

Variables and Data

Textbook

Variables and Data



One of the best lists you can keep track of is the books you've read! What if you could program your micro:bit to count things for you? In programming, [variables](#) are like containers that can hold numbers, words, or even other data. You can use variables to keep track of information, like a counter that increases every time you press a button. In this lesson, we'll explore how to create and use variables to make your micro:bit a data-tracking machine!

Data



[Data](#) is information. It tells us things! For example, if 8 people said they like blackberries and 5 people said they like blueberries, then that tells us that more people like blackberries.

For these coding challenges, you will turn the micro:bit into a counter and track the data you gather for each challenge. You will first need to learn how to program variables to do this.

Types of Data:

Data can come in different forms, or **types**:

- **Numbers:** Like `8` , `5` , or `100` .
- **Strings (Words):** Like `"blackberry"` , `"blueberry"` , or `"Hello!"` .
- **True/False:** Simple answers like `yes` or `no` .

Sometimes, we organize data into **data structures**, which are ways to store information neatly, like a list of names or a collection of numbers from an experiment.

Analyzing Data: What Does It Tell Us?

Once we have data, we can look closely at it to understand what happened or to make predictions. This is called **analyzing data**.

- **Example 1: Moon Journal**
 - Imagine Kim watched the moon for a whole month. Every night, she wrote in her journal about the moon's shape (like a sliver, half, or full) and how big it looked.
 - At the end of the month, she would **analyze** all her notes (her data) to figure out patterns. She could then draw conclusions, like how the moon changes its shape from new to full and back again during the month.
- **Example 2: Plant Growth Experiment**
 - Courtney's class grew a plant called Virginia creeper. They collected **data** by measuring how much the plant grew each day.
 - By looking at all their measurements, they could **analyze** the data. This helped them guess (make a hypothesis) how fast the plant grows and if it grows faster on sunny days compared to cloudy days.

Analyzing data helps us learn, solve problems, and understand the world around us!

Searching for Data: Finding What You Need

Sometimes you have a lot of data, and you need to find one specific piece of information. There are different ways, or **algorithms**, we can use to search through data.

- **Example 1: Finding a Word in a List**
 - Imagine you have a long list of all the words in a book. If you wanted to find the word "adventure," you could start from the very first word and look at each one until you find "adventure." This is one way to search.
- **Example 2: Finding a Card in a Deck**
 - If you're looking for the "Queen of Hearts" in a shuffled deck of cards, you might flip through them one by one. That's another search algorithm.

Some ways of searching are much faster than others, especially when you have a lot of data!

Important Data vs. Extra Information

When you collect data, not everything you write down might be important for the problem you're trying to solve. You need to figure out what information is truly useful.

Differentiating Data: This means picking out the **relevant** (important and useful) data from **miscellaneous** (extra or not important) information.

