

Python For Loops

Textbook

Python For Loops

The [for Loop](#) is used for addressing each piece of data in a sequence (a [list](#), [dictionary](#), or [tuple](#)).



Imagine a lunch line. Every person in the lunch line needs to move through the serving area and get their lunch. A loop works similarly. Each item in the list needs to move through the code.

This is how to loop through a list.

```
1 desserts = ["cake", "ice cream", "pie", "brownies"]
2
3 for x in desserts:
4     print(x)
5
```

Try it!

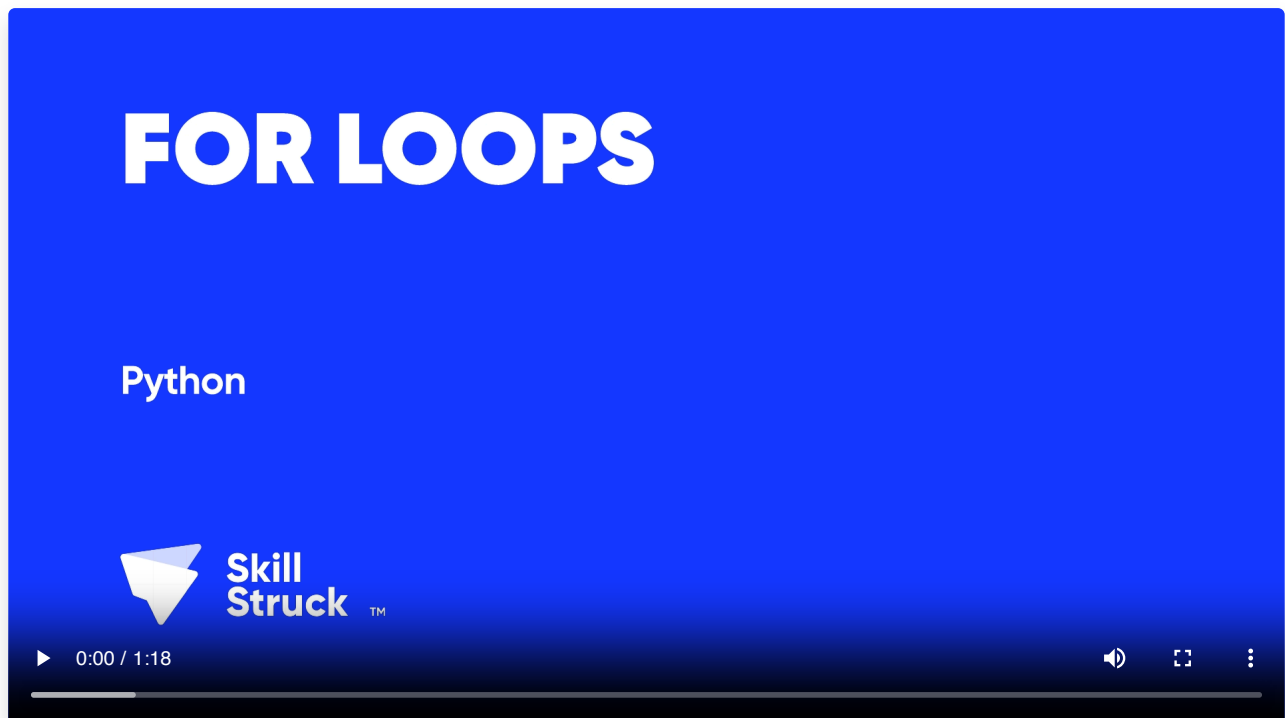
Notice the use of the letter `x`. The `x` is simply a variable representing each item in the list. For each item in the list, you will execute the code indented below the "for" statement. So each item in the list gets to be "x" one at a time. The code indented below in this situation is `print(x)`, which will print each item in the list.

Note: In this course, we will use the letter `x` specifically, but other letters or words could be used. For example, the following code will behave in the exact same way as the example above.

```
1 desserts = ["cake", "ice cream", "pie", "brownies"]
2
3 for item in desserts:
4     print(item)
```

Try it!

Run this code and see what happens! Each of the items in the list named `desserts` gets printed. The print statement inside the loop must be [indented](#).



Inside the Loop

The fun thing about loops is that for each item in the list, you can execute a variety of code inside the loop.

```
1 desserts = ["cake", "ice cream", "pie", "brownies"]
2
3 for x in desserts:
4     print("I love to eat " + x)
5
```

Try it!

See what happens when you run this code!

You can also do math inside a for loop.

```
1 allowance = [ 8, 5, 10, 4, 7]
2 for x in allowance:
3     print(x + 10)
4
```

Try it!

