

## Topic 1: For Loops in Python

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### ◆ Definition

A **for loop** in Python is used to iterate (loop) over a sequence — such as a list, tuple, dictionary, set, or string — and execute a block of code repeatedly for each element in that sequence.

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### ◆ Terminologies

- **Iteration:** Each time the loop runs once.
  - **Iterable:** Any object that can return its elements one at a time (like a list or string).
  - **Loop variable:** The variable that represents the current element in each iteration.
  - **Range():** A built-in function often used to generate a sequence of numbers for looping.
  - **Loop body:** The block of code inside the loop that gets executed each time.
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### ◆ Explanation

When you use a for loop, Python automatically goes through every item in a sequence. It assigns each item to a variable, then executes your block of code. After finishing the last element, the loop stops automatically.

We use for loops when:

- We know how many times we want to run a block of code.
  - We need to process each item in a list, tuple, or string.
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### ◆ Examples + Outputs

#### Example 1

```
fruits = ["apple", "banana", "cherry"]
```

```
for fruit in fruits:
```

```
    print(fruit)
```

**Output:**

apple

banana

cherry

**Example 2**

Using range():

```
for i in range(5):
```

```
    print("Iteration:", i)
```

**Output:**

Iteration: 0

Iteration: 1

Iteration: 2

Iteration: 3

Iteration: 4

**Example 3**

Using for loop with strings:

```
for letter in "Python":
```

```
    print(letter)
```

**Output:**

P

y

t

h

o

n

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#### ◆ Benefits of Using For Loops

- ✓ Simple and readable syntax.
  - ✓ Reduces repetition — no need to manually increase counters.
  - ✓ Works directly with any iterable (lists, tuples, sets, strings, etc.).
  - ✓ Helps automate repetitive tasks efficiently.
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#### ◆ 20 Challenges (Practice Problems)

##### ✓ Solved Challenge 1

**Question:** Print all even numbers between 1 and 10.

```
for i in range(1, 11):
```

```
    if i % 2 == 0:
```

```
        print(i)
```

**Output:**

2

4

6

8

10

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##### ✓ Solved Challenge 2

**Question:** Print each character in the word “developer” in uppercase.

```
for ch in "developer":
```

```
    print(ch.upper())
```

**Output:**

D

E

V

E

L

O

P

E

R

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◆ **Your 18 Challenges (for practice)**

1. Print numbers from 10 to 1 in reverse order.
2. Print all odd numbers between 1 and 20.
3. Loop through a list of your 5 favorite foods and print them.
4. Print the square of numbers from 1 to 10.
5. Count how many vowels exist in the word “programming”.
6. Print all numbers between 1 and 50 that are divisible by 5.
7. Print each element of a list on the same line separated by spaces.
8. Use a for loop to sum all numbers from 1 to 100.
9. Create a list of 5 colors and print “Color: \_\_\_” for each.
10. Print each character of “Tkinter” except vowels.
11. Print multiplication table of 3 (3×1 to 3×10).
12. Loop through a string and print the index + letter.
13. Find the factorial of a number using for loop.
14. Print all elements in a tuple of numbers.
15. Print characters of “PYTHON” in reverse order.
16. Print the cubes of numbers from 1 to 10.
17. Print all elements in a list that are greater than 50.

18. Write a for loop that prints every second letter in “challenges”.