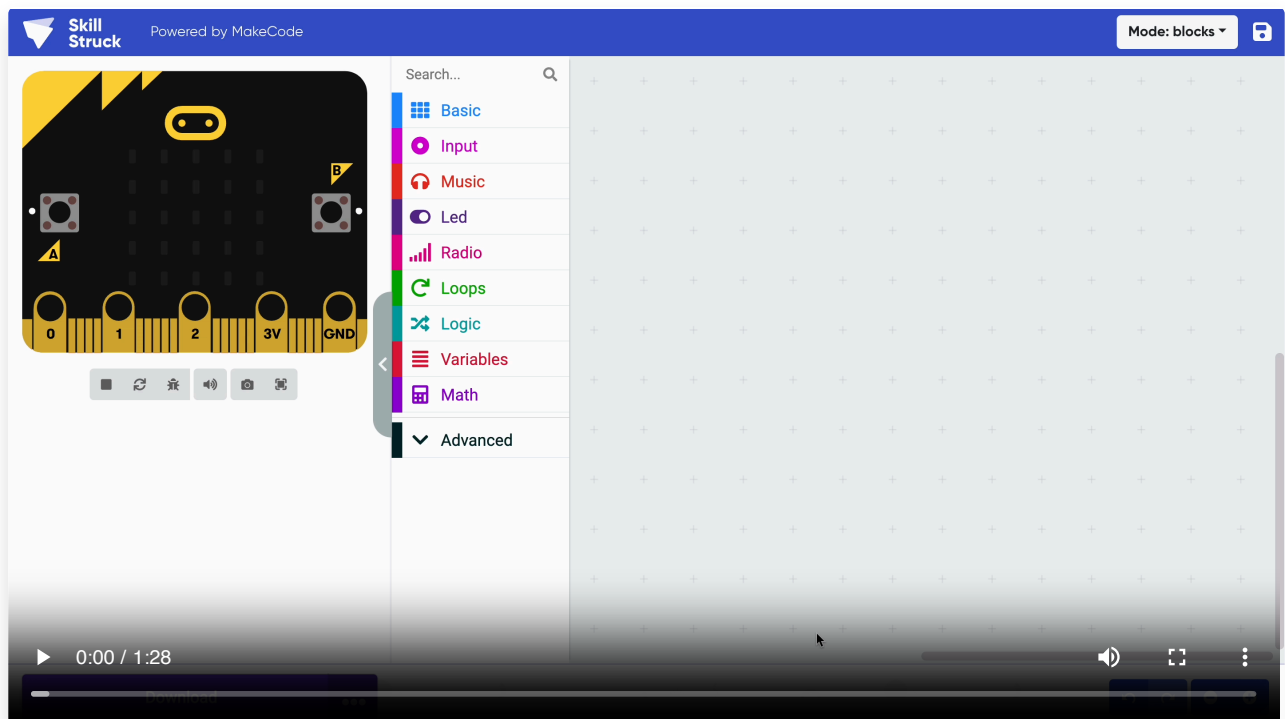
Scenario: Let's say you want to figure out how many red shirts your classmates are wearing today.

- **Usable Data:** The *color* of each classmate's shirt. This is the important information you need to count red shirts.
- **Miscellaneous Information:** The type of shirt (t-shirt or long-sleeve), if it has a picture on it, or what brand it is. This might be interesting, but it's not useful for *this specific problem* (counting red shirts).

Being a good problem-solver means knowing what information is important and what is just extra! You have to evaluate all the information to see if it helps you reach your goal.

Variables

A [variable](#) in programming is when you can put whatever value (numbers or words) you want inside a variable. Then you can move the variable around your program easily! You can also replace what's inside the variable when you need to.



Code It! - Variables

Practice coding a variable.

1. Drag the **on start** block into the code editor.
2. Drag the **show number** block and connect it in the **on start** block.
3. Click on the Variables category and select "**Make a Variable.**"
4. Type the word "**count**" as your new variable. Then, click the green checkmark.

5. Drag the `set count to 0` variable block and connect it underneath the `show number` block within the `on start` block.
6. Drag the `on button A pressed` input block into the code editor.
7. Then, drag another `show number` block and `set count to 0` variable block inside the `on button A pressed` input block.

This code will tell the micro:bit that when you press play, it will start the counter at 0. When Button A is pressed, the counter will reset to 0.

You will complete the program in the challenges in this lesson.

Critical Thinking Question

1. Can you think of something fun or interesting you might want to count using a program—like how many books you've read or how many laps you ran? How can a variable help you store that number?
2. If your program asks users to type in a word, like a food or color, how could a variable help organize that information?
3. What would happen if you didn't use a variable and typed the value each time instead?

