

## Repeat with a For Loop

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### Textbook

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## Repeat with a For Loop



Let's learn how to make the code repeat a certain number of times.

This is done with a `for loop` and `range()`. A [for loop](#) tells the code to repeat a certain number of times. `range()` tells the code how many times to repeat.

It looks like this.

```
1 for index in range(4):  
2     basic.show_string("Hey")
```

Notice how the basic command is indented in one TAB space below the for loop. This code will repeat the string `"Hey"` four times.

For the autograder, you must use the word index. However for your own projects, you can include whatever word makes sense.

To change the number of times it repeats (or the number of times it loops), just change the number in the parentheses.

```
1 for index in range(2):  
2     basic.show_string("Hey")
```

This will repeat the string `"Hey"` two times.

## Multiple Commands

You can also add multiple commands inside the for loop.

```
1 for index in range(4):  
2     basic.show_string("Hey")  
3     basic.show_icon(IconNames.HEART)  
4
```

This code will run the string and then the icon in that order 4 times.

Try playing around with more commands inside your **for loop**!

## Multiple Loops

If you want to have more than one loop, you just need to update the word index to include a number. For example, `index2`.

```
1 for index in range(4):  
2     basic.show_icon(IconNames.HEART)  
3     basic.show_icon(IconNames.SMALL_HEART)  
4  
5 for index2 in range(4):  
6     basic.show_icon(IconNames.DIAMOND)  
7     basic.show_icon(IconNames.HEART)  
8
```

You can continue to do this with as many loops as you want!

*Adopted from microbit.org platform*

## Critical Thinking Questions

- Imagine you're programming a robot to pack items into boxes. How would you instruct the robot to repeat the same packing actions exactly ten times using a programming concept that handles a specific number of repetitions? Why is knowing the exact number of repetitions important here?
- Think about everyday tasks that involve doing something over and over, like setting the table for dinner or doing a series of exercises. How does the idea of a "for loop" (doing something a set number of times) make these tasks more efficient to describe or automate?

- If you wanted a computer program to draw a perfect square, why would you use a repeating instruction that draws a line and then turns, and how many times would you need to tell it to repeat these actions?

## Questions (10)

### 1. How many times will "Hello" appear on screen when you run this code?

MULTIPLE CHOICE

```
for index in range(3): basic.show_string("Hello")
```

Choose the correct answer:

- A. 2 times
- B. 3 times
- C. 4 times
- D. 1 time

### 2. What will happen if you run this code with wrong indentation?

MULTIPLE CHOICE

```
for index in range(2): basic.show_string("Test")
```

Choose the correct answer:

- A. "Test" shows 2 times
- B. "Test" shows 1 time
- C. The code will have an error
- D. "Test" shows forever

### 3. You want to show "Good" 5 times in a row. What should you change in this code?

MULTIPLE CHOICE

```
for index in range(2): basic.show_string("Good")
```

Choose the correct answer:

- A. Change "Good" to "Good Good Good"
- B. Change range(2) to range(5)
- C. Add more basic.show\_string lines
- D. Change index to index5

**4. What is the correct order of events when this code runs?**

Choose the correct answer:

- A. "Hi", "Hi", HAPPY, HAPPY
- B. "Hi" and HAPPY show at the same time
- C. HAPPY, "Hi", HAPPY, "Hi"
- D. "Hi", HAPPY, "Hi", HAPPY

**5. A student wants to create two separate loops that each run 3 times. What is wrong with this code?**

MULTIPLE CHOICE

```
for index in range(3): basic.show_string("First") for index in range(3): basic.show_string("Second")
```

Choose the correct answer:

- A. Both loops use the same variable name
- B. The range numbers are the same
- C. Missing indentation
- D. Nothing is wrong with this code

**6. What happens when you put one command inside a loop and one command outside?**

MULTIPLE CHOICE

```
for index in range(3): basic.show_string("Inside") basic.show_string("Outside")
```

Choose the correct answer:

- A. "Inside" shows 3 times, then "Outside" shows 1 time
- B. "Inside" and "Outside" both show 3 times
- C. "Outside" shows 3 times, then "Inside" shows 1 time
- D. Only "Inside" shows

**7. You need to create a pattern where a STAR icon shows 40 times, then a MOON icon shows 20 times. What code structure should you use?**

MULTIPLE CHOICE

**Choose the correct answer:**

- A. One loop with range(6)
- B. Two separate loops with different range numbers
- C. One loop with 6 different commands
- D. Two loops with the same range number

