

## Variables and Temperature

---

### Textbook

---

## Variables and Temperature



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:



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.*

## Variables

In the micro:bit, temperature is stored inside a variable. A [variable](#) in programming is like a container that holds a bit of information. So a variable is like a box that can hold a number or a string. In order to use the temperature in our programming, we need to store it inside a variable. Then we can use it in our program.

The temperature information collected by the micro:bit is an example of a variable, because that information can then be used with the micro:bit.

## Add a Variable to your Code

Here's how to program the micro:bit's temperature sensor using the temperature variable.

First we need to create a variable named `temp`. We want this variable to be equal to whatever the temperature in the room is. So we set it equal to the inputted temperature like this.

```
1 temp = input.temperature()  
2
```

Now let's use this variable named `temp` in different ways.

## Display the Temperature

Let's display the number value of the temperature! Remember how to show a number?

```
1 basic.show_number(3)
```

Now we can replace the number in the parentheses with the variable named `temp` . This variable is holding the value that is the temperature in the room. So the code would look like this.

```
1 def on_forever():
2     temp = input.temperature()
3     basic.show_number(temp)
4
5 basic.forever(on_forever)
6
```

Can you see how the value in the parentheses is the variable named `temp` ?

This means that the `basic.show_number(temp)` command will display the variable named `temp` . The variable named `temp` is holding the current temperature in the room.

*Adopted from microbit.org platform*

## Critical Thinking Questions

- Imagine you're building a smart garden system. How would you design a program to use a temperature sensor to decide when to automatically turn on a sprinkler system, and what specific pieces of information would your program need to "remember" for this to work?
- The concept of a "variable" in programming is like a container for information that can change. Can you describe a real-world system, other than a thermostat, that relies on continually updated information (a "variable") to function correctly? What kind of information would that system need to track?
- If you wanted to create a device that displayed the outdoor temperature in a different format (e.g., as a happy face for warm, a sad face for cold), why is it useful to store the temperature reading in a "variable" first, rather than just using the raw sensor data directly each time?

## Questions (10)

### 1. What will happen when you run this code in a room that is 22 degrees Celsius?

MULTIPLE CHOICE

```
def on_forever(): temp = input.temperature() basic.show_number(temp) basic.forever(on_forever)
```

**Choose the correct answer:**

- A. Shows the number 22 on screen
- B. Shows the word "temp" on screen
- C. Shows nothing on screen
- D. Shows the number 72 on screen

**2. A student writes this code but forgets to create the variable. What will happen?**

```
def on_forever(): basic.show_number(temp) basic.forever(on_forever)
```

**Choose the correct answer:**

- A. Shows 0 on screen
- B. Shows the current temperature
- C. The code will have an error
- D. Shows the word "temp"

**3. You want to show the current temperature only when button A is pressed. How should you organize this code?**

MULTIPLE CHOICE

```
temp = input.temperature() def on_forever(): if input.button_is_pressed(Button.A): basic.show_number(temp) basic.forever(on_forever)
```

**Choose the correct answer:**

- A. This code is correct
- B. Move temp = input.temperature() inside the if statement
- C. Move temp = input.temperature() inside the forever function
- D. Remove the forever function

**4. What is the best way to think about what a variable does in programming?****Choose the correct answer:**

- A. A variable is a type of sensor
- B. A variable is like a container that holds information
- C. A variable is a command that runs code
- D. A variable is a way to display numbers

**5. You want to create a smart thermostat that shows "HOT" when the temperature is above 25 degrees. What code structure do you need?**

MULTIPLE CHOICE

```
def on_forever(): temp = input.temperature() # What goes here? basic.forever(on_forever)
```

**Choose the correct answer:**

- A. A for loop to check temperature multiple times
- B. An if statement to compare temp with 25
- C. A variable to store the word "HOT"
- D. A function to calculate temperature

**6. What is wrong with this variable name choice?**

MULTIPLE CHOICE

```
def on_forever(): current room temperature in celsius = input.temperature() basic.show_number(current room temperature in celsius) basic.forever(on_forever)
```

**Choose the correct answer:**

- A. Variable names cannot have spaces
- B. The variable name is too long
- C. Should use Fahrenheit instead
- D. Missing quotation marks

**7. Programming languages have rules about what characters you can use in variable names.**

MULTIPLE CHOICE

```
def on_forever(): temp = input.temperature() basic.show_string("Temp:") basic.show_number(temp) basic.forever(on_forever)
```

**Choose the correct answer:**

- A. This code is wrong
- B. This code will work but shows them separately
- C. This code will show them at the same time
- D. This code will only show the message

**8. A student wants to check if the room is too cold (below 18 degrees). Which comparison should they use?**

MULTIPLE CHOICE

```
def on_forever(): temp = input.temperature() if temp _____ 18: basic.show_string("Too Cold") basic.forever(on_forever)
```

**Choose the correct answer:**

- A. temp == 18
- B. temp > 18
- C. temp < 18
- D. temp = 18

**9. What happens to the temp variable each time the forever loop runs?**

MULTIPLE CHOICE

```
def on_forever(): temp = input.temperature() basic.show_number(temp) basic.forever(on_forever)
```

**Choose the correct answer:**

- A. It keeps the same value forever
- B. It gets updated with the current temperature reading
- C. It gets deleted and recreated
- D. It stores all previous temperature readings

**10. You want to create a temperature alarm that beeps when it gets above 30 degrees. What combination of programming concepts do you need?**

MULTIPLE CHOICE

**Choose the correct answer:**

- A. Only variables
- B. Variables and loops
- C. Variables, conditionals, and output commands
- D. Only conditionals

# Robotics Challenges (1)

## 1. Current Temperature

Challenge

Textbook

### Current Temperature

Create a program that displays the current temperature in the room on the micro:bit.