You can run almost any code you want inside of a for loop! This is what makes them so useful!

```
1 allowance = [ 8, 5, 10, 4, 7]
2 for x in allowance:
3     print(x + 2)
4
```

Try it!

For Loops and Range

A for loop can also be very useful when used with the `range()` command. For example:

```
1 for x in range(2, 10):
2     print(x)
```

Try it!

This will print out **2 3 4 5 6 7 8 9** all on separate lines. Notice how it will include the first number in the range but NOT the second number.

If you want to include the second number, add a +1 on the end of the second variable like this.

```
1 for x in range(2, 10 + 1):
2     print(x)
```

Try it!

Try putting just one value inside the parenthesis for `range()`. See what happens!

Play around and see what else loops can do!

Update a Variable Inside a For Loop

You can use a for loop to update a variable.

```
1 total = 0
```

```
2  
3 for x in range(4):  
4     total = total + x  
5  
6 print(total)
```

Try it!

This code will loop 4 times. This is because `range()` goes up to the number inside the parentheses without including the number.

Each time the loop runs, the variable named `total` gets the value of `x` added to it. So if the loop were on its second time running, the value named `total` would increase by 2 since `x` is equal to 2 on that loop.

This code will print out `6`.

LOOP THROUGH A STRING

Python



Skill
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Critical Thinking Questions

1. How does the analogy of a lunch line help explain the concept of a for loop in Python? Can you think of any other real-life scenarios where a similar iterative process occurs, and how might you represent it using a for loop?
2. Consider the code snippet where the range function is used within a for loop. Why is it important to understand the inclusivity of the range values (i.e., the range starts from the first value but excludes the second value)? How might this knowledge be crucial in designing algorithms or solving problems efficiently using for loops?

Checkpoint

Python For Loops

1. Create a list of **4 strings** of the spikiest animals ever and assign it to a list named `animals`.
2. Create a **for loop** that will loop through the list you just created that was named `animals`.
3. With each loop print out the animal string.
4. Concatenate each animal with the string " `is the spikiest animal ever!` " and print your sentences.

Requirements:

- Create a list of 4 different strings and assign it to the variable named `animals` .
- Create a for loop to loop through the list named `animals` .
- Print out each list item inside the for loop and concatenate it with the string `" is the spikiest animal ever!"`

Questions (8)

1. In the code "for x in desserts:" what does the x mean?

MULTIPLE CHOICE

Choose the correct answer:

- A. Literally, the letter x.
- B. It represents each item in the list in turn.
- C. It's adding the letter x to the list.
- D. It's declaring a new variable.

2. Edit the text box below to debug (fix) the code:

DEBUG CODE

Code to Debug:

```
1 hours= [ 8, 5, 10, 4, 7]
2 for x in hours;
3     print(x + 1)
```

3. Edit the text box below to debug (fix) the code:

DEBUG CODE

Code to Debug:

```
1 desserts = ["cake", "ice cream", "pie", "brownies"]
2
3 for x on desserts:
4     print(x)
```

4. True or False: The code to be executed inside the for loop must be indented.

MULTIPLE CHOICE

Choose the correct answer:

- A. True
- B. False

5. What will the following code print out?

```
sports = ["soccer", "basketball", "volleyball"]  
for x in sports: print("I love to play " + x)
```

Choose the correct answer:

- A. I love to play soccer I love to play basketball I love to play volleyball
- B. soccer basketball volleyball
- C. I love to play volleyball I love to play basketball I love to play soccer
- D. x

6. What will the following code print out?

```
windows = [3, 5, 2, 10, 6]  
for x in windows: print(x * 2)
```

Choose the correct answer:

- A. 6 10 4 20 12
- B. 3 5 2 10 6
- C. 5 7 4 12 8
- D. x x x x x

7. True or False: The only code allowed inside a for loop are print statements.**Choose the correct answer:**

- A. True
- B. False

8. How many times will a for loop run when running through a list?**Choose the correct answer:**

- A. As many times as the list has items.
- B. One time more than the list has items.
- C. Once
- D. Twice

Challenges (3)

1. Automatic Numbers

Write a program that takes **two integers** (var1 and var2) as input.

Print all the numbers from var1 to var2.

Include both var1 and var2.

Inputs: 3 , 7

Output: 3 4 5 6 7

Another example:

Inputs: 15 , 20

Output: 15 16 17 18 19 20

Note: Make sure var1 < var2

Hint: Use `range()` for this challenge.

2. Add the Numbers

Create a program that will calculate the sum of the numbers in a given range. Add the two chosen numbers and all the numbers in between.

1. The program will ask for **2 inputs**. The first input will be the first number in a range. The second input will be the second number in a range.
2. The program will then add all the numbers between the two numbers (the range) together and print the total. It will also add the beginning and end number.