**8. You want to show "Start", then repeat "Go" 30 times, then show "End". How should you organize your code?**

MULTIPLE CHOICE

**Choose the correct answer:**

- A. Put everything inside one loop
- B. Use "Start", then a loop for "Go", then "End" outside any loop
- C. Use three separate loops
- D. Put "Start" and "End" in one loop, "Go" in another

**9. Debug the following code:**

DEBUG CODE

**Code to Debug:**

```
1 for index in range(4)
2     basic.show_string("Hey")
```

**10. Debug the following code:**

DEBUG CODE

**Code to Debug:**

```
1 for index in range4:
2     basic.show_icon(IconNames.HEART)
3     basic.show_icon(IconNames.SMALL_HEART)
```

# Robotics Challenges (5)

## 1. Repeated Icons

Challenge

Textbook

### Repeated Icons

Create a program that will repeat displaying 2 icons.

1. Add a for loop to repeat the code 2 times.
2. Inside the first for loop, display the **GIRAFFE** icon and then the **TORTOISE** icon. These two icons will display twice because of the for loop.

Don't forget to indent!

3. Then, create a second for loop to repeat the code 4 times. Don't forget to name it **for index2 in range()**
4. Inside the second loop, display the **FABULOUS** icon and then the **SURPRISED** icon.

Don't forget to indent!

#### Requirements

- Create a for loop to repeat the code 2 times.

### Step 1

Create the **for index in range()** code to repeat something two times.

Repeated Icons Step 1 of 4



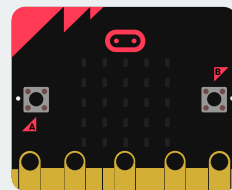
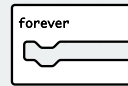
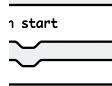
1

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## 2. O McDonald Had a Farm

Challenge

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### O McDonald Had a Farm

Create a program that shows the letters **E I E I O**.

Requirements:

1. Create a for loop to repeat the letters **E** and **I**
2. Then, after the for loop, show the letter **O**.

#### Requirements

- Create a for loop to repeat the code 2 times.
- Inside the for loop, display the string **E**
- Inside the for loop, display the string **I**
- After the for loop but not inside it, display the string **O**

creating new project...

### 3. Chatterbox

Challenge

Textbook

#### Chatterbox

Do you know someone who likes to talk a lot? Create a program that displays an image that looks like a smiley face. The image will then change to the face with its mouth open.

These images will go inside a for loop to repeat 10 times.

**Requirements**

- Create the for index in range() code to repeat the code 10 times.
- Inside the first for loop, display two images to look like someone talking

Answer Key

Submit

**Step 1**

Create the `for index in range()` code to repeat something 10 times.

Chatterbox Step 1 of 2

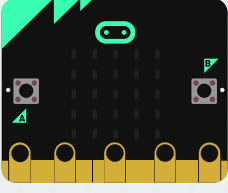
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### 4. Ocean Wave

Challenge

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#### Ocean Wave

Have you ever been to the ocean? The waves that crash on the shore repeat over and over again.

Create an ocean wave that repeats 3 times. Use at least 10 images to create the wave. Place them all inside a for loop.

**Requirements**

- Create a for loop to repeat the code 3 times.
- Inside the for loop, display ten images to look like a wave

Answer Key

Submit

**Step 1**

Create the `for index in range()` code to repeat something 3 times.

Ocean Wave Step 1 of 2

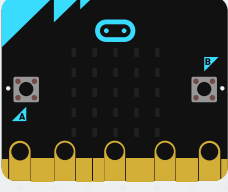
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## 5. Dance Party

Challenge

Textbook

### Dance Party

Create a dance party with the micro:bit!

Create an image of a person. Use a for loop to repeat moves.

#### Requirements:

Add at least 3 for loops. A reminder to use `index`, `index2`, and `index3` in your loops.

Within each repeated section, have at least 2 images.

Repeat each image 3 times.

#### Requirements

- ☐ Add at least 3 for loops.
- ☐ Within each repeated section, have at least 2 images.
- ☐ Repeat each image 3 times.

### Step 1

Create the `for index in range()` code to repeat something at least 3 times.