1. Create a forever function
2. Inside the forever function, create a variable named `temp`. Set it equal to `input.temperature()`
3. Inside the forever function, display the variable named `temp`.

Try taking the micro:bit outside to see if the temperature changes!

*Adopted from [micro:bit.org projects](https://micro:bit.org/projects)*

#### Requirements

- ☐ Create the forever function
- ☐ Inside the forever function, create a variable named `temp`.

### Step 1

Create the forever function

Current Temperature Step 1 of 3



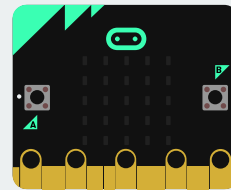
1

Next

Toolbox

Search

```
1 def on_forever():
2     pass
3     basic.forever(on_forever)
4
```



Download



## Answer Keys & Solutions

### Questions

1. What will happen when you run this code in a room that is 22 degrees Celsius?

MULTIPLE CHOICE

Correct Answer:

- |                                    |             |
|------------------------------------|-------------|
| A. Shows the number 22 on screen   | ✓ Correct   |
| B. Shows the word "temp" on screen | ✗ Incorrect |
| C. Shows nothing on screen         | ✗ Incorrect |
| D. Shows the number 72 on screen   | ✗ Incorrect |

**Explanation:**

The variable stores the actual temperature value and displays it as a number.

2. A student writes this code but forgets to create the variable. What will happen?

MULTIPLE CHOICE

Correct Answer:

- |                                  |             |
|----------------------------------|-------------|
| A. Shows 0 on screen             | ✗ Incorrect |
| B. Shows the current temperature | ✗ Incorrect |
| C. The code will have an error   | ✓ Correct   |
| D. Shows the word "temp"         | ✗ Incorrect |

**Explanation:**

You must create a variable before you can use it in your program.



3. You want to show the current temperature only when button A is pressed. How should you organize this code?

MULTIPLE CHOICE

Correct Answer:

- A. This code is correct ✗ Incorrect
- B. Move `temp = input.temperature()` inside the if statement ✗ Incorrect
- C. Move `temp = input.temperature()` inside the forever function ✓ Correct
- D. Remove the forever function ✗ Incorrect

**Explanation:**

Temperature changes over time, so you need to read it repeatedly to get current values.

4. What is the best way to think about what a variable does in programming?

MULTIPLE CHOICE

Correct Answer:

- A. A variable is a type of sensor ✗ Incorrect
- B. A variable is like a container that holds information ✓ Correct
- C. A variable is a command that runs code ✗ Incorrect
- D. A variable is a way to display numbers ✗ Incorrect

**Explanation:**

The lesson compares variables to boxes that can store different types of data.

5. You want to create a smart thermostat that shows "HOT" when the temperature is above 25 degrees. What code structure do you need?

MULTIPLE CHOICE

Correct Answer:

- A. A for loop to check temperature multiple times ✗ Incorrect
- B. An if statement to compare temp with 25 ✓ Correct
- C. A variable to store the word "HOT" ✗ Incorrect

D. A function to calculate temperature

✗ Incorrect

### Explanation:

Use conditional statements to make decisions based on variable values.

## 6. What is wrong with this variable name choice?

MULTIPLE CHOICE

### Correct Answer:

A. Variable names cannot have spaces

✓ Correct

B. The variable name is too long

✗ Incorrect

C. Should use Fahrenheit instead

✗ Incorrect

D. Missing quotation marks

✗ Incorrect

### Explanation:

Programming languages have rules about what characters you can use in variable names.

## 7. Programming languages have rules about what characters you can use in variable names.

MULTIPLE CHOICE

### Correct Answer:

A. This code is wrong

✗ Incorrect

B. This code will work but shows them separately

✓ Correct

C. This code will show them at the same time

✗ Incorrect

D. This code will only show the message

✗ Incorrect

### Explanation:

Each display command runs one after another, not at the same time.

## 8. A student wants to check if the room is too cold (below 18 degrees). Which comparison should they use?

MULTIPLE CHOICE

**Correct Answer:**

A. temp == 18

✗ Incorrect

B. temp > 18

✗ Incorrect

C. temp < 18

✓ Correct

D. temp = 18

✗ Incorrect

**Explanation:**

"Below 18 degrees" means the temperature value is smaller than 18.

**9. What happens to the temp variable each time the forever loop runs?**

MULTIPLE CHOICE

**Correct Answer:**

A. It keeps the same value forever

✗ Incorrect

B. It gets updated with the current temperature reading

✓ Correct

C. It gets deleted and recreated

✗ Incorrect

D. It stores all previous temperature readings

✗ Incorrect

**Explanation:**

Each loop cycle reads the sensor again and stores the new value in the variable.

**10. You want to create a temperature alarm that beeps when it gets above 30 degrees. What combination of programming concepts do you need?**

MULTIPLE CHOICE

**Correct Answer:**

A. Only variables

✗ Incorrect

B. Variables and loops

✗ Incorrect

C. Variables, conditionals, and output commands

✓ Correct

D. Only conditionals

✗ Incorrect

**Explanation:**

You need to store temperature data, check conditions, and produce output when conditions are met.