Hint: Create a variable and assign it to 0 before starting the for loop. Then, inside the for loop, update what the variable is by adding each number to it.

For example:

Inputs: 4 , 8

Output: 30

Another example:

Inputs: 5 , 10

Output: 45

Hint: remember that to add all the numbers within a given range, use a for-loop:

```
for x in range() :
```

A reminder that you can update the value of a variable. Don't forget to indent the code inside the for loop!

Do not use the sum function. You can use addition, but not the function named `sum` .

3. Factorial

Write a program that prints the product of the factorial of the input.

Create a program that takes in a number for an input. The program will then multiply all the whole numbers counting up to that number.

As a reminder, the factorial of 4 is $1 * 2 * 3 * 4$ which equals 24.

For example:

Input: 4

Output: 24

Another example:

Input: 6

Output: 720

Hint, as you go through a loop, you can reassign the same variable with new values each time you loop. For this scenario, you would create a variable and multiply it by each number leading up to the inputted number.

Remember, the range goes up to a number but doesn't include the number, so you might need to add one to your range number to include the inputted number.

Answer Keys & Solutions

Checkpoint Solutions

Python For Loops

```
1 animals = ["hedgehog", "porcupine", "lizard", "urchin"]
2
3 for x in animals:
4     print(x + " is the spikiest animal ever!")
```

Questions

1. In the code "for x in desserts:" what does the x mean?

MULTIPLE CHOICE

Correct Answer:

- A. Literally, the letter x. ✗ Incorrect
- B. It represents each item in the list in turn. ✓ Correct
- C. It's adding the letter x to the list. ✗ Incorrect
- D. It's declaring a new variable. ✗ Incorrect

Explanation:

The x is a different value each time the loop runs.

2. Edit the text box below to debug (fix) the code:

DEBUG CODE

Incorrect Code:

```
1 hours= [ 8, 5, 10, 4, 7]
2 for x in hours;
3     print(x + 1)
```

Correct Solution:

```
1 hours= [ 8, 5, 10, 4, 7]
2 for x in hours:
3     print(x + 1)
```

Explanation:

The semicolon needs to be something else.

3. Edit the text box below to debug (fix) the code:

DEBUG CODE

Incorrect Code:

```
1 desserts = ["cake", "ice cream", "pie", "brownies"]
2
3 for x on desserts:
4     print(x)
```

Correct Solution:

```
1 desserts = ["cake", "ice cream", "pie", "brownies"]
2
3 for x in desserts:
4     print(x)
```

Explanation:

There's a spelling error.

4. True or False: The code to be executed inside the for loop must be indented.

MULTIPLE CHOICE

Correct Answer:

- A. True ✓ Correct
- B. False ✗ Incorrect

Explanation:

Indentation matters in Python.

5. What will the following code print out?

MULTIPLE CHOICE

Correct Answer:

- A. I love to play soccer I love to play basketball I love to play volleyball ✓ Correct
- B. soccer basketball volleyball ✗ Incorrect
- C. I love to play volleyball I love to play basketball I love to play soccer ✗ Incorrect

D. x

✗ Incorrect

Explanation:

The for loop will print the sentence with each variable in order.

6. What will the following code print out?

MULTIPLE CHOICE

Correct Answer:

A. 6 10 4 20 12

✓ Correct

B. 3 5 2 10 6

✗ Incorrect

C. 5 7 4 12 8

✗ Incorrect

D. x x x x x

✗ Incorrect

Explanation:

The for loop will do the math with each variable in the list in turn.

7. True or False: The only code allowed inside a for loop are print statements.

MULTIPLE CHOICE

Correct Answer:

A. True

✗ Incorrect

B. False

✓ Correct

Explanation:

For loops are useful because the programmer can put all kinds of code inside the for loop.

8. How many times will a for loop run when running through a list?

MULTIPLE CHOICE

Correct Answer:

A. As many times as the list has items.

✓ Correct

B. One time more than the list has items.

✗ Incorrect

C. Once

✗ Incorrect

D. Twice

✗ Incorrect

Explanation:

The for loop will run through the list.

Challenges

1. Automatic Numbers

Solution:

```
1 first = int(input("Pick a number"))
2 second = int(input("Pick another number"))
3
4 for x in range(first, second+1):
5     print(x)
```

2. Add the Numbers

Solution:

```
1 first = int(input("First number in your range"))
2 second = int(input("Second number in your range"))
3
4 total = 0
5
6 for x in range(first, second):
7     total = total + x
8
9 print(total + second)
```

3. Factorial

Solution:

```
1 number = int(input("Enter a number"))
2
3 total = 1
4
5 for x in range(1, number + 1):
6     total = total * x
7 print(total)
```