do you use to test if one number is smaller than another in the IF statement?

MULTIPLE CHOICE

Correct Answer:

- A. "=" block ✗ Incorrect
- B. "0 < 0" block ✓ Correct
- C. "+" block ✗ Incorrect
- D. "Repeat" block ✗ Incorrect

2. You want to show a sun icon if it's hot. Where do you drag the sun icon?

MULTIPLE CHOICE

Correct Answer:

- A. Into the start block ✗ Incorrect
- B. Into the IF part ✓ Correct
- C. Into the forever block ✗ Incorrect
- D. Next to the number 20 ✗ Incorrect

Explanation:

The IF block checks to see if something is true.

3. What is the purpose of using the temperature variable in a program?

MULTIPLE CHOICE

Correct Answer:

- A. To play a sound ✗ Incorrect

B. To change the color

✗ Incorrect

C. To store and check the room's temperature

✓ Correct

D. To show the time

✗ Incorrect

Explanation:

Variables hold information, like the temperature.

4. How does the micro:bit know the temperature in the room?

MULTIPLE CHOICE

Correct Answer:

A. It guesses

✗ Incorrect

B. It uses a temperature sensor

✓ Correct

C. It reads the weather app

✗ Incorrect

D. It looks outside

✗ Incorrect

Explanation:

Sensors are built in to detect things like temperature.

5. You want to use a variable for sound instead of temperature. What must you do first?

MULTIPLE CHOICE

Correct Answer:

A. Drag a loop

✗ Incorrect

B. Make a new variable

✓ Correct

C. Add an icon

✗ Incorrect

D. Use "="

✗ Incorrect

Explanation:

Each variable holds a different kind of information.

1. Temperature Typing

Typing game - no answer key needed. Students practice typing the provided content.

2. Temperature Matching

Matching Game Solutions:

1. →

2. →

3. →

4. →

Students must drag items from the left to match with corresponding items on the right.