

# VARIABLES AND DATA TYPES

Course: Python Programming

Section: Python Basics

Topic: Variables and Data Types

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## What You Will Learn

- What variables are and why they are used
  - How Python stores data in variables
  - Common data types in Python
  - Dynamic typing in Python
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## 1. What is a Variable?

A **variable** is a name that refers to a value stored in memory.

It allows a program to store data and use it later.

In Python, variables are created when a value is assigned to them.

Example (conceptual):

```
x stores the value 10  
name stores the value "Python"
```

Variables make programs flexible and reusable.

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## 2. Why Variables Are Important

Variables are important because they:

- Store information that can be reused
- Make programs easier to read and understand

- Allow programs to work with different data
- Help perform calculations and decision-making

Without variables, programs would only work with fixed values.

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### 3. Data Types in Python

A **data type** defines the type of value a variable holds.

Python automatically assigns a data type based on the value given.

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#### ◆ Integer ( `int` )

- Stores whole numbers
- Examples: `10` , `5` , `0`

Used for counting and calculations.

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#### ◆ Floating Point ( `float` )

- Stores decimal numbers
- Examples: `3.14` , `5.0` , `2.75`

Used when precision is required.

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#### ◆ String ( `str` )

- Stores text data
- Written inside single or double quotes
- Examples: `"Python"` , `'Hello'`

Used for names, messages, and text processing.

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#### ◆ Boolean ( `bool` )

- Stores logical values
- Possible values: `True` or `False`

Used in conditions and decision making.

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## 4. Dynamic Typing in Python

Python uses **dynamic typing**, which means:

- You do not need to declare the data type of a variable
- Python automatically decides the type based on the value

Example:

```
x = 10      → x is an integer  
x = "Hello" → x becomes a string
```

The same variable can store different types of values at different times.

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## 5. Checking the Data Type

Python provides a way to check the data type of a variable.

Concept:

- A built-in function can be used to identify the data type

This helps in debugging and understanding program behavior.

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## 6. Rules for Naming Variables

Python variable names must follow these rules:

- Must start with a letter or underscore
- Cannot start with a number
- Can contain letters, numbers, and underscores
- Cannot use Python keywords

Good variable names improve code readability.

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## 7. Common Mistakes with Variables

Beginners often make these mistakes:

- Using unclear variable names
- Forgetting that input values are strings
- Mixing data types incorrectly
- Assuming Python will always convert values automatically

Understanding data types helps avoid logical errors.

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## Summary

- Variables store data in memory
- Python automatically assigns data types
- Common data types include int, float, str, and bool
- Python supports dynamic typing
- Proper variable usage is essential for clean code