Questions (5)

1. What is a variable in programming?

MULTIPLE CHOICE

Choose the correct answer:

- A. A type of robot
- B. A container that holds information like numbers or words
- C. A button you press on the micro:bit
- D. A math problem

2. Which of the following is an example of data?

MULTIPLE CHOICE

Choose the correct answer:

- A. Playing outside
- B. A drawing
- C. 8 people like blackberries
- D. Jumping rope

3. Why might you use a variable in a micro:bit program?

Choose the correct answer:

- A. To draw pictures
- B. To track changing information
- C. To listen to music
- D. To make the screen blink

4. What category do you click on to make a new variable in MakeCode?

Choose the correct answer:

- A. Music
- B. Input
- C. Variables
- D. Math

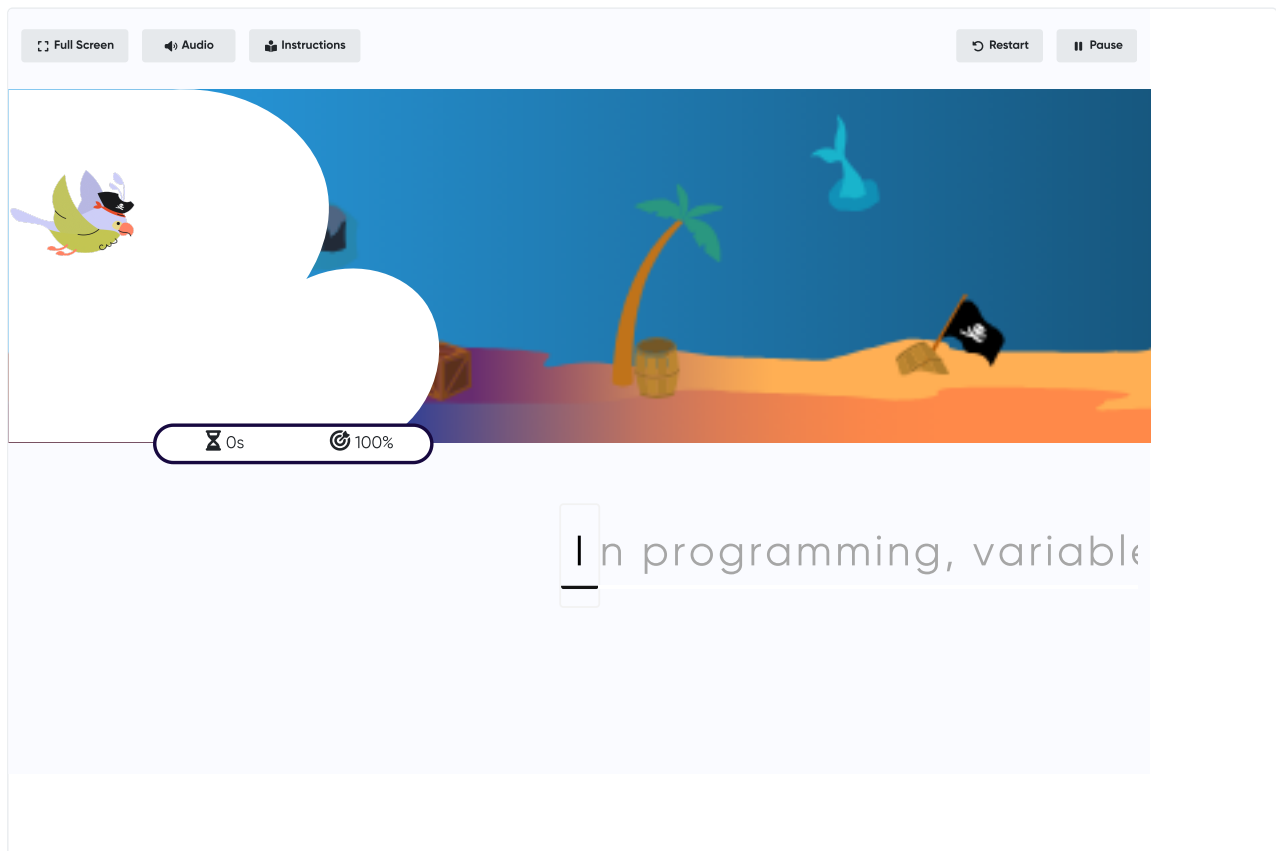
5. Why is using a variable better than typing a number every time you need it?