Dance Party Step 1 of 6



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#### Toolbox

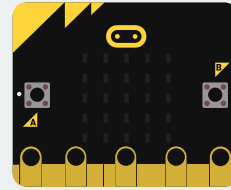
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1 start

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## Answer Keys & Solutions

### Questions

1. How many times will "Hello" appear on screen when you run this code?

MULTIPLE CHOICE

Correct Answer:

- A. 2 times ✗ Incorrect
- B. 3 times ✓ Correct
- C. 4 times ✗ Incorrect
- D. 1 time ✗ Incorrect

**Explanation:**

The number inside range() tells you exactly how many times the loop runs.

2. What will happen if you run this code with wrong indentation?

MULTIPLE CHOICE

Correct Answer:

- A. "Test" shows 2 times ✗ Incorrect
- B. "Test" shows 1 time ✗ Incorrect
- C. The code will have an error ✓ Correct
- D. "Test" shows forever ✗ Incorrect

**Explanation:**

Python needs proper indentation to know which commands belong inside the loop.

3. You want to show "Good" 5 times in a row. What should you change in this code?

MULTIPLE CHOICE

Correct Answer:

A. Change "Good" to "Good Good Good"

✗ Incorrect

B. Change range(2) to range(5)

✓ Correct

C. Add more basic.show\_string lines

✗ Incorrect

D. Change index to index5

✗ Incorrect

#### Explanation:

The range() function controls how many times the entire loop repeats.

### 4. What is the correct order of events when this code runs?

MULTIPLE CHOICE

#### Correct Answer:

A. "Hi", "Hi", HAPPY, HAPPY

✗ Incorrect

B. "Hi" and HAPPY show at the same time

✗ Incorrect

C. HAPPY, "Hi", HAPPY, "Hi"

✗ Incorrect

D. "Hi", HAPPY, "Hi", HAPPY

✓ Correct

#### Explanation:

All commands inside the loop run in order, then the whole sequence repeats.

### 5. A student wants to create two separate loops that each run 3 times. What is wrong with this code?

MULTIPLE CHOICE

#### Correct Answer:

A. Both loops use the same variable name

✗ Incorrect

B. The range numbers are the same

✗ Incorrect

C. Missing indentation

✗ Incorrect

D. Nothing is wrong with this code

✓ Correct

#### Explanation:

You can reuse the same variable name in separate loops without problems.

## 6. What happens when you put one command inside a loop and one command outside?

MULTIPLE CHOICE

**Correct Answer:**

- A. "Inside" shows 3 times, then "Outside" shows 1 time ✓ Correct
- B. "Inside" and "Outside" both show 3 times ✗ Incorrect
- C. "Outside" shows 3 times, then "Inside" shows 1 time ✗ Incorrect
- D. Only "Inside" shows ✗ Incorrect

### Explanation:

Only indented commands repeat with the loop; unindented commands run once after the loop finishes.

## 7. You need to create a pattern where a STAR icon shows 40 times, then a MOON icon shows 20 times. What code structure should you use?

MULTIPLE CHOICE

**Correct Answer:**

- A. One loop with range(6) ✗ Incorrect
- B. Two separate loops with different range numbers ✓ Correct
- C. One loop with 6 different commands ✗ Incorrect
- D. Two loops with the same range number ✗ Incorrect

## 8. You want to show "Start", then repeat "Go" 30 times, then show "End". How should you organize your code?

MULTIPLE CHOICE

**Correct Answer:**

- A. Put everything inside one loop ✗ Incorrect
- B. Use "Start", then a loop for "Go", then "End" outside any loop ✓ Correct
- C. Use three separate loops ✗ Incorrect
- D. Put "Start" and "End" in one loop, "Go" in another ✗ Incorrect

**Explanation:**

Only the part that needs to repeat should go inside the loop.

**9. Debug the following code:**

DEBUG CODE

**Incorrect Code:**

```
1 for index in range(4)
2     basic.show_string("Hey")
```

**Correct Solution:**

```
1 for index in range(4):
2     basic.show_string("Hey")
```

**Explanation:**

This code is missing a colon.

**10. Debug the following code:**

DEBUG CODE

**Incorrect Code:**

```
1 for index in range4:
2     basic.show_icon(IconNames.HEART)
3     basic.show_icon(IconNames.SMALL_HEART)
```

**Correct Solution:**

```
1 for index in range(4):
2     basic.show_icon(IconNames.HEART)
3     basic.show_icon(IconNames.SMALL_HEART)
```

**Explanation:**

This code is missing parentheses