Choose the correct answer:

- A. It's slower
- B. It makes your program look cooler
- C. It helps the code be more flexible and efficient
- D. It lets the micro:bit change colors

Games (2)

1. Variables and Data Typing



2. Variables and Data Memory

Find the matching pairs of data.

Full Screen

Audio

Instructions

Answer Key

Pause

Flips: 0

1

9

2

γobnu2

3

γbniw

4

zς

5

elqpp

6

γobnu2

7

γbniw

8




zς

9

elqpp

or

9



Robotics Challenges (1)

1. Counter

Challenge

Textbook

Counter

Create a program so when you press play on the micro:bit, it will:

- Start the counter at 0.
- Reset the counter to 0 when Button A is pressed.
- Change the count by 1 on the counter and show the number counting up when Button B is pressed.

Then, use the counter to track different data points in your classroom, like:

- How many people own at least one pet?
- How many people like orange juice with pulp?
- How many people's favorite color is blue?

Requirements

- Program the micro:bit counter to start at 0.

Step 1

Drag the **on start** block into the code editor.

Counter Step 1 of 10



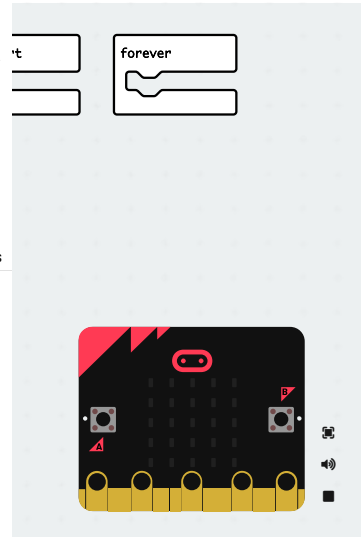
1

Next

Toolbox

Search...

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



Download

Answer Keys & Solutions

Questions

1. What is a variable in programming?

MULTIPLE CHOICE

Correct Answer:

- A. A type of robot ✗ Incorrect
- B. A container that holds information like numbers or words ✓ Correct
- C. A button you press on the micro:bit ✗ Incorrect
- D. A math problem ✗ Incorrect

Explanation:

Think of it like a box that stores something important.

2. Which of the following is an example of data?

MULTIPLE CHOICE

Correct Answer:

- A. Playing outside ✗ Incorrect
- B. A drawing ✗ Incorrect
- C. 8 people like blackberries ✓ Correct
- D. Jumping rope ✗ Incorrect

Explanation:

Data tells you information or facts you can count or track.

3. Why might you use a variable in a micro:bit program?

MULTIPLE CHOICE

Correct Answer:

- A. To draw pictures ✗ Incorrect

B. To track changing information

✓ Correct

C. To listen to music

✗ Incorrect

D. To make the screen blink

✗ Incorrect

Explanation:

Like keeping score or counting something.

4. What category do you click on to make a new variable in MakeCode?

MULTIPLE CHOICE

Correct Answer:

A. Music

✗ Incorrect

B. Input

✗ Incorrect

C. Variables

✓ Correct

D. Math

✗ Incorrect

Explanation:

That's where you make and manage your variables.

5. Why is using a variable better than typing a number every time you need it?

MULTIPLE CHOICE

Correct Answer:

A. It's slower

✗ Incorrect

B. It makes your program look cooler

✗ Incorrect

C. It helps the code be more flexible and efficient

✓ Correct

D. It lets the micro:bit change colors

✗ Incorrect

Explanation:

You can update one value without changing your whole program.

1. Variables and Data Typing

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

2. Variables and Data Memory

Memory Game Pairs:

1. ↔
2. ↔
3. ↔
4. ↔
5. ↔

Students must find all matching pairs by flipping cards and remembering